December 18, 2020

Mr. Edward Wiegman
Southern California Gas Company
PO Box 818
Goleta, CA 93116-0818

FID: 01734
Permit: P7R 09584 R7
SSID: 05019

Re: Part 70 Permit Renewal / Reevaluation Application 09584 R7

Dear Mr. Wiegman:

On December 17, 2020, the Santa Barbara County Air Pollution Control District (District) determined that your application for Part 70 Permit Renewal / Reevaluation (PT-70/Reeval) No. 09584 R7 for the SoCalGas La Goleta facility was complete. The District will make a decision to either issue or deny a permit for the application within 180 days from the completeness date or 180 days after lead agency approval of the project, whichever time period is longer.

Please be advised that proceeding with the construction of your project without an PT-70/Reeval permit violates District Rule 201 and may result in penalties.

Please include the Facility Identification (FID) and Permit numbers shown above on all correspondence regarding this permit application. If you have any questions, please call me at (805) 961-8888.

Sincerely,

William Sarraf, Division Supervisor
Engineering Division

cc: La Goleta 01734 Project File
Mr. Andrew Longworth
Engr Chron File

\\sbcapcd.org\shares\Groups\ENGR\WP\Oil&Gas\Major Sources\SSID 05019 So Cal Gas - La Goleta\Reevals\PTO 9584-R7\PT-70-Reeval 09584 R7 - ATC Completeness - 12-17-2020

Print Form

air pollution control district
SANTA BARBARA COUNTY
apcd

General Permit Application Form -01

Santa Barbara County Air Pollution Control District
260 N. San Antonio Road, Suite A
Santa Barbara, CA 93110-1315

1. APPLICATION TYPE (check all that apply):

- ☐ Authority to Construct (ATC)
- ☐ Permit to Operate (PTO)
- ☐ ATC Modification
- ☐ PTO Modification
- ☒ Other (Specify) Title V Renewal
- ☐ Transfer of Owner/Operator (use Form -01T)
- ☐ Emission Reduction Credits
- ☐ Increase in Production Rate or Throughput
- ☐ Decrease in Production Rate or Throughput

Previous ATC/PTO Number (if known) 9584-R6

◉ Yes ○ No Are Title 5 Minor Modification Forms Attached? (this applies to Title 5 sources only and applies to all application types except ATCs and Emission Reduction Credits). Complete Title 5 Form -1302 A1/A2, B, and M. Complete Title 5 Form -1302 C1/C2, D1/D2, E1/E2, F1/F2, G1/G2 as appropriate. http://www.ourair.org/wp-content/uploads/t5-forms.pdf

Mail the completed application to the APCD's Engineering Division at the address listed above.

2. FILING FEE:

A $420 application filing fee must be included with each application. The application filing fee is COLA-adjusted every July 1st. Please ensure you are remitting the correct current fee (the current fee schedule is available on the APCD's webpage at: http://www.ourair.org/district-fees). This filing fee will not be refunded or applied to any subsequent application. Payment may also be made by credit card by using the Credit Card Authorization Form at the end of this application.

3. IS YOUR PROJECT'S PROPERTY BOUNDARY LOCATED OR PROPOSED TO BE LOCATED WITHIN 1,000 FEET FROM THE OUTER BOUNDARY OF A SCHOOL? If yes, and the project results in an emissions increase, submit a completed Form -03 (*School Summary Form*) http://www.ourair.org/wp-content/uploads/apcd-03.pdf ○ Yes ◉ No

If yes, provide the name of school(s)

Address of school(s)

City | Zip Code

4. DOES YOUR APPLICATION CONTAIN CONFIDENTIAL INFORMATION? ○ Yes ◉ No

If yes, please submit with a redacted duplicate application which shall be a public document. In order to be protected from disclosure to the public, all information claimed as confidential shall be submitted in accordance with APCD Policy & Procedure 6100-020 (*Handling of Confidential Information*): http://www.ourair.org/wp-content/uploads/6100-020.pdf, and meet the criteria of CA Govt Code Sec 6254.7. Failure to follow required procedures for submitting confidential information, or to declare it as confidential at the time of application, shall be deemed a waiver by the applicant of the right to protect such information from public disclosure. *Note: Part 70 permit applications may contain confidential information in accordance with the above procedures, however, the content of the permit documents must be public (no redactions).*

FOR APCD USE ONLY				DATE STAMP
FID	01734	Permit No.	PT-70/Reeval 09584-R7	RECEIVED OCT 30 2020 SBCAPCD
Project Name	La Goleta			
Filing Fee	$420 CK # 2101449 So Cal Gas	202.E? YES / NO		

5. COMPANY/CONTACT INFORMATION:

Owner Info	(◉) Yes ( ) No	Use as Billing Contact?
Company Name	Southern California Gas Company	
Doing Business As		
Contact Name	Andrew Longworth	Position/Title: Principal Environmental Specialist
Mailing Address	PO Box 818	
City	Goleta	State: CA / Zip Code: 93116-0818
Telephone	805-681-8072	Cell: (805) 617-5501 / Email: alongworth@socalgas.com

Operator Info	( ) Yes (◉) No	Use as Billing Contact?
Company Name	Southern California Gas Company	
Doing Business As		
Contact Name	Edward Wiegman	Position/Title: Storage Operations Manager
Mailing Address	PO Box 818	
City	Goleta	State: CA / Zip Code: 93116-0818
Telephone	805-681-8068	Cell: (805) 551-2689 / Email: EWiegman@socalgas.com

Authorized Agent Info*	( ) Yes (◉) No	Use as Billing Contact?
Company Name		
Doing Business As		
Contact Name		Position/Title:
Mailing Address		
City		State: / Zip Code:
Telephone		Cell: / Email:

*Use this section if the application is not submitted by the owner/operator. Complete APCD Form -01A (http://www.ourair.org/wp-content/uploads/apcd-01a.pdf). Owner/Operator information above is still required.

SEND PERMITTING CORRESPONDENCE TO *(check all that apply)*:

- [x] Owner
- [x] Operator
- [ ] Authorized Agent
- [ ] Other (attach mailing information)

6. GENERAL NATURE OF BUSINESS OR AGENCY:

Gas utility.

7. EQUIPMENT LOCATION (Address):

Specify the street address of the proposed or actual equipment location. If the location does not have a designated address, please specify the location by cross streets, or lease name, UTM coordinates, or township, range, and section.

Equipment Address	1171 More Ranch Road
City	Santa Barbara
State	CA
Zip Code	93111
Work Site Phone	+1 (805) 681-8068

○ Incorporated (within city limits) ◉ Unincorporated (outside city limits) ○ Used at Various Locations

Assessors Parcel No(s):

8. PROJECT DESCRIPTION:

(Describe the equipment to be constructed, modified and/or operated or the desired change in the existing permit. Attach a separate page if needed):

Title V renewal application

9. DO YOU REQUIRE A LAND USE PERMIT OR OTHER LEAD AGENCY PERMIT FOR THE PROJECT DESCRIBED IN THIS APPLICATION?: ○ Yes ◉ No

A. If yes, please provide the following information

Agency Name	Permit #	Phone #	Permit Date

* The lead agency is the public agency that has the principal discretionary authority to approve a project. The lead agency is responsible for determining whether the project will have a significant effect on the environment and determines what environmental review and environmental document will be necessary. The lead agency will normally be a city or county planning agency or similar, rather than the Air Pollution Control District.

B. If yes, has the lead agency permit application been deemed complete and is a copy of their completeness letter attached?

○ Yes ○ No

Please note that the APCD will not deem your application complete until the lead agency application is deemed complete.

C. If the lead agency permit application has not been deemed complete, please explain.

D. A copy of the final lead agency permit or other discretionary approval by the lead agency may be requested by the APCD as part of our completeness review process.

10. PROJECT STATUS:

A. Date of Equipment Installation: Not applicable

B. Have you been issued a Notice of Violation (NOV) for not obtaining a permit for this equipment/modification *and/or* have you installed this equipment without the required APCD permit(s)? If yes, the application filing is double per Rule 210. ○ Yes ◉ No

C. Is this application being submitted due to the loss of a Rule 202 exemption? ○ Yes ◉ No

D. Will this project be constructed in multiple phases? If yes, attach a separate description of the nature and extent of each project phase, including the associated timing, equipment and emissions. ○ Yes ◉ No

E. Is this application also for a change of owner/operator? If yes, please also include a completed APCD Form -01T. ○ Yes ◉ No

11. APPLICANT/PREPARER STATEMENT:

The person who prepares the application also must sign the permit application. The preparer may be an employee of the owner/operator or an authorized agent (contractor/consultant) working on behalf of the owner/operator (an *Authorized Agent Form -01A* is required).

I certify pursuant to H&SC Section 42303.5 that all information contained herein and information submitted with this application is true and correct.

Kari Anderson for	10/23/20
Signature of application preparer	Date
Andrew Longworth	Southern California Gas Company
Print name of application preparer	Employer name

12. APPLICATION CHECKLIST (*check all that apply*)

☒ Application Filing Fee (Fee = $420. The application filing fee is COLA adjusted every July 1st. Please ensure you are remitting the current fee.) As a convenience to applicants, the APCD will accept credit card payments. If you wish to use this payment option, please complete the attached *Credit Card Authorization Form* and submit it with your application.

☐ Existing permitted sources may request that the filing fee be deducted from their current reimbursable deposits by checking this box. Please deduct the filing fee from my existing reimbursement account.

☐ Form -01T (*Transfer of Owner/Operator*) attached if this application also addresses a change in owner and/or operator status from what is listed on the current permit. http://www.ourair.org/wp-content/uploads/apcd-01t.pdf

☐ Form -03 (*School Summary Form*) attached if the project's property boundary is within 1,000 feet of the outer boundary of a school (k-12) and the project results in an emissions increase. http://www.ourair.org/wp-content/uploads/apcd-03.pdf

☐ Information required by the APCD for processing the application as identified in APCD Rule 204 (*Applications*), the APCD's *General APCD Information Requirements List* (http://www.sbcapcd.org/eng/dl/other/gen-info.pdf), and any of the APCD's Process/Equipment Summary Forms (http://www.ourair.org/permit-applications) that apply to the project.

☐ Form -01A (*Authorized Agent Form*) attached if this application was prepared by and/or if correspondence is requested to be sent to an Authorized Agent (e.g., contractor or consultant). This form must accompany each application. http://www.ourair.org/wp-content/uploads/apcd-01a.pdf

☐ Confidential Information submitted according to APCD Policy & Procedure 6100-020. (*Failure to follow Policy and Procedure 6100-020 is a waiver of right to claim information as confidential.*)

13. NOTICE OF CERTIFICATION:

All applicants must complete the following Notice of Certification. This certification must be signed by the Authorized Company Representative representing the owner/operator. Signatures by Authorized Agents will not be accepted.

NOTICE of CERTIFICATION

I, Ed Wiegman, am employed by or represent

Type or Print Name of Authorized Company Representative

Southern California Gas Company

Type or Print Name of Business, Corporation, Company, Individual, or Agency

(hereinafter referred to as the applicant), and certify pursuant to H&SC Section 42303.5 that all information contained herein and information submitted with this application is true and correct and the equipment listed herein complies or can be expected to comply with said rules and regulations when operated in the manner and under the circumstances proposed. If the project fees are required to be funded by the cost reimbursement basis, as the responsible person, I agree that I will pay the Santa Barbara County Air Pollution Control District the actual recorded cost, plus administrative cost, incurred by the APCD in the processing of the application within 30 days of the billing date. If I withdraw my application, I further understand that I shall inform the APCD in writing and I will be charged for all costs incurred through closure of the APCD files on the project.

For applications submitted for Authority to Construct, modifications to existing Authority to Construct, and Authority to Construct/Permit to Operate permits, I hereby certify that all major stationary sources in the state and all stationary sources in the air basin which are owned or operated by the applicant, or by an entity controlling, controlled by, or under common control with the applicant, are in compliance, or are on approved schedule for compliance with all applicable emission limitations and standards under the Clean Air Act (42 USC 7401 *et seq.*) and all applicable emission limitations and standards which are part of the State Implementation Plan approved by the Environmental Protection Agency.

Completed By: Edward Wiegman

Title: Storage Operations Manager

Date: 10/21/2020

Phone: (805) 681-8068

Signature of Authorized Company Representative: E A Wiegman

PLEASE NOTE THAT FAILURE TO COMPLETELY PROVIDE ALL REQUIRED INFORMATION OR FEES WILL RESULT IN YOUR APPLICATION BEING RETURNED OR DEEMED INCOMPLETE.

RECEIVED
OCT 30 2020
SBCAPCD

Andrew Longworth
Principal Environmental Specialist

1171 More Ranch Road
Goleta, CA, 93111

Mailing Address
PO Box 818 Goleta, CA 93116
tel: 805 681 8072
cell: 805 617 5501
email: alongworth@semprautilities.com

September 29, 2020

Mr. William Sarraf
Santa Barbara County
Air Pollution Control District
260 North San Antonio Road, Suite A
Santa Barbara, CA 93110-1315

Subject: Title V Renewal Package for La Goleta Facility (FID: 01734; SSID: 05019)

Dear Mr. Sarraf:

Title V Permit No. 9584-R6 was issued for the Southern California Gas Company's La Goleta facility in May 2018. Santa Barbara County Air Pollution Control District Rule 1304 requires that a Title V renewal application be submitted no later than two years and six months after the issuance date. The enclosed Title V renewal package has been prepared for the La Goleta facility to comply with Regulation XIII requirements.

The package is comprised of the Title V forms and a proposed Title V permit including changes made in underline and strikethrough format.

The proposed updates incorporated into the renewal package are summarized in the table below.

Requested Permit Updates

Item	Permit Section	Action
1	1.5, 4.2.1, 7.4, 9.C.1.b.Viii	Update to remove references to SoCalGas providing ERCs to the Point Arguello project.
2	4.2.1	List correct CO emission factor for Ingersoll-Rand engines, 3.825 lb/MMBtu. Refer to CO emission factor value in Attachment 10.1 of the permit.
3	9.C.6	Update Table C.6 to include updated component leak-path information from Quarter 2, 2020 audit.
4	9.C.16	Update documents incorporated by reference to include the 2020 version of Processed Gas Flow Measurement Plan, which has been updated to include the most recent fuel meter serial numbers.

Item	Permit Section	Action
5	9.C.16	Update documents incorporated by reference to include the 2020 version of Process Monitor Calibration and Maintenance Plan, which was updated to include maximum oxygen sensor hours to match values listed in the facility IC Engine Inspection and Maintenance Plan.
6	9.C.16	Update documents incorporated by reference to include the 2014 version of Compliance Assurance Monitoring (CAM) Plan.
7	9.D.14	Update Table 9.D.14. to include updated component leak-path information from Quarter 2, 2020 audit.
8	9.D.15	Remove requirements for continuous bleed natural gas-powered pneumatic devices. Section 9.D.15 currently lists three (3) continuous bleed pneumatic devices; these devices have been removed and de-registered.
9	Table 5.1-1A, Table 5.1-2A, Table 5.1-3A, Table 5.1-4A	Update equipment category for Device Nos. 001199-001205 to Internal Combustion Engine – NOx Controlled. Update equipment category for Device No. 001206 to Internal Combustion Engine – Uncontrolled.
10	Table 5.1-1A, Table 5.1-2A, Table 5.1-3A, Table 5.1-4A	Update Gas Compressor Engine #9: Cooper-Bessemer GMV-10C from Device No. 001209 to 001206.
11	Table 5.1-1B, Table 5.1-2B, Table 5.1-3B, Table 5.1-4B	In accordance with Draft PTO 15298, update Rule 361 emission factors for Emission Unit ID 001214 and remove Emission Unit ID 107535, which is replaced by exempt Emission Unit ID 394789.
12	Table 5.1-1B, Table 5.1-2B, Table 5.1-3B, Table 5.1-4B	Update to include updated component leak-path information from Quarter 2, 2020 audit.
13	Table 5.4-1A	Update equipment category for Device Nos. 001199-001205 to Internal Combustion Engine – NOx Controlled. Update equipment category for Device No. 001206 to Internal Combustion Engine – Uncontrolled.
14	Table 5.4-1B	In accordance with Draft PTO 15298, remove Emission Unit ID 107535, which is replaced by exempt Emission Unit ID 394789.
15	10.5	Update equipment list to include updated component leak-path information from Quarter 2, 2020 audit.
16	10.5	Update equipment list with new catalyst serial numbers for devices 110815, 110816, 110817, 110818, 110819 and 110820.

Item	Permit Section	Action
17	10.5	Update equipment list with revisions from Draft PTO, 2020, by replacing Hot Oil Heater #2 (Emission Unit ID 107535) with new permit exempt unit (Emission Unit ID 394789).

Fees in the amount of $458.00 for the Title V permit renewal are enclosed. Please contact myself or Edward Wiegman (805.681.8068) if there are any questions or need for additional information.

Sincerely,

Andrew Longworth
Principal Environmental Specialist

Attachments: Title V Renewal Application with Appendices
Check for Application Fee

cc: K. Fickerson
E. Wiegman

Title V Operating Permit Renewal Application

Southern California Gas Company

La Goleta Facility

1171 More Road
Goleta, CA 93117

September 2020

Prepared by:

Yorke ENGINEERING, LLC
www.YorkeEngr.com

Office Locations:
Los Angeles, Orange County, Riverside, Ventura,
San Diego, Fresno, Berkeley, San Jose, Bakersfield

Tel: (949) 248-8490
Fax: (949) 248-8499

Title V Operating Permit Renewal Application

Prepared for:

Southern California Gas Company
La Goleta Facility
1171 More Road
Goleta, CA 93117

September 2020

Table of Contents

List of Tables

Appendices

List of Acronyms and Abbreviations

AFRC	Air/Fuel Ratio Controller
AOS	Alternative Operating Scenario
ATC	Authority to Construct
bhp	Brake Horsepower
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CVR	Compliance Verification Report
EPA	[United States] Environmental Protection Agency
FID	Facility Identification Number
HAP	Hazardous Air Pollutant
IC	Internal Combustion
NSCR	Non-Selective Catalytic Reduction
NO_x	Oxides of Nitrogen
PM_{10}	Particulate Matter Less Than 10 Microns in Size
PTE	Potential to Emit
PTO	Permit to Operate
PUC	Public Utilities Commission
ROC	Reactive Organic Compound
SBCAPCD	Santa Barbara County Air Pollution Control District
scf	Standard Cubic Feet
SIC	Standard Industrial Classification
SO_x	Oxides of Sulfur
SSID	Stationary Source Identification Number
TPY	Tons per Year
VOC	Volatile Organic Compound

Title V Operating Permit Renewal Application

1.0 INTRODUCTION

1.1 Application Overview

This application is submitted by Southern California Gas Company (SoCalGas) for the Title V permit renewal for its La Goleta facility.

The facility is subject to Title V permit requirements because it is a major source of oxides of nitrogen (NO_x), reactive organic compounds (ROCs), and carbon monoxide (CO).

This application is submitted in accordance with the requirements for a 3-year Title V Permit renewal. This application contains the information required by the Code of Federal Regulations (CFR) Title 40 Section 70.5(c) and Santa Barbara County Air Pollution Control District (SBCAPCD) Title V permit renewal requirements per Rule 1302.

The application forms required for permit renewal are provided in Appendix A. Additional supporting documentation, including copies of the current Title V permit, is provided in the remaining appendices.

1.2 Facility Contact Information

Facility contact information is provided in Table 1-1.

Table 1-1: Facility Contact Information

Applicant's Name:	Southern California Gas Company – La Goleta Facility
Applicant Contact Information:	Andrew Longworth Principal Environmental Specialist Phone: (805) 681-8072 E-mail: ALongworth@socalgas.com
Applicant Responsible Official Information:	Edward Wiegman Storage Operations Manager Phone: (805) 681-8068 E-mail: EWiegman@socalgas.com
Mailing Address:	P.O. Box 818 Goleta, CA 93116
Equipment Location:	1171 More Road Goleta, CA 93117

2.0 APPLICATION REQUIREMENTS

The application requirements as specified in SBCAPCD Rule 1302 are presented in this section.

2.1 Source Identification Information

Source identification information is required by Rule 1302(D)(1)(a). The La Goleta Station is owned and operated by SoCalGas. The source (Facility ID 1734) includes natural gas compressors, a dehydration plant, ancillary equipment, and an underground natural gas storage reservoir. It is located in the Southern Zone of Santa Barbara County with a street address of 1171 More Road, Goleta, CA 93117.

The La Goleta facility was constructed in the 1940s. It consists of 21 underground gas storage wells; a dehydration plant consisting of a tank farm, odorization equipment, methanol storage tank, and external combustion equipment, including flares; and a number of gas-fired internal combustion (IC) engines driving natural gas compressors and pumps. The La Goleta facility is permitted to withdraw natural gas from its underground storage at the rate of 680 million standard cubic feet (MMscf) per day, while its hydrocarbon (HC) liquid production is restricted to 125,000 gallons per year.

Natural gas of public utilities commission (PUC) quality is compressed, cooled, and stored in an underground depleted gas reservoir. During heavy demand, the gas is withdrawn from the reservoir, separated from sand/moisture, dehydrated, odorized, and routed to pipelines.

2.2 Standard Industrial Classification

The facility four-digit Standard Industrial Classification (SIC) code, stationary source identification number (SSID), and facility identification number (FID), as required by Rule 1302(D)(1)(b), are listed in Table 2-1.

Table 2-1: SIC Code, SSID, and FID

SIC Code:	4922
SSID:	005019
FID:	1734

2.3 Identification and Description of all Sources of Emissions

All points of emissions are identified and described in Table 2-2, as required by Rule 1302(D)(1)(c).

Table 2-2: Source Identification

Device ID #	Description	Equipment Category
001199	Gas Compressor #2: Ingersoll-Rand LVG-82	Internal Combustion Engine - Controlled
001200	Gas Compressor #3: Ingersoll-Rand LVG-82	Internal Combustion Engine - Controlled
001201	Gas Compressor #4: Ingersoll-Rand LVG-82	Internal Combustion Engine - Controlled
001202	Gas Compressor #5: Ingersoll-Rand LVG-82	Internal Combustion Engine - Controlled
001203	Gas Compressor #6: Ingersoll-Rand KVG-62	Internal Combustion Engine - Controlled
001204	Gas Compressor #7: Ingersoll-Rand KVG-62	Internal Combustion Engine - Controlled

Device ID #	Description	Equipment Category
001205	Gas Compressor #8: Ingersoll-Rand KVG-62	Internal Combustion Engine - Controlled
001206	Gas Compressor #9: Ingersoll-Rand GMV-10C	Internal Combustion Engine - Controlled
107543	Micro-turbine Generator, #1 Capstone C60	Micro-turbine Generator
107544	Micro-turbine Generator #2 Capstone C60	Micro-turbine Generator
107545	Micro-turbine Generator #3 Capstone C60	Micro-turbine Generator
107546	Micro-turbine Generator #4 Capstone C60	Micro-turbine Generator
008666	E/S Diesel Firewater Pump #12A: Cummins V-378F2	Emergency Fire Pump
008668	E/S Diesel Firewater Pump #13A: Cummins V-378F2	Emergency Fire Pump
001221	Air Compressor #4A: Waukesha VRG220U	Internal Combustion Engine – Permit Exempt
001222	Air Compressor #5A: Waukesha VRG220U	Internal Combustion Engine – Permit Exempt
001215	Flare #3 (Tank Farm)	External Combustion
001212	Flare #2 (Plant #14)	External Combustion
001211	Flare #1 (Plant #14)	External Combustion
001214	Hot Oil Heater #1	External Combustion
394789	Hot Oil Heater #2	External Combustion – Permit Exempt
113985	Heater #1	External Combustion
113987	Heater #2	External Combustion
001219	Flotation Cell #1	HC Liquid Storage Tank
001220	Flotation Cell #2	HC Liquid Storage Tank
001217	Liquid Hydrocarbon Storage Tank	HC Liquid Storage Tank
008669	Grade Level Loading Station	Loading Station
100882	Valves – Accessible	Fugitive Components
100883	Connections – Accessible	Fugitive Components
100886	Pressure Relief Devices – Uncontrolled	Fugitive Components
100885	Compressor Seals – Accessible	Fugitive Components
100884	Pump Seals – Accessible	Fugitive Components
100903	Gas Stacks/Vents	Emissions (Venting)
100873	Flash-tank Unit	Gas/Glycol Contactors
008680	Solvent Process Operations	Solvent Usage

2.4 Emission-Related Information

As required by Rule 1302(D)(1)(d), the facility criteria pollutant emissions (potential to emit [PTE] basis) are shown in Table 2-3. Criteria pollutant emissions were calculated using the permitted emission factors and throughputs from the current version of the permit, with some updates. These updates include modifications proposed by Draft PTO 15298, issued May 28, 2020, which provides revised SBCAPCD Rule 361 NOx and CO emission factors for Emission Unit 001214 and de-permits Emission Unit 107535. These updates also include fugitive emission calculations using the most recent fugitive emission component counts as described in Section 2.10 and Appendix C of this application.

Table 2-3: Criteria Pollutant PTE

Equipment Category	NO_x (TPY)	ROC (TPY)	CO (TPY)	SO_x (TPY)	PM_{10} (TPY)
Combustion – IC Engines	101.66	182.87	1,313.80	3.7	5.41
Combustion – External	3.20	0.33	11.48	1.44	0.48
HC Liquid Storage Tanks	–	0.11	–	–	–
Loading Station	–	0.17	–	–	–
Fugitive Components	–	0	–	–	–
Venting	–	33.95	–	–	–
Glycol Unit	–	9.51	–	–	–
Solvent Usage	–	0.4	–	–	–
Total	**104.86**	**227.34**	**1,325.28**	**5.14**	**5.89**

Hazardous air pollutant (HAP) emissions, which were reproduced from the facility permit using permit emission factors and throughput rates, are shown in Table 2-4.

Table 2-4: Hazardous Air Pollutant PTE

Pollutant	IC Engines (TPY)	Other Sources (TPY)	Total (TPY)
Acetaldehyde	6.44E-01	1.03E-03	6.45E-01
Acrolein	1.39	3.09E-04	1.39
Benzene	7.79E-02	1.78E-01	2.56E-01
1, 3-Butadiene	2.94E-03	–	2.94E-03
Carbon tetrachloride	7.75E-05	–	7.75E-05
Chlorobenzene	5.6 5E-05	–	5.65E-05
Chloroform	6.00E-05	–	6.00E-05
1, 3-Dichlororpropene	5.56E-05	–	5.56E-05
Ethylbenzene	5.61E-04	2.93E-02	2.99E-02
Ethylene dibromide	9.33E-05	–	9.33E-05
Ethylene dichloride	4.95E-05	–	4.95E-05
Formaldehyde	2.40	2.41E-02	2.42
Hexane	4.07E-06	2.09	2.09
Hydrogen Chloride	2.82E-05	–	2.82E-05
Methanol	6.42E-01	–	6.42E-01

Pollutant	IC Engines (TPY)	Other Sources (TPY)	Total (TPY)
Methylene Chloride	1.80E-04	–	1.80E-04
Naphthalene	1.32E-02	2.32E-04	1.34E-02
PAHs	2.10E-04	6.41E-05	2.75E-04
Propylene dichloride	5.69E-05	–	5.69E-05
Propylene oxide	4.08E-04	–	4.08E-04
1,1,2,2-Tetrachloroethane	1.11E-04	–	1.11E-04
1,1,2-Trichloroethane	6.70E-05	–	6.70E-05
Styrene	5.61E-02	–	5.61E-02
Toluene	4.29E-03	2.45E-02	2.88E-02
Vinyl Chloride	3.14E-05	–	3.14E-05
Xylenes	1.76E-03	2.18E-02	2.36E-02
Arsenic	2.42E-07	1.21E-05	1.23E-05
Berylium	–	7.26E-07	7.26E-07
Cadmium	2.27E-07	6.65E-05	6.68E-05
Chromium	9.09E-08	8.47E-05	8.48E-05
Cobalt	–	5.08E-06	5.08E-06
Lead	1.26E-06	–	1.26E-06
Manganese	4.69E-07	2.30E-05	2.35E-05
Mercury	3.03E-07	1.57E-05	1.60E-05
Nickel	5.91E-07	1.27E-04	1.28E-04
Selenium	3.33E-07	1.45E-06	1.78E-06
		Total HAP (TPY)	**7.61**

2.5 Citation and Description of all Applicable Requirements

As required by Rule 1302(D)(1)(e), a summary of facility rule requirements is listed in Form 1302-I in Appendix A.

2.6 Proposed Exemptions

The facility is operating exempt and insignificant emission units [Rule 1302(D)(1)(f)]. A list of exempt and exempt insignificant emission units is listed in Table 2-5 and included as Form 1302-H in Appendix A.

Table 2-5: Exempt and Insignificant Emission Units

Emission Unit ID	Unit Description	Status
100914	Wipe Cleaning Solvent Usage	Insignificant
008665	IC Engine: Emergency Generator	Exempt and Insignificant

Emission Unit ID	Unit Description	Status
100890	Glycol/Glycol Heat Exchanger	Exempt and Insignificant
100911	Diesel Tanks	Exempt and Insignificant
100910	Glycol Storage Tanks	Exempt and Insignificant
100912	Lube Oil Tanks	Exempt and Insignificant
100913	Degreaser Unit	Exempt and Insignificant
100915	Hot Water Heaters	Exempt and Insignificant
100916	Air Conditioning System	Exempt and Insignificant
394789	Hot Oil Heater #2	Exempt and Insignificant
001221	IC Engine: Air Compressor # 4A	Exempt and Insignificant
001222	IC Engine: Air Compressor # 5A	Exempt and Insignificant
100891	Glycol/Oil Heat Exchanger	Exempt and Insignificant
114270	Heat Exchanger	Exempt
	Abrasive Blasting Cabinet	Exempt and Insignificant

2.7 Compliance Plan

A facility Compliance Plan [Rule 1302(D)(1)(h)] is included as Form 1302-J in Appendix A of this application. There are no ongoing non-compliance issues at the La Goleta facility.

2.8 Compliance Certification

Application Certification is provided via Form 1302-M, which is included in Appendix A [Rule 1302(D)(1)(i)].

2.9 Acid Rain

The facility is not an Acid Rain facility; the requirements of 40 CFR Part 72 do not apply [Rule 1302(D)(1)(j)].

2.10 Permit Updates

The facility is requesting several permit updates. The requested permit updates include revisions from recent Draft PTO 15298, issued May 28, 2020. PTO 15298 provided updated emission factors for Hot Oil Heater #1 (Emission Unit ID 001214) in accordance with Rule 361 and replaced previous Hot Oil Heater #2 (Emission Unit ID 107535) with a new, permit exempt insignificant unit (Emission Unit ID 394789).

The requested permit updates also include removal of sections of the permit that reference the emission reduction credit (ERC) agreement with Point Arguello. The Point Arguello project has ceased; SoCalGas is no longer providing ERCs to the Point Arguello project.

A list of requested changes is provided in Table 2-6. The suggested revised permit language for selected update items is provided in Appendix C. The most recent versions of the Processed Gas Flow Measurement Plan and Process Monitor Calibration and Maintenance Plan, both dated Junes 22, 2020, are provided in Appendix D.

Table 2-6: Requested Permit Updates

Item	Permit Section	Action
1	1.5, 4.2.1, 7.4, 9.C.1.b.Viii	Update to remove references to SoCalGas providing ERCs to the Point Arguello project.
2	4.2.1	List correct CO emission factor for Ingersoll-Rand engines, 3.825 lb/MMBtu. Refer to CO emission factor value in Attachment 10.1 of the permit.
3	9.C.6	Update Table C.6 to include updated component leak-path information from Quarter 2, 2020 compliance check.
4	9.C.16	Update documents incorporated by reference to include the 2020 version of Processed Gas Flow Measurement Plan, which has been updated to include the most recent fuel meter serial numbers.
5	9.C.16	Update documents incorporated by reference to include the 2020 version of Process Monitor Calibration and Maintenance Plan, which was updated to include maximum oxygen sensor hours to match values listed in the facility IC Engine Inspection and Maintenance Plan.
6	9.C.16	Update documents incorporated by reference to include the 2014 version of the Compliance Assurance Monitoring Plan that was included in, and approved with the Reevaluation 5 package but the reference was not updated.
7	9.D.14	Update Table 9.D.14. to include updated component leak-path information from Quarter 2, 2020 compliance check.
8	9.D.15	Remove requirements for continuous bleed natural gas-powered pneumatic devices. Section 9.D.15 currently lists three (3) continuous bleed pneumatic devices; these devices have been removed and de-registered.
9	Table 5.1-1A, Table 5.1-2A, Table 5.1-3A, Table 5.1-4A	Update equipment category for Device Nos. 001199-001205 to Internal Combustion Engine – NOx Controlled. Update equipment category for Device No. 001206 to Internal Combustion Engine – Uncontrolled.
10	Table 5.1-1A, Table 5.1-2A, Table 5.1-3A, Table 5.1-4A	Update Gas Compressor Engine #9: Cooper-Bessemer GMV-10C from Device No. 001209 to 001206.
11	Table 5.1-1B, Table 5.1-2B, Table 5.1-3B, Table 5.1-4B	In accordance with Draft PTO 15298, update Rule 361 emission factors for Emission Unit ID 001214 and remove Emission Unit ID 107535, which is replaced by exempt Emission Unit ID 394789.
12	Table 5.1-1B, Table 5.1-2B, Table 5.1-3B, Table 5.1-4B	Update to include updated component leak-path information from Quarter 2, 2020 compliance check.

Item	Permit Section	Action
13	Table 5.4-1A	Update equipment category for Device Nos. 001199-001205 to Internal Combustion Engine – NOx Controlled. Update equipment category for Device No. 001206 to Internal Combustion Engine – Uncontrolled.
14	Table 5.4-1B	In accordance with Draft PTO 15298, remove Emission Unit ID 107535, which is replaced by exempt Emission Unit ID 394789.
15	10.5	Update equipment list to include updated component leak-path information from Quarter 2, 2020 compliance check.
16	10.5	Update equipment list with new catalyst serial numbers for devices 110815, 110816, 110817, 110818, 110819 and 110820.
17	10.5	Update equipment list with revisions from Draft PTO, 2020, by replacing Hot Oil Heater #2 (Emission Unit ID 107535) with new permit exempt unit (Emission Unit ID 394789).

2.11 Permit History

The recent facility permit revisions, reevaluations, and modifications, including permit to operate (PTO) and authority to construct (ATC) listings, are shown in Table 2-7.

Table 2-7: History of Permit Revisions, Modifications, and Reevaluations

Permit	Issue Date	Action
PT-70 ADM 15014	05/11/2017	Permit part 70 administrative change. Updated Alternate Responsible Official to Mr. Glenn La Fevers.
PTO 14840	12/27/2017	Permit to operate for installation of additional fugitive components to allow for safety upgrades at the storage wells.
PT-70/Reeval 09584 R6	5/18/2018	Permit part 70 reevaluation, revision 6.
ATC 15298	06/14/2019	Demonstrate compliance with Rule 361 emission standards for two existing process heaters.
Draft PTO 15298	5/28/2020	Updated emissions for unit #001214 to comply with emission limits required by Rule 361. De-permitted unit #107535. Permitted new exempt equipment, device #394789.

2.12 Compliance History

The facility violation history since the previous federal permit renewal is shown in Table 2-8. The violations were issued in response to self-reported deviations of permit conditions in a semi-annual compliance verification report (CVR). The facility currently has no unresolved non-compliance issues.

Table 2-8: Listing of Violations

Violation	Number	Issue Date	Description
NOV	11380	9/17/2018	Deviation reported in second half 2017 CVR is a violation of Condition 9.C.1(c)1 of PT-70 09584-R6. Settled.

Violation	Number	Issue Date	Description
NOV	12458	7/14/2020	Deviation reported in first half 2019 CVR is a violation of Condition 9.C.3(d)(iii) of PT-70 09584-R6. Settled.
NOV	12459	7/14/2020	Deviation reported in annual 2019 CVR is a violation of Condition 9.C.4(c)(ii) of PT-70 09584-R6. Settled.
NOV	12499	9/8/2020	Deviation identified during routine inspection is a violation of Greenhouse Gas Emission Standards for Crude Oil Facilities CCR Title 17 Section 95669. Settlement in progress.

3.0 ALTERNATIVE OPERATING SCENARIO

A complete description of any reasonable anticipated alternative operating scenario (AOS) is required by Rule 1302(D)(1)(g). SoCalGas is proposing an AOS related to major overhauls of the compressor engines at the facility.

3.1 Background

The La Goleta Natural Gas Storage Facility operates eight compressors; Units #2 through #8 are four-stroke rich-burn units equipped with non-selective catalytic reduction (NSCR) for emission control. Unit #9, the largest compressor, is a two-stroke lean-burn unit equipped with Clean-Burn technology to reduce its emissions to below the District requirements.

Once per year, the facility takes one of the eight engines/units out of service for a routine overhaul. In order to return the engine to service following the overhaul, it is necessary to operate it under no load and light load [i.e., less than 500 brake horsepower (bhp)] conditions in order to check, adjust, tune, and "break in" the equipment. For this discussion, these activities are referred to as "recommissioning." Recommissioning can be completed in less than 150 hours of engine operation. The Air/Fuel Ratio Controller (AFRC) is not capable of controlling the engine operation throughout such a wide range of horsepower (i.e., 0 to 650 bhp) and is shut off until the engine is capable of, and operating at, near its normal operating load and temperatures.

During the up to 150 hours of recommissioning, the engine exhaust will pass through the muffler, but the catalytic converter element will be removed to prevent oil fouling. Operating the engine with the catalyst in place but without the AFRC would not result in a corresponding control of emissions, as the correct operating conditions (such as temperature) for the catalyst would not be maintained; thus, the catalyst is removed during this period. Additionally, oil fouling of the catalyst may occur, which would render the catalyst ineffective and necessitate replacement at an estimated cost of over $10,000. Upon completion of recommissioning, the catalytic converter element is reinstalled, the AFRC is placed back in service, and the engine is operated at normal loads. A mobile emissions lab is used to monitor the exhaust while the engine is tuned so that the exhaust demonstrates compliance with the emissions concentration limits required during these activities.

For the past 6 years, the recommissioning has been allowed under a variance issued by the Hearing Board. However, because engine overhauls are a necessary and reoccurring maintenance procedure, and in response to the Hearing Board's request, SoCalGas is proposing to incorporate the recommissioning activities associated with engine overhauls as an AOS in the Title V Operating Permit. The SCAQMD Draft Title V Technical Guidance Document (2005) offers the following definition of an AOS, which describes the approach that SoCalGas is proposing for this application:

> *"An **alternative operating scenario** (AOS) is a set of provisions and conditions in a permit that allow a facility to switch back and forth between alternative modes of operation without submitting an application for a permit revision before each switch. Incorporating an AOS into a permit involves applying for a change of permit conditions. The application for a change of conditions can be filed with an initial Title V permit application, renewal application or a permit revision."*

SBCAPCD Rule 1303.E.1 Reasonably Anticipated Operating Scenarios requires that "The operating scenario descriptions shall contain emission information for each scenario and sufficient information for the District to develop reasonable permit conditions defining each scenario." The discussion below indicates how the emissions will be maintained within the current annual emissions cap and proposes permit conditions to be added to the Title V operating permit that would apply to this proposed AOS.

3.2 Emissions

Table 3-1 summarizes the projected hours of normal operations and recommissioning hours for a year in which an engine is overhauled. The projected hours reflect a minimum downtime duration of 900 hours for engine overhaul during the year in which recommissioning occurs; a longer actual overhaul duration is expected. Table 3-2 summarizes the emission factors used to estimate emissions. The emissions factor for NO_x for recommissioning was sourced from the Environmental Protection Agency (EPA) AP-42 (Table 3.2-3, Uncontrolled Emission Factors For 4-Stroke Rich-Burn Engines). Because the uncontrolled emission factors for CO, oxides of sulfur (SO_x), volatile organic compounds (VOCs), and particulate matter less than 10 microns in size (PM_{10}) listed in EPA AP-42 are lower than the permitted emission factors from the current facility permit, to ensure that emissions during the recommissioning period are not underestimated, the higher permitted emission factors are used for these pollutants during the recommissioning period. Emission factors for normal operations are taken from the permit specified in Attachment 10.1.

Table 3-1: Hours of Operation Per Emissions Unit – Overhaul Year

Period	Duration (hr/yr)
Recommissioning	150
Normal Operations	7,710
Total Annual	**7,860***

*Reflects 900 hours of downtime for the maintenance rebuild activities.

Table 3-2: Emission Factors

Pollutant	Emission Factors (lb/MMBtu)		
	AP-42 Emission Factor[1]	Commissioning Period[2]	Normal Operations[3]
NO_x	2.27	2.27	0.324
CO	3.72	3.825	3.825
SO_x	0.00059	0.0129	0.0129
VOC	0.0296	0.321	0.321
PM_{10}	0.0095	0.014	0.014

[1] Reference AP-42, Chapter 3.2, Table 3.2.3.
[2] To ensure that commissioning emissions are not underestimated, the higher of AP-42 or the permitted emission factors are used.
[3] From current permit Attachment 10.1.

As shown in Table 3-3, the maximum potential NO_x emissions from the recommissioning are approximately 1.2 tons per year. However, the engine would have no emissions during the maintenance overhaul period (taking at least 900 hours per overhaul event); thus, annual emissions would not exceed the current permitted levels due to the overhaul.

Table 3-3: AOS Emissions (PTE)

Pollutant	Recommissioning Emissions (lb/yr)	Normal Operating Emissions (lb/yr)	Total Annual Emissions (Recommissioning Year) (lb/yr)	Total Annual Emissions (Recommissioning Year) (TPY)	Permitted Annual Emissions (TPY)
NO_x	2,486	18,236	20,721	10.36	10.36
CO	4,188	215,282	219,471	109.74	122.3
SO_x	14.1	726	740	0.37	0.41
VOC	351.5	18,067	18,418	9.21	10.26
PM_{10}	15.3	788	803	0.4	0.45

3.3 Proposed Permit Conditions

SoCalGas suggests the following permit conditions for the AOS:

1) The operator may operate one (1) engine per year for a period not to exceed 150 hours without the non-selective catalytic reduction system, air-fuel ratio controller, or oxidation catalyst in order to facilitate the post-overhaul checks, adjustments, "break in", and equipment tuning following an engine overhaul.
2) Total operating hours shall not exceed 7,860 hours per engine during any calendar year in which the engine is overhauled.
3) The operator must operate and maintain any engine operated under this AOS, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions and in accordance with manufacturer's recommendations.
4) The post-overhaul checks, adjustments, "break in", and equipment tuning must be conducted in accordance with the District-approved I&M Plan.
5) The operator shall maintain a log of the date, operating hours, fuel consumption, and activities associated with the post-overhaul recommissioning and start-up activities. All changes of operating scenarios must be recorded in the log contemporaneously with the change.
6) Emission limits provided in Rule 333.E.1.a are not applicable during this period of up to 150 hours.
7) The operator shall calculate uncontrolled emissions from the recommissioning activities using the following emission factors:
    a. NOx 2.27 lb/MMBtu
    b. CO 3.825 lb/MMBtu

c. SOx 0.0129 lb/MMBtu

d. VOC 0.321 lb/MMBtu

e. PM10 0.014 lb/MMBtu

8) A report of summarizing the records required by this AOS shall be submitted with the Semi-Annual Compliance Verification Report.

4.0 MISCELLANEOUS PERMIT TOPICS

4.1 Application Shield

In accordance with Rule 1302, the Title V program includes an application shield provision that protects the applicant from being in violation of Title V for operating without a permit under certain circumstances. Application shields apply to initial permit and permit renewal applications.

The application shield allows the applicant to operate without a renewed Title V permit provided compliance with the Rule requirements are met. Pursuant to Rule 1304, a Title V permit renewal application shall be submitted no later than 2 years and 6 months from the date of issuance. A timely application for this facility would be no later than November 2020.

4.2 Streamlined Permit Conditions

A Title V permit applicant may request to streamline permit conditions when there are overlapping regulatory requirements. SoCalGas is not requesting streamlined permit conditions with this Title V renewal application.

4.3 Permit Shield

As provided in Rule 1303, a permit shield is an optional part of a Title V permit that gives a facility explicit protection from requirements that do not apply. A permit shield is a provision in a permit which states that compliance with the conditions of the permit shall be deemed compliance with all identified regulatory requirements. A permit shield can also identify specific regulatory requirements that do not apply to specific equipment or processes. SoCalGas is not requesting a permit shield with this Title V renewal application.

4.4 California Environmental Quality Act

Pursuant to Section 21080.24 of the California Health and Safety Code, the California Environmental Quality Act (CEQA) does not apply to the issuance, modification, amendment, or renewal of a permit by an air pollution control district or air quality management district pursuant to Title V, as defined in Section 39053.3 of the Health and Safety Code, or pursuant to a district Title V program established pursuant to Sections 42301.10, 42301.11, and 42301.12 of the Health and Safety Code, unless the issuance, modification, amendment, or renewal authorizes a physical or operational change to a source or facility. Because this renewal application does not seek a modification, amendment, or authorization of a physical or operational change to a source or facility, the renewal is not subject to CEQA review.

APPENDIX A – APPLICATION FORMS

Application Form Name	Form Number
Stationary Source Summary	1302-A1
Stationary Source Summary	1302-A2
Total Stationary Source Emissions	Form 1302-B
Exempt Emissions Units	Form 1302-H
Compliance Plan	Form 1302-I
Compliance Plan Certification	Form 1302-J
Certification Statement	Form 1302-M

STATIONARY SOURCE SUMMARY
(Form 1302-A1)

APCD: Santa Barbara County Air Pollution Control District	
COMPANY NAME:	Southern California Gas Company

➢ APCD USE ONLY ➣

APCD IDS Processing ID:

Application #: **Date Application Received:**

Application Filing Fee*: **Date Application Deemed Complete:**

I. SOURCE IDENTIFICATION

1. Source Name: Southern California Gas Company - La Goleta Station
2. Four digit SIC Code: 4922 USEPA AIRS Plant ID (for APCD use only):
3. Parent Company (if different than Source Name): Sempra Energy
4. Mailing Address of Responsible Official: P.O. Box 818, Goleta, CA 93116-0818
5. Street Address of Source Location (include Zip Code): 1171 More Road, Goleta, CA 93111
6. UTM Coordinates (if required) (see instructions):
7. Source located within: 50 miles of the state line [ ] Yes [x] No
   50 miles of a Native American Nation [ ] Yes [ ] No [x] Not Applicable
8. Type of Organization: [ ] Corporation [ ] Sole Ownership [ ] Government
   [ ] Partnership [x] Utility Company
9. Legal Owner's Name: Southern California Gas Company
10. Owner's Agent Name (if any): Title: Telephone #:
11. Responsible Official: Edward Wiegman Title: Storage Operations Manager Telephone #: 805-681-8068
12. Plant Site Manager/Contact: Edward Wiegman Title: Storage Operations Manager Telephone #: 805-681-8068
13. Type of facility: Natural Gas Compression and Storage
14. General description of processes/products: California Public Utilities Commission (CPUC) quality natural gas is transported from oil and gas producing companies for injection and storage. This natural gas is stored by compressing it and injecting it into a underground natural gas reservoir.
15. Does your facility store, or otherwise handle, greater than threshold quantities of any substance on the Section 112(r) List of Substances and their Thresholds (see Attachment A)? [ ] Yes [x] No
16. Is a Federal Risk Management Plan [pursuant to Section 112(r)] required? [ ] Not Applicable [ ] Yes [x] No
    (If yes, attach verification that Risk Management Plan is registered with appropriate agency or description of status of Risk Management Plan submittal.)

* Applications submitted without a filing fee will be returned to the applicant immediately as “improper” submittals

STATIONARY SOURCE SUMMARY
(Form 1302-A2)

APCD: **Santa Barbara County Air Pollution Control District**	**➢ APCD USE ONLY ≺** **APCD IDS Processing ID:**
COMPANY NAME: Southern California Gas Company	**SOURCE NAME:** La Goleta Station

II. TYPE OF PERMIT ACTION

	CURRENT PERMIT (permit number)	**EXPIRATION** (date)
Initial SBCAPCD's Regulation XIII Application		
Permit Renewal	9584-R6	May 31, 2021
Significant Permit Revision*		
Minor Permit Revision*		
Administrative Amendment		

III. DESCRIPTION OF PERMIT ACTION

1. Does the permit action requested involve: a: [ ] Portable Source [ ] Voluntary Emissions Caps
[ ] Acid Rain Source [x] Alternative Operating Scenarios
[ ] Source Subject to MACT Requirements [Section 112]

   b: [ ] None of the options in 1.a. are applicable

2. Is source operating under a Title V Program Compliance Schedule? [ ] Yes [x] No

3. For permit modifications, provide a general description of the proposed permit modification:
   SoCalGas is requesting permit updates as described in Section 2.10 and Appendix C of the permit renewal application.

*Requires APCD-approved NSR permit prior to a permit revision submittal

•

TOTAL STATIONARY SOURCE EMISSIONS
(Form 1302-B)

APCD: Santa Barbara County Air Pollution Control District	➢ APCD USE ONLY ≺ APCD IDS Processing ID:
COMPANY NAME: Southern California Gas Company	**SOURCE NAME:** La Goleta Station

I. TOTAL STATIONARY SOURCE EMISSIONS

Provide a brief description of operating scenario:

Normal operating scenario. Units are operating within the conditions and emission limits contained in Title V PTO 9584-R6 and PTO 15298.

POLLUTANT * (name)	EMISSIONS (tons per year)	PRE-MODIFICATION EMISSIONS (tons per year)	EMISSIONS CHANGE (tons per year)
NOx	104.86		
ROC	227.34		
CO	1325.28		
SOx	5.14		
PM	5.89		
PM10	5.89		
PM2.5	5.89		
HAP (Total)	7.61		

* Emissions for all pollutants for which the source is major and for all NSPS/MACT-regulated air pollutants must be reported. HAP emissions must be determined, and those exceeding one ton per year from any emission unit category must also be quantified; if less than one ton per year, just list the HAPs emitted by name.

EXEMPT EMISSIONS UNITS
(Form 1302-H1)

APCD: Santa Barbara County Air Pollution Control District	➢ APCD USE ONLY ≺ APCD IDS Processing ID:
COMPANY NAME: Southern California Gas Company	**SOURCE NAME:** La Goleta Station

Are you claiming any emitting activities to be insignificant? (See definition at bottom of page)

YES __X___ NO ______

I. ACTIVITIES CLAIMED TO BE INSIGNIFICANT (Attach supporting calculations)

Activity	Description of Activity/Emission Units	Potential to Emit for each Pollutant
Device #100914	Wipe Cleaning Solvent Usage	
Device #008665	IC Engine: Emergency Generator	
Device #100890	Glycol/Glycol Heat Exchanger	
Device #100911	Diesel Tanks	
Device #100910	Glycol Storage Tanks	
Device #100912	Lube Oil Tanks	
Device #100913	Degreaser Unit	
Device #100915	Hot Water Heaters	
Device #100916	Air Conditioning System	
Device #394789	Hot Oil Heater #2	

Insignificant activities are defined in APCD Rule 1301 (definitions). For an activity to be considered insignificant emissions cannot exceed 2 tons per year potential to emit (PTE) any criteria pollutants, and 0.5 tons per year for any regulated HAP.

Note: Insignificant activities are not exempt from Part 70 requirements/permits.

EXEMPT EMISSIONS UNITS
(Form 1302-H2)

APCD: Santa Barbara County Air Pollution Control District	**➢ APCD USE ONLY ➣** APCD IDS Processing ID:
COMPANY NAME: Southern California Gas Company	**SOURCE NAME:** La Goleta Station

Are you claiming any emitting activities to be insignificant? (See definition at bottom of page)

YES __X___ NO ______

I. ACTIVITIES CLAIMED TO BE INSIGNIFICANT (Attach supporting calculations)

Activity	Description of Activity/Emission Units	Potential to Emit for each Pollutant
Device #001221	IC Engine: Air Compressor # 4A	
Device #001222	IC Engine: Air Compressor # 5A	
Device #100891	Glycol/Oil Heat Exchanger	
Device #114270	Heat Exchanger	
Abrasive Blasting	Abrasive Blasting Cabinet	0.00025 tons per year of PM, PM_{10} and $PM_{2.5}$

Insignificant activities are defined in APCD Rule 1301 (definitions). For an activity to be considered insignificant emissions cannot exceed 2 tons per year potential to emit (PTE) any criteria pollutants, and 0.5 tons per year for any regulated HAP.

Note: Insignificant activities are not exempt from Part 70 requirements/permits.

Abrasive Blasting Cabinet Emissions Calculation

Media usage will be 50 pounds per year this will be monitored by purchasing records.

Emission factor reference PTO 0954-R6 Section 4.7.6
0.01 pounds of PM per pound of abrasive media.

Emissions:

$$\frac{0.01 \times 50}{2000} = \mathbf{0.00025 \text{ tons per year}}$$

COMPLIANCE PLAN
(Form 1302-I1)

APCD: Santa Barbara County Air Pollution Control District	➢ APCD USE ONLY ➣ APCD IDS Processing ID:
COMPANY NAME: Southern California Gas Company	SOURCE NAME: La Goleta Station

I. PROCEDURE FOR USING FORM 1302-I

This form shall be submitted as part of the SBCAPCD's Regulation XIII Application. The Responsible Official shall identify the applicable federal requirement(s) to which the source is subject. In the Compliance Plan (Form 1302-I), a Responsible Official shall identify whether the source identified in the SBCAPCD's Regulation XIII Application currently operates in compliance with all applicable federal requirements.

II. APPLICABLE FEDERAL REQUIREMENTS

Applicable Federal Requirement[1]		Affected Emission Unit	In compliance?	Effective
Regulatory Reference[2]	Regulation Title[2]		(yes/no/exempt[3])	Date[4]
APCD Rule 101	Compliance by Existing Installations	All emission units	Yes	May 18, 1981
APCD Rule 102	Definitions	All emission units	Yes	April 11, 2013
APCD Rule 103	Severability	All emission units	Yes	May 18, 1981
APCD Rule 201	Permits Required	All emission units	Yes	February 9, 2016
APCD Rule 202	Exemptions to Rule 201	Applicable emission units, as listed in Part 70 renewal	Yes	May 5, 1982
APCD Rule 203	Transfer	All emission units	Yes	February 9, 2016
APCD Rule 205	Standards for Granting Permits	All emission units	Yes	May 5, 1982
APCD Rule 206	Conditional Approval of Authority to Construct or Permit to Operate	All emission units	Yes	February 9, 2016
APCD Rule 212	Emission Statements	All emission units	Yes	May 26, 2004
APCD Rule 301	Circumvention	All emission units	Yes	May 18, 1981
APCD Rule 302	Visible Emissions	All emission units	Yes	May 18, 1981
APCD Rule 303	Nuisance	All emission units	Yes	May 18, 1981
APCD Rule 305	PM Concentration - South Zone	Each PM source	Yes	May 18, 1981
APCD Rule 309	Specific Contaminants	All emission units	Yes	May 18, 1981
APCD Rule 311	Sulfur Content of Fuel	All combustion units	Yes	May 18, 1981
APCD Rule 317	Organic Solvents	Emission units using solvents	Yes	May 18, 1981
APCD Rule 321	Solvent Cleaning Machines and Solvent Cleaning	Emission units using solvents	Yes	January 30, 2014

COMPLIANCE
PLAN (Form 1302-I2)

Applicable Federal Requirement[1] Regulatory Reference[2]	Regulation Title[2]	Affected Emission Unit	In compliance? (yes/no/exempt[3])	Effective Date[4]
APCD Rule 324	Disposal and Evaporation of Solvents	Emission units using solvents	Yes	May 18, 1981
APCD Rule 326	Storage of Reactive Organic Compound Liquids.	Tanks, Sumps, Vessels.	Yes	July 8, 2002
APCD Rule 333	Control of Emissions from Reciprocating IC Engines	IC engines at the facility driving compressors and emergency fire pumps.	Yes	May 31, 2011
APCD Rule 346	Loading of Organic Liquids	Loading rack at the facility.	Yes	October 29, 2002
APCD Rule 352	Natural Gas-Fired Fan-Type Central Water Heaters	New water heaters and furnaces	Yes	April 11, 2013
APCD Rule 353	Adhesives and Sealants	Emission units using adhesives and sealants	Yes	August 30, 2013
APCD Rule 359	Flares and Thermal Oxidizers	Flares.	Yes	May 7, 1996
APCD Rule 360	Emissions of Oxides of Nitrogen from Large Water Boilers and Small Boilers	Gas Preheaters and any new small boiler installed at the facility.	Yes	October 14, 2003
APCD Rule 361	Small Boilers, Steam Generators, and Process Heaters	Hot Oil Heaters.	Yes	May 31, 2011
APCD Rule 505	Breakdown Conditions	All emission units	Yes	May 18, 1981
APCD Rule 603	Emergency Episode Plans	Stationary sources with PTE greater than 100 tpy	Yes	June 21, 1982
APCD Rule 1301	Part 70 Operating Permits	All emission units	Yes	November 26, 1997
40 CFR Parts 51/52	New Source Review	All Emission units	Yes	November 25, 1971
40 CFR 63 Subpart ZZZZ	National Emission Standards for Hazardous Air Pollutants for	Internal combustion Engines 2-9, Firewater pump engines 4A and 5A,	Yes	January 30, 2013

1 Review APCD SIP Rules, NSPS, NESHAPS, and MACTs .
2 Regulatory Reference is the abbreviated citation (e.g. 40 CFR 60 Subpart OOO, APCD Rule 325.H) and Title is the prosaic title (e.g. NSPS Standards of Performance for Nonmetallic Mineral Processing Plants, Crude Oil Production and Separation, Inspection)
3 If exempt from applicable federal requirement, include explanation for exemption.
4 Indicate the date during the permit term that the applicable federal requirement will become effective for the emission unit.

*** If more than one page is used, please ensure that “Santa Barbara APCD”, stationary source name and “Form 1302-I1” appear on each page. ***

COMPLIANCE PLAN
(Form 1302-I3)

APCD: **Santa Barbara County Air Pollution Control District**	**➤ APCD USE ONLY ◄** **APCD IDS Processing ID:**
COMPANY NAME:	**SOURCE NAME:**

III. COMPLIANCE CERTIFICATION

Under penalty of perjury, I certify the following:

Based on information and belief formed after reasonable inquiry, the source identified in this application will continue to comply with the applicable federal requirement(s) with which the source is in compliance identified in form 1302-I1;

Based on information and belief formed after reasonable inquiry, the source identified in this application will comply with the future-effective applicable federal requirement(s) identified in form 1302-I1, on a timely basis[1];

Based on information and belief formed after reasonable inquiry, the source identified in this application is not in compliance with the applicable federal requirement(s), identified in form 1302-I1, and I have attached a compliance plan schedule.[2]

SAWeisman   9/24/2020

Signature of Responsible Official   Date

1. Unless a more detailed schedule is expressly required by the applicable federal requirement.
2. At the time of expected permit issuance, if the source expects to be out of compliance with an applicable federal requirement, the applicant is required to provide a compliance schedule with this application, with the following exception. A source which is operating under a variance that is effective for less than 90 days need not submit a Compliance Schedule. For sources operating under a variance, which is in effect for more than 90 days, the Compliance Schedule is the schedule that was approved as part of the variance granted by the hearing board.

   The compliance schedule shall contain a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with this applicable federal requirement. For sources operating under a variance, the compliance schedule is part of the variance granted by the hearing board. The compliance schedule shall resemble, and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject. For sources not operating under a variance, consult the Air Pollution Control Officer regarding procedures for obtaining a compliance schedule.

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J1)

APCD: **Santa Barbara County Air Pollution Control District**	**➤ APCD USE ONLY ➤** **APCD IDS Processing ID:**
COMPANY NAME: Southern California Gas Company	**SOURCE NAME: La Goleta Station**

II. CERTIFICATION INFORMATION

EMISSION UNIT: **Internal Combustion Engines - District ID #1199-#1205 (Plant ID #2-#8)**

Applicable Federal Requirement & its Title: 40 CFR 63 Subpart ZZZZ, RICE MACT

Method	Description or Reference Method
Monitoring	The equipment permitted herein is subject to the following monitoring requirements: (i) Limits Exceedance — Any District-certified IC engine source test result which indicates the applicable Rule 333 emission limits or NSR permit-specified limits have been exceeded shall constitute a violation of this permit. (ii) Compliance Assurance Monitoring: SoCalGas shall implement the following CAM required monitoring: A. Monitor all compliance assurance indicators for the engines in conformance with the requirements listed in the CAM Plan. B. Log any excursions of each indicator from its limits that are set forth in the latest CAM Plan. C. Log all periods of monitor shutdowns, monitoring malfunctions and associated monitor repairs and any required quality assurance/quality control activity periods for the monitors (i.e., the AFRC controller and the catalyst thermocouple units) as listed in the CAM Plan [Ref: 40 CFR 64.7.(c)]. The reason for each shutdown, e.g., indicator range excursion or malfunction, shall also be listed in the log. D. Per 40 CFR 64.6.(c)(4), a minimum 90 percent data capture rate on a quarterly basis is required for each indicator. For the purposes of minimum data capture computations, any data obtained during the following periods are not included: • Routine monitor calibrations and inspections; • Sudden and infrequent monitor malfunctions beyond the operator's reasonable control [Ref: 40 CFR 64.7(c)]; and, • IC engine start-up periods. E. A Quality Improvement Plan (QIP) is triggered for any engine subject to CAM Rule, if more than one (1) percent [per 40 CFR 64.8 (a)] of valid individual data points obtained in any calendar quarter lie outside the CAM Plan established indicator ranges. SoCalGas shall immediately notify the District if a QIP has been triggered and shall develop and submit such a Plan to the District for approval as expeditiously as practicable. The QIP submitted by SoCalGas shall meet all the requirements specified for it in 40 CFR Section 64.8 [QIP Requirements], at a minimum.

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J2)

Emission Unit	Internal Combustion Engines - District ID #1199-#1205 (Plant ID #2-#8)
Monitoring	The following monitoring requirements apply: A. Inspection and Maintenance Plan — SoCalGas shall implement all monitoring provisions of its IC Engine Inspection and Maintenance Plan approved by the District. This includes emissions monitoring of the 7 engines per District Rule 333.F.3.The inspections shall be conducted prior to any adjustments to the AFRC set points and shall consist of one (1) fifteen minute run at the previously established set point. B. Fuel Heating Value — The gross heating value of the gaseous fuel (Btu/scf) shall be measured using approved ASTM or ARB-approved test methods semi-annually. C. Fuel Sulfur Content — The total sulfur content and H2S content of the gaseous fuel burned on the property shall be determined semi-annually using approved ASTM or ARB-approved test methods. D. Operating Hours — The hours of operation each month of each engine shall be documented in a log. E. Fuel Use Metering — Fuel use for each engine shall be monitored by an in-line fuel meter. Meter design and specifications shall be approved by the District. The meters shall be calibrated per the latest District-approved Process Monitor Calibration and Maintenance Plan.
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition and include information required by 40 CFR 63 Subpart ZZZZ Table 7 and §63.6650 in addition to the material specified in Condition 9.C.15. of the PTO. Information required by 40 CFR 63 Subpart ZZZZ Table 7 and §63.6650 are as follows: A. The Compliance report must contain the information below: a. Company name and address. b. Statement by a responsible official, with that official's name, title, and signature, certifying the accuracy of the content of the report. c. Date of report and beginning and ending dates of the reporting period. d. If the equipment had a malfunction during the reporting period, the compliance report must include the number, duration, and a brief description for each type of malfunction which occurred during the reporting period and which caused or may have caused any applicable emission limitation to be exceeded. The report must also include a description of actions taken by an owner or operator during a malfunction of an affected source to minimize emissions in accordance with 40 CFR 63 Subpart ZZZZ §63.6605(b), including actions taken to correct a malfunction. e. If there are no deviations from any emission or operating, a statement that there were no deviations from the emission or operating limitations during the reporting period.

COMPLIANCE PLAN
CERTIFICATION (Form 1302-J3)

Emission Unit	Internal Combustion Engines - District ID #1199-#1205 (Plant ID #2-#8)
Reporting	B. For each deviation from an emission or operating limitation that occurs for a stationary RICE where the owner or operator are not using a CMS to comply with the emission or operating limitations, the Compliance report must contain the information in Conditions 5.a.i-iv of the PTO and the information below: a. The total operating time of the stationary RICE at which the deviation occurred during the reporting period. b. Information on the number, duration, and cause of deviations (including unknown cause, if applicable), as applicable, and the corrective action taken.
Record Keeping	The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request: (i) *Hours* — Records documenting hours of operation and days of operation for each IC engine each month. The record shall document any 60-minute start-up period required for the IC engine after it is shut-down. (ii) *Fuel Use* **—** Records documenting IC engine(s) monthly fuel consumption (scf/month). (iii) *Fuel Heating Value* — Records documenting the gross heating value of fuel (Btu/scf) on a semi-annual basis. (iv) *Fuel Sulfur Content* — Records documenting the total sulfur content and H2S content of the gaseous fuel on a semi-annual basis. (v) *Equipment Maintenance Data* — Records summary documenting engine/control device maintenance on an annual basis. (vi) *I&M Plan Logs* — Logs documenting the parameter settings, NOx and CO level recorded, and other values required under the *Inspection and Maintenance Plan* for each engine shall be kept on-site. (vii) *Equipment ID/Tags* — If an operator's tag number is used in lieu of an IC engine identification plate, written documentation which references the operator's unique IC engine ID number to a list containing the make, model, rated maximum continuous BHP and the corresponding RPM. (viii) *Monitor Non-operational Time* – Logs documenting all non-operational times for the AFRC controller units and the catalyst temperature measurement units including the reasons for all monitor shutdowns, as monitored per Condition 9.C.1.(c)(ii)(C) of the PTO. (ix) *Set Point Settings Data* — A record of the most current Air Fuel Ratio Controller set points and the date these were established. (x) *Engine Operation Outside Settings* — A record of any continuous engine operation outside of the indicator ranges established in the CAM Plan. All such excursions are to be flagged specifically in the CAM logs. (xi) *Maintenance Records* **—** Records on all maintenance performed for all equipment specified in this permit including engine time settings, engine maintenance, catalyst maintenance, and air-fuel ratio controller. (xii) *Control Equipment Parameters* — Records on catalyst (including manufacturer, model and serial numbers), engine, air-fuel ratio controller, or sensor replacement. (xiii) *CAM Plan Required Data* – A monthly summary of all compliance indicator data excursions and all monitor non-operational times, obtained pursuant to Conditions 9.C.1 (c)(ii)B and C in the PTO.

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J4)

Emission Unit	Internal Combustion Engines - District ID #1199-#1205 (Plant ID #2-#8)
Recordkeeping	(xiv) If the owner and operator must comply with the emission and operating limitations, the owner and operator must keep the records of the following: A. A copy of each notification and report that the owner and operator submitted to comply with Subpart ZZZZ, including all documentation supporting any Initial Notification or Notification of Compliance Status that the owner and operator submitted, according to the requirement in 40 CFR 63 Subpart ZZZZ §63.10(b)(2)(xiv). B. Records of the occurrence and duration of each malfunction of operation (i.e., process equipment) air pollution control and monitoring equipment. C. Records of performance tests and performance evaluations as required in 40 CFR 63 Subpart ZZZZ §63.10(b)(2)(viii) and §63.6655(a)(3). D. Records of all required maintenance performed on the air pollution control and monitoring equipment. E. Records of actions taken during periods of malfunction to minimize emissions in accordance with 40 CFR 63 Subpart ZZZZ §63.6605(b), including corrective actions to restore malfunctioning process equipment to its normal or usual manner of operation. i. The owner and operator must keep records of the maintenance conducted on the stationary RICE in order to demonstrate that the owner and operator operated and maintained the stationary RICE according to the maintenance plan.
Test Methods	Measure: CARB 1-100 for O2; CARB 1-100, or USEPA Method 7E and 10 for NOx and CO respectively; USEPA Method 18 for ROC

EMISSION UNIT: **Internal combustion units - District IDs #1206, #1221, #1222, #8665, #8666, #8668 (Plant ID #9, #4A, #5A, #12A, #13A, Emergency Generator)**

Applicable Federal Requirement & its Title: 40 CFR 63 Subpart ZZZZ, RICE MACT

Method	**Description of Reference Method**
Monitoring	The following source testing and monitoring conditions apply: (i) *Limits Exceedance* — Any District-certified IC engine source test result which indicates the applicable Rule 333 emission limits or NSR permit-specified limits (as specified in Table 5.1-3 of the PTO) have been exceeded shall constitute a violation of this permit. (ii) *I&M Plan* — SoCalGas shall implement all monitoring provisions of its *IC Engine I&M Plan* approved by the District. (iii) *Fuel Heating Value* — The gross heating value of the gaseous fuel (Btu/scf) shall be measured using approved ASTM or ARB-approved test methods annually. (iv) *Fuel Sulfur Content* — The total sulfur content and H_2S content of the gaseous fuel burned on the property shall be analyzed and determined annually using approved ASTM or ARB-approved test methods. (v) *Operating Hours* — The hours of operation each month of each engine, including the IC engines exempt from permitting, shall be documented in a log. The log shall be made available for inspection upon request. (vi) *Fuel Use Metering*— Fuel use for the engine with plant ID #9 shall be monitored by an in-line fuel meter. Meter design and specifications shall be approved by the District. The meters shall be calibrated per the latest District-approved *Process Monitor Calibration and Maintenance Plan.*

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J5)

Emission Unit	Internal combustion units - District IDs #1206, #1221, #1222, #8665, #8666, #8668 (Plant ID #9, #4A, #5A, #12A, #13A, Emergency Generator)
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit and include information required by 40 CFR 63 Subpart ZZZZ Table 7 and §63.6650 in addition to the material specified in Condition 9.C.15. of the PTO. Information required by 40 CFR 63 Subpart ZZZZ Table 7 and §63.6650 are as follows: A. The Compliance report must contain the information below: a. Company name and address. b. Statement by a responsible official, with that official's name, title, and signature, certifying the accuracy of the content of the report. c. Date of report and beginning and ending dates of the reporting period. d. If the equipment had a malfunction during the reporting period, the compliance report must include the number, duration, and a brief description for each type of malfunction which occurred during the reporting period and which caused or may have caused any applicable emission limitation to be exceeded. The report must also include a description of actions taken by an owner or operator during a malfunction of an affected source to minimize emissions in accordance with 40 CFR 63 Subpart ZZZZ §63.6605(b), including actions taken to correct a malfunction. e. If there are no deviations from any emission or operating, a statement that there were no deviations from the emission or operating limitations during the reporting period. B. For each deviation from an emission or operating limitation that occurs for a stationary RICE where the owner or operator are not using a CMS to comply with the emission or operating limitations, the Compliance report must contain the information in Conditions 5.a.i-iv and the information below: a. The total operating time of the stationary RICE at which the deviation occurred during the reporting period. b. Information on the number, duration, and cause of deviations (including unknown cause, if applicable), as applicable, and the corrective action taken. C. For emergency stationary RICE with a site rating of more than 100 brake HP that operates or is contractually obligated to be available for more than 15 hours per calendar year (Firewater Pumps- Device IDs #008666 and #008668; Emergency Generator-Device ID #008665), for the purposes specified in 40 CFR 63 Subpart ZZZZ §63.6640(f)(2)(ii) and (iii) or that operates for the purpose specified in §63.6640(f)(4)(ii), the owner or operator must submit an annual report containing the following information: a. Company name and address where the engine is located. b. Date of the report and beginning and ending dates of the reporting period. c. Engine site rating and model year. d. Latitude and longitude of the engine in decimal degrees reported to the fifth decimal place. e. Hours operated by type of operation (maintenance, testing, emergency, non-emergency, etc.), including the date, start time, and end time for engine operation. The report shall also identify the entity that dispatched the engine and the situation that necessitated the dispatch of the engine, as applicable. f. Number of hours the engine is contractually obligated to be available. g. If there were no deviations from the fuel requirements that apply to the engine (if any), a statement that there were no deviations from the fuel requirements during the reporting period. h. If there were deviations from the fuel requirements that apply to the engine (if any), information on the number, duration, and cause of deviations, and the corrective action taken.

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J6)

Emission Unit	**Internal combustion units - District IDs #1206, #1221, #1222, #8665, #8666, #8668 (Plant ID #9, #4A, #5A, #12A, #13A, Emergency Generator)**
Record Keeping	SoCalGas shall keep the required logs, as applicable to this permit, which demonstrate compliance with emission limits, operation limits and monitoring requirements listed in the PTO. All logs shall be available to the District upon request. Written information (logs) shall include: (i) *Hours* — Records documenting individual IC engine operating hours each month. (ii) *Fuel Use* — Records documenting IC engine Plant ID # 9 monthly fuel consumption (scf/month). (iii) *Fuel Heating Value* — Records documenting the gross heating value of fuel (Btu/scf) on an annual basis. (iv) *Fuel Sulfur Content* — Records documenting the total sulfur content and H2S content of the gaseous fuel on an annual basis. (v) *Equipment Maintenance Data* — Records summary documenting engine/control device maintenance on an annual basis. (vi) *I&M Plan Logs* — Logs documenting the parameter settings, NOx and CO level recorded, and other values required under the *Inspection and Maintenance Plan* for the engine shall be kept on-site. (vii) *Equipment ID/Tags* — If an operator's tag number is used in lieu of an IC engine identification plate, written documentation which references the operator's unique IC engine ID number to a list containing the make, model, rated maximum continuous BHP and the corresponding RPM. (viii) If the owner and operator must comply with the emission and operating limitations, the owner and operator must keep the records of the following: 1. A copy of each notification and report that the owner and operator submitted to comply with Subpart ZZZZ, including all documentation supporting any Initial Notification or Notification of Compliance Status that the owner and operator submitted, according to the requirement in 40 CFR 63 Subpart ZZZZ §63.10(b)(2)(xiv). 2. Records of the occurrence and duration of each malfunction of operation (i.e., process equipment) air pollution control and monitoring equipment. 3. Records of performance tests and performance evaluations as required in 40 CFR 63 Subpart ZZZZ §63.10(b)(2)(viii) and §63.6655(a)(3). 4. Records of all required maintenance performed on the air pollution control and monitoring equipment. 5. Records of actions taken during periods of malfunction to minimize emissions in accordance with 40 CFR 63 Subpart ZZZZ §63.6605(b), including corrective actions to restore malfunctioning process equipment to its normal or usual manner of operation. 6. The owner and operator must keep records of the maintenance conducted on the stationary RICE in order to demonstrate that the owner and operator operated and maintained the stationary RICE according to the maintenance plan.

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J7)

Emission Unit	**Internal combustion units - District IDs #1206, #1221, #1222, #8665, #8666, #8668 (Plant ID #9, #4A, #5A, #12A, #13A, Emergency Generator)**
Record Keeping	(x) For the Firewater Pumps (Device IDs #008666 and #008668) and Emergency Generator (Device ID #008665), the owner or operator shall keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. The owner or operator must document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. If the engine is used for the purposes specified in §63.6640(f)(2)(ii) or (iii) or §63.6640(f)(4)(ii), the owner or operator must keep records of the notification of the emergency situation, and the date, start time, and end time of engine operation for these purposes. (xi) For the Firewater Pumps (Device IDs #008666 and #008668), the owner or operator must keep records of the parameters that are analyzed as part of the oil analysis program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.
Test Methods	IC engine #9: CARB 1-100 for O_2; CARB 1-100, or USEPA Method 7E and 10 for NO_x and CO respectively; USEPA Method 18 for ROC Emergency and firewater pumps: ASTM Method; Measure

COMPLIANCE PLAN
CERTIFICATION (Form 1302-J8)

EMISSION UNIT: **Micro Turbines - District ID#107543-107546**

Federal Requirement & its Title:

<table>
<tr><th>Method</th><th>Description or Reference Method</th></tr>
<tr><td>Monitoring</td><td>The permitted equipment is subject to the following monitoring requirements:
(i) Fuel Usage Metering. The permittee shall install and operate a dedicated, temperature and pressure-corrected, totalizing, non-resettable type fuel meter, to measure the amount of natural gas used.
(ii) Heating Value Data. On an annual basis maintain record of the heat content (HHV) basis of the fuel gas in units of Btu/scf.
(iii) Fuel Gas Sulfur Data. The permittee shall measure the total sulfur and H_2S content of the fuel gas annually in accordance with EPA Methods 15/16/16A.
(iv) Source Testing. When requested in writing by the District the permittee shall source test the C60 micro-turbines to demonstrate compliance with Condition 9.C.3 (a) in the PTO. Pollutants and process parameters that are to be monitored when the micro-turbines are source tested are provided in the PTO.</td></tr>
<tr><td>Reporting</td><td>On a semi-annual basis, a report detailing the previous six month’s activities shall be provided to the District. The report must include all data required by the Semi-Annual Compliance Verification Reports condition of this permit.</td></tr>
<tr><td>Record Keeping</td><td>The following records shall be maintained by the permittee and shall be made available to the District upon request:
(i) Fuel Gas Use. The total amount of PUC quality natural gas used between the four Capstone C60 micro-turbines shall be recorded on a monthly, quarterly, and annual basis in units of standard cubic feet and million Btus.
(ii) Heat Content. Record the annual heating value results of the fuel gas.
(iii) Operational Days. For each month, the number of days each micro-turbine operated.
(iv) Sulfur Content. The annual measured total sulfur and H_2S content, both in units of ppmvd, of the fuel gas burned in the micro-turbines.</td></tr>
<tr><td>Test Methods</td><td>Turbine Exhaust:
<table>
<tr><td>NO_x</td><td>EPA Method 7E, ARB 1-100</td></tr>
<tr><td>ROC</td><td>EPA Method 18</td></tr>
<tr><td>CO</td><td>EPA Method 10, ARB 1-100</td></tr>
<tr><td>Sampling Point Deter.</td><td>EPA Method 1</td></tr>
<tr><td>Stack Gas Flow Rate</td><td>EPA Method 2 or 19</td></tr>
<tr><td>O_2</td><td>EPA Method 3</td></tr>
<tr><td>Moisture Content</td><td>EPA Method 4</td></tr>
</table>
Fuel Gas:
<table>
<tr><td>Higher Heating Value</td><td>ASTM D 3588-88</td></tr>
<tr><td>Total Sulfur Content[d]</td><td>EPA 15/16/16A</td></tr>
</table>
</td></tr>
</table>

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J9)

EMISSION UNIT: **Process Heaters - District ID #001214, 113985, 113987**

Federal Requirement & its Title:

Method	Description or Reference Method
Monitoring	The equipment permitted herein is subject to the following monitoring requirements: (i) *Default Rating Method*. The volume of natural gas used (in units of standard cubic feet) shall be reported as permitted annual heat input limit for the unit (Btu/year) divided by the District-approved heating value of the fuel (Btu/scf). (ii) *Fuel Use Meter*. The volume of fuel gas (in units of standard cubic feet) used in device IDs 113985 and 113987 shall be measured through the use of a dedicated District-approved fuel meter. Each heater is equipped with its own fuel meter. The meters shall be temperature and pressure corrected. The fuel meters shall be accurate to within five percent (5%) of the full scale reading. The meters shall be calibrated according to manufacturer's specifications and/or SoCal Gas Company procedures, and the calibration records shall be made available to the District upon request. (iii) *Existing Units Rated Between 2.000 - 5.000 MMBtu/hr*. These units are subject to Rule 361 tuning requirements and must be source tested upon request by the District. (iv) *Units Rated at 2.000 MMBtu/hr or Below*. Any unit manufactured after October 17, 2003 shall be tuned once every 12 months following the manufacturer's recommended tuning procedure or by an alternative tuning procedure approved by the District.
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the Semi-Annual Compliance Verification Reports condition of this permit.
Record Keeping	The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request: (i) *Fuel Use – Device IDs 1214*. The volume of fuel gas used each year (in units of standard cubic feet) as determined by the Default Rating Method. (ii) *Fuel Use – Device IDs 113985 and 113987*. The volume of fuel gas used each year (in units of standard cubic feet) as determined by the fuel meters. (iii) *Fuel Use Meter Calibration Records*. Calibration records of District-approved fuel use meters. (iv) *Tuning Records*. For units subject to Rule 360 and Rule 361, maintain documentation verifying the required tune-ups, including a complete copy of each tune-up report. (v) *Maintenance Logs*. Maintenance logs for the unit(s) and fuel meter (as applicable).
Test Methods	None

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J10)

EMISSION UNIT: **Flares - District ID #1211, 1212, 1215, 104915, 113418, 104916, 107706**

Federal Requirement & its Title:

Method	Description or Reference Method
Monitoring	The following monitoring conditions apply to the flare equipment items: (i) *Heating Value:* The heating value of the 'gaseous fuel' (Btu/scf) shall be analyzed annually using the ASTM methods listed in Rule 359.E (test methods). (ii) *Fuel Sulfur Content:* For flare unit 1215, 'gaseous fuel' sulfur content (H_2S and TRS) must be measured annually using the ASTM methods listed in Rule 359.E (test methods). For flare units 1211 and 1212, the total sulfur content in 'gaseous fuel' shall be measured semi-annually using the Rule 359.E listed methods. (iii) *Purge Gas Sulfur Content:* The purge gas sulfur content must be measured annually using Rule 359.E-listed ASTM methods, if such gas is not PUC quality natural gas or an inert gas. (iv) *Media Bed Changes:* SoCalGas shall maintain purchase records documenting the type of material purchased for the SULFATREAT units and the CEI-KMN units.
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the Semi-Annual Compliance Verification Reports condition of this permit.
Record Keeping	SoCalGas shall keep the required logs, as applicable to this permit, which demonstrate compliance with emission limits, operation limits and monitoring requirements in the PTO. All logs shall be available to the District upon request. Written information (logs) shall include: (i) *Heating Value***:** Annual records documenting the higher heating value of the 'gaseous fuel.' Such documents shall be the results of the laboratory analyses using ASTM test methods prescribed in Rule 359.E. (ii) *Fuel Sulfur Content:* Records documenting annually the 'gaseous fuel' sulfur content as measured periodically, and, if applicable, the purge gas sulfur content for each flare unit. (iii) *Media Bed Change:* Records documenting any media bed changes for the SULFATREAT units and the CEI-KMN units. The records shall include the dates and times of each change-out, the quantity of material replaced, and the type of material placed in the unit.
Test Methods	None

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J11)

EMISSION UNIT: **Fugitive Hydrocarbon Emissions Components - District ID # 100882-100886**

Federal Requirement & its Title:

Method	Description or Reference Method
Monitoring	SoCalGas shall track the component leak path (clp) counts for all categories of components at the natural gas production facility that are listed in Table 5.1-2 in the PTO and log any clp count changes, including de minimis changes, in a clp inventory maintained by the natural gas production facility.
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the Semi-Annual Compliance Verification Reports condition of this permit.
Record Keeping	SoCalGas shall keep a log of the changes in fugitive emissions component count and the associated emissions changes summarized on a quarterly basis. All inspection and/or repair records shall be retained at the plant for a minimum of five years. In addition SoCalGas shall maintain the following records: 1. *Carbon Canister Change:* Records documenting carbon replacement for the canister serving the odorant system. The records shall include the dates of each change-out, the quantity of material replaced, and the type of material placed in the unit.
Test Methods	None

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J12)

EMISSION UNIT: **Hydrocarbon Liquid Storage Tanks – District ID #1217-1220, 100899, 100901, 100910**

Federal Requirement & its Title:

Method	Description or Reference Method
Monitoring	The following monitoring conditions apply: (i) *Hydrocarbon Liquid (Condensate) Volume*: The volume of hydrocarbon liquid (condensate) produced annually shall be monitored by noting the volume (in gallons) flowing out of the hydrocarbon liquid storage tank (ID # 1217) into trucks on a monthly basis. (ii) *API Gravity & True Vapor Pressure Of Stored HC* — The API gravity and the true vapor pressure at 67.2 degrees F of the stored hydrocarbon liquid in each storage tank (ID # 1219, 1220 and 1217) shall be determined annually. Alternately, the Reid vapor pressure of the stored condensate may be measured by the ASTM D 323 Standard Method and the true vapor pressure calculated by API Bulletin 2517, or equivalent District-approved Reid/True vapor pressure correlation. The actual temperature of the stored hydrocarbon liquid shall be measured each time a sample is taken for API gravity and TVP analysis. <u>Note:</u> The API gravity and TVP analysis for the HC Condensate Storage tank may be used as representative values for all three tanks instead of sampling from each tank individually.
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.
Record Keeping	SoCalGas shall keep the required logs, as applicable to this permit, which demonstrate compliance with emission limits, operation limits and monitoring requirements listed in the PTO. All logs shall be available to the District upon request. Written information (logs) shall include: (i) *Hydrocarbon Liquid (Condensate) Volume*: The volume of hydrocarbon liquid produced annually shall be recorded (ii) *API Gravity & True Vapor Pressure Of Stored HC* — The API gravity, the true vapor pressure at 67.2 degrees F, and the actual storage temperature of the stored hydrocarbon liquid in each storage tank (ID # 1219, 1220 and 1217) shall be recorded annually. (iii) *Maintenance Records* — Records of maintenance performed per Sections B.3 and B.5 of Rule 326. These records contain, at a minimum, the following: A. *Tank Identification*: Tank identification type of vapor controls used, and initials of personnel performing maintenance. B. *Maintenance Performed*: Description of maintenance procedure performed. C. *Estimated Excess Emissions*: Excess emissions caused by maintenance and how determined. D. *Maintenance Dates & Times*: Times and dates of maintenance procedure.
Test Methods	None

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J13)

EMISSION UNIT: **Loading Station - District ID # 8669**

Federal Requirement & its Title:

Method	Description or Reference Method
Monitoring	SoCalGas shall monitor, via a log or a shipping invoices document, the daily and total annual volumes of hydrocarbon condensate shipment from the truck loading station.
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.
Record Keeping	SoCalGas shall record the daily and total annual volumes (in gallons) of HC condensate shipment from the loading station, in a log kept on-site. When vacuum trucks are used to empty the condensate tanks, the log shall include the operator's initials, date of loading operation, and the destination of the condensate. If vacuum trucks are not used to empty the condensate tanks, the log shall include the operator's initials, date of loading operation, transfer temperature, and method of determining throughput for each loading operation.
Test Methods	None

EMISSION UNIT: **Wells – District ID # 8670,100903**

Federal Requirement & its Title:

Method	Description or Reference Method
Monitoring	On an annual basis, SoCalGas shall (i) measure the reactive organic compound (ROC) content of the vented gas, using gas-liquid chromatography analysis, and the gas total sulfur (TRS) content, and (ii) annually record the computed volume of vented reservoir gas from each pipeline depressurization event.
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.
Record Keeping	SoCalGas shall record the following: (i) The computed volume of gas (in units of scf) vented annually to the atmosphere resulting from all pipeline depressurizations; and the ROC and TRS content (by weight percent) of this gas. (ii) The dates and volumes of venting attributed to emergency events, and documentation of each emergency.
Test Methods	None

COMPLIANCE PLAN CERTIFICATION
(Form 1302-J14)

EMISSION UNIT: **Solvent Usage – District ID # 8680** Federal Requirement & its Title:

Method	Description or Reference Method
Monitoring	None
Reporting	On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.
Record Keeping	SoCalGas shall record in a log the following on a monthly basis for each solvent used: amount used; the percentage of ROC by weight (as applied); the solvent density; the amount of solvent reclaimed for District-approved disposal; whether the solvent is photochemically reactive; and, the resulting emissions to the atmosphere in units of pounds per month and pounds per day. Product sheets (MSDS or equivalent) detailing the constituents of all solvents shall be readily available.
Test Methods	None

***** If more than one page is used, please ensure that "Santa Barbara APCD", source name and "Form 1302-J2" appear on each page. *****

CERTIFICATION STATEMENT
(Form 1302-M)

APCD: Santa Barbara County Air Pollution Control District	➤ APCD USE ONLY ◀ APCD IDS PROCESSING ID:
COMPANY NAME: Southern California Gas Company	SOURCE NAME: La Goleta Station

Identify, by checking off below, the forms and attachments that are part of your application. If the application contains forms or attachments that are not identified below, please identify these attachments in the blank space provided below. Review the instructions if you are unsure of the forms and attachments that need to be included in a complete application.

Forms included with application

X Stationary Source Summary Form
X Total Stationary Source Emission Forms
X Compliance Plan Form
X Compliance Plan Certification Form
X Exempt Equipment Form
X Certification Statement Form

List other forms or attachments

X Proposed revisions to Title V PTO 9584-R6
X Revised Processed Gas Flow Measurement Plan
X Revised Process Monitor Calibration and Maintenance Plan
X Proposed Alternative Operating Scenarios

[ ] check here if additional forms listed on back

Attachments included with application

__ Description of Operating Scenarios
__ Sample emission calculations
__ Fugitive emission estimates
___ List of Applicable requirements
___ Discussion of units out of compliance with applicable federal requirements and, if required, submit a schedule of Compliance
___ Facility schematic showing emission points
___ NSR Permit
___ PSD Permit
___ Compliance Assurance monitoring protocols
___ Risk management verification per 112(r)

I certify under penalty of law, based on information and belief formed after reasonable inquiry, that the information contained in this application, composed of the forms and attachments identified above, are true, accurate, and complete.

I certify that I am the responsible official, as defined in SBCAPCD's Regulation XIII, Rule 1301 or USEPA's 40 CFR Part 70.

EWiegman ______ 9/24/2020
Signature of Responsible Official **Date**

Print Name of Responsible Official: Edward Wiegman

Title of Responsible Official and Company Name: Storage Operations Manager

APPENDIX B – CURRENT PERMITS

Appendix B.1 – Permit to Operate 9584-R6

Appendix B.2 – Draft Permit to Operate 15298

PERMIT to OPERATE 9584-R6
and
RENEWAL PART 70 OPERATING PERMIT 9584

LA GOLETA FACILITY
SOUTHERN CALIFORNIA GAS COMPANY

1171 MORE ROAD
GOLETA, CA 93117

OPERATOR

Southern California Gas Company

OWNERSHIP

Southern California Gas Company

Santa Barbara County
Air Pollution Control District

May 2018

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LIST OF FIGURES and TABLES

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FIGURE **PAGE**

ABBREVIATIONS/ACRONYMS

AP-42	USEPA's *Compilation of Emission Factors*
District	Santa Barbara County Air Pollution Control District
API	American Petroleum Institute
ASTM	American Society for Testing Materials
BACT	Best Available Control Technology
bpd	barrels per day (1 barrel = 42 gallons)
CAM	compliance assurance monitoring
CEMS	continuous emissions monitoring
CO	carbon monoxide
dscf	dry standard cubic foot
°F	degree Fahrenheit
gal	gallon
GHG	greenhouse gases
gr	grain
HAP	hazardous air pollutant (as defined by CAAA, Section 112(b))
H_2S	hydrogen sulfide
I&M	inspection & maintenance
k	kilo (thousand)
l	liter
lb	pound
lbs/day	pounds per day
lbs/hr	pounds per hour
LACT	Lease Automatic Custody Transfer
LPG	liquid petroleum gas
M	mega (million)
MACT	Maximum Achievable Control Technology
MM	million
MW	molecular weight
NESHAP	National Emission Standards for Hazardous Pollutants
NO_X	Oxides of nitrogen
NSPS	New Source Performance Standards
O_2	oxygen
OCS	outer continental shelf
ppm(vd or w)	parts per million (volume dry or weight)
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PM	particulate matter
PM_{10}	particulate matter less than 10 μm in size
$PM_{2.5}$	particulate matter less than 2.5 μm in size
PRD	pressure relief device
PTO	Permit to Operate
ROC	reactive organic compounds, same as VOC as used in this permit
RVP	Reid vapor pressure
scf	standard cubic foot
scfd (or scfm)	standard cubic feet per day (or per minute)
SIP	State Implementation Plan
SO_X	Sulfur oxides
STP	standard temperature (60°F) and pressure (29.92 inches of mercury)
THC	Total hydrocarbons
tpy, TPY	tons per year
TVP	true vapor pressure
USEPA	United States Environmental Protection Agency
VE	visible emissions
VRS	vapor recovery system

1.0 Introduction

1.1 Purpose

General. The Santa Barbara County Air Pollution Control District (District) is responsible for implementing all applicable federal, state and local air pollution requirements that affect any stationary source of air pollution in Santa Barbara County. The federal requirements include regulations listed in the Code of Federal Regulations: 40 CFR Parts 50, 51, 52, 61, 63, 64, 68, 70 and 82. The State regulations may be found in the California Health & Safety Code, Division 26, Section 39000 et seq. The applicable local regulations can be found in the District's Rules and Regulations. This is a combined permitting action that covers both the Federal Part 70 permit renewal (*Part 70 Operating Permit 9584*) as well as the State Operating Permit (*Permit to Operate 9584*).

Santa Barbara County is designated as an ozone non-attainment area for the state ambient air quality standards. The County is also designated a non-attainment area for the state PM_{10} ambient air quality standard.

Part 70 Permitting. This is the fifth renewal of the Part 70 Permit for the SoCalGas La Goleta facility, and satisfies the permit issuance requirements of the District's Part 70 Operating Permit program. The District's triennial permit reevaluation has been combined with this Part 70 Permit renewal. SoCalGas La Goleta Plant comprises the *SoCalGas – La Goleta* stationary source (SSID 5019), which is a major source for VOC[1], NO_X and CO. Conditions listed in this permit are based on federal, state or local rules and requirements. Sections 9.A, 9.B and 9.C of this permit are enforceable by the District, the USEPA and the public since these sections are federally enforceable under Part 70. Where any reference contained in Sections 9.A, 9.B or 9.C refers to any other part of this permit that part of the permit referred to is federally enforceable. Conditions listed in Section 9.D are "District-only" enforceable.

Pursuant to the stated aims of Title V of the CAAA of 1990 (i.e., the Part 70 operating permit program), this permit has been designed to meet two objectives. First, compliance with all conditions in this permit would ensure compliance with all federally enforceable requirements for the facility. Second, the permit is a comprehensive document to be used as a reference by the permittee, the regulatory agencies, and the public to assess compliance.

Greenhouse Gases - Rule 810. This reevaluation incorporates greenhouse gas emission calculations for the stationary source. These emissions establish baseline conditions under Rule 810, *Federal Prevention of Significant Deterioration*.

1.2 Facility Overview

1.2.1 Facility Overview: The La Goleta Stationary Source (SSID# 005019) is solely owned and operated by Southern California Gas Company (SoCalGas), a subsidiary of Sempra Energy, with the company regional headquarters located in downtown Los Angeles, CA. The source, consisting of the La Goleta facility (FID 1734) includes a number of natural gas compressors, a dehydration unit, ancillary units and a large underground natural gas storage reservoir. It is located in Goleta with a street address of 1171 More Road, Goleta, CA 93117 (postal address is

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[1] VOC as defined in Regulation XIII has the same meaning as reactive organic compounds as defined in Rule 102. The term ROC shall be used throughout the remainder of this document, but where used in the context of the Part 70 regulation, the reader shall interpret the term as VOC.

P.O. Box 818, Goleta, CA 93116). For District regulatory purposes, the source location is in the Southern Zone of the Santa Barbara County[2]. Figure 1-1 provides a site map depicting the source location and the main emission units.

The La Goleta facility was constructed in the 1940s. It consists of 21 underground gas storage wells, a dehydration plant consisting of a tank farm, odorization equipment, methanol storage tank, and external combustion equipment including flares, as well as a number of gas-fired internal combustion (IC) engines driving natural gas compressors and pumps. The La Goleta facility is permitted to withdraw natural gas from its underground storage at the rate of 680 MMscf/day, while its HC liquid (condensate, dry) production is restricted to 125,000 gallons per year. The facility consists of the following operating systems:

- Underground Natural Gas Storage and Retrieval system
- Sand and moisture separator system
- Gas Dehydration system
- Natural gas compression (using IC engines) and cooling system
- Tank farm for brine/condensate removal and storage
- Flares and Flare Gas Sulfur Removal System
- Gas shipping and metering system
- Electrical system /Micro-turbines
- Safety system
- Emergency fire pumps

Natural gas of PUC quality is compressed, cooled and stored in an underground depleted gas reservoir. During heavy demand the gas is withdrawn from the reservoir, separated from sand/moisture, dehydrated, odorized and routed to pipelines.

1.2.2 Facility Permit Overview: Since the last Part 70 renewal in June 2015, have been two (2) permit actions taken at this facility. Also one permit, ATC 14159 was issued prior to 2015 the permit is considered used and still active. The permits listed below.

ATC 14159 – Issued on 11/19/2013 for an upgrade of the dehydration plant by installing new gas processing and condensate removal equipment.

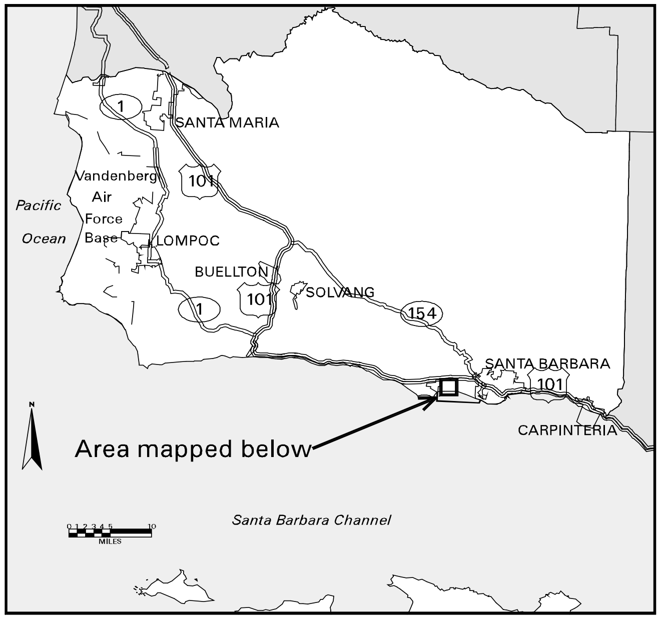
ATC 14840 – Issued on 08/11/2016 for installation of additional fugitive components to allow for safety upgrades at the storage wells.

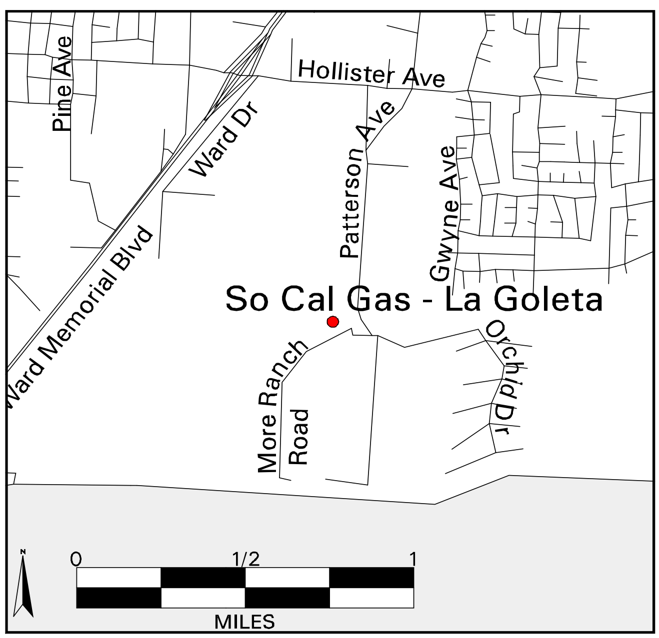
PTO 14840 – Issued on 12/27/2017 for operation of additional fugitive components to allow for safety upgrades at the storage wells.

[2] District Rule 102, Definition: “Southern Zone”

Figure 1.1 Location Map for SoCalGas La Goleta facility

Southern California Gas - La Goleta





1.3 Emission Sources

Air pollutant emissions at the La Goleta facility come from the following equipment categories:

Dehydration Plant Unit 14 - Consists of glycol gas dehydration units including glycol contactors, filters, rectifiers, electric pumps and heat exchangers; Plant Unit 14 also includes the following emissions units:

Tank Farm Units - Consists of flotation cells, hydrocarbon liquid storage tanks, brine water storage tank, methanol storage tank, pumps and a loading rack for hydrocarbon liquid (condensate) loading;

Separators at Plant Unit 14 - Consists of high- and low-pressure separators and sand traps along with valves and flanges;

Odorant Storage and Metering station at Unit 14 - Consists of an odorant storage tank, two pneumatically-driven odorant injection pumps, and two expansion tanks; and,

External Combustion Equipment – Consists of two (2) oil heaters and three (3) flares servicing the dehydration plant and the tank farm.

Gas Venting – Consists of gas vented through stacks during pipeline depressurization.

Natural Gas Fired Compression Units - Consists of eight large compressors driven by gas-fired IC engines; and,

Natural Gas Fired Support Units - Consists of two gas-fired IC engines powering air compressors, one gas-fired IC engine powering an emergency power generator, and four gas-fired micro turbines powering electrical generators.

Diesel-Fired Units – Consists of two IC engines that provide power to emergency fire pumps.

Section 4 of this permit provides the District's engineering analysis of these emission units. Section 5 describes the allowable emissions listed for each permitted equipment, the total permitted emissions from all permitted equipment. Potential HAP emissions estimates are also described in Section 5.

A list of all equipment, their operator-provided IDs, and individual unit ratings is provided in the Appendix, Section 10.5. Equipment considered permit-exempt by the District is listed in Section 10.6.

1.4 Emission Control Overview

The following emission control techniques are employed at the facility:

- Use of a vapor recovery system to reduce ROC emissions from the hydrocarbon liquid storage tank by 95 per cent (weight basis), as stipulated by Rule 326;
- Use of submerged fill pipes on all tanker trucks to reduce loading rack ROC emissions;
- Use of a flare relief system to combust hydrocarbon gases that would otherwise be released directly to the atmosphere; application of Rule 359 control measures to reduce flare emissions.
- Non-selective catalytic reduction (NSCR) units serving seven of the eight engines driving gas compressors. Air-fuel ratio (AFR) controllers assist all seven of the NSCR-controlled units.

- Sulfur removal units, using iron oxides and potassium permanganate, to reduce H_2S and mercaptans in the gaseous fuel going to the waste gas flares to permissible levels.
- Clean-burn technology controlling pollutant emissions from the lean burn engine, which powers the largest gas compressor.
- Designed low-NO_X emissions (approx. 10 ppmv) for the micro-turbines, which are Air Resources Board certified for California's distributed generation program, when fired on Public Utility Commission (PUC)-quality natural gas.
- An Inspection and Maintenance program for detecting and repairing leaks of hydrocarbons from piping components, i.e., valves, flanges and seals, consistent with the requirements of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

1.5 Offsets/Emission Reduction Credit Overview

The La Goleta plant facility does not require emission offsets. However, it provides NO_X emission reduction credits to the Point Arguello Project's Gaviota facility.

NO_X emission reductions achieved by the NSCR units at seven gas compressors are used as NO_X emission offsets. These emission reduction credits are valid for the life of the Point Arguello project. SoCalGas may use none of these emission reduction credits for other projects including those implemented, without prior approval by the District. Section 7 of this permit describes these emission reduction credits in detail.

1.6 Part 70 Operating Permit Overview

1.6.1. Federally-Enforceable Requirements: All federally enforceable requirements are listed in 40 CFR Part 70.2 (*Definitions*) under "applicable requirements". These include all SIP-approved District Rules, all conditions in the District-issued Authority to Construct permits and all conditions applicable to major sources under federally promulgated rules and regulations. All these requirements are enforceable by the public under CAAA. (*See Tables 3.1 and 3.2 for a list of federally enforceable requirements*).

1.6.2. Insignificant Emissions Units: Insignificant emission units are defined under District Rule 1301 `as any regulated air pollutant emitted from the unit, excluding Hazardous Air Pollutants (HAPs), that are less than 2 tons per year based on the unit's potential to emit and any HAP regulated under section 112(g) of the Clean Air Act that does not exceed 0.5 ton per year based on the unit's potential to emit. Insignificant activities must be listed in the Part 70 application with supporting calculations. Applicable requirements may apply to insignificant units.

1.6.3. Federal Potential to Emit: The federal potential to emit (PTE) of a stationary source does not include fugitive emissions of any pollutant, unless the source is: (1) subject to a federal NSPS/NESHAP requirement which was in effect as of August 7, 1980, or (2) included in the 29-category source list specified in 40 CFR 70.2. The federal PTE does include all emissions from any insignificant emissions units. None of the equipment at this facility is subject to a federal NSPS/NESHAP requirement which was in effect as of August 7, 1980, nor is it included in the 29-category list, therefore the federal PTE does not include fugitive emissions. (*See Section 5.4 for the federal PTE for this source.*)

1.6.4. Permit Shield: The operator of a major source may be granted a shield: (a) specifically stipulating any federally enforceable conditions that are no longer applicable to the source and (b) stating the reasons for such non-applicability. The permit shield must be based on a request from the source and its detailed review by the District. Permit shields cannot be granted indiscriminately with respect to all federal requirements. SoCalGas has not made a request for a permit shield.

1.6.5. Alternate Operating Scenarios: A major source may be permitted to operate under different operating scenarios, if appropriate descriptions of such scenarios are included in its Part 70 permit application and if such operations are allowed under federally-enforceable rules. SoCalGas made no request for permitted alternative operating scenarios.

1.6.6. Compliance Certification: Part 70 permit holders must certify compliance with all applicable federally enforceable requirements including permit conditions. Such certification must accompany each Part 70 permit application; and, be re-submitted annually on or before March 1st and September 1st, as specified in the permit. Each certification is signed by a "responsible official" of the owner/operator company whose name and address is listed prominently in the Part 70 permit. (*See Section 1.6.10 below)*

1.6.7. Permit Reopening: Part 70 permits are re-opened and revised if the source becomes subject to a new rule or new permit conditions are necessary to ensure compliance with existing rules. The permits are also re-opened if they contain a material mistake or the emission limitations or other conditions are based on inaccurate permit application data.

1.6.8. MACT/Hazardous Air Pollutants (HAPs): Part 70 permits also regulate emission of HAPs from major sources through the imposition of maximum achievable control technology (MACT), where applicable. The federal PTE for HAP emissions from a source is computed to determine MACT or any other rule applicability. Gas compressors #2 through #8 are subject to NESHAP provisions to control formaldehyde emissions. Gas compressors #2 through #8 are equipped with NSCR as required by 40 CFR 63 Subpart ZZZZ. Exhaust concentrations of formaldehyde emissions are limited to 2.7 ppmvd at 15% oxygen. (*see Sections 3.2, 4.8 and 9.C)*.

1.6.9. Compliance Assurance Monitoring (CAM): The CAM rule became effective on April 22, 1998. This rule affects emission units at the source subject to a federally enforceable emission limit or standard that uses a control device to comply with the emission standard, and either pre-control or post-control emissions exceed the Part 70 source emission thresholds. Sources subject to CAM Rule must submit a CAM Rule Compliance Plan along with their Part 70 operating permit renewal applications. All NSCR-controlled IC engines driving the compressors are subject to this Rule. (*see Sections 3.2.6, 4.9.3, Table 4.2 and 9.C.18)*

1.6.10 Responsible Official: The designated responsible official and mailing address is:

Mr. Edward Wiegman, Storage Operations Manager
Southern California Gas Company
Post Office Box 818
Goleta, California 93116-0818
Telephone: (805) 681-8068

The designated alternative responsible official and mailing address is:

Mr. Glenn La Fevers
Southern California Gas Company
9400 Oakdale Avenue
Chatsworth, California 91311

2.0 Process Description

2.1 Process Summary

California Public Utilities Commission (CPUC) quality natural gas (meeting General Order 58-A standards) is purchased by SoCalGas from regional oil and gas producing companies. The gas comes to the La Goleta facility via pipelines. This natural gas is re-compressed to above 1300 psig by the eight (8) large IC engine driven compressors at the facility; after re-compression, the gas is stored in an underground depleted gas reservoir. During heavy demand periods natural gas is withdrawn from the sub-surface reservoir, its trapped impurities are removed, it is dehydrated, then it is transferred to pipelines.

Seven compressors, Units #2 through #8, are four-stroke rich burn units equipped with non-selective catalytic reduction (NSCR) for emission control. Unit #9, the largest compressor, is a two-stroke lean-burn unit equipped with Clean-Burn technology to lower its emissions below the District requirements.

2.1.1 *Separators:* Separators at the dehydration facility remove free liquids and solids from the withdrawal gas stream. Sand causes erosion in the existing processing equipment and liquids, which reduces the efficiency of the glycol contactors.

Gas withdrawn from the field enters the dehydration plant through high-pressure separators, where sand and free liquids are removed. Gas then flows to low-pressure separators where any residual sand and free liquids are removed. The gas then flows to the glycol contactors for dehydration or directly to the transmission lines. Sand removed from the high-pressure separators is allowed to flow into a sand trap, which is emptied as necessary using a vacuum truck or manually. The free liquids removed from the separators are routed to the flotation cells at the tank farm.

2.1.2 *Dehydration Plant 14:* The "Dehy" plant is used to dehydrate gas withdrawn from the field. This gas contains hydrocarbon liquids and water and must be dried to pipeline quality before entering the transmission system. Gas withdrawn from the field enters the station through regulators where the pressure is reduced from 1300 - 1800 psig to 1,000 psig or below. The gas flows into glycol contactors where most of the free liquids are absorbed by the glycol. Along with the water, the glycol absorbs some entrained hydrocarbons and other impurities present in the gas. This rich glycol is then heated by heat exchangers to regenerate the glycol by driving off water, condensate, and other impurities. The regenerated lean glycol is then re-circulated into the contactors. The gas coming off from the contactor unit is commingled with a pre-determined amount of non-dehydrated gas to achieve the designed mix; and then routed into the supply system.

A condenser removes HC condensates from the glycol rectifier flash gas. The liquid removed from this gas is routed to the flotation cells at the tank farm. The post-condenser excess flash gas is treated for sulfur removal by the Sulfa Treat units, and then burned off in the flare stacks serving the dehydration plant.

2.1.3 *Tank Farm:* Oily/Watery liquids collected from the gas in the separator traps and other units of the dehydration plant are pumped into one of the two flotation cells where the brine water and oily liquids are separated by gravity. After separation, the oily liquid is pumped into the hydrocarbon liquid storage tank and the brine is pumped into the brine water storage tank. The HC/brine is removed from the brine tank for disposal by a vacuum truck (highway tanker cargo carrier).

The HC condensate storage tank, the brine water storage tank and the flotation cells are closed and equipped with a vapor recovery system. When pressure builds in the tanks past a low-pressure set-point, a blower is activated and the excess gas is vented to a flare that is equipped with a continuous flame pilot.

2.1.4 *Methanol Storage Tank:* Methanol is used to prevent the formation of hydrates in the withdrawal gas pressure regulators. The hydrates can freeze to ice, which would occur during large pressure drops. Pneumatic pumps at the dehydration plant are used to inject methanol.

2.1.5 *Natural Gas Odorant and Metering Equipment:* A metering pump injects odorant Captan-50 (50% Tetrahydrothiophene and 50% t-Butyl Mercaptan) or Thiophane into gas piped from the SoCalGas La Goleta underground storage and dehydration facility. Tanker trucks equipped with a vapor recovery system to reduce transfer emissions fill the odorant storage tank.

2.1.6 *Fugitive Components:* The fugitive components emit reactive organic compounds (ROC) from the valves, flanges, and fittings. Molecular composition of the ROC in the natural gas ranges to 13.3%, by weight, of the total hydrocarbon amount.

2.2 Support Systems

2.2.1 *Power Generation*: Four (4) natural gas fired micro-turbines powering generators provide power for the plant facility. La Goleta facility also employs one 160 hp gas-fired IC engine to provide emergency power to the office building at the facility. The gas-fired emergency equipment unit is restricted to 199 hours of operation annually, and is exempt from emission controls.

2.2.2 *Cooling Fans:* Cooling fans at the La Goleta facility, previously driven by gas-fired IC engines, are now driven by electric motors. Thus, these are no longer subject to any IC engine emission control rules.

2.2.3 *Support Operations:* Two (2) gas-fired IC engines, Units 4A and 5A, drive air compressors, and two (2) diesel-fired IC engines (units 12A and 13A) drive emergency firewater pumps to service equipment at the facility. The support units 4A and 5A are rated less than 50 horsepower and not subject to the District Rule 333 standards, and are not emissions-controlled. The support units 12A and 13A are exempt from Rule 333 per Rule 333.B.1.d and are not emissions-controlled.

2.2.4 *Heat Supply*: One hot oil (thermal fluid) heater rated at 3.500 MMBtu/hr and a similar 2.200 MMBtu/hr hot oil heater are used to provide heat to the heat exchangers in the dehydration process. Each unit is fired on PUC-quality natural gas. The 2.200 MMBtu/hr unit only operates when the 3.500 MMBtu/hr unit is not operating. There may be very brief overlap in operations of the two units but an analysis submitted by SoCalGas showed the combined operations cannot exceed five (5) minutes, after which one of the two units is forced to shut down automatically. This analysis demonstrated the heat exchangers cannot handle heat input from both heaters simultaneously for more than five minutes without temperatures in the heat exchangers rising above design levels. Also, two pre-heat boilers each rated at 2.0 million Btu/hr, pre-heat the gas upstream of the regulation station which feeds to Line 1003.

2.2.5 *Flares:* Three flares, each rated at 1.60 million BTU/hr, are used to flare off excess ROC from the tanks and dehydration plant. The constant-flame pilots at the flares are fired by PUC quality natural gas. The flare gas sulfur level is controlled by SulfaTreat units to below 239 ppmv.

2.2.6 *Loading Station:* A loading station facilitates periodic removal of liquids from the HC condensate storage tank into trucks. The trucks remove up to 125,000 gallons of the HC condensates annually.

2.2.7 *Flow Metering:* Flow metering is essential in the pre-sales blending of de-hydrated and non-dehydrated processed gases at the Gas Plant. All of the flow measurement devices (3419, 3433, 3445, 3464 and the four contactor outlets) are fitted with transmitters to meter and monitor volumetric flows via dynamic compensation procedures. Volumetric flow data is fed to a server computer at the Plant.

2.3 Maintenance/Degreasing Activities

2.3.1 *Paints and Coatings*: Maintenance painting at La Goleta facility is conducted on an intermittent basis. Normally, only touch-up and equipment labeling or tagging is done with cans of spray paint.

2.3.2 *Solvent Usage*: Solvents not used for surface coating thinning may be used at the facility for daily operations. Usage includes cold solvent degreasing and wipe cleaning with rags.

2.4 Planned Process Turnarounds

Process turnarounds on the facility equipment are not planned/scheduled at La Goleta Plant.

2.5 Other Processes

Venting: Gas may be vented during pipeline depressurization. This gas is vented through a stack, but it is not flared and emissions of ROC are not controlled during this process. SoCalGas is limited to venting no more than 10 MMscf of gas per year.

2.6 Detailed Process Equipment Listing

Refer to the tables in Attachment 10.5 and 10.6 for a complete listing of all permitted and exempt emission units.

3.0 Regulatory Review

This Section identifies the federal, state and local rules and regulations applicable to the La Goleta facility.

3.1 Rule Exemptions Claimed

⇒ District Rule 202 (*Exemptions to Rule 201*): SoCalGas has requested and obtained permit exemptions for the following equipment items (*note that an exemption from permit does not grant relief from any applicable prohibitory rule unless specifically exempted by that prohibitory rule)*:

- Two (2) gas-fired IC engines, Waukesha VRG 220Us, 48 hp each (*202.F.1.f)*
- Two (2) glycol storage tanks, 2000 gallons capacity each and one (1) glycol run tank (*202.V.1*);
- Three (3) diesel tanks, two 110 gallons and one 600 gallons capacity (*202.V.2*);
- Three (3) Lube oil tanks, 5000 gallons capacity each (*202.V.3*)
- One (1) degreaser unit, JRI, Model TL 21, using non-ROC solvent (*202.U.2.c*);
- One (1) emergency electrical generator driven by a Waukesha F817GU gas-fired IC engine rated at 160 hp and operated < 200 hours/year (*202.F.1.d)*; and,
- One (1) glycol/glycol heat exchanger and one (1) glycol/oil heat exchanger (202.L.1).
- One (1) water/gas heater exchanger (202.L.1)

⇒ District Rule 325 (*Crude Oil Production and Storage)*: Based on Rule 325.A, this post-custody-transfer facility is not subject to Rule 325.

⇒ District Rule 326 (*Storage of Reactive Organic Compound Liquids)*: The pressurized glycol tanks and the methanol liquid storage tank at this facility are less than 5,000 gallons capacity. Similarly, the pressurized odorant storage tanks are less than 5,000 gallons capacity. Based on Rule 326.B.1.(a) and (b), these tanks are exempt from this rule

⇒ District Rule 331 (*Fugitive Emissions Inspection and Maintenance*): This facility, as currently configured, is not a gas production field or a gas processing plant as defined by Rule 331.C. Therefore this facility is not subject to Rule 331.

⇒ District Rule 333 (*Control of Emissions from Reciprocating Internal Combustion Engines*): Two (2) gas-fired IC engines driving two air compressors (4A & 5A) are rated less than 50 bhp, therefore they are not subject to Rule 333. The gas-fired emergency generator is exempt from Rule 333 based on Rule 333.B.1.b. The two diesel-fired emergency fire pumps are exempt from Rule 333 per Rule 333.B.1.d.

⇒ District Rule 342 (*Control of NO_X Emissions from Boilers, Steam Generators and Process Heaters*): The two hot oil heaters are not subject to Rule 342 since the heaters each have a heat input less than 5.0 MMBtu/hr.

⇒ District Rule 359 (*Flares and Thermal Oxidizers*): Each of the three flares is rated at 1.60 MMBtu/hour heat input. Based on Rule 359.B.3, the provisions of Rule 359 with the exception of Sections D.1 (*fuel sulfur content*), D.2 (*technology standards*), G (*monitoring*) and H (*reporting*), do not apply to the flares.

3.2 Compliance with Applicable Federal Rules and Regulations

3.2.1 40 CFR Parts 51/52 {*New Source Review (Nonattainment Area Review and Prevention of Significant Deterioration*)}: The La Goleta facility was constructed and permitted prior to the applicability of these regulations. However, all permit modifications as of July 1979 are subject to District NSR requirements. Compliance with District Regulation VIII (*New Source Review*) ensures that future modifications to the facility will comply with these regulations.

3.2.2 40 CFR Part 60 {*New Source Performance Standards*}: None of the equipment in this permit is subject NSPS requirements.

3.2.3 40 CFR Part 61 {*NESHAP}*: None of the equipment in this permit is subject 40 CFR Part 61 requirements.

3.2.4 40 CFR Part 63 {*MACT*}: On June 17, 1999, the USEPA promulgated Subpart HHH, a NESHAPS for Oil and Natural Gas Production and Natural Gas Transmission and Storage. The subpart applies to owners and operators of natural gas transmission and storage facilities that are major sources of HAPs. Based on District records, HAP emissions from the La Goleta Plant do not exceed the USEPA-defined major HAP source threshold levels (see Section 5 for estimated HAP emissions). Therefore, this subpart does not apply.

3.2.5 40 CFR Part 63 (MACT): The rule requirements listed below are based on the current version of the NESHAP.

The final amendments to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for reciprocating internal combustion engines (RICE) was published in the Federal Register on January 18, 2008 as 40 CFR Part 63 Subpart ZZZZ. An affected source under the NESHAP is any existing, new, or reconstructed stationary RICE located at a major source or area source. Based on District records, HAP emissions from the La Goleta Plant do not exceed the USEPA-defined major HAP source threshold levels (see Section 5 for estimated HAP emissions). Therefore, the La Goleta Plant is currently considered an area HAP source.

A stationary RICE located at an area source of HAP emissions is new if construction or reconstruction commenced on or after June 12, 2006. Reconstruction is defined in 40 CFR 63.2 as the replacement of components to such an extent that the fixed capital costs of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable new source. All of the engines at the facility were in place before June 12, 2006. The cost of ongoing maintenance on each engine does not exceed 50% of the fixed capital cost that would be required to construct a comparable new engine, therefore all of the RICEs at the facility are considered existing engines for the purpose of this Subpart.

Existing emergency standby compression ignition RICE at area sources of HAP emissions (the two E/S DICE firewater pumps) must comply with the applicable emission and operating limits. The following operating requirements apply:

(1) Change the oil and filter every 500 hours of operation or annually, whichever comes first;

(2) inspect the air cleaner every 1,000 hours of operation or annually, whichever comes first;

(3) inspect all hoses and belts every 500 hours of operation or annually, whichever comes first.

Existing emergency standby spark ignition RICE at area sources of HAP emissions (the Waukesha emergency electrical generator) must comply with the applicable emission and operating limits. The following operating requirements apply:

(1) Change the oil and filter every 500 hours of operation or annually, whichever comes first;

(2) inspect spark plugs every 1,000 hours of operation or annually, whichever comes first;

(3) inspect all hoses and belts every 500 hours of operation or annually, whichever comes first.

Existing non-emergency, non-black start 2SLB spark ignition RICE at area sources of HAP emissions (the Cooper-Bessemer) must comply with the applicable emission and operating limits. The following operating requirements apply:

(1) Change the oil and filter every 4,320 hours of operation or annually, whichever comes first;

(2) inspect spark plugs every 4,320 hours of operation or annually, whichever comes first;

(3) inspect all hoses and belts every 4,320 hours of operation or annually, whichever comes first.

Existing non-emergency, non-black start 4SRB spark ignition RICE rated less than or equal to 500 hp at area sources of HAP emissions (the two Waukesha air compressors) must comply with the applicable emission and operating limits. The following operating requirements apply:

(1) Change the oil and filter every 1,440 hours of operation or annually, whichever comes first;

(2) inspect spark plugs every 1,440 hours of operation or annually, whichever comes first;

(3) inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first.

For any engine subject to oil change requirements, the owner or operator has the option of utilizing an oil analysis program specified in 40 CFR 63 Subpart ZZZZ §63.6625(i) in order to extend the specified oil change interval. If all the requirements detailed in this section of the regulation are satisfied, the owner or operator shall not be required to change the oil. If any of the limits are exceeded the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis. If the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later.

Existing non-emergency, non-black start 4SRB spark ignition RICE rated greater than 500 hp at area sources of HAP emissions (the eight Ingersoll-Rand gas compressors) must comply with the applicable emission and operating limits. The following emission limits apply:

(1) Limit concentration of formaldehyde in the exhaust to 2.7 ppmvd @ 15% O_2; or

(2) Reduce formaldehyde emissions by 76% or more.

Gas compressors #2 through #8 are subject to NESHAP provisions to control formaldehyde emissions. Gas compressors #2 through #8 are equipped with NSCR as required by 40 CFR 63 Subpart ZZZZ. Exhaust concentrations of formaldehyde emissions are limited to 2.7 ppmvd at 15% oxygen.

The operator must:

(1) Collect the catalyst inlet temperature data according to §63.6625(b), reducing these data to 4-hour rolling averages; and maintaining the 4-hour rolling averages within the limitation of greater than or equal to 750 °F and less than or equal to 1,250°F for the catalyst inlet temperature; or

(2) Immediately shut down the engine if the catalyst inlet temperature exceeds 1,250^{o} F.

To demonstrate continuous compliance with the operating parameters, the operator must:

(1) Measure the pressure drop across the catalyst once per month; and

(2) Collect the catalyst inlet temperature data and reduce the data to 4-hour rolling averages.

The operator must conduct a performance test every 8,760 hours of operation, or every three years, whichever comes first.

3.2.6 40 CFR Part 63 (*MACT*): EPA has implemented MACT standards for boilers per 40 CFR 63 Subpart DDDDD (major sources) and per 40 CFR 63 Subpart JJJJJJ (area sources). The La Goleta facility is an area source of HAP. Therefore, 40 CFR 63 Subpart DDDDD is not applicable. Additionally, gas-fired boilers are not subject to 40 CFR 63 subpart JJJJJJ per section 63.11195(e). Thus, SoCalGas is not subject to the requirements of either of the Boiler MACT regulations.

3.2.7 <u>40 CFR Part 64 {*Compliance Assurance Monitoring*}</u>: This rule became effective on April 22, 1998. This rule affects emission units at the source subject to a federally enforceable emission limit or standard that uses a control device to comply with the emission standard, and either pre-control or post-control emissions exceed the Part 70 source emission thresholds. Compliance with this rule was evaluated and it was determined that all IC engines driving gas compressors at this facility and equipped with NSCR devices are subject to Compliance Assurance Monitoring (CAM) [*Ref: 40 CFR 64.2(a)*]. SoCalGas submitted a CAM Plan in August 2002, and has updated it periodically. See Section 4.9.3 (along with Table 4.2) and 9.C.1(c)(ii) of this permit for further detailed information on the CAM Plan requirements.

3.2.7 <u>40 CFR Part 70 {*Operating Permits*}</u>: This Subpart is applicable to the La Goleta Plant. Table 3.1 lists the federally enforceable District promulgated rules that are "generic" and apply to the EOF. Table 3.2 lists the federally enforceable District promulgated rules that are "unit-specific" that apply to the EOF. These tables are based on data available from the District's administrative files, from SoCalGas Part 70 Operating Permit 9584-R4 issued in June 2012 and their renewal application submitted in December 2014. Table 3.2 includes the District's adoption dates of these rules.

In its Part 70 permit application, SoCalGas certified compliance with all existing District rules and permit conditions. This certification is also required of SoCalGas semi-annually. Issuance of this permit and compliance with all its terms and conditions will ensure that SoCalGas complies with the provisions of all applicable Subparts.

3.3 Compliance with Applicable State Rules and Regulations

3.3.1 Division 26. Air Resources {California Health & Safety Code}: The administrative provisions of the Health & Safety Code apply to this facility and will be enforced by the District. These provisions are District-enforceable only.

3.3.2 California Code of Regulations, Title 17, Sub-Chapter 6, Sections 92000 through 92530: These sections specify the standards by which abrasive blasting activities are governed throughout the State. All abrasive blasting activities at the La Goleta Plant are required to conform to these standards. Compliance will be assessed through onsite inspections. These standards are District-enforceable only. However, CAC Title 17 does not preempt enforcement of any SIP-approved rules that may be applicable to emissions from abrasive blasting activities.

3.3.3 California Code of Regulations, Title 17, Section 93115: This section is the airborne toxic control measure (ATCM) to reduce diesel particulate matter (PM) and criteria pollutant emissions from stationary diesel-fueled compression ignition (CI) engines. Its provisions apply to any stationary, industrial CI engine operated in California with a rated brake horsepower greater than 50 (>50 bhp). Portable or off-road l IC engines not integral to the stationary source operations are exempt from this ATCM. The two emergency standby firewater pump engines are subject to the ATCM. Per section 93115.3(n) the engines are exempt from the maintenance and testing hours limits of the ATCM, as long as they only operate the number of hours necessary to comply with the testing requirements of the NFPA Standard 25.

3.3.4 Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (CCR Title 17, Section 95665 *et. Seq.*): On October 1, 2017, the California Air Resources Board (CARB) finalized this regulation, which establishes greenhouse gas emission standards for natural gas underground storage facilities. This facility is subject to the provisions of this regulation. The separators and tanks at this facility satisfy the requirements of the CARB regulation through the use of a vapor collection system. The reciprocating natural gas compressors at this facility are subject to the rod packing/seal vent flow measurement requirements and flow rate standards of Section 95668(c)(4) of the regulation. The natural gas powered pneumatic devices at this facility must comply with the requirements of Section 95668(e) of the regulation. The well casing vents at this facility are not open to the atmosphere during normal operations, and are therefore exempt from the flow rate monitoring requirements of the regulation. The components, including components found on tanks, separators, wells and pressure vessels, are subject to the leak detection and repair (LDAR) requirements of Section 95669 of the regulation. The CARB regulation also requires SoCalGas to implement a continuous monitoring program and daily or continuous leak screening at each injection/withdrawal wellhead. This facility does not utilize circulation tanks for well stimulation treatments, centrifugal natural gas compressors, or liquids unloading from natural gas only wells, and is therefore not subject to the CARB regulation standards and requirements for these equipment and processes.

3.4 Compliance with Applicable Local Rules and Regulations

3.4.1 Applicability Tables: Tables 3.1 and 3.2 list the federally-enforceable District rules. Table 3.3 lists the non-federally-enforceable District rules that apply to this facility.

3.4.2 Rules Requiring Further Discussion: This section provides a more detailed discussion regarding the applicability and compliance of certain rules. The following is a rule-by-rule evaluation of compliance for La Goleta facility:

Rule 201 - Permits Required: This rule applies to any person who builds, erects, alters, replaces, operates or uses any article, machine, equipment, or other contrivance which may cause the issuance of air contaminants. The equipment included in this permit is listed in Attachment 10.4. An Authority to Construct is required to return any de-permitted equipment to service and may be subject to New Source Review.

Rule 210 - Fees: Pursuant to Rule 210.G, District permits are reevaluated every three years. This includes the re-issuance of the underlying permit to operate. Also included are the PTO fees. The fees for this facility are based on the District Rule 210, Fee Schedule A. Attachment 10.3 presents the fee calculations for the reevaluated permit. La Goleta Plant was scheduled for reevaluation in June 2018 and the 3-year fees are based on this date.

Rule 301 - Circumvention: This rule prohibits the concealment of any activity that would otherwise constitute a violation of Division 26 (Air Resources) of the California H&SC and the District rules and regulations. To the best of the District's knowledge, SoCalGas is operating in compliance with this rule.

Rule 302 - Visible Emissions: This rule prohibits the discharge from any single source any air contaminants for which a period or periods aggregating more than three minutes in any one hour which is as dark or darker in shade than a reading of 1 on the Ringlemann Chart or of such opacity to obscure an observer's view to a degree equal to or greater than a reading of 1 on the Ringlemann Chart. Sources subject to this rule include: the flares and all gas or diesel-fired piston internal combustion engines. Compliance will be assured by requiring all engines to be maintained according to manufacturer maintenance schedules, and through visible emissions monitoring requirements in Condition 9.B.2. Rule 359 addresses the need for the flares to operate in a smokeless fashion.

Rule 303 - Nuisance: This rule prohibits the plant operator from causing a public nuisance due to the discharge of air contaminants. SoCalGas will maintain complaint logs on-site to record any nuisance complaints reported to the District, which requires SoCalGas mitigation action.

Rule 305 - Particulate Matter, Southern Zone: La Goleta Plant is considered a Southern Zone source. This rule prohibits the discharge into the atmosphere from any source particulate matter in excess of specified concentrations measured in gr/scf. The maximum allowable concentrations are determined as a function of volumetric discharge, measured in scfm, and are listed in Table 305(a) of the rule (*lowest allowable limit is 0.01 gr/dscf*). Sources subject to this rule include: the flares, all IC engines, including diesel-fired units, and the micro-turbine generators. Compliance with PM_{10} emission limits is usually met by all natural gas-fired devices (uncontrolled PM_{10} emission factor equivalent to 0.007 gr/dscf). Improperly maintained diesel engines have the potential to violate this rule. Compliance will be assured by requiring all engines to be maintained according to a District-approved *IC Engine Inspection and Maintenance Plan*.

Rule 309 - Specific Contaminants: Under Section A, no source may discharge sulfur compounds and combustion contaminants in excess of 0.2% as SO_2 (by volume) and 0.3 gr/scf (at 12% CO_2) respectively. Sulfur emissions due to the combustion of waste gases in the flares should comply with the SO_2 limit due to stoichiometric combustion requirements. All diesel powered piston IC engines have the potential to exceed the combustion contaminant limit if not properly maintained (see discussion on Rule 305 above for compliance).

Rule 311 - Sulfur Content of Fuels: This rule limits the sulfur content of fuels combusted in La Goleta facility to 0.5% (by weight) for liquids fuels and 15 gr/100 scf (calculated as H_2S) {or 239 ppmv} for gaseous fuels. Natural gas fuel used at the facility is of PUC quality (4 ppmv H_2S); gaseous fuel combusted at the flares are controlled to 239 ppmv H_2S content using sulfur removal units.

Rule 317 - Organic Solvents: This rule sets specific prohibitions against the discharge of emissions of both photochemically and non-photochemically reactive organic solvents (40 lb/day and 3,000 lb/day respectively). Solvents may be used at the La Goleta Plant during normal operations for degreasing by wipe cleaning and for use in paints and coatings in maintenance operations. There is the potential to exceed the limits under Section B.2 during significant surface coating activities. SoCalGas will be required to maintain records to ensure compliance with this rule.

*Rule 321 - Solvent Cleaning Operations***:** This rule was revised to fulfill the commitment in the Clean Air Plans to implement requirements for solvent cleaning machines and solvent cleaning. The revised rule contains solvent reactive organic compounds (ROCs) content limits, revised requirements for solvent cleaning machines, and sanctioned solvent cleaning devices and methods. These provisions apply to solvent cleaning machines and wipe cleaning.

Rule 322 - Metal Surface Coating Thinner and Reducer: This rule prohibits the use of photochemically reactive solvents for use as thinners or reducers in metal surface coatings. The permittee will be required to maintain records during maintenance operations to ensure compliance with this rule.

Rule 323.1 – Architectural Coatings: This rule sets the standards for any architectural coating that is supplied, sold, offered for sale, or manufactured for use within the District.

Rule 324 - Disposal and Evaporation of Solvents: This rule prohibits any source from disposing more than one and a half gallons of any photochemically reactive solvent per day by means that will allow the evaporation of the solvent to the atmosphere. SoCalGas will be required to maintain records to ensure compliance with this rule.

Rule 326 – Storage of Reactive Organic Compound Liquids: This rule, adopted December 14, 1993, applies to equipment used to store ROC liquids with a vapor pressure greater than 0.5 psia. The primary requirements of this rule are under Sections D and E. The flotation cells and the HC condensate storage tank (Device ID#s 1217, 1219, and 1220) are subject to the requirements of this rule. SoCalGas complies with this rule by using a District-approved vapor recovery system on all three tanks.

Rule 330 – Surface Coating of Metal Parts and Products: This rule applies to the use of surface coatings applied to metal parts and products. It does not apply to coating operations which are subject to Rule 323.

Rule 333 - Control of Emissions from Reciprocating Internal Combustion Engines: This rule applies to all engines with a rated brake horsepower of 50 or greater that are fueled by liquid or gaseous fuels. As stated above, the emergency standby DICEs powering the firewater pumps and the emergency standby generator are exempt from the requirements of Rule 333. The IC engines powering the eight compressors are subject to the NO_X, CO and ROC standards under Section E for non-cyclic engines. Unit #9 is a lean-burn engine; the other seven engines subject to the rule are rich-burn engines. Ongoing compliance will be achieved through implementation of the

District-approved *Inspection and Maintenance Plan* and through biennial source testing for Unit #9 and, annual source testing for Units #2-8.

Rule 346 - Loading of Organic Liquids: This rule applies to the transfer of organic liquids into an organic liquid cargo vessel. For this rule only, an organic liquid cargo vessel is defined as a truck, trailer or railroad car. The loading station operated at the La Goleta facility is subject to this rule. Compliance with the rule requirements is met since submerged fill pipes are used. The facility throughput is limited to less than 20,000 gallons per day and 150,000 gallons per year so a vapor recovery system is not required for the loading station.

Rule 352 – Natural Gas-Fired Fan-Type Central Furnaces and Small Water Heaters: This rule applies to new water heaters rated less than 75,000 Btu/hr and new fan-type central furnaces. It requires the certification of newly installed units.

Rule 353 – Adhesives and Sealants: This rule applies to the use of adhesives and sealants. Compliance with this rule will be achieved through use of Rule 353-allowable sealants and adhesives and through proper record keeping per Rule 353 addressing the use of adhesives and sealants at the facility.

Rule 359 - Flares and Thermal Oxidizers: This rule applies to flares for both planned and unplanned flaring events. Compliance with this rule has been documented. A detailed review of compliance issues is as follows:

- D.1 - Sulfur Content in Gaseous Fuels: Part (a) limits the total sulfur content of all planned flaring from South County flares to 15 gr/100 cubic feet (239 ppmv) calculated as H_2S at standard conditions. Compliance with this rule is anticipated since SoCalGas has installed a sulfur removal system upstream of the flare, and periodic monitoring of the system is required per Section 9.C.4 provisions.
- D.2 - Technology Based Standard: Requires all flares to be smokeless and sets pilot flame requirements. The flares at La Goleta facility are in compliance with this section.

Rule 360 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers: This rule applies to any water heater, boiler, steam generator, or process heater rated from 75,000 Btu/hour to 2.000 MMBtu/hr. Any unit manufactured after October 17, 2003 must be certified to meet the NO_X emission limits of the rule. The two new 2.000 MMBtu/hr gas preheaters are certified to meet the emission limits for NO_X at 30 ppm @3% O_2 and for CO at 400 ppm@3% O_2.

Rule 361- Small Boilers, Steam Generators, and Process Heaters: This rule applies to process heaters rated between 2 and 5 MMBtu/hr. A process heater is defined in Rule 361 as any external combustion equipment which transfers heat from combustion gases to water or process streams. The heaters use oil to heat a rich glycol process stream, therefore the units are defined as process heaters per Rule 361.

The emission standards of Rule 361 do not apply to existing units until 2020. Therefore no modifications to the units, or monitoring, or source testing is required at this time. SoCalGas will be required to comply with the requirements for existing units for HOH #1 and HOH #2 (device IDs 001214 and 107535) by the deadlines established in the rule.

Rule 505 - Breakdown Conditions: This rule describes the procedures that SoCalGas must follow when a breakdown condition occurs to any emissions unit associated with La Goleta facility. A breakdown condition is defined as an unforeseeable failure or malfunction of (1) any air pollution control equipment or related operating equipment which causes a violation of an emission limitation or restriction prescribed in the District Rules and Regulations, or by State law, or (2) any in-stack continuous monitoring equipment, provided such failure or malfunction:

a. Is not the result of neglect or disregard of any air pollution control law or rule or regulation;

b. Is not the result of an intentional or negligent act or omission on the part of the owner or operator;

c. Is not the result of improper maintenance;

d. Does not constitute a nuisance as defined in Section 41700 of the Health and Safety Code;

e. Is not a recurrent breakdown of the same equipment.

Rule 603 - Emergency Episode Plans: Section A of this rule requires the submittal of *Stationary Source Curtailment Plan* for all stationary sources that can be expected to emit more than 100 tons per year of hydrocarbons, nitrogen oxides, carbon monoxide or particulate matter. SoCalGas submitted such a plan December 2008 which was subsequently approved by the District on June 18, 2009.

Rule 810 – Federal Prevention of Significant Deterioration: This rule was adopted January 20, 2011 to incorporate the federal Prevention of Significant Deterioration rule requirements into the District's rules and regulations. Future projects at the facility will be evaluated to determine whether they constitute a new major stationary source or a major modification.

3.5 Compliance History

This section contains a summary of the compliance history for this facility and was obtained from documentation contained in the District's administrative file.

3.5.1 Violations: Notice of Violation 10721 was issued to SoCal Gas on June 2, 2015 for failure to measure the gross heating value and sulfur content of gaseous fuels combusted in internal combustion engines and failure to measure sulfur content of gaseous fuel burned in flares. The NOV has been settled.

3.5.2 Hearing Board Actions: Variance 2016-26-N was granted on September 9, 2016 to allow the 650 hp gas fired compressor to operate under "no load" and "light load" conditions (<500 bhp) to check, adjust, tune-up and break-in the engine/compressor following overhaul work. During this period the catalytic converter element was removed to prevent oil fouling.

Table 3.1 - Generic Federally-Enforceable District Rules

Generic Requirements	Affected Emission Units	Basis for Applicability	Adoption Date
RULE 101: Compliance by Existing Installations	All emission units	Emission of pollutants	June 21, 2012
RULE 102: Definitions	All emission units	Emission of pollutants	August 25, 2016
RULE 103: Severability	All emission units	Emission of pollutants	October 23, 1978
RULE 201: Permits Required	All emission units	Emission of pollutants	June 19, 2008
RULE 202: Exemptions to Rule 201	Applicable emission units, as listed in form 1302-H of the Part 70 application.	Insignificant activities/emissions, per size/rating/function	August 25, 2016
RULE 203: Transfer	All emission units	Change of ownership	April 17, 1997
RULE 204: Applications	All emission units	Addition of new equipment of modification to existing equipment.	August 25, 2016.
RULE 205: Standards for Granting Permits	All emission units	Emission of pollutants	April 17, 1997
RULE 206: Conditional Approval of Authority to Construct or Permit to Operate	All emission units	Applicability of relevant Rules	October 15, 1991
RULE 207: Denial of Applications	All emission units	Applicability of relevant Rules	October 23, 1978
RULE 208: Action on Applications – Time Limits	All emission units. Not applicable to Part 70 permit applications.	Addition of new equipment of modification to existing equipment.	April 17, 1997
RULE 212: Emission Statements	All emission units	Administrative	October 20, 1992
RULE 301: Circumvention	All emission units	Any pollutant emission	October 23, 1978
RULE 302: Visible Emissions	All emission units	Particulate matter emissions	June 1981
RULE 303: Nuisance	All emission units	Emissions that can injure, damage or offend.	October 23, 1978
RULE 305: Particulate Matter – Southern Zone	Each PM Source	Emissions of PM in effluent gas	October 23, 1978
RULE 309: Specific Contaminants	All emission units	Combustion contaminant emission	October 23, 1978
Rule 310: Odorous Organic Sulfides	All emission units	Combustion contaminant emission	October 23, 1978
RULE 311: Sulfur Content of Fuel	All combustion units	Use of fuel containing sulfur	October 23, 1978

Generic Requirements	Affected Emission Units	Basis for Applicability	Adoption Date
RULE 317: Organic Solvents	Emission units using solvents	Solvent used in process operations.	October 23, 1978
RULE 321: Solvent Cleaning Operations	Emission units using solvents.	Solvent used in process operations.	June 21, 2012
RULE 322: Metal Surface Coating Thinner and Reducer	Emission units using solvents.	Solvent used in process operations.	October 23, 1978
RULE 323.1: Architectural Coatings	Paints used in maintenance and surface coating activities.	Application of architectural coatings.	January 1, 2015
RULE 324: Disposal and Evaporation of Solvents	Emission units using solvents.	Solvent used in process operations.	October 23, 1978
RULE 353: Adhesives and Sealants	Emission units using adhesives and solvents.	Adhesives and sealants used in process operations.	June 21, 2012
RULE 505.B2, B3, C, E, F, G: Breakdown Conditions	All emission units	Breakdowns where permit limits are exceeded or rule requirements are not complied with.	October 23, 1978
RULE 603: Emergency Episode Plans	Stationary sources with PTE greater than 100 tpy	Dos Cuadras - South County is a major source.	June 15, 1981
REGULATION VIII: New Source Review	All emission units	Addition of new equipment of modification to existing equipment. Applications to generate ERC Certificates.	August 25, 2016
REGULATION XIII (RULES 1301-1305): Part 70 Operating Permits	All emission units	SoCalGas La Goleta - South County is a major source.	January 18, 2001

Table 3.2 - Unit-Specific Federally-Enforceable District Rules

Unit-Specific Requirements	Affected Emission Units	Basis for Applicability	Adoption Date
RULE 326: Storage of reactive Organic Compounds	Tanks, sumps, and vessels	All reactive organic compound storage units	January 18, 2001
RULE 333: Control of Emissions from Reciprocating IC Engines	Internal combustion engines driving compressors and emergency fire water pumps.	IC engines exceeding 50 bhp rating.	June 19, 2008
RULE 346: Loading of Organic Liquids	Loading Rack at this facility	Rate/capacity triggering applicability.	January 18, 2001
RULE 352: Natural Gas Fired Fan-Type Central Furnaces and Small Water Heaters	New water heaters and furnaces.	Upon Installation	October 20, 2011
RULE 359: Flares and Thermal Oxidizers	Flare Relief System; ID# 005493	Flaring.	June 28, 1994
RULE 360: Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers	Gas Preheaters and any new small boiler installed at the facility.	New units rated from 75,000 Btu/hour to 2.000 MMBtu/Hour.	March 15, 2018
RULE 361: Small Boilers, Steam Generators, and Process Heaters.	Hot Oil Heaters	Any boiler, steam generator, and process heater with a rated heat input capacity greater than 2 MMBtu/hr and less than 5 MMBTU/hr.	January 17, 2008

Table 3.3 - Non-Federally-Enforceable District Rules

Requirement	Affected Emission Units	Basis for Applicability	Adoption Date
RULE 210: Fees	All emission units	Administrative	March 17, 2005
RULE 310: Odorous Organic Sulfides	All emission units	Emission of organic sulfides	October 23, 1978
RULES 501-504: Variance Rules	All emission units	Administrative	October 23, 1978
RULES 506-519: Variance Rules	All emission units	Administrative	October 23, 1978

4.0 Engineering Analysis

4.1 General

The engineering analyses performed for this permit were limited to the review of:

- Facility process flow diagrams.
- Emission factors and calculation methods for each emissions unit.
- Emission control equipment (including RACT, BACT, NSPS, NESHAP, MACT).
- Emission source testing, sampling, CAM.
- Process monitors needed to ensure compliance.

Unless noted otherwise, default ROC/THC reactivity profiles from the District's document titled "*VOC/ROC Emission Factors and Reactivities for Common Source Types*" dated April 1, 2003 (ver. 1.3) was used to determine non-methane, non-ethane fraction of THC.

4.2 Stationary Internal Combustion Sources

The stationary source has a total of thirteen IC engines at the facility, eleven gas-fired and two diesel-fired, as described below, as well as four micro-turbine generators.

4.2.1 *Gas-Fired Piston IC Engines with Emissions Control:* IC engines operating at the La Goleta Plant and equipped with emissions control comprise of the following:

- Gas compressors #2 through #8 are rich-burn, non-cyclic, natural gas-fired Ingersoll-Rand IC engines (four Model LVG-82s and three Model KVG-62s), each equipped with a non-selective catalytic reduction (NSCR) system and an automatic air-fuel ratio controller, and each driving a gas compressor;
- One lean-burn, non-cyclic, two-stroke, natural gas-fired Cooper Bessemer Model GMV-10C engine, equipped with "Clean-Burn" emissions control technology (using leaner air-fuel ratio, turbo-charged unit, jet cell fuel ignitors and an AFRC unit regulating the turbocharger), driving a gas compressor;

The seven Ingersoll-Rand engines have provided emission reduction credits (ERCs) since 1989 to the Point Arguello project. Their stipulated NO_X emission factor is 0.324 lb/MMBtu, which is higher than the emission factor which corresponds to 50 ppmv @ 15% O_2, but the engines may emit 0.324 lb NO_X/MMBtu and still comply with Rule 333 as long as they can demonstrate 90% control. The ROC emission factor is 0.32 lb/MMBtu, which corresponds to 250 ppmv @ 15% O_2 and a molecular weight of 16 lb/lb-mole for the organic compounds, and the CO emission factor is 3.815 lb/MMBtu, which corresponds to 1,700 ppmvd @ 15% O_2.

The Cooper Bessemer engine operates with a permitted NO_X emission factor of 125 ppmvd @ 15% oxygen, ROC emission factor of 750 ppmv @ 15% oxygen, and CO emission factor of 4,500 ppmvd @ 15% oxygen.

Sulfur dioxide emissions from all engines are based on mass balance calculations, assuming maximum 80 ppmv total sulfur content for fuel. The PM_{10} emissions from all engines are based on the corresponding emission factors listed in USEPA's AP-42 Table 3.2-3. The emission factors and heat input rate are calculated in appendix 10.1. The calculation methodology is as follows:

$$ER = (EF \times Q \times HPP)$$

where: ER = emission rate (lb/period)
EF = pollutant specific emission factor (lb/MMBtu)
Q = heat input rate (MMBtu/hr)
HPP = operating hours per time period (hrs/period)

The emission factor and heat input rate are based on the higher heating value (HHV) of the fuel.

4.2.2 Diesel Engines: Diesel fired IC engines operating at the La Goleta Plant:

Two (2) emergency standby Cummins V 378 F2 engines, driving fire pumps, each rated at 133 bhp.

The emission factors are based on the engine's rating and age. The NO_X, CO, ROC and PM10 emissions factors were obtained from USEPA's AP-42 Table 3.3-1. The SOx emissions factor was obtained from USEPA's AP-42 Table 3.3-2 and assumed 0.0015% by weight of sulfur in the diesel fuel. Daily operations are limited to 2 hours and annual operations are limited to 20 hours for maintenance and testing. Emergency use is unlimited. The calculation methodology is as follows:

E1, lb/day = Engine Rating (bhp) * EF (g/bhp-hr) * Daily Hours (hr/day) * (lb/453.6 g)
E2, tpy = Engine Rating (bhp) * EF (g/bhp-hr) * Annual Hours (hr/yr) * (lb/453.6 g) * (ton/2000 lb)

4.2.3 *Gas-Fired Piston IC Engines Without Emissions Control*: Natural gas fired District-permit-exempt IC engines operating at the La Goleta Plant:

Two (2) rich-burn, non-cyclic, natural gas-fired Waukesha IC engines (two VRG 220U's driving air compressors; and,

One (1) emergency gas-fired electrical generator driven by a Waukesha F817GU IC engine rated at 160 hp.

The NO_X, ROC, CO and PM_{10} emission factors for these units correspond to those listed in USEPA's AP-42 (*Air Chief, Version 9.0, 10/02*). Sulfur dioxide emissions from the engines are based on mass balance calculations, assuming maximum 80 ppmv total sulfur content of fuel. The calculation methodology is as follows:

$$ER = (EF \times Q \times HPP)$$

where: ER = emission rate (lb/period)
EF = pollutant specific emission factor (lb/MMBtu)
Q = heat input rate (MMBtu/hr)
HPP = operating hours per time period (hrs/period)

The emission factor and heat input rate are based on the higher heating value (HHV) of the fuel.

4.2.4 *Micro-Turbine Generators:* Four (4) natural gas-fired micro-turbine generators are used for electrical power generation.

The NO_X, CO and ROC emission factors for these units correspond to those listed in CARB DG-002. These are 0.5 lb/MW-hr for NO_X, 6 lb/MW-hr for CO, and 1 lb/MW-hr for ROC. Sulfur dioxide emissions from the engines are based on mass balance calculations, assuming maximum 80 ppmv total sulfur content of fuel. The emission factors are calculated in appendix 10.2. The calculation methodology is as follows:

$$ER = [(EF \times Q \times HPP)]$$

where: ER = emission rate (lb/period)
EF = pollutant specific emission factor (lb/MMBtu)
Q = heat input rate (MMBtu/hr)
HPP = operating hours per time period (hrs/period)

The emission factor and heat input rate are based on the higher heating value (HHV) of the fuel.

4.3 Stationary External Combustion Sources

The stationary external combustion sources at La Goleta facility are the two hot oil heaters, two gas preheaters, and the three flares. None of these equipment items are subject to any mass emission or emission concentration limits specified in the relevant District Rules 342, 359, and 361. However, the two gas preheaters are subject to the emission limits set in Rule 360, and the flares are subject to the operational standards listed in Rule 359.

4.3.1 *Gas-Fired Heaters*: The two oil heaters and the two gas preheaters are PUC-quality natural gas-fired. The heaters supply hot oil for dehydration facility operations including glycol heat exchanger operations. The hot oil heater manufactured by Fulton Thermal Corporation is rated at 3.5 MMBtu/hour heat input. The hot oil heater manufactured by American Heating Company is rated at 2.2 MMBtu/hour heat input. The two gas preheaters heat the gas upstream of the regulation station which feeds to Line 1003. The gas preheaters are manufactured by Parker Boiler. The calculation methodology for these combustion units is:

$$ER = EF \times Q$$

where: ER = emission rate (lb/period)
EF = pollutant specific emission factor (lb/MMBtu)
Q = heat input rate (MMBtu/hr)

The emission factors for NO_X, CO, ROC, PM and PM_{10} are based on AP-42 emission factors for small natural gas-fired boilers (Tables 1.4-1 and 1.4-2). The SO_x emission factor is based on the combustion of PUC natural gas.

4.3.2 *Flare Relief System*: The flare relief system consists of three 1.60 MMBtu flares which connect to the tank farm and the glycol system. Both planned and unplanned flaring events occur. Emission factors for NO_X, CO and ROC are based on the USEPA AP-42, Table 11.5-1 (9/91). PM emission factors are based on a District flare study. Sulfur oxide emissions are based on mass balance calculations assuming both planned and pilot/purge sulfur levels at 80 ppmv and unplanned flaring sulfur levels at 239 ppmv. The emissions for both planned and unplanned flaring events are calculated. The SO_x emission factor is determined using the equation: (0.169) (ppmv S)/ (HHV). The calculation methodology for the flares is:

$$ER = EF \; x \; Q$$

where: ER = emission rate (lb/period)
EF = pollutant specific emission factor (lb/MMBtu)
Q = heat input rate (MMBtu/hr)

4.4 Fugitive Hydrocarbon Sources

4.4.1 Emissions of reactive organic compounds from piping components such as valves, flanges and connections have been assigned emission factors pursuant to District P&P 6100.061 (*Determination of Fugitive Hydrocarbon Emissions at Oil and Gas Facilities Through the Use of Facility Component Counts - Modified for Revised ROC Definition*). The component leak-path was counted consistent with P&P 6100.061. This leak-path count is not the same as the component count required by District Rule 331. Only gas/light liquid side components are in service at this facility.

The number of emission leak-paths was determined by the operator. The leak path count is documented in Table 5.1-1. The calculation methodology for the fugitive emissions is:

$$ER = [(EF \; x \; CLP \; \div \; 24) \; x \; (1 \; - \; CE) \; x \; (HPP)]$$

where: ER = emission rate (lb/period)
EF = ROC emission factor (lb/clp-day)
CLP = component leak-path (clp)
CE = control efficiency
HPP = operating hours per time period (hrs/period)

Consistent with P&P 6100.061, an emission control efficiency of eighty (80) percent is applied to all components since the La Goleta facility is subject to an Inspection and Maintenance program for leak detection and repair required by the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation. The Production Field component specific emission factors from Table 2 of P&P 6100.061 are used to calculate emissions. Detailed emission calculations for fugitive emissions are shown in Attachments 10.1 and 10.2.

4.5 Tanks/Vessels/Separators

4.5.1 *Tanks*: The La Goleta facility operates two flotation cells (brine/hydrocarbon storage tanks), one hydrocarbon liquid storage tank and a brine water storage tank. All four storage tanks are connected to the vapor recovery unit. The detailed tank calculations for the HC condensate tank and the flotation cells will be performed using the methods presented in USEPA AP-42, Chapter 7. Also note that each gas/glycol contactor at the plant is equipped with a pressurized control tank; and the plant operates one NG-blanketed methanol storage tank. All these tank emissions are uncontrolled. However, the emissions are low and are assumed to be less than 0.10 tpy (200 lb/yr.).

4.5.2 *Vessels*: The dehydration facility operates a pressurized odorant storage tank, 1,000 gallons capacity. The pressure vessel is connected to the facility's gas gathering system. All PSVs, vents, and blow down valves vent to the atmosphere. Emissions from a pressure vessel are due to fugitive hydrocarbon leaks from valves and connections. No emission reduction credits are given since the equipment is not subject to District Rule 331.

4.5.3 *Gas/Liquid Separators*: The dehydration facility is equipped with two high-pressure and two low-pressure separators along with a sand trap. Emissions from these separators are due to fugitive hydrocarbon leaks from valves and connections. No emission reduction credits are given since the equipment is not subject to District Rule 331.

4.6 Glycol Reboiler

The glycol reboiler regenerates rich glycol into lean glycol by driving off the water that was picked up during the dehydration of the natural gas. The heat source for this process is the oil/glycol heat exchangers serviced by the 3.500 MMBtu/hr gas-fired hot oil heater and the 2.200 MMBtu/hr gas-fired hot oil heater. Along with water, hydrocarbons are also driven off from the rich glycol. This vapor stream is collected, passed through a condenser and two adsorber beds, and then directed to the flare.

4.7 Other Emission Sources

The following is a brief discussion of other emission sources on La Goleta facility:

4.7.1 *Loading Station*: A grade level loading station is used to load HC condensates from the HC condensate storage tank to trucks. Uncontrolled ROC emissions from the HC condensate loading are 2.76 lb/1,000 gallons of liquid loaded, calculated based on USEPA's AP-42, section 5.2, June 2008. Allowed maximum throughput for the HC condensate is 125,000 gallons/year. The HC/ROC emissions are computed based on this throughput and assuming zero ROC removal efficiency, since the truck loading emissions are not controlled.

4.7.2 *Vapor Recovery System:* Gas from tank farm storage tanks are gathered by a vapor recovery system. Collected gases are piped to the flare for disposal via a blower. A control efficiency of 95% is assigned to the system.

4.7.3 *Gas Venting:* Facility Emergency Shut Down (ESD) tests (twice a year) and pipeline operational needs result in occasional depressurizing of pipeline segments at the facility. This is achieved by venting the gases contained in the pipeline segments to the atmosphere through stack vents. Mass emissions from venting are calculated based on the volume of gas vented and the ROC content of the gas.

4.7.4 *Sulfur Removal Unit:* Two pairs of Kleen Air adsorber bed units are used in parallel to remove sulfur compounds from the flash gases given off by the glycol unit. Each pair has an upstream unit with ferric oxide to remove hydrogen sulfide components and a downstream unit with potassium permanganate to remove mercaptans from the waste gas stream. Because they are arranged in parallel, one pair may be taken off-line for maintenance while the other pair treats the waste gas stream. A cumulative sulfur compound removal efficiency is not required; emissions are based on the permitted limit of 239 ppmv.

4.7.5 *General Solvent Cleaning/Degreasing*: Solvent usage (not used as thinners for surface coating) that may occur on La Goleta facility as part of normal daily operations includes a JRI, Model No. TL 21 unit and wipe cleaning. Mass balance emission calculations are used assuming all the solvent used evaporates to the atmosphere (*Section 10.1*).

4.7.5 *Surface Coating*: Surface coating operations typically include normal touch up activities. Entire Plant painting programs may be performed once every few years. Emissions are determined based on mass balance calculations assuming all solvents evaporate into the atmosphere. Emission of PM/PM_{10} from paint over spray are not calculated due to the lack of established calculation techniques.

4.7.6 *Abrasive Blasting*: Abrasive blasting with CARB certified sands may be performed as a preparation step prior to surface coating. Particulate matter is emitted during this process. A general emission factor of 0.01 pound PM per pound of abrasive is used (SCAQMD - Permit Processing Manual, 1989) to estimate emissions of PM and PM_{10} when needed for compliance evaluations. A PM/PM_{10} ratio of 1.0 is assumed.

4.8 BACT/NSPS/NESHAP-MACT

None of the emission units at La Goleta facility are subject to Best Available Control Technology (BACT), or NSPS provisions. Gas compressors #2 through #8 are subject to NESHAP provisions to control formaldehyde emissions. Gas compressors #2 through #8 are equipped with NSCR as required by 40 CFR 63 Subpart ZZZZ. Exhaust concentrations of formaldehyde emissions are limited to 2.7 ppmvd at 15% oxygen.

4.9 CEMS/Process Monitoring/CAM

4.9.1 CEMS: There are no CEMS at this facility.

4.9.2 Process Monitoring: In many instances, ongoing compliance beyond a single (snap shot) source test is assessed by the use of process monitoring systems. Examples of these monitors include: gas/liquid flow meters, fuel usage meters, engine hour meters and air-fuel ratio controllers. Once these process monitors are in place, it is important that they be well maintained and calibrated to ensure that the required accuracy and precision of the devices are within specifications. At a minimum, the following process monitors will be required to be calibrated and maintained in good working order:

- Meter(s) recording the flow of gas being processed at the dehydration plant unit 14.
- Gauges recording the volume of HC liquid (condensate) from the hydrocarbon liquid storage tank into trucks at the loading station.
- Meters recording use of natural gas (as fuel) at all IC engines and micro-turbine generators.
- An hour meter at the emergency generator IC engine restricted to 200 hours per year of operation.
- Hour meters at the emergency fire pump engines restricted to 20 hours per year of operation.

To implement the above calibration and maintenance requirements, a *Process Monitor Calibration and Maintenance Plan* is required. This Plan takes into consideration manufacturer recommended maintenance and calibration schedules. Where manufacturer guidance is not available, the recommendations of comparable equipment manufacturers and good engineering judgment have been utilized.

4.9.3 CAM: SoCalGas La Goleta Plant is a major source that is subject to the USEPA's Compliance Assurance Monitoring (CAM) rule (40 CFR 64). The CAM rule applies to any emissions unit at the facility with an uncontrolled potential to emit exceeding major source emission thresholds for any pollutant (100 tons/year for NO_X , ROC, and CO in Santa Barbara County), and which uses control devices to comply with federally enforceable emission standards for these pollutants. Each of the seven (7) spark-ignition, four-stroke rich-burn (4SRB) IC engines at the Plant uses NSCR/AFRC controls to meet the federally enforceable emission standards (NO_X, ROC and CO) of District Rule 333, and thus is subject to the CAM Rule. In addition, all the seven engines are subject to more frequent monitoring per the CAM Rule, since the controlled CO potential to emit of each exceeds 100 tons/year (i.e., large pollutant-specific emission units under the CAM Rule). 40 CFR Section 64.3.(b).(4).(ii) sets the guidelines for frequency of monitoring. The District has determined that obtaining one parameter data point per hour is sufficient, since each engine is equipped with alarm sensors controlled by the AFRC millivolt output signal and the thermocouple output signal. Applicable CAM requirements for the engines are listed in Table 4.2 and Condition 9.C.1. The allowed AFRC oxygen sensor millivolt set-point must be within 5% of the setpoint used in the most recent Rule 333 Monitoring. The CAM plan allows set-points to be changed on any engine provided compliance is demonstrated by emissions data at the new set-point. A QIP will be triggered for any engine if there is a 1% excursion rate of any indicator during a calendar quarter.

4.10 Source Testing/Sampling

Source testing and sampling are required in order to ensure compliance with permitted emission limits, prohibitory rules, control measures and the assumptions that form the basis of this operating permit. Table 4.1 details the pollutants, test methods and frequency of required testing. SoCalGas is required to follow the *District Source Test Procedures Manual (May 24, 1990 and all updates).* The gas compressor engines are the only engines required to be source tested. The micro-turbines may be source tested if portable analyzer measurements indicate an exceedance of emission limits.

The process streams listed in the Table 4.3 are required to be sampled and analyzed. All sampling and analyses are required to be performed according to District approved procedures and methodologies. Typically, the appropriate ASTM methods are acceptable. It is important that all sampling and analysis be traceable by chain of custody procedures. The following table summarizes the sampling requirements:

Table 4.1 IC ENGINE SOURCE TEST REQUIREMENTS[(a)(b)(c)]

SoCalGas ID#	Pollutant or Operation Parameter	Test Methods and Remarks (if any)	Frequency
2 – 8	Exhaust Oxygen, % NOx ppmv, CO ppmv, ROC ppmv[d], NO_X lb/hr, CO lb/hr, ROC lb/hr. Catalyst NO_X reduction efficiency may be tested as an alternate method of demonstrating compliance with NO_X limits.	Measure: CARB 1-100 for O_2; CARB 1-100, or USEPA Method 7E and 10 for NO_X and CO respectively; USEPA Method 18 for ROC	Annually
	Engine load, at least 90% of rated horsepower; all source test loads are to be addressed in the Source Test Plans submitted to the District for approval.	Document setting used in testing.	
	The test is to be conducted with AFRC set points at the “as-found” setting		
9	Exhaust Oxygen, % NO_X ppmv, CO ppmv, ROC ppmv[d], NO_X lb/hr, CO lb/hr, ROC lb/hr.	Measure: CARB 1-100 for O_2; CARB 1-100, or USEPA Method 7E and 10 for NO_X and CO respectively; USEPA Method 18 for ROC	Biennially
	Engine load, at least 90% of rated horsepower; all source test loads are to be addressed in the Source Test Plans submitted to the District for approval.	Document setting used in testing.	
	Ignition Timing (°BTDC)		
All engines subject to source testing	Fuel [Ultimate Analysis (HHV, S, H_2S, etc.)]	ASTM Method; Measure	Each Test
All engines subject to source testing	Fuel Flow, scf/hr	METER: Measure at each engine	Each Test

Notes**:**
a. All emission and process parameter tests shall be performed consistent with District protocol, e.g., all emission tests to consist of a minimum of three 30-minute runs at safe maximum load. USEPA Methods 1-4 to be used to determine O_2, dry MW, moisture content, CO_2 and stack flow rate. Alternately, USEPA 19 may be used to determine stack flow rate. Procedures to obtain the required operating loads shall be defined clearly in the source test plan.

b. All source tested values shall be reported at std. condition (60°F & 14.69 psia), or as otherwise specified.

c. IC engine output (BHP) is determined by RPM.

d. Compliance with the ROC ppmv limit is determined based on the actual concentrations of compounds in the exhaust stream. The concentration should not be reported “as methane” in the source test report.

TABLE 4.2 COMPLIANCE ASSURANCE MONITORING REQUIREMENTS

Indicator	Indicator Range
Oxygen Sensor mV Output	Within 5% of the set point used in the latest Rule 333 Monitoring
Catalyst Inlet Temperature	Greater than 610 deg F
Catalyst Outlet Temperature	Between 610 and 1400 deg F

1. All indicators listed in the table are to be monitored on a '*once per hour*' basis. All monitoring operations shall conform to the requirements of 40 CFR 64.7.(c) [*Continued Operation*].
2. Oxygen sensor millivolt output readings are displayed at each AFRC and sent simultaneously to the SoCalGas operations computer for recording of the same.
3. The temperatures are measured by thermocouples and recorded by the operations computer.

TABLE 4.3 PROCESS STREAM SAMPLING

Process Stream	Parameter (Equipment ID#)	Location	Frequency
Fuel Gas	HHV Total sulfur Hydrogen sulfide Composition	(i) Plant fuel system regulator unit; or (ii) combustion unit inlets	Semi-annually Semi-annually Semi-annually Semi-annually
Vented Gas	ROC Content Total sulfur	Any valve in the storage field piping segment involved	Annually Annually
Hydrocarbon Condensate	API Gravity TVP (RVP)	HC storage tank pump inlet or outlet	Annually Annually
Gaseous Fuel (flare)	HHV # 1211:Total sulfur # 1212:Total Sulfur # 1215:Total sulfur	Gaseous fuel inlet at the flare unit	Annually Semi-annually Semi-annually Annually

TABLE 4.4 - C60 MICRO-TURBINE SOURCE TEST REQUIREMENTS[e, g]					
Emission & Limit Test Points	**Pollutants**	**Parameters[b]**	**Test Methods[a],[c]**	**Concentration Limit**	**Mass Emissions Limit**
				(ppmvd @ 15% O_2)	(lb/hr)
Turbine Exhaust [b]	NO_X	ppmv, lb/hr	EPA Method 7E, ARB 1-100	10	0.03
	ROC	ppmv, lb/hr	EPA Method 18	58	0.06
	CO	ppmv, lb/hr	EPA Method 10, ARB 1-100	199	0.36
	Sampling Point Deter.		EPA Method 1		
	Stack Gas Flow Rate		EPA Method 2 or 19		
	O_2	Dry, Mol. Wt	EPA Method 3		
	Moisture Content		EPA Method 4		
Fuel Gas	Fuel Gas Flow Rate		Fuel Gas Meter[f]		
	Higher Heating Value	BTU/scf	ASTM D 3588-88		
	Total Sulfur Content[d]		EPA 15/16/16A		

Notes:

[a] Alternative methods may be acceptable on a case-by-case basis.
[b] The emission rates shall be based on EPA Methods 2 and 4, or Method 19 along with the heat input rate. Measured NO_X, ROC, and CO ppmvd shall not exceed the limits specified in Condition.9.C.3 (a) of this PTO.

[c] For NO_X, ROC, CO and O_2 a minimum of three 40-minute runs shall be obtained during each test.
[d] Total sulfur content fuel samples shall be obtained using EPA Method 18 with Tedlar Bags (or equivalent) equipped with Teflon tubing and fittings. Turnaround time for laboratory analysis of these samples shall be no more than 24 hours from sampling in the field.
[e] Source testing, when requested by the District, shall be performed for the micro-turbines in an as found condition operating per the District's Source Test Procedures Manual.

[f] Fuel meter shall meet the calibration and metered volume corrections specified in Rule 333, §G.3.a.

[g] Source testing will not be required unless the District specifically requests that the units be tested.

4.11 Part 70 Engineering Review: Hazardous Air Pollutant Emissions

Potential HAP emissions from each emissions unit are computed and listed in Section 5. The emission factors for each emission category are shown in Section 5 and the sources of the HAP emission factors are documented in Appendix 10.1.

5.0 EMISSIONS

5.1 General

Emission calculations are divided into permitted and exempt categories. District permit-exempt equipment is determined by District Rule 202. The permitted emissions for each emissions unit are based on the equipment's potential-to-emit (as defined by Rule 102). Section 5.2 details the permitted emissions for each emissions unit. Section 5.3 details the overall permitted emissions for the facility based on reasonable worst-case scenarios using the potential-to-emit for each emissions unit. Section 5.4 details the federal potential to emit for this facility. Section 5.5 provides an estimate of the emissions from exempt emission sources and insignificant emission activities. Section 5.6 provides the estimated HAP emissions from the La Goleta facility. In order to accurately track the emissions from a facility, the District uses a computer database. Attachment 10.4 contains the District's documentation for the information entered into that database.

5.2 Permitted Emission Limits - Emission Units

Each emissions unit associated with the facility was analyzed to determine the potential-to-emit for the following pollutants:

- Nitrogen Oxides (NO_X) [3]
- Reactive Organic Compounds (ROC)
- Carbon Monoxide (CO)
- Sulfur Oxides (SO_X) [4]
- Particulate Matter (PM) [5]
- Particulate Matter smaller than 10 microns (PM_{10})
- Particulate Matter smaller than 2.5 microns ($PM_{2.5}$)
- Greenhouse Gases (GHG)

Permitted emissions are calculated for both short term (hourly and daily) and long term (quarterly and annual) time periods. Section 4.0 (Engineering Analysis) provides a general discussion of the basic calculation methodologies and emission factors used. The reference documentation for the specific emission calculations, as well as detailed calculation spreadsheets, may be found in Section 4 and Attachments 10.1 and 10.2 respectively. Tables 5.1-1 A/B provide the basic operating characteristics. Tables 5.1-2 A/B provide the specific emission factors. Tables 5.1-3 A/B and 5.1-4 A/B show the permitted short-term and permitted long-term emissions for each unit or operation.

[3] Calculated and reported as nitrogen dioxide (NO_2)

[4] Calculated and reported as sulfur dioxide (SO_2)

[5] Calculated and reported as all particulate matter smaller than 100 μm

5.3 *Permitted Emission Limits - Facility Totals*

The total potential-to-emit for all permitted emission units associated with the facility was analyzed. This analysis looked at the reasonable worst-case operating scenarios for each operating period. The equipment operating in each of the scenarios are presented below. Unless otherwise specified, the operating characteristics defined in Table 5.1-1 A/B for each emission unit are assumed. Tables 5.2 A/B show the total permitted emissions for the facility.

Hourly and Daily Scenario:

- All compressor IC engines
- All flares
- Both hot oil heaters
- Both gas preheaters
- All well cellars, ROC storage tanks and the condensate loading station
- All fugitive emissions from valves, flanges and other piping components
- Pipeline depressurization venting
- All Micro-turbine generators
- Both Emergency firewater pumps

Quarterly and Annual Scenario:

- All compressor IC engines
- All flares
- Both hot oil heaters
- Both gas preheaters
- All well cellars, ROC storage tanks and the condensate loading station
- All fugitive emissions from valves, flanges and other piping components
- Pipeline depressurization venting
- All Micro-turbine generators
- Both Emergency firewater pumps

5.4 *Part 70: Federal Potential to Emit for the Facility*

Table 5.3 lists the federal Part 70 potential to emit (PTE). Fugitive emissions are excluded from the federal definition of potential to emit unless the source belongs to one of the categories listed in 40 CFR 70.2. This facility does not belong to one of the categories listed in 40 CFR 70.2, therefore fugitive emissions do not contribute to the federal PTE.

This facility does not have the potential to emit 100,000 tpy or more carbon dioxide equivalent emissions. Therefore, the facility is not subject to permitting requirements for greenhouse gas emissions. The emission totals are listed in the permit solely to document the potential to emit of the facility.

5.5 *Exempt Emission Sources/Part 70 Insignificant Emissions*

Attachment 10.6 lists Equipment/activities exempt from District permits, pursuant to Rule 202.

Insignificant emission units are defined under Part70/District Rule 1301 as any regulated air pollutant emitted from the unit, excluding HAPs, that are less than 2 tons per year based on the unit's potential to emit and any HAP regulated under section 112(g) of the Clean Air Act that does not exceed 0.5 ton per year based on the unit's potential to emit. The following emission units are considered insignificant emission units:

- Maintenance Operations involving Solvents (e.g., wipe cleaning)

- Two glycol storage tanks and a glycol run tank;
- Three diesel fuel storage tanks, one 600 gallons and two 110 gallons capacity;
- Three Lube oil storage tanks, 5,000 gallons capacity each;
- One degreaser unit (JRI, Model TL 21);
- One glycol/glycol and one glycol/oil heat exchanger; and,
- Emergency backup electrical generator w/ gas-fired IC engine.

Note: Equipment exempt per District Rules may still be considered Part 70 significant units, based on their potential to emit. In this permit, the following units are Part 70 significant units:

- Two 48 bhp Waukesha engines Units# 4A and 5A.

Tables 5.3 A/B showing the federal PTE also present the annual emissions from permit-exempt equipment items, including exempt items considered Part 70 significant. Please note the non-maintenance type solvents or surface coating operations (see Section 9.C) are not permit-exempt.

5.6 Hazardous Air Pollutant Emissions for the Facility

Total emissions of hazardous air pollutants (HAP) are computed based on the emission factors listed in Table 5.4-1 for each emissions unit. Potential HAP emission factors and emissions, based on the worst-case scenario listed in Section 5.3 above, are shown in Tables 5.4-1 A/B and 5.4-2 A/B. The HAP emissions have been included in the Part 70 permit solely for the purpose of any future MACT applicability determination. They do not constitute any emissions or operations limit. More details on HAP emission factors are given in Attachment 10.1 of this permit.

Table 5.1-1 A

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6

IC Engines Operating Equipment Description

			Device Specifications				Usage Data		Maximum Operating Schedule					
Equipment Category	**ID#**	**Description**	**Fuel**	**ppmv S**	**Size**	**Units**	**Capacity**	**Units**	**Load**	**hr**	**day**	**qtr**	**year**	**References***
Internal Combustion Engines	001199	#2: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	A
- *Controlled*	001200	#3: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001201	#4: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001202	#5: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001203	#6: Ingersoll-Rand KVG-62:	NG	80	660.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001204	#7: Ingersoll-Rand KVG-62:	NG	80	660.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001205	#8: Ingersoll-Rand KVG-62:	NG	80	660.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001209	#9: Cooper-Bessemer GMV-10C	NG	80	1100.00	bhp	10.02	MMBtu/hr	1.000	1.0	24	2,190	8,760	
Micro-turbine generators	107543	#1: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	107544	#2: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	B
	107545	#3: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	107546	#4: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	D	15	133	bhp	0.930	MMBtu/hr	1.000	1.0	2	5	20	
	008668	#13A: Cummins V-378-F2	D	15	133	bhp	0.930	MMBtu/hr	1.000	1.0	2	5	20	
Internal Combustion Engines	*001221*	*#4A: Waukesha VRG220U*	NG	80	48.00	bhp	0.50	MMBtu/hr	1.000	1.0	24	2,190	8,760	I
- Permit exempt but	*001222*	*#5A: Waukesha VRG220U*	NG	80	48.00	bhp	0.50	MMBtu/hr	1.000	1.0	24	2,190	8,760	
federally significant units														

***** -- Refer to Attachment 10.1 for listed References A, B, I

Table 5.1-1 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Non-IC Engine Operating Emissions Units Description

			Device Specifications				Usage Data			Maximum Operating Schedule				
Equipment Category	**Description**	**ID #**	**Fuel**	**ppmv S**	**Size**	**Units**	**Capacity**	**Units**	**Load**	**hr**	**day**	**qtr**	**year**	**References***
Combustion - External	Flare: Field	001215	NG	239	--	--	1.600	MMBtu/hr	--	1.0	24	2,190	8,760	C1
	Flare: Field	001212	NG	239	--	--	1.600	MMBtu/hr	--	1.0	24	2,190	8,760	
	Flare: Field	001211	NG	239	--	--	1.600	MMBtu/hr	--	1.0	24	2,190	8,760	
	Hot Oil Heater #1	001214	NG	80	--	--	3.500	MMBtu/hr	--	1.0	24	2,190	8,760	C2
	Hot Oil Heater #2	107535	NG	80	--	--	2.200	MMBtu/hr	--	1.0	24	2,190	8,760	
	Heater #1	113985	NG	80	--	--	2.000	MMBtu/hr	--	1.0	24	2,190	8,760	
	Heater #2	113987	NG	80	--	--	2.000	MMBtu/hr	--	1.0	24	2,190	8,760	
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	--	12'd x 12'h	ft	10,000	gallons	--	1.0	24	2,190	8,760	D
	Flotation Cell: Tank 2	001220	--	--	12'd x 12'h	ft	10,000	gallons	--	1.0	24	2,190	8,760	
	HC Storage Tank	001217	--	--	10'd x 12'h	ft	7,050	gallons	--	1.0	24	2,190	8,760	
Loading Station	NGL Loading Station	008669	--	--	--	--	7.140	k-gallons/hour		1.0	3	4	18	E
Fugitive Components (Gas/Light Liquid Service)	Valves	100882	--	--	3,570	comp.leak-path	--	--	--	1.0	24	2,190	8,760	G
	Connections	100883	--	--	16,918	comp.leak-path	--	--	--	1.0	24	2,190	8,760	
	Pr. Relief Dev.	100886	--	--	49	comp.leak-path	--	--	--	1.0	24	2,190	8,760	
	Compressor Seals	100885	--	--	14	comp.leak-path	--	--	--	1.0	24	2,190	8,760	
	Pump Seals	100884	--	--	5	comp.leak-path	--	--	--	1.0	24	2,190	8,760	
				clp total:	20,556									
Emissions (Venting)	Wells -- Pipelines	100903	--	--	--	--	10	MMscf/year	--	1.0	24	2,190	8,760	G
Glycol Unit	Flash-tank Unit	100873	--	--	--	--	680	MMscf/day	--	1.0	24	2,190	8,760	H
Solvent Usage	Solvent Process Operations	008680	--	--	--	--	0.092	gal/hr (non-photochem)		1.0	6	548	2,190	I

Table 5.1-2 A
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
IC Engines Emission Factors

Equipment Category	ID#	Equipment: Plant ID & Description	Emission Factors NO_X	ROC	CO	SO_X	PM	PM_{10}	$PM_{2.5}$	GHG	Units	References*
Internal Combustion Engines	001199	#2: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
- Controlled	001200	#3: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001201	#4: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001202	#5: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001203	#6: Ingersoll-Rand KVG-62:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001204	#7: Ingersoll-Rand KVG-62:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001205	#8: Ingersoll-Rand KVG-62:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001209	#9: Cooper-Bessemer GMV-10C	0.4600	2.4950	10.125	0.0129	0.0480	0.0480	0.048	117.10	lb/MMBtu	
Micro-turbine generators	107543	#1: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
	107544	#2: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
	107545	#3: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
	107546	#4: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	14.08	1.12	3.03	0.006	0.99	0.99	0.99	117.10	g/bhp-hr	
	008668	#13A: Cummins V-378-F2	14.08	1.12	3.03	0.006	0.99	0.99	0.99	117.10	g/bhp-hr	
Internal Combustion Engines	*001221*	*#4A: Waukesha VRG220U*	*1.905*	*0.1030*	*1.6000*	*0.0129*	*0.014*	*0.014*	*0.014*	*117.10*	lb/MMBtu	
- Permit exempt but	*001222*	*#5A: Waukesha VRG220U*	*1.905*	*0.1030*	*1.6000*	*0.0129*	*0.014*	*0.014*	*0.014*	*117.10*	lb/MMBtu	
federally significant units												

Table 5.1-2 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Non-IC Engine Equipment Emission Factors

			Emission Factors									
Equipment Category	**Description**	**ID#**	**NO_X**	**ROC**	**CO**	**SO_X**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**GHG**	**Units**	**References***
Combustion - External	Flare: Field	001215	0.095	0.005	0.082	0.041	0.008	0.008	0.008	117.10	lb/MMBtu	C1
	Flare: Field	001212	0.095	0.005	0.082	0.041	0.008	0.008	0.008	117.10	lb/MMBtu	
	Flare: Field	001211	0.095	0.005	0.082	0.041	0.008	0.008	0.008	117.10	lb/MMBtu	
	Hot Oil Heater #1	001214	0.098	0.005	0.082	0.014	0.008	0.008	0.008	117.10	lb/MMBtu	C2
	Hot Oil Heater #2	107535	0.098	0.005	0.082	0.014	0.008	0.008	0.008	117.10	lb/MMBtu	
	Heater #1	113985	0.036	0.005	0.297	0.014	0.008	0.008	0.008	117.10	lb/MMBtu	
	Heater #2	113987	0.036	0.005	0.297	0.014	0.008	0.008	0.008	117.10	lb/MMBtu	
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	**Calc's are**	--	--	--	--	--	--	**AP-42, Ch.7**	D
	Flotation Cell: Tank 2	001220	--	**based on**	--	--	--	--	--	--	**Eqn. Units --**	
	HC Storage Tank	001217	--	**AP42,Ch.7**	--	--	--	--	--	--	**multiple para.**	
Loading Station	NGL Loading Station	008669	--	2.7557	--	--	--	--	--	--	lb/1000 gal	E
Fugitive Components	Valves	100882	--	0.008	--	--	--	--	--	--	lb/day-clp	G
(Gas/Light Liquid Service)	Connections	100883	--	0.002	--	--	--	--	--	--	lb/day-clp	
	Pr. Relief Dev.	100886	--	0.177	--	--	--	--	--	--	lb/day-clp	
	Compressor Seals	100885	--	0.057	--	--	--	--	--	--	lb/day-clp	
	Pump Seals	100884	--	0.030	--	--	--	--	--	--	lb/day-clp	
Emissions (Venting)	Wells -- Pipelines	100903	--	6,789.0	--	--	--	--	--	--	lb/MMscf	G
Glycol Unit	Flash-tank Unit	100873	--	**Gly-Calc 4.0**	--	--	--	--	--	--		
Solvent Usage	Solvent Process Operations	008680	--	4.000	--	--	--	--	--	--	lbs./gal	H

***** -- Refer to Attachment 10.1 for References C - H

Table 5.1-3 A

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6

IC Engines Short-Term Permitted Emissions

			Mass Emission Limits															
			NO_X		ROC		CO		SO_X		PM		PM_{10}		$PM_{2.5}$		GHG	
Equipment Category	**Equipment ID**	**Equipment: Plant ID & Description**	**lb/hr**	**lb/day**	**lb/hr**	**lb/day**	**lb/hr**	**lb/day**	**lb/hr**	**lb/day**	**lb/hr**	**lb/day**	**lb/hr**	**lb/hr**	**lb/hr**	**lb/hr**	**lb/hr**	**lb/day**
Internal Combustion Engines	001199	#2: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
- *Controlled*	001200	#3: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001201	#4: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001202	#5: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001203	#6: Ingersoll-Rand KVG-62:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001204	#7: Ingersoll-Rand KVG-62:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001205	#8: Ingersoll-Rand KVG-62:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001209	#9: Cooper-Bessemer GMV-10C	4.61	110.62	25.00	600.00	101.45	2,434.86	0.13	3.10	0.48	11.54	0.48	11.54	0.48	11.54	1,173.34	28,160
Micro-turbine generators	107543	#1: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
	107544	#2: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
	107545	#3: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
	107546	#4: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	4.12	8.25	0.33	0.66	0.89	1.78	0.00	0.00	0.29	0.58	0.29	0.58	0.29	0.58	108.90	218
	008668	#13A: Cummins V-378-F2	4.12	8.25	0.33	0.66	0.89	1.78	0.00	0.00	0.29	0.58	0.29	0.58	0.29	0.58	108.90	218
Total for Permitted Engines			**29.54**	**527.35**	**42.30**	**1,000.74**	**300.13**	**7,163.97**	**0.83**	**19.89**	**1.80**	**30.38**	**1.80**	**30.38**	**1.80**	**30.38**	**7,751.55**	**181,246**
Internal Combustion Engines	*001221*	*#4A: Waukesha VRG220U*	*0.95*	*22.86*	*0.05*	*1.24*	*0.80*	*19.20*	*0.01*	*0.15*	*0.01*	*0.17*	*0.01*	*0.17*	*0.01*	*0.17*	*58.55*	*1,405*
- *Permit exempt but federally significant units*	*001222*	*#5A: Waukesha VRG220U*	*0.95*	*22.86*	*0.05*	*1.24*	*0.80*	*19.20*	*0.01*	*0.15*	*0.01*	*0.17*	*0.01*	*0.17*	*0.01*	*0.17*	*58.55*	*1,405*
Total for permit exempt engines			***1.91***	***45.72***	***0.10***	***2.47***	***1.60***	***38.40***	***0.01***	***0.31***	***0.01***	***0.34***	***0.01***	***0.34***	***0.01***	***0.34***	***117.10***	***2,810.40***

Table 5.1-3 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Non-IC Engines Daily Emissions

Equipment Category	Description	ID#	NO_X lb/day	ROC lb/day	CO lb/day	SO_X lb/day	PM lb/day	PM_{10} lb/day	$PM_{2.5}$ lb/day	GHG lb/day
Combustion - External	Flare: Field	001215	3.66	0.20	3.16	1.57	0.29	0.29	0.29	4,497
	Flare: Field	001212	3.66	0.20	3.16	1.57	0.29	0.29	0.29	4,497
	Flare: Field	001211	3.66	0.20	3.16	1.57	0.29	0.29	0.29	4,497
	Hot Oil Heater #1	001214	8.23	0.45	6.89	1.15	0.63	0.63	0.63	9,836
	Hot Oil Heater #2	107535	5.17	0.29	4.33	0.72	0.40	0.40	0.40	6,183
	Heater #1	113985	1.73	0.26	14.26	0.66	0.36	0.36	0.36	5,621
	Heater #2	113987	1.73	0.26	14.26	0.66	0.36	0.36	0.36	5,621
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	0.21	--	--	--	--	--	--
	Flotation Cell: Tank 2	001220	--	0.21	--	--	--	--	--	--
	HC Storage Tank	001217	--	0.19	--	--	--	--	--	--
Loading Station	NGL Loading Station	008669	--	55.09	--	--	--	--	--	--
Fugitive Components	Valves	100882	--	28.01	--	--	--	--	--	--
(Gas/Light Liquid Service)	Connections	100883	--	31.50	--	--	--	--	--	--
	Pr. Relief Dev.	100886	--	8.69	--	--	--	--	--	--
	Compressor Seals	100885	--	0.80	--	--	--	--	--	--
	Pump Seals	100884	--	0.15	--	--	--	--	--	--
Emissions (Venting)	Wells -- Pipelines	100903	--	186.00	--	--	--	--	--	--
Glycol Unit	Flash-tank Unit	100873	--	52.13	--	--	--	--	--	--
Solvent Usage**	Solvent Process Operations	008680	--	2.21	--	--	--	--	--	--

** -- This item does not represent an emissions limit

Table 5.1-4 A

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6

IC Engines Long-Term Permitted Emissions

			Mass Emission Limits															
			NO_X		**ROC**		**CO**		**SO_X**		**PM**		**PM_{10}**		**$PM_{2.5}$**		**GHG**	
Equipment Category	**Equipment ID**	**Equipment: Plant ID & Description**	**TPQ**	**TPY**	**TPQ**	**TPY**	**TPQ**	**TPY**	**TPQ**	**TPY**	**TPQ**	**TPY**	**TPQ**	**TPY**	**TPQ**	**TPY**	**TPQ**	**TPY**
Internal Combustion Engines	001199	#2: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
- *Controlled*	001200	#3: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001201	#4: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001202	#5: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001203	#6: Ingersoll-Rand KVG-62:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001204	#7: Ingersoll-Rand KVG-62:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001205	#8: Ingersoll-Rand KVG-62:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001209	#9: Cooper-Bessemer GMV-10C	5.05	20.19	27.37	109.50	111.09	444.36	0.14	0.57	0.53	2.11	0.53	2.11	0.53	2.11	1,285	5,139
Micro-turbine generators	107543	#1: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
	107544	#2: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
	107545	#3: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
	107546	#4: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	0.01	0.04	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.27	1.09
	008668	#13A: Cummins V-378-F2	0.01	0.04	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.27	1.09
Total for Permitted Engines			**23.33**	**93.31**	**45.60**	**182.42**	**326.70**	**1,306.80**	**0.91**	**3.65**	**1.34**	**5.35**	**1.34**	**5.35**	**1.34**	**5.35**	**8,250**	**33,000**
Internal Combustion Engines	*001221*	*#4A: Waukesha VRG220U*	*1.04*	*4.17*	*0.06*	*0.23*	*0.88*	*3.50*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*64.1*	*256.4*
- Permit exempt but federally significant units	*001222*	*#5A: Waukesha VRG220U*	*1.04*	*4.17*	*0.06*	*0.23*	*0.88*	*3.50*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*64.1*	*256.4*
Total for permit exempt engines			***2.09***	***8.34***	***0.11***	***0.45***	***1.75***	***7.01***	***0.01***	***0.06***	***0.02***	***0.06***	***0.02***	***0.06***	***0.02***	***0.06***	***128.22***	***512.90***

Table 5.1-4 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Non-IC Engines Annual Emissions

Equipment Category	Description		NO_X TPY	ROC TPY	CO TPY	SO_X TPY	PM TPY	PM_{10} TPY	$PM_{2.5}$ TPY	GHG TPY
Combustion - External	Flare: Field	001215	0.67	0.04	0.58	0.29	0.05	0.05	0.05	820.6
	Flare: Field	001212	0.67	0.04	0.58	0.29	0.05	0.05	0.05	820.6
	Flare: Field	001211	0.67	0.04	0.58	0.29	0.05	0.05	0.05	820.6
	Hot Oil Heater #1	001214	1.50	0.08	1.26	0.21	0.11	0.11	0.11	1,795.1
	Hot Oil Heater #2	107535	0.94	0.05	0.79	0.13	0.07	0.07	0.07	1,128.4
	Heater #1	113985	0.32	0.05	2.60	0.12	0.07	0.07	0.07	1,025.8
	Heater #2	113987	0.32	0.05	2.60	0.12	0.07	0.07	0.07	1,025.8
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	0.04	--	--	--	--	--	--
	Flotation Cell: Tank 2	001220	--	0.04	--	--	--	--	--	--
	HC Storage Tank	001217		0.03	--	--	--	--	--	--
Loading Station	NGL Loading Station	008669	--	0.17	--	--	--	--	--	--
Fugitive Components	Valves	100882	--	5.11	--	--	--	--	--	--
(Gas/Light Liquid Service)	Connections	100883	--	5.75	--	--	--	--	--	--
	Pr. Relief Dev.	100886	--	1.59	--	--	--	--	--	--
	Compressor Seals	100885	--	0.15	--	--	--	--	--	--
	Pump Seals	100884	--	0.03	--	--	--	--	--	--
Emissions (Venting)	Wells -- Pipelines	100903	--	33.95	--	--	--	--	--	--
Glycol Unit	Flash-tank Unit	100873	--	9.51	--	--	--	--	--	--
Solvent Usage**	Solvent Process Operations	008680	--	0.40	--	--	--	--	--	--

** -- This item does not represent an emissions limit

Table 5.2
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Facility Permitted Potential to Emit (FPTE)

A. DAILY (lb/day)

Equipment Category	NO_X	ROC	CO	SO_X	PM	PM_{10}	$PM_{2.5}$	GHG
Combustion -- IC Engines	527.35	1,000.74	7,163.97	19.89	30.38	30.38	30.38	181,246
Combustion - External	27.83	1.84	49.22	7.92	2.61	2.61	2.61	40,751
HC Liquid Storage Tanks	--	0.61	--	--	--	--	--	--
Loading Station	--	55.09	--	--	--	--	--	--
Fugitive Components (Gas/LL Service)	--	69.16	--	--	--	--	--	--
Emissions (Venting)	--	186.00	--	--	--	--	--	--
Glycol unit	--	52.13	--	--	--	--	--	--
Solvent Usage**	--	2.21	--	--	--	--	--	--
TOTAL:	**555.18**	**1,367.78**	**7,213.19**	**27.81**	**32.99**	**32.99**	**32.99**	**221,996**

B. ANNUAL (tpy)

Equipment Category	NO_X	ROC	CO	SO_X	PM	PM_{10}	$PM_{2.5}$	GHG
Combustion -- IC Engines	93.31	182.42	1,306.80	3.65	5.35	5.35	5.35	33,000
Combustion - External	5.08	0.34	8.98	1.45	0.48	0.48	0.48	7,437
HC Liquid Storage Tanks	--	0.11	--	--	--	--	--	--
Loading Station	--	0.17	--	--	--	--	--	--
Fugitive Components (Gas/LL Service)	--	12.62	--	--	--	--	--	--
Emissions (Venting)	--	33.95	--	--	--	--	--	--
Glycol unit	--	9.51	--	--	--	--	--	--
Solvent Usage**	--	0.40	--	--	--	--	--	--
TOTAL:	**98.39**	**239.51**	**1,315.78**	**5.09**	**5.83**	**5.83**	**5.83**	**40,437**

** -- This item does not represent an emissions limit

Table 5.3
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Facility Federal Potential to Emit (PTE-Fed)

A. DAILY (lb/day)

Equipment Category	NO_X	ROC	CO	SO_X	PM	PM_{10}	$PM_{2.5}$	GHG
Combustion -- IC engines	573.07	1,003.21	7,202.37	20.20	30.72	30.72	30.72	181,246
Combustion - external	27.83	1.84	49.22	7.92	2.61	2.61	2.61	40,751
HC Liquid Storage Tanks	--	0.61	--	--	--	--	--	--
Loading Station	--	55.09	--	--	--	--	--	--
Fugitive Components (Gas/LL Servic	--	0.00	--	--	--	--	--	--
Emissions (Venting)	--	186.00	--	--	--	--	--	--
Glycol unit	--	52.13	--	--	--	--	--	--
Solvent Usage**	--	2.21	--	--	--	--	--	--
TOTAL:	**600.90**	**1,301.10**	**7,251.59**	**28.12**	**33.33**	**33.33**	**33.33**	**221,996**

B. ANNUAL (tpy)

Equipment Category	NO_X	ROC	CO	SO_X	PM	PM_{10}	$PM_{2.5}$	GHG
Combustion -- IC engines	101.66	182.87	1,313.80	3.70	5.41	5.41	5.41	33,000
Combustion - External	5.08	0.34	8.98	1.45	0.48	0.48	0.48	7,437
HC Liquid Storage Tanks	--	0.11	--	--	--	--	--	--
Loading Station	--	0.17	--	--	--	--	--	--
Fugitive Components (Gas/LL Servic	--	0.00	--	--	--	--	--	--
Emissions (Venting)	--	33.95	--	--	--	--	--	--
Glycol unit	--	9.51	--	--	--	--	--	--
Solvent Usage**	--	0.40	--	--	--	--	--	--
TOTAL:	**106.74**	**227.34**	**1,322.79**	**5.15**	**5.89**	**5.89**	**5.89**	**40,437**

Table 5.4-1 A
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
IC Engines Hazardous Air Pollutant Emission Factors

Equipment Category	Description	Device ID	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Carbon tetrachloride	Chlorobenzene	Chloroform	1,3-Dichloropropene	Ethylbenzene	Ethylene dibromide	Ethylene dichloride	Ethylidene dichloride	Formaldehyde	Hexane	Hydrogen Chloride	Methanol	Methylene chloride	Naphthalene	PAHs (not incl. napthalene)	Propylene dichloride	Propylene oxide	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	Styrene	Toluene	Vinyl chloride	Xylenes	Arsenic	Cadmium	Chromium	Lead	Manganese	Mercury	Nickel	Selenium	Units	References
Internal Combustion Engines	#2: Ingersoll-Rand LVG-82	001199	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
- *Controlled*	#3: Ingersoll-Rand LVG-82	001200	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#4: Ingersoll-Rand LVG-82	001201	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#5: Ingersoll-Rand LVG-82	001202	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#6: Ingersoll-Rand KVG-62	001203	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#7: Ingersoll-Rand KVG-62	001204	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#8: Ingersoll-Rand KVG-62	001205	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#9: Cooper-Bessemer GMV-10C	001209	4.79E-03	4.85E-03	1.17E-03	--	--	--	--	--	--	--	--	--	5.06E-02	--	--	2.49E-03	--	1.17E-04	--	--	--	--	--	--	1.05E-03	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
Micro-turbine generators	#1: Capstone C60	107543	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
	#2: Capstone C60	107544	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
	#3: Capstone C60	107545	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
	#4: Capstone C60	107546	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
Emergency Fire Pumps	#12A: Cummins V-378-F2	008666	7.83E-01	3.39E-02	1.86E-01	2.17E-01	--	2.00E-04	--	--	1.09E-02	--	--	--	1.73E+00	2.690E-02	1.86E-01	--	--	1.97E-02	3.62E-02	--	--	--	--	--	1.05E-01	--	4.240E-02	1.60E-03	1.50E-03	6.00E-04	8.30E-03	3.10E-03	2.00E-03	3.90E-03	2.20E-03	lb/1000 gal	C
	#13A: Cummins V-378-F2	008668	7.83E-01	3.39E-02	1.86E-01	2.17E-01	--	2.00E-04	--	--	1.09E-02	--	--	--	1.73E+00	2.690E-02	1.86E-01	--	--	1.97E-02	3.62E-02	--	--	--	--	--	1.05E-01	--	4.240E-02	1.60E-03	1.50E-03	6.00E-04	8.30E-03	3.10E-03	2.00E-03	3.90E-03	2.20E-03	lb/1000 gal	C
Internal Combustion Engines	#4A: Waukesha VRG220U	001221	2.79E-03	2.63E-03	1.58E-03	6.63E-04	1.77E-05	1.29E-05	1.37E-05	1.27E-05	2.48E-05	2.13E-05	1.13E-05	1.13E-05	2.05E-02	--	--	3.06E-03	4.12E-05	9.71E-05	4.39E-05	1.30E-05	--	2.53E-05	1.53E-05	1.19E-05	5.58E-04	7.18E-06	1.95E-04	--	--	--	--	--	--	--	--	lb/MMBtu	D
- *Permit exempt but federally significant units*	#5A: Waukesha VRG220U	001222	2.79E-03	2.63E-03	1.58E-03	6.63E-04	1.77E-05	1.29E-05	1.37E-05	1.27E-05	2.48E-05	2.13E-05	1.13E-05	1.13E-05	2.05E-02	--	--	3.06E-03	4.12E-05	9.71E-05	4.39E-05	1.30E-05	--	2.53E-05	1.53E-05	1.19E-05	5.58E-04	7.18E-06	1.95E-04	--	--	--	--	--	--	--	--	lb/MMBtu	D

References:
A - USEPA, AP-42 Appendix A of the background report for Section 3.2, results for a similar engine (June 2000)
B - USEPA, AP-42 Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines (April 2000)
C - VCAPCD, AB 2588 Combustion Emission Factors, Diesel Combustion Factors - internal combustion (May 2001)
D - USEPA, AP-42 Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (August 2000)

Table 5.4-1 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Non-IC Engines Hazardous Air Pollutant Emission Factors

Equipment Category	Description	Device ID	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Hexane	Naphthalene	PAHs (not incl. napthalene)	Toluene	Xylenes	Arsenic	Beryllium	Cadmium	Chromium	Cobalt	Manganese	Mercury	Nickel	Selenium	Units	References
Combustion - External	Flare: Field	001215	4.30E-02	1.00E-02	1.59E-01	1.44E+00	1.17E+00	2.90E-02	1.10E-02	3.00E-03	5.80E-02	2.90E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	E
	Flare: Field	001212	4.30E-02	1.00E-02	1.59E-01	1.44E+00	1.17E+00	2.90E-02	1.10E-02	3.00E-03	5.80E-02	2.90E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	E
	Flare: Field	001211	4.30E-02	1.00E-02	1.59E-01	1.44E+00	1.17E+00	2.90E-02	1.10E-02	3.00E-03	5.80E-02	2.90E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	E
	Hot Oil Heater #1	001214	4.30E-03	2.70E-03	8.00E-03	9.50E-03	1.70E-02	6.30E-03	3.00E-04	1.00E-04	3.66E-02	2.72E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	F
	Hot Oil Heater #2	107535	4.30E-03	2.70E-03	8.00E-03	9.50E-03	1.70E-02	6.30E-03	3.00E-04	1.00E-04	3.66E-02	2.72E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	F
	Heater #1	113985	4.30E-03	2.70E-03	8.00E-03	9.50E-03	1.70E-02	6.30E-03	3.00E-04	1.00E-04	3.66E-02	2.72E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	F
	Heater #2	113987	4.30E-03	2.70E-03	8.00E-03	9.50E-03	1.70E-02	6.30E-03	3.00E-04	1.00E-04	3.66E-02	2.72E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	F
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	--	2.71E-02	--	--	5.31E-02	--	--	1.58E-02	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	G
	Flotation Cell: Tank 2	001220	--	--	2.71E-02	--	--	5.31E-02	--	--	1.58E-02	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	G
	HC Storage Tank	001217	--	--	2.71E-02	--	--	5.31E-02	--	--	1.58E-02	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	G
Loading Station	NGL Loading Station	008669	--	--	1.79E-03	--	--	1.77E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	H
Fugitive Components	Valves	100882	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
(Gas/Light Liquid Service)	Connections	100883	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
	Pr. Relief Dev.	100886	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
	Compressor Seals	100885	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
	Pump Seals	100884	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
Emissions (Venting)	Wells -- Pipelines	100903	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
Glycol Unit[1]	Flash-tank Unit	100873	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	n/a	
Solvent Usage	Solvent Process Operations	008680	--	--	5.00E-02	--	--	--	--	--	5.00E-02	5.00E-02	--	--	--	--	--	--	--	--	--	lb/lb ROC	J

References:

E1 - VCAPCD, AB 2588 Combustion Emission Factors, Natural Gas Fired External Combustion Equipment - flare (May 2001)

E2 - USEPA, AP-42 Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion (July 1998)

F1 - VCAPCD, AB 2588 Combustion Emission Factors, Natural Gas Fired External Combustion Equipment - <10 MMBTUh (May 2001)

F2 - USEPA, AP-42 Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion (July 1998)

G - Emission factors for benzene, hexane and toluene are from CARB Speciation Manual Second Edition, Profile Number 297, Crude Oil Evaporation - Vapor Composite from Fixed Roof Tanks (August 1991); iso-octane (i.e., 2,2,4-trimethylpentane) was excluded because iso-octane is not exp

H - Emission factors for benzene and hexane are from CARB Speciation Manual Second Edition, Profile Number 756, Oil & Gas Production Fugitives - Liquid Service (August 1991); iso-octane (i.e., 2,2,4-trimethylpentane) was excluded because iso-octane is not expected in the gas handled a

I1 - Emission factor for hexane is based on the Hydrocarbon Analysis for Goleta Storage Field performed by the Engineering Analysis Center in April 2015

I2 - Emission factor for benzene is from CARB Speciation Manual Second Edition, Profile Number 757, Oil & Gas Production Fugitives - Gas Service (August 1991); iso-octane (i.e., 2,2,4-trimethylpentane) was excluded because iso-octane is not expected in the gas handled at this facility

J - APCD: Solvents assumed to contain 5% benzene, 5% toluene, 5% xylene

Notes:

1. There are no hazardous air pollutants emitted from this equipment.

Table 5.4-2 A
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
IC Engines Annual Hazardous Air Pollutant Emissions (TPY)

Equipment Category	Description	Device ID	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Carbon tetrachloride	Chlorobenzene	Chloroform	1,3-Dichloropropene	Ethylbenzene	Ethylene dibromide	Ethylene dichloride	Ethylidene dichloride	Formaldehyde	Hexane	Hydrogen Chloride	Methanol	Methylene chloride
Internal Combustion Engines	#2: Ingersoll-Rand LVG-82	001199	6.01E-02	1.67E-01	2.78E-03	--	--	--	--	--	--	--	--	--	1.10E-02	--	--	7.42E-02	--
- *Controlled*	#3: Ingersoll-Rand LVG-82	001200	6.01E-02	1.67E-01	2.78E-03	--	--	--	--	--	--	--	--	--	1.10E-02	--	--	7.42E-02	--
	#4: Ingersoll-Rand LVG-82	001201	6.01E-02	1.67E-01	2.78E-03	--	--	--	--	--	--	--	--	--	1.10E-02	--	--	7.42E-02	--
	#5: Ingersoll-Rand LVG-82	001202	6.01E-02	1.67E-01	2.78E-03	--	--	--	--	--	--	--	--	--	1.10E-02	--	--	7.42E-02	--
	#6: Ingersoll-Rand KVG-62	001203	6.01E-02	1.67E-01	2.78E-03	--	--	--	--	--	--	--	--	--	1.10E-02	--	--	7.42E-02	--
	#7: Ingersoll-Rand KVG-62	001204	6.01E-02	1.67E-01	2.78E-03	--	--	--	--	--	--	--	--	--	1.10E-02	--	--	7.42E-02	--
	#8: Ingersoll-Rand KVG-62	001205	6.01E-02	1.67E-01	2.78E-03	--	--	--	--	--	--	--	--	--	1.10E-02	--	--	7.42E-02	--
	#9: Cooper-Bessemer GMV-10C	001209	2.10E-01	2.13E-01	5.13E-02	--	--	--	--	--	--	--	--	--	2.22E+00	--	--	1.09E-01	--
Micro-turbine generators	#1: Capstone C60	107543	1.41E-04	2.25E-05	4.23E-05	1.51E-06	--	--	--	--	1.13E-04	--	--	--	2.50E-03	--	--	--	--
	#2: Capstone C60	107544	1.41E-04	2.25E-05	4.23E-05	1.51E-06	--	--	--	--	1.13E-04	--	--	--	2.50E-03	--	--	--	--
	#3: Capstone C60	107545	1.41E-04	2.25E-05	4.23E-05	1.51E-06	--	--	--	--	1.13E-04	--	--	--	2.50E-03	--	--	--	--
	#4: Capstone C60	107546	1.41E-04	2.25E-05	4.23E-05	1.51E-06	--	--	--	--	1.13E-04	--	--	--	2.50E-03	--	--	--	--
Emergency Fire Pumps[1]	#12A: Cummins V-378-F2	008666	5.93E-05	2.57E-06	1.41E-05	1.65E-05	--	1.51E-08	--	--	8.25E-07	--	--	--	1.31E-04	2.04E-06	1.41E-05	--	--
	#13A: Cummins V-378-F2	008668	5.93E-05	2.57E-06	1.41E-05	1.65E-05	--	1.51E-08	--	--	8.25E-07	--	--	--	1.31E-04	2.04E-06	1.41E-05	--	--
Total for Permitted Engines			**6.32E-01**	**1.38E+00**	**7.10E-02**	**3.90E-05**	**0.00E+00**	**3.03E-08**	**0.00E+00**	**0.00E+00**	**4.52E-04**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.31E+00**	**4.07E-06**	**2.82E-05**	**6.29E-01**	**0.00E+00**
Internal Combustion Engines	#4A: Waukesha VRG220U	001221	6.11E-03	5.76E-03	3.46E-03	1.45E-03	3.88E-05	2.83E-05	3.00E-05	2.78E-05	5.43E-05	4.66E-05	2.47E-05	2.47E-05	4.49E-02	--	--	6.70E-03	9.02E-05
- *Permit exempt but federally significant units*	#5A: Waukesha VRG220U	001222	6.11E-03	5.76E-03	3.46E-03	1.45E-03	3.88E-05	2.83E-05	3.00E-05	2.78E-05	5.43E-05	4.66E-05	2.47E-05	2.47E-05	4.49E-02	--	--	6.70E-03	9.02E-05
Total for Permit Exempt Engines			**1.22E-02**	**1.15E-02**	**6.92E-03**	**2.90E-03**	**7.75E-05**	**5.65E-05**	**6.00E-05**	**5.56E-05**	**1.09E-04**	**9.33E-05**	**4.95E-05**	**4.95E-05**	**8.98E-02**	**0.00E+00**	**0.00E+00**	**1.34E-02**	**1.80E-04**
IC Engines Total HAPs (TPY):			**6.44E-01**	**1.39E+00**	**7.79E-02**	**2.94E-03**	**7.75E-05**	**5.65E-05**	**6.00E-05**	**5.56E-05**	**5.61E-04**	**9.33E-05**	**4.95E-05**	**4.95E-05**	**2.40E+00**	**4.07E-06**	**2.82E-05**	**6.42E-01**	**1.80E-04**

Description	Device ID	Naphthalene	PAHs (not incl. napthalene)	Propylene dichloride	Propylene oxide	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	Styrene	Toluene	Vinyl chloride	Xylenes	Arsenic	Cadmium	Chromium	Lead	Manganese	Mercury	Nickel	Selenium
#2: Ingersoll-Rand LVG-82	001199	1.08E-03	--	--	--	--	--	1.43E-03	--	--	--	--	--	--	--	--	--	--	--
#3: Ingersoll-Rand LVG-82	001200	1.08E-03	--	--	--	--	--	1.43E-03	--	--	--	--	--	--	--	--	--	--	--
#4: Ingersoll-Rand LVG-82	001201	1.08E-03	--	--	--	--	--	1.43E-03	--	--	--	--	--	--	--	--	--	--	--
#5: Ingersoll-Rand LVG-82	001202	1.08E-03	--	--	--	--	--	1.43E-03	--	--	--	--	--	--	--	--	--	--	--
#6: Ingersoll-Rand KVG-62	001203	1.08E-03	--	--	--	--	--	1.43E-03	--	--	--	--	--	--	--	--	--	--	--
#7: Ingersoll-Rand KVG-62	001204	1.08E-03	--	--	--	--	--	1.43E-03	--	--	--	--	--	--	--	--	--	--	--
#8: Ingersoll-Rand KVG-62	001205	1.08E-03	--	--	--	--	--	1.43E-03	--	--	--	--	--	--	--	--	--	--	--
#9: Cooper-Bessemer GMV-10C	001209	5.13E-03	--	--	--	--	--	4.61E-02	--	--	--	--	--	--	--	--	--	--	--
#1: Capstone C60	107543	4.58E-06	3.17E-06	--	1.02E-04	--	--	--	4.58E-04	--	2.25E-04	--	--	--	--	--	--	--	--
#2: Capstone C60	107544	4.58E-06	3.17E-06	--	1.02E-04	--	--	--	4.58E-04	--	2.25E-04	--	--	--	--	--	--	--	--
#3: Capstone C60	107545	4.58E-06	3.17E-06	--	1.02E-04	--	--	--	4.58E-04	--	2.25E-04	--	--	--	--	--	--	--	--
#4: Capstone C60	107546	4.58E-06	3.17E-06	--	1.02E-04	--	--	--	4.58E-04	--	2.25E-04	--	--	--	--	--	--	--	--
#12A: Cummins V-378-F2	008666	1.49E-06	2.74E-06	--	--	--	--	--	7.98E-06	--	3.21E-06	1.21E-07	1.14E-07	4.54E-08	6.28E-07	2.35E-07	1.51E-07	2.95E-07	1.67E-07
#13A: Cummins V-378-F2	008668	1.49E-06	2.74E-06	--	--	--	--	--	7.98E-06	--	3.21E-06	1.21E-07	1.14E-07	4.54E-08	6.28E-07	2.35E-07	1.51E-07	2.95E-07	1.67E-07
Total for Permitted Engines		**1.27E-02**	**1.82E-05**	**0.00E+00**	**4.08E-04**	**0.00E+00**	**0.00E+00**	**5.61E-02**	**1.85E-03**	**0.00E+00**	**9.08E-04**	**2.42E-07**	**2.27E-07**	**9.09E-08**	**1.26E-06**	**4.69E-07**	**3.03E-07**	**5.91E-07**	**3.33E-07**
#4A: Waukesha VRG220U	001221	2.13E-04	9.61E-05	2.85E-05	--	5.54E-05	3.35E-05	2.61E-05	1.22E-03	1.57E-05	4.27E-04	--	--	--	--	--	--	--	--
#5A: Waukesha VRG220U	001222	2.13E-04	9.61E-05	2.85E-05	--	5.54E-05	3.35E-05	2.61E-05	1.22E-03	1.57E-05	4.27E-04	--	--	--	--	--	--	--	--
Total for Permit Exempt Engines		**4.25E-04**	**1.92E-04**	**5.69E-05**	**0.00E+00**	**1.11E-04**	**6.70E-05**	**5.21E-05**	**2.44E-03**	**3.14E-05**	**8.54E-04**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
IC Engines Total HAPs (TPY):		**1.32E-02**	**2.10E-04**	**5.69E-05**	**4.08E-04**	**1.11E-04**	**6.70E-05**	**5.61E-02**	**4.29E-03**	**3.14E-05**	**1.76E-03**	**2.42E-07**	**2.27E-07**	**9.09E-08**	**1.26E-06**	**4.69E-07**	**3.03E-07**	**5.91E-07**	**3.33E-07**

Notes:
1. The following default values were used based on the District's Piston IC Engine Technical Reference Document (November 2002): higher heating value of 137,000 Btu/gal and brake-specific fuel consumption of 7,800 Btu/bhp-hr.

Table 5.4-2 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Non-IC Engines Annual Hazardous Air Pollutant Emissions (TPY)

Equipment Category	Description	Device ID	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Hexane	Naphthalene	PAHs (not incl. napthalene)	Toluene	Xylenes	Arsenic	Beryllium	Cadmium	Chromium	Cobalt	Manganese	Mercury	Nickel	Selenium
Combustion - External[2]	Flare: Field	001215	2.87E-04	6.67E-05	1.06E-03	9.64E-03	7.80E-03	1.94E-04	7.34E-05	2.00E-05	3.87E-04	1.94E-04	1.33E-06	8.01E-08	7.34E-06	9.34E-06	5.61E-07	2.54E-06	1.74E-06	1.40E-05	1.60E-07
	Flare: Field	001212	2.87E-04	6.67E-05	1.06E-03	9.64E-03	7.80E-03	1.94E-04	7.34E-05	2.00E-05	3.87E-04	1.94E-04	1.33E-06	8.01E-08	7.34E-06	9.34E-06	5.61E-07	2.54E-06	1.74E-06	1.40E-05	1.60E-07
	Flare: Field	001211	2.87E-04	6.67E-05	1.06E-03	9.64E-03	7.80E-03	1.94E-04	7.34E-05	2.00E-05	3.87E-04	1.94E-04	1.33E-06	8.01E-08	7.34E-06	9.34E-06	5.61E-07	2.54E-06	1.74E-06	1.40E-05	1.60E-07
	Hot Oil Heater #1	001214	6.28E-05	3.94E-05	1.17E-04	1.39E-04	2.48E-04	9.20E-05	4.38E-06	1.46E-06	5.34E-04	3.97E-04	2.92E-06	1.75E-07	1.61E-05	2.04E-05	1.23E-06	5.55E-06	3.80E-06	3.07E-05	3.50E-07
	Hot Oil Heater #2	107535	3.95E-05	2.48E-05	7.34E-05	8.72E-05	1.56E-04	5.78E-05	2.75E-06	9.18E-07	3.36E-04	2.50E-04	1.84E-06	1.10E-07	1.01E-05	1.28E-05	7.71E-07	3.49E-06	2.39E-06	1.93E-05	2.20E-07
	Heater #1	113985	3.59E-05	2.25E-05	6.67E-05	7.93E-05	1.42E-04	5.26E-05	2.50E-06	8.34E-07	3.05E-04	2.27E-04	1.67E-06	1.00E-07	9.18E-06	1.17E-05	7.01E-07	3.17E-06	2.17E-06	1.75E-05	2.00E-07
	Heater #2	113987	3.59E-05	2.25E-05	6.67E-05	7.93E-05	1.42E-04	5.26E-05	2.50E-06	8.34E-07	3.05E-04	2.27E-04	1.67E-06	1.00E-07	9.18E-06	1.17E-05	7.01E-07	3.17E-06	2.17E-06	1.75E-05	2.00E-07
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	--	1.08E-03	--	--	2.12E-03	--	--	6.33E-04	--	--	--	--	--	--	--	--	--	--
	Flotation Cell: Tank 2	001220	--	--	1.08E-03	--	--	2.12E-03	--	--	6.33E-04	--	--	--	--	--	--	--	--	--	--
	HC Storage Tank	001217	--	--	8.14E-04	--	--	1.59E-03	--	--	4.75E-04	--	--	--	--	--	--	--	--	--	--
Loading Station	NGL Loading Station	008669	--	--	3.08E-04	--	--	3.04E-02	--	--	--	--	--	--	--	--	--	--	--	--	--
Fugitive Components	Valves	100882	--	--	1.66E-02	--	--	2.25E-01	--	--	--	--	--	--	--	--	--	--	--	--	--
(Gas/Light Liquid Service)	Connections	100883	--	--	1.87E-02	--	--	2.54E-01	--	--	--	--	--	--	--	--	--	--	--	--	--
	Pr. Relief Dev.	100886	--	--	5.15E-03	--	--	7.00E-02	--	--	--	--	--	--	--	--	--	--	--	--	--
	Compressor Seals	100885	--	--	4.73E-04	--	--	6.42E-03	--	--	--	--	--	--	--	--	--	--	--	--	--
	Pump Seals	100884	--	--	8.85E-05	--	--	1.20E-03	--	--	--	--	--	--	--	--	--	--	--	--	--
Emissions (Venting)	Wells -- Pipelines	100903	--	--	1.10E-01	--	--	1.50E+00	--	--	--	--	--	--	--	--	--	--	--	--	--
Glycol Unit	Flash-tank Unit	100873	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Solvent Usage	Solvent Process Operations	008680	--	--	2.01E-02	--	--	--	--	--	2.01E-02	2.01E-02	--	--	--	--	--	--	--	--	--
	Non-IC Engines Total HAPs (TPY):		**1.03E-03**	**3.09E-04**	**1.78E-01**	**2.93E-02**	**2.41E-02**	**2.09E+00**	**2.32E-04**	**6.41E-05**	**2.45E-02**	**2.18E-02**	**1.21E-05**	**7.26E-07**	**6.65E-05**	**8.47E-05**	**5.08E-06**	**2.30E-05**	**1.57E-05**	**1.27E-04**	**1.45E-06**

Notes:
2. The default higher heating value of 1050 Btu/scf for natural gas was assumed.

Table 5.4-3
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584-R6
Total Hazardous Air Pollutant Emissions (TPY)

Facility	Permit #	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Carbon tetrachloride	Chlorobenzene	Chloroform	1,3-Dichloropropene	Ethylbenzene	Ethylene dibromide	Ethylene dichloride	Ethylidene dichloride	Formaldehyde	Hexane	Hydrogen Chloride	Methanol	Methylene chloride	Naphthalene	PAHs (not incl. napthalene)
01734 - La Goleta	PTO 9584-R6	6.45E-01	1.39E+00	2.56E-01	2.94E-03	7.75E-05	5.65E-05	6.00E-05	5.56E-05	2.99E-02	9.33E-05	4.95E-05	4.95E-05	2.42E+00	2.09E+00	2.82E-05	6.42E-01	1.80E-04	1.34E-02	2.75E-04

Facility	Permit #	Propylene dichloride	Propylene oxide	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	Styrene	Toluene	Vinyl chloride	Xylenes	Arsenic	Beryllium	Cadmium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	**Total - All HAPS**
01734 - La Goleta	PTO 9584-R6	5.69E-05	4.08E-04	1.11E-04	6.70E-05	5.61E-02	2.88E-02	3.14E-05	2.36E-02	1.23E-05	7.26E-07	6.68E-05	8.48E-05	8.47E-05	1.26E-06	2.35E-05	1.60E-05	1.28E-04	1.78E-06	7.61E+00

6.0 Air Quality Impact Analyses

6.1 Modeling

Air quality modeling was not required for this stationary source.

6.2 Increments

An air quality increment analysis was not required for this stationary source

6.3 Monitoring

Air quality monitoring is not required for this stationary source.

6.4 Health Risk Assessment

The SoCalGas La Goleta stationary source is subject to the Air Toxics Hot-Spots Program (AB-2588). A health risk assessment (HRA) for the facility was prepared by the District on May 22, 1996 under the requirements of the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588). The HRA is based on 1994 toxic emissions inventory data submitted to the District by SoCalGas.

Based on the 1994 toxic emissions inventory, a cancer risk of 7 per million off the property was estimated for the La Goleta facility. This risk is primarily due to emissions of polycyclic aromatic hydrocarbon (PAH) from internal combustion devices (generators, cranes, heaters, compressors, etc.). Additionally, a chronic risk of 0.10 has been estimated by the District and is mainly due to acrolein emissions for internal combustion devices. The cancer and non-cancer chronic risk projections are well below the District's AB-2588 significance thresholds of 10 in a million and 1.0 in a million, respectively.

7.0 CAP Consistency, Offset Requirements and ERCs

7.1 General

The stationary source is located in an ozone nonattainment area. Santa Barbara County has not attained the state ozone ambient air quality standards. The County also does not meet the state PM_{10} ambient air quality standards. Therefore, emissions from all emission units at the stationary source and its constituent facilities must be consistent with the provisions of the USEPA and State approved Clean Air Plans (CAP) and must not interfere with progress toward attainment of federal and state ambient air quality standards. Under District regulations, any modifications at the source that result in an emissions increase of any nonattainment pollutant exceeding 25 lbs/day must apply BACT (NAR). Increases above offset thresholds will trigger offsets at the source or elsewhere so that there is a net air quality benefit for Santa Barbara County. These offset threshold levels are 55 lbs/day for all non-attainment pollutants except PM_{10}, for which the level is 80 lbs/day.

7.2 Clean Air Plan

The 2007 Clean Air Plan, adopted by the District Board on August 16, 2007, addressed both federal and state requirements, serving as the maintenance plan for the federal eight-hour ozone standard and as the state triennial update required by the Health and Safety Code to demonstrate how the District will expedite attainment of the state eight-hour ozone standard. The plan was developed for Santa Barbara County as required by both the 1998 California Clean Air Act and the 1990 Federal Clean Air Act Amendments.

In March 2015 the District Board adopted the 2013 Clean Air Plan. The 2013 Plan provides a three-year update to the 2010 Clean Air Plan. As Santa Barbara County has yet to attain the state eight-hour ozone standard, the 2013 Clean Air Plan demonstrates how the District plans to attain that standard. The 2013 Clean Air Plan therefore satisfies all state triennial planning requirements.

7.3 Offset Requirements

The SoCalGas La Goleta stationary source exceeds the emission offset thresholds of Regulation VIII for NO_X and ROC emissions, however this stationary source did not become subject to the emission offset requirements of Regulation VIII until adoption of revised Rule 802 in August 2016. Therefore, SoCalGas is not required to provide emission reduction credits for the emissions associated with this permit.

7.4 Emission Reduction Credits

The SoCalGas La Goleta stationary source generates and provides NO_X emission reduction credits to the Point Arguello Project, as follows:

- Seven compressor engines, units #2 - #8, provide the emission reduction credits. Each of the seven engines is equipped with a NO_X abatement system. The system consists of a non-selective catalytic converter aided by an automatic air-fuel-ratio controller. The NO_X control provides a minimum NO_X emission reduction of 90%.

<u>Estimated minimum reductions:</u>

The expected minimum NO_X emission reduction for each engine, based on PTO 7500, was estimated as follows:

- Uncontrolled NO_X emissions from each engine = 3,400 lb/MMscf = 3.238 lb/MMBtu;
- Minimum emissions reduction from each engine = 0.9 * 3.238 = 2.914 lb/MMBtu;
- Anticipated average heat input/engine (minimum annual fuel data) = 3.19 MMBtu/hour;
- Expected minimum NO_X emission reductions/engine = 2.914 * 3.19 = 9.296 lb/hr.
- *Expected NO_X emission reductions from the Plant = 7 * 9.296*8760/2000 = 285 tons/yr.*

Out of the total annual NO_X emissions reduction of 285 tons expected to be achieved at the La Goleta Plant, 96.06 tons are currently allotted to the Point Arguello Project (i.e., the Outer Continental Shelf components only of the Project).

The emission reduction credits offered by the La Goleta source are verified through quarterly recording and reporting of quantities of emissions captured. Annual source tests are the mechanisms for verifying the emission reduction credits achieved. Operational compliance to ensure ERCs is also verified through on-site inspections. The operating requirements to ensure these emission reductions are stipulated in Section 9.C.1 of this permit.

8.0 Lead Agency Permit Consistency

To the best of the District's knowledge, no other government agency's permit requires air quality mitigation for emissions pursuant to this District reevaluation permit 9584-R4 issued for the SoCalGas La Goleta stationary source.

9.0 Permit Conditions

This section lists the applicable permit conditions for the La Goleta Gas Plant. Section A lists the standard administrative conditions. Section B lists ‘generic’ permit conditions, including emission standards, for all equipment in this permit. Section C lists conditions affecting specific equipment. Section D lists non-federally enforceable (i.e., District only) permit conditions. Conditions listed in Sections A, B and C are enforceable by the USEPA, the District, the State of California and the public. Conditions listed in Section D are enforceable only by the District and the State of California. Where any reference contained in Sections 9.A, 9.B, and 9.C refers to any other part of this permit that part of the permit referred to is federally enforceable. In case of a discrepancy between the wording of a condition and the applicable federal or District rule(s), the wording of the rule(s) shall control.

For the purposes of submitting compliance certifications or establishing whether or not a person has violated or is in violation of any standard in this permit, nothing in the permit shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test had been performed.

9.A Standard Administrative Conditions

The following administrative permit conditions apply to La Goleta facility:

A.1 **Compliance with Permit Conditions.**

(a) The permittee shall comply with all permit conditions in Sections 9.A, 9.B and 9.C.

(b) This permit does not convey property rights or exclusive privilege of any sort.

(c) Noncompliance with any permit conditions is grounds for permit termination, revocation and re-issuance, modification, enforcement action, or for denial of permit renewal. Any permit non-compliance constitutes a violation of the Clean Air Act and its implementing regulations or of District Rules or both, as applicable.

(d) The permittee shall not use the "need to halt or reduce a permitted activity in order to maintain compliance" as a defense for noncompliance with any permit condition.

(e) A pending permit action or notification of anticipated noncompliance does not stay any permit condition.

(f) Within a reasonable time period, the permittee shall furnish any information requested by the Control Officer, in writing, for the purpose of determining:

(i) compliance with the permit, or

(ii) whether or not cause exists to modify, revoke and reissue, or terminate a permit or for an enforcement action.

(g) In the event that any condition herein is determined to be in conflict with any other condition contained herein, then if principles of law do not provide to the contrary, the condition most protective of air quality and public health and safety shall prevail. [*Re: 40 CFR Part 70.6.(a)(6)(iii), District Rules 102, 1303.D.1.j, 1303.D.1.n, 1303.D.1.l, 1303.D.1.k, 1303.D.1.o*]

A.2 **Emergency Provisions.** The permittee shall comply with the requirements of the District, Rule 505 (Upset/Breakdown rule) and/or District Rule 1303.F, whichever is applicable to the emergency situation. In order to maintain an affirmative defense under Rule 1303.F, the permittee shall provide the District, in writing, a "notice of emergency" within 2 working days of the emergency. The notice of emergency shall contain the information/documentation listed in Sections (1) through (5) of Rule 1303.F. [*Re: District Rule 1303.F*]

A.3 **Compliance Plan.**

(a) The permittee shall comply with all federally enforceable requirements that become applicable during the permit term, in a timely manner.

(b) For all applicable equipment, the permittee shall implement and comply with any specific compliance plan required under any federally enforceable rules or standards. [*Re: District Rule 1302.D.2*]

A.4 **Right of Entry.** The Regional Administrator of USEPA, the Control Officer, or their authorized representatives, upon the presentation of credentials, shall be permitted to enter upon the premises where a Part 70 source is located or where records must be kept:

(a) To inspect the stationary source, including monitoring and control equipment, work practices, operations, and emission-related activity;

(b) To inspect and duplicate, at reasonable times, records required by this Permit to Operate;

(c) To sample substances or monitor emissions from the source or assess other parameters to assure compliance with the permit or applicable requirements, at reasonable times. Monitoring of emissions can include source testing.

[*Re: District Rule 1303.D.2.a*]

A.5 **Permit Life.** The Part 70 permit shall become invalid three years from the date of issuance, unless a timely and complete renewal application is submitted to the District. Any operation of the source to which this Part 70 permit is issued beyond the expiration date of this Part 70 permit and without a valid Part 70 operating permit (or a complete Part 70 permit renewal application) shall be a violation of the CAAA, § 502(a) and 503(d) and of the District rules.

The permittee shall apply for renewal of the Part 70 permit no later than 6 months before the date of the permit expiration. Upon submittal of a timely and complete renewal application, the Part 70 permit shall remain in effect until the Control Officer issues or denies the renewal application. [*Re: District Rules 1304.D.1.*]

A.6 **Payment of Fees.** The permittee shall reimburse the District for all its Part 70 permit processing and compliance monitoring expenses for the stationary source on a timely basis. Failure to reimburse on a timely basis shall be a violation of this permit and of applicable requirements and can result in forfeiture of the Part 70 permit. Operation without a Part 70 permit subjects the source to potential enforcement action by the District and the USEPA pursuant to section 502(a) of the Clean Air Act. [*Re: District Rules 1303.D.1.p, 1304.D.11 and 40 CFR 70.6(a)(7)*]

A.7 **Deviation from Permit Requirements.** The permittee shall submit a written report to the District documenting each and every deviation from the requirements of this permit or any applicable federal requirements within 7 days after discovery of the violation, but not later than 180 days after the date of occurrence. The report shall clearly document 1) the probable cause and extent of the deviation 2) equipment involved, 3) the quantity of excess pollutant emissions, if any, and 4) actions taken to correct the deviation. The requirements of this condition shall not apply to deviations reported to District in accordance with Rule 505 *Breakdown Conditions*, or Rule 1303.F *Emergency Provisions*. [*Re: District Rule 1303.D.1.g, 40 CFR 70.6(a)(3)(iii)(B)*]

A.8 **Federally-enforceable Conditions.** Each federally enforceable condition in this permit shall be enforceable by the USEPA and members of the public. None of the conditions in the District-only enforceable section of this permit are federally enforceable or subject to the public/USEPA review [*Re: CAAA, § 502(b)(6), 40 CFR 70.6(b)*]

A.9 **Reporting Requirements/Compliance Certification.**
The permittee shall submit compliance certification reports to the USEPA *annually* and to the Control Officer *semi-annually*. These reports shall be submitted on District forms and shall identify each applicable requirement/condition of the permit, the compliance status with each requirement/condition, the monitoring methods used to determine compliance, whether the compliance was continuous or intermittent, and include detailed information on the occurrence and correction of any deviations (excluding emergency upsets) from permit requirement. The reporting periods shall be each half of the calendar year, e.g., January through June for the first half of the year. These reports shall be submitted by September 1 and March 1, respectively, each year. Supporting monitoring data shall be submitted in accordance with the "Semi-Annual Compliance Verification Report" condition in section 9.C. The permittee shall include a written statement from the responsible official, which certifies the truth, accuracy, and completeness of the reports. [*Re: District Rules 1303.D.1, 1302.D.3, 1303.2.c*]

A.10 **Recordkeeping Requirements**. The permittee shall maintain records of required monitoring information that include the following:

(a) The date, place as defined in the permit, and time of sampling or measurements;

(b) The date(s) analyses were performed;

(c) The company or entity that performed the analyses;

(d) The analytical techniques or methods used;

(e) The results of such analyses; and

(f) The operating conditions as existing at the time of sampling or measurement;

The records (electronic or hard copy), as well as all supporting information shall be maintained for a minimum of five (5) years from date of initial entry by SoCalGas and shall be made available to the District upon request. [*Re: District Rule 1303.D.1.f*]

A.11 **Conditions for Permit Reopening.** The permit shall be reopened and revised for cause under any of the following circumstances:

(a) <u>Additional Requirements</u>: If additional applicable requirements (e.g., NSPS or MACT) become applicable to the source which has an unexpired permit term of three (3) or more years, the permit shall be reopened. Such a reopening shall be completed no later than 18 months after promulgation of the applicable requirement. However, no such reopening is required if the effective date of the requirement is later than the date on which the permit is due to expire, unless the original permit or any of its terms and conditions has been extended. All such re-openings shall be initiated only after a 30 day notice of intent to reopen the permit has been provided to the permittee, except that a shorter notice may be given in case of an emergency.

(b) Inaccurate Permit Provisions: If the District or the USEPA determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emission standards or other terms or conditions of the permit, the permit shall be reopened. Such re-openings shall be made as soon as practicable.

(c) Applicable Requirement: If the District or the USEPA determines that the permit must be revised or revoked to assure compliance with any applicable requirement including a federally enforceable requirement, the permit shall be reopened. Such re-openings shall be made as soon as practicable.

Administrative procedures to reopen and revise/revoke/reissue a permit shall follow the same procedures as apply to initial permit issuance. Re-openings shall affect only those parts of the permit for which cause to reopen exists. If the permit is reopened, and revised, it will be reissued with the expiration date that was listed in the permit before the re-opening.
[*Re: 40 CFR 70.7(f)(1)-(3), 40 CFR 70.6(a)(2)*]]

A.12 **Recordkeeping.** All records and logs required by this permit and any applicable District, state or federal rule or regulation shall be maintained for a minimum of five calendar years from the date of information collection and log entry at the facility. These records or logs shall be readily accessible and be made available to the District upon request. [*Re: District Rule 1303, 40 CFR 70.6*]

9.B Generic Conditions

The generic conditions listed below apply to all emission units, regardless of their category or emission rates. In case of a discrepancy between the wording of a condition and the applicable District rule, the wording of the rule shall control.

B.1 **Circumvention (Rule 301).** A person shall not build, erect, install, or use any article, machine, equipment or other contrivance, the use of which, without resulting in a reduction in the total release of air contaminants to the atmosphere, reduces or conceals an emission which would otherwise constitute a violation of Division 26 (Air Resources) of the Health and Safety Code of the State of California or of these Rules and Regulations. This Rule shall not apply to cases in which the only violation involved is of Section 41700 of the Health and Safety Code of the State of California, or of District Rule 303.

B.2 **Visible Emissions (Rule 302).** SoCalGas shall not discharge into the atmosphere from any single source of emission any air contaminants for a period or periods aggregating more than three minutes in any one hour which is:

(a) As dark or darker in shade as that designated as No. 1 on the Ringlemann Chart, as published by the United States Bureau of Mines, or

(b) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in subsection B.2.(a) above.

For the equipment listed below, SoCalGas shall determine compliance with this Rule as specified below:

- *Flares.* For both of its planned and unplanned flaring, SoCalGas shall perform a USEPA Method 9 visible emission evaluation (VEE) annually. The VEE shall be for a six-minute period or the duration of the flaring event, whichever is shorter.
- *Diesel Fueled IC Engines.* SoCalGas shall perform a USEPA Method 9 visible emission evaluation (VEE) for a six-minute period annually.

SoCalGas staff or its contractor, certified in VEE, shall perform the VEE and maintain logs in accordance with USEPA Method 9. SoCalGas shall obtain District approval of the VEE log required by this condition. The start-time, end-time and the date of each visible emissions inspection shall be recorded in the log. All VEE sheets and records shall be maintained consistent with the recordkeeping condition of this permit. [*Re: District Rule 302*].

B.3 **Nuisance (Rule 303).** No pollutant emissions from any source at SoCalGas shall create nuisance conditions. No operations shall endanger health, safety or comfort, nor shall they damage any property or business.

B.4 **PM Concentration - South Zone (Rule 305).** SoCalGas shall not discharge into the atmosphere, from any source, particulate matter in excess of the concentrations listed in Table 305(a) of Rule 305.

B.5 **Specific Contaminants (Rule 309).** SoCalGas shall not discharge into the atmosphere from any single source sulfur compounds, carbon monoxide and combustion contaminants in excess of the applicable standards listed in Sections A, E and G of Rule 309.

B.6 **Sulfur Content of Fuels (Rule 311).** SoCalGas shall not burn fuels with a sulfur content in excess of 0.5% (by weight) for liquid fuels and 239 ppmvd or 15 grains per 100 cubic feet (measured as H_2S at standard conditions) for gaseous fuel or fuel gas to the combustion units. Compliance with this condition shall be based on *periodic* measurements of the fuel gas and gaseous fuel using District-approved methods, and vendor-submitted data showing certified sulfur content for diesel.

B.7 **Organic Solvents (Rule 317).** The permittee shall comply with the emission standards listed in Rule 317.B. Compliance with this condition shall be based on the permittee's compliance with Condition 9.C.10 of this permit. [*Re: District Rule 317*]

B.8 **Metal Surface Coating Thinner and Reducer (Rule 322).** The use of photochemically reactive solvents as thinners or reducers in metal surface coatings is prohibited. Compliance with this condition shall be based on the permittee's compliance with Condition 9.C.10 of this permit and facility inspections. [*Re: District Rule 322*]

B.9 **Architectural Coatings (Rule 323.1).** The permittee shall comply with the coating ROC content and handling standards listed in Rule 323.D as well as the Administrative requirements listed in Section F of Rule 323. Compliance with this condition shall be based on the permittee's compliance with Condition 9.C.10 of this permit and facility inspections. [*Re: District Rules 323, 317, 322, 324*]

B.10 **Disposal and Evaporation of Solvents (Rule 324).** the permittee shall not dispose through atmospheric evaporation of more than one and a half gallons of any photochemically reactive solvent per day. Compliance with this condition shall be based on the permittee's compliance with Condition 9.C.10 of this permit and facility inspections. [*Re: District Rule 324*].

B.11 **Adhesives and Sealants (Rule 353).** The permittee shall not use adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, or any other primers, unless the permittee complies with the following:

(a) Such materials used are purchased or supplied by the manufacturer or suppliers in containers of 16 fluid ounces or less; or alternately

(b) When the permittee uses such materials from containers larger than 16 fluid ounces and the materials are not exempt by Rule 353, Section B.1, the total reactive organic compound emissions from the use of such material shall not exceed 200 pounds per year unless the substances used and the operational methods comply with Sections D, E, F, G, and H of Rule 353. Compliance shall be demonstrated by record keeping in accordance with Section B.2 and/or Section O of Rule 353.

B.12 **Large Water Heaters and Small Boilers (Rule 360).** Any boiler, water heater, steam generator, or process heater rated greater than or equal to 75,000 Btu/hr and less than or equal to 2.000 MMBtu/hr and manufactured after October 17, 2003 shall be certified per the provisions of Rule 360. An ATC/PTO permit shall be obtained prior to installation of any grouping of boilers, water heaters, steam generators, or process heaters subject to Rule 360 whose combined system design heat input rating exceeds 2.000 MMBtu/hr.

B.13 **Breakdowns (Rule 505).** SoCalGas shall promptly report: (a) breakdowns that result in violations of emission limitations or restrictions prescribed by District Rules or by this permit, or (b) any in-stack, continuous monitoring equipment breakdowns; such reporting shall be made in conformance with the requirements of Rule 505, Sections A, B1 and D.

B.14 **Emergency Episode Plan (Rule 603).** During emergency episodes, SoCalGas shall implement the most current District-approved *Emergency Episode Plan.*

B.15 **CARB Registered Portable Equipment.** State registered portable equipment (e.g., IC engines) shall comply with State registration requirements. A copy of the State registration shall be readily available whenever the equipment is at the facility. *[Re: District Rule 202]*

9.C Requirements and Equipment Specific Conditions

Federally-enforceable conditions, including emissions and operations limits, monitoring, recordkeeping and reporting are included in this section for each specific group of equipment. This section may also contain other non-generic conditions.

C.1 **Internal Combustion Engines Providing Emission Reduction Credits (ERCs).** The following IC engine equipment items are included in this emissions unit category:

Table C.1-1 — IC Engines *Providing Emission Reduction Credits (ERCs)*

District ID#	Plant ID#	Equipment Item (IC Engine) Description
1199	#2	Ingersoll-Rand LVG-82, SN 8AL126; 650 hp gas compressor
1200	#3	Ingersoll-Rand LVG-82, SN 8AL129; 650 hp gas compressor
1201	#4	Ingersoll-Rand LVG-82, SN 8AL128; 650 hp gas compressor
1202	#5	Ingersoll-Rand LVG-82, SN 8AL127; 650 hp gas compressor
1203	#6	Ingersoll-Rand KVG-62, SN 6EL265; 660 hp gas compressor
1204	#7	Ingersoll-Rand KVG-62, SN 6EL266; 660 hp gas compressor
1205	#8	Ingersoll-Rand KVG-62, SN 6EL267; 660 hp gas compressor

(a) **Emission Limitations.** Mass emissions from the IC engines with Plant IDs #2 through #8 shall not exceed the limits listed in Tables 5.1-3 and 5.1-4. Allowable pollutant emission concentrations for the same engines are listed below. Compliance with these limits shall be assessed through compliance with the monitoring (includes source testing requirements, the *ICE I&M Plan*, and the *CAM Plan*), record keeping and reporting conditions listed below in this permit.

Table C.1-2 - Emission Concentration Limits for IC Engines Providing ERCs

District ID#	Plant ID#	Rich or Lean Burn?	Pollutant Name	Emission Limit: Concentration (ppmvd)	Emission Limit: Mass Rate (lbs/hr)
1199 thru 1205	#2 - #8	Rich Burn	NO_X	50 ppmv @ 15% O_2 or 90% control and 0.324 lb/MMBtu	2.37
1199 thru 1205	#2 - #8	Rich Burn	ROC	250 ppmv @ 15% O_2 and 0.32 lb/MMBtu	2.34
1199 thru 1205	#2 - #8	Rich Burn	CO	1,700 @ 15% O_2	27.92

SoCal Gas may demonstrate compliance with the NO_X emission limits listed above either by meeting the exhaust concentration limit, or by both demonstrating at least 90% control of NO_X across the catalyst and meeting the emission factor limit of 0.324 lb/MMBtu.

(b) **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

(i) *Fuel Use* - Only natural gas shall be used as fuel in the IC engines listed above.

(ii) *Engine Identification* - Each internal combustion engine shall have an identification plate or tag permanently affixed listing the make, model and serial number (or the operator's tag number). During any inspection, all identification plates or tags shall be made accessible and legible to facilitate District inspection of the engine.

(iii) *Heat Input Limits* — The following heat input limits apply to the IC engines:

District ID#	**Plant ID #**	**Maximum Hourly Heat Input *(MMBtu/hour)***	**Maximum Annual Heat Input *(MMBtu/year)***
1199 through 1205	#2 – #8	7.30 for each engine	63,948 for each engine

(iv) *Inspection And Maintenance Plan (I&M Plan)* - The permittee shall operate in accordance with the District-approved, Rule 333.F. required, IC engine *Inspection and Maintenance Plan* and any subsequent District-approved updates.

(v) *Catalyst Operation* - Engines #2 through #8 above shall be equipped with a three-way non-selective catalytic reduction (NSCR) device on each engine to reduce hazardous air pollutants (HAP) as well as NO_X, ROC, and CO from these engines. The catalysts shall operate at all times the engines are operating.

(vi) *Automatic Shutdown* - Operate equipment to automatically shut down the engine if the catalyst inlet temperature exceeds 1,250^{o}F.

(vii) Formaldehyde Emissions - Formaldehyde emissions shall not exceed 2.7 ppmvd at 15% oxygen. Compliance with this requirement shall be determined through annual source tests and an initial performance test.

(viii) *IC Engines Providing ERCs* - For all IC engines above, the following operational limits shall apply to ensure appropriate Emission Reduction Credits to the Point Arguello Project:

A. Air-Fuel Ratio Controllers - Each Air-Fuel Ratio Controller (AFRC) shall be operated, calibrated, and maintained at all times in accordance with manufacturer's recommendations.

B. Oxygen Sensors - Oxygen sensors in the stack shall be replaced by SoCalGas according to the schedule in the *IC Engine I&M Plan*. The date of each replacement shall be recorded in the maintenance log and quarterly reports, and this data shall be made available to the District inspector upon request.

C. Engine/Catalyst Operation - The performance standards of each NO_X emission control device shall be maintained consistent with the *IC Engine I&M Plan.*

D. Maintenance Of Engines - Each engine shall be maintained in conformance with the permittee-designed operations and maintenance procedures necessary to minimize the pollutant emissions from the engine. A copy of these procedures shall be made available to the District upon request. For each engine, records shall be kept to document the maintenance activities along with any District-approved adjustment to the operations and maintenance procedures which may change the emissions. These maintenance and adjustment records shall be submitted to the District upon request.

E. Replacement Reporting - SoCalGas shall inform the District via telephone within 24 hours and in writing within five working days of any replacement of the engines or their associated control equipment. Replacement of the engines or their associated control equipment is only allowed in accordance with the District Rules and Regulations. If an engine is replaced, source testing shall be conducted in accordance with the procedures set forth in the source testing condition of this permit. Source testing shall be conducted within 60 calendar days of replacement to determine the actual emission reduction associated with the new equipment. This source testing shall be in addition to, and not a replacement of, the annual source test as required by Section 9.C.1(c)(i) of this permit. If a catalyst element is replaced, monitoring shall be conducted in accordance with the procedures specified in Appendix A of the *IC Engine I&M Plan*.

F. Emission Reduction Credits Dedicated To Point Arguello Project - The emission reduction credits created by District PTO 7500 are offsets for use by the Point Arguello Project, to meet its offset requirements. Emission reduction measures implemented to create the above emission reductions shall be maintained according to the *IC Engine I&M Plan*. The emission reduction credits are valid for the life of the Point Arguello Project only.

G. Shifts In Load - To assure that offsets in District PTO 7500 are real, quantifiable, surplus, and enforceable, SoCalGas shall not utilize a shift in load from the controlled engines with Plant ID#'s 2 - 8 to other uncontrolled point sources at the stationary source as means of generating possible additional emission reduction credits (ERCs).

For the purposes of this condition, shift in load is defined as a redirecting of fuel from a controlled emission unit to an uncontrolled emission unit for the sole purpose of increasing the uncontrolled emission unit's baseline fuel usage resulting in the generation of false surplus ERCs. If such shift in load does occur, the increased emissions at the uncontrolled emission unit shall not be considered in any baseline calculation for possible ERC for that uncontrolled emission unit.

H. Monitoring Of Engine Operation - Each engine shall be equipped with a non-resettable hour meter to record its hours of operation.

(c) **Monitoring**: The equipment permitted herein is subject to the following monitoring requirements:

(i) *Limits Exceedance* - Any District-certified IC engine source test result which indicates the applicable Rule 333 emission limits or NSR permit-specified limits (as specified in Table 5.1-3) have been exceeded shall constitute a violation of this permit.

(ii) *Compliance Assurance Monitoring:* SoCalGas shall implement the following CAM required monitoring:

A. Monitor all compliance assurance indicators for the engines in conformance with the requirements listed in the CAM Plan.

B. Log any excursions of each indicator from its limits that are set forth in the latest CAM Plan.

C. Log all periods of monitor shutdowns, monitoring malfunctions and associated monitor repairs and any required quality assurance/quality control activity periods for the monitors (i.e., the AFRC controller and the catalyst thermocouple units) as listed in the CAM Plan [*Ref: 40 CFR 64.7.(c)*]. The reason for each shutdown, e.g., indicator range excursion or malfunction, shall also be listed in the log.

D. Per 40 CFR 64.6.(c)(4), a minimum 90% data capture rate on a quarterly basis is required for each indicator. For the purposes of minimum data capture computations, any data obtained during the following periods are not included:

- Routine monitor calibrations and inspections;
- Sudden and infrequent monitor malfunctions beyond the operator's reasonable control [Ref: 40 CFR 64.7(c)]; and,
- IC engine start-up periods.

E. A Quality Improvement Plan (QIP) is triggered for any engine subject to CAM Rule, if more than one (1) percent [*per 40 CFR 64.8 (a)]* of valid individual data points obtained in any calendar quarter lie outside the CAM Plan established indicator ranges. SoCalGas shall immediately notify the District if a QIP has been triggered and shall develop and submit such a Plan to the District for approval as expeditiously as practicable. The QIP submitted by SoCalGas shall meet all the requirements specified for it in 40 CFR Section 64.8 [*QIP Requirements*], at a minimum.

(iii) *General Monitoring* - For the I.C engines listed in Table C.1-1 above, the following monitoring requirements apply:

A. *Inspection and Maintenance Plan* - SoCalGas shall implement all monitoring provisions of its *IC Engine Inspection and Maintenance Plan* approved by the District. This includes emissions monitoring of the 7 engines per District Rule 333.F.3.The inspections shall be conducted prior to any adjustments to the AFRC set points and shall consist of one (1) fifteen minute run at the previously established set point.

B. *Fuel Heating Value* - The gross heating value of the gaseous fuel (Btu/scf) shall be measured using approved ASTM or ARB-approved test methods semi-annually.

C. *Fuel Sulfur Content* - The total sulfur content and H_2S content of the gaseous fuel burned on the property shall be determined semi-annually using approved ASTM or ARB-approved test methods.

D. *Operating Hours* - The hours of operation each month of each engine shall be documented in a log.

E. *Fuel Use Metering* - Fuel use for each engine shall be monitored by an in-line fuel meter. Meter design and specifications shall be approved by the District. The meters shall be calibrated per the latest District-approved *Process Monitor Calibration and Maintenance Plan.*

(d) **Recordkeeping**: The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request:

(i) *Hours* - Records documenting hours of operation and days of operation for each IC engine each month. The record shall document any 60-minute start-up period required for the IC engine after it is shut-down.

(ii) *Fuel Use* - Records documenting IC engine(s) monthly fuel consumption (scf/month).

(iii) *Fuel Heating Value* - Records documenting the gross heating value of fuel (Btu/scf) on a semi-annual basis.

(iv) *Fuel Sulfur Content* - Records documenting the total sulfur content and H2S content of the gaseous fuel on a semi-annual basis.

(v) *Equipment Maintenance Data* - Records summary documenting engine/control device maintenance on an annual basis.

(vi) *I&M Plan Logs* - Logs documenting the parameter settings, NO_X and CO level recorded, and other values required under the *Inspection and Maintenance Plan* for each engine shall be kept on-site.

(vii) *Equipment ID/Tags* - If an operator's tag number is used in lieu of an IC engine identification plate, written documentation which references the operator's unique IC engine ID number to a list containing the make, model, rated maximum continuous BHP and the corresponding RPM.

(viii) *Monitor Non-operational Time* - Logs documenting all non-operational times for the AFRC controller units and the catalyst temperature measurement units including the reasons for all monitor shutdowns, as monitored per Condition 9.C.1.(c)(ii)(C) above.

(ix) *Set Point Settings Data* - A record of the most current Air Fuel Ratio Controller set points and the date these were established.

(x) *Engine Operation Outside Settings* - A record of any continuous engine operation outside of the indicator ranges established in the CAM Plan. All such excursions are to be flagged specifically in the CAM logs.

(xi) *Maintenance Records* - Records on all maintenance performed for all equipment specified in this permit including engine time settings, engine maintenance, catalyst maintenance, and air-fuel ratio controller.

(xii) *Control Equipment Parameters* - Records on catalyst (including manufacturer, model and serial numbers), engine, air-fuel ratio controller, or sensor replacement.

(xiii) *CAM Plan Required Data* - A monthly summary of all compliance indicator data excursions and all monitor non-operational times, obtained pursuant to Conditions 9.C.1 (c)(ii)B and C above.

(e) **Reporting**: On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.2 **Internal Combustion Engines Not Providing ERCs.** The following IC engine equipment items are included in this emissions unit category:

Table C.2-1 — IC Engines not Providing ERCs

District ID#	Plant ID#	Equipment Item (IC Engine) Description
001206	*#9*	*Cooper-Bessemer GMV-10C; 1,100 hp gas compressor*
*001221**	*#4A*	*Waukesha VRG-220U; 48 hp driving air compressor*
*001222**	*#5A*	*Waukesha VRG-220U; 48 hp driving air compressor*
*008665**	*Emergency Generator*	*Waukesha F817GU; 160 hp*
008666	*#12A*	*133 bhp Cummins Model V-378-F2 diesel-fired emergency standby firewater pump engine*
008668	*#13A*	*133 bhp Cummins Model V-378-F2 diesel-fired emergency standby firewater pump engine*

*-- *Items in italics are District permit-exempt; however, they are not District Rule exempt*

Table C.2-2 - Emission Concentration Limits for IC engines not Providing ERCs

District ID#	Plant ID#	Rich or Lean Burn?	Pollutant Name	Emission Limit: Concentration (ppmvd)	Emission Limit: Mass Rate (lbs/hr)
001206	#9	Lean Burn	NO_X	125 @ 15% O_2	4.61
			VOC (ROC)	750 @ 15% O_2	25.00
			CO	4,500 @ 15% O_2	101.45

(a) **Emission Limits:** Mass emissions from the IC engine Plant ID #9 shall not exceed the limits listed in Tables 5.1-3 and 5.1-4. Allowable pollutant emission concentrations for the engine are listed in Table C.2-2 above. Compliance with these limits shall be assessed through compliance with the monitoring (includes source testing and *ICE I&M Plan*), record keeping and reporting conditions listed below in this permit.

(b) **Operational Limits:** The operational limitations listed below shall apply to the IC engine (Plant ID #9) listed in Table C.2-1 above. Compliance with these limits shall be assessed through compliance with the monitoring, record keeping and reporting conditions listed in this permit section.

(i) *Fuel Use* - Only natural gas shall be used as fuel.

(ii) *Engine Identification* - Each internal combustion engine shall have an identification plate or tag permanently affixed listing the make, model and serial number (or the operator's tag number). During any inspection, all identification plates or tags shall be made accessible and legible to facilitate District inspection of the engine.

(iii) *Heat Input Limits* - The following heat input limits apply to the IC engine Plant ID #9: 10.02 MMBtu per hour and 87,795 MMBtu per year.

(iv) *Inspection And Maintenance Plan (I&M Plan)* - The permittee shall operate in accordance with the District-approved, Rule 333.F required IC engine Inspection and Maintenance Plans and their subsequent District-approved updates for all IC engines subject to Rule 333.

(v) Gas Compressor #9 (Device ID #001206)

A. Change the oil and filter every 4,320 hours of operation or annually, whichever comes first. Alternatively, So Cal Gas may utilize an oil analysis program specified in 40 CFR 63 Subpart ZZZZ §63.6625(i). If all the requirements detailed in this section of the regulation are satisfied, the owner or operator shall not be required to change the oil.

B. If any of the limits are exceeded the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later.

C. Inspect the spark plugs every 4,320 hours of operation or annually, whichever comes first, and replace as necessary.

D. Inspect all hoses and belts every 4,320 hours of operation or annually, whichever comes first, and replace as necessary.

(vi) Firewater Pumps (Device IDs #008666 and #008668)

A. Change the oil and filter every 500 hours of operation or annually, whichever comes first.

B. Alternatively, So Cal Gas may utilize an oil analysis program specified in 40 CFR 63 Subpart ZZZZ §63.6625(i). If all the requirements detailed in this section of the regulation are satisfied, the owner or operator shall not be required to change the oil.

C. If any of the limits are exceeded the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later.

D. Inspect the air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary.

E. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

F. These engines shall use diesel fuel that meets the requirements in 40 CFR 80.510(b) for nonroad diesel fuel, except that any existing diesel fuel purchased (or otherwise obtained) prior to January 1, 2015, may be used until depleted.

(vi) Emergency Generator (Device ID #008665)

A. Change the oil and filter every 500 hours of operation or annually, whichever comes first.

B. Alternatively, So Cal Gas may utilize an oil analysis program specified in 40 CFR 63 Subpart ZZZZ §63.6625(i). If all the requirements detailed in this section of the regulation are satisfied, the owner or operator shall not be required to change the oil.

C. If any of the limits are exceeded the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis; if the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later.

D. Inspect the spark plugs every 1,000 hours of operation or annually, whichever comes first, and replace as necessary.

E. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

F. This engine may be operated up to 100 hours per calendar year for maintenance, testing, and emergency demand response. The RICE may also be operated up to 50 hours per calendar year in non-emergency situations, but the 50 hours of operation in non-emergency situations are counted as part of the 100 hours. There is no time limit on the use of the RICE in emergency instructions.

(vii) Air Compressors (Device IDs #001221 and #001222)

A. Change the oil and filter every 1,440 hours of operation or annually, whichever comes first.

B. Inspect the spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.

C. Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.

D. The operator shall minimize each engine’s time at idle during startups to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.

E. The owner and operator must operate and maintain each engine and emission control device in a manner consistent with safety and good air pollution control practices for minimizing emissions or according to the manufacturer's emissions related operation and maintenance instructions.

(c) **Monitoring:** The following source testing and monitoring conditions apply:

(i) *Limits Exceedance* - Any District-certified IC engine source test result which indicates the applicable Rule 333 emission limits or NSR permit-specified limits (as specified in Table 5.1-3) have been exceeded shall constitute a violation of this permit.

(ii) *I&M Plan* - SoCalGas shall implement all monitoring provisions of its *IC Engine I&M Plan* approved by the District.

(iii) *Fuel Heating Value* - The gross heating value of the gaseous fuel (Btu/scf) shall be measured using approved ASTM or ARB-approved test methods annually.

(iv) *Fuel Sulfur Content* - The total sulfur content and H_2S content of the gaseous fuel burned on the property shall be analyzed and determined annually using approved ASTM or ARB-approved test methods.

(v) *Operating Hours* - The hours of operation each month of each engine, including the IC engines exempt from permitting, shall be documented in a log. The log shall be made available for inspection upon request.

(vi) *Fuel Use Metering* - Fuel use for the engine with plant ID #9 shall be monitored by an in-line fuel meter. Meter design and specifications shall be approved by the District. The meters shall be calibrated per the latest District-approved *Process Monitor Calibration and Maintenance Plan.*

(d) **Recordkeeping**: SoCalGas shall keep the required logs, as applicable to this permit, which demonstrate compliance with emission limits, operation limits and monitoring requirements above. All logs shall be available to the District upon request. Written information (logs) shall include:

(i) *Hours* - Records documenting individual IC engine operating hours each month.

(ii) *Fuel Use* - Records documenting IC engine Plant ID #9 monthly fuel consumption (scf/month).

(iii) *Fuel Heating Value* - Records documenting the gross heating value of fuel (Btu/scf) on an annual basis.

(iv) *Fuel Sulfur Content* - Records documenting the total sulfur content and H2S content of the gaseous fuel on an annual basis.

(v) *Equipment Maintenance Data* - Records summary documenting engine/control device maintenance on an annual basis.

(vi) *I&M Plan Logs* - Logs documenting the parameter settings, NO_X and CO level recorded, and other values required under the *Inspection and Maintenance Plan* for the engine shall be kept on-site.

(vii) *Equipment ID/Tags* - If an operator's tag number is used in lieu of an IC engine identification plate, written documentation which references the operator's unique IC engine ID number to a list containing the make, model, rated maximum continuous BHP and the corresponding RPM.

(viii) In addition, the following requirements from 40 CFR 63 Subpart ZZZZ §63.6655 and §63.6660 shall be met:

a. If the owner and operator must comply with the emission and operating limitations, the owner and operator must keep the records of the following:

1. A copy of each notification and report that the owner and operator submitted to comply with Subpart ZZZZ, including all documentation supporting any Initial Notification or Notification of Compliance Status that the owner and operator submitted, according to the requirement in 40 CFR 63 Subpart ZZZZ §63.10(b)(2)(xiv).

2. Records of the occurrence and duration of each malfunction of operation (*i.e.,* process equipment) air pollution control and monitoring equipment.

3. Records of performance tests and performance evaluations as required in 40 CFR 63 Subpart ZZZZ §63.10(b)(2)(viii) and §63.6655(a)(3).

4. Records of all required maintenance performed on the air pollution control and monitoring equipment.

5. Records of actions taken during periods of malfunction to minimize emissions in accordance with 40 CFR 63 Subpart ZZZZ §63.6605(b), including corrective actions to restore malfunctioning process equipment to its normal or usual manner of operation.

i. The owner and operator must keep records of the maintenance conducted on the stationary RICE in order to demonstrate that the owner and operator operated and maintained the stationary RICE according to the maintenance plan.

ii. For the Firewater Pumps (Device IDs #008666 and #008668) and Emergency Generator (Device ID #008665), the owner or operator shall keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. The owner or operator must document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation.

iii. For the Firewater Pumps (Device IDs #008666 and #008668), the owner or operator must keep records of the parameters that are analyzed as part of the oil analysis program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.

(e) **Reporting**: On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.3. **Micro-Turbines.** The following equipment is included in this emissions unit category:

Device No	Name
107543	#1: Capstone C60, Micro-Turbine, 60 kW / 0.804 MMBtu/hr
107544	#2: Capstone C60, Micro-Turbine, 60 kW / 0.804 MMBtu/hr
107545	#3: Capstone C60, Micro-Turbine, 60 kW / 0.804 MMBtu/hr
107546	#4: Capstone C60, Micro-Turbine, 60 kW / 0.804 MMBtu/hr

(a) **Emission Limits**: The mass emissions from the equipment permitted herein shall not exceed the values in Table 5.2. Compliance with the short-term and long-term mass emission limits for the Capstone C60 micro-turbines shall be based on the aggregated potential to emit of all four units. Compliance shall be based on the operational, monitoring, recordkeeping and reporting conditions of this permit.

Based on CARB DG-002, emissions from the Capstone C60 micro-turbines shall not exceed 0.5 lb/MW-hr NO_X, 6 lb/MW-hr CO, and 1 lb/MW-hr ROC.

(b) **Operational Limits**: The permitted equipment is subject to the following operational restrictions:

(i) *PUC Quality Natural Gas Fuel Sulfur Limit*. The total sulfur and hydrogen sulfide (H_2S) content (calculated as H_2S at standard conditions, 60^oF and 14.7 psia) of the PUC quality natural gas used as fuel in the Capstone C60 micro-turbines shall not exceed 80 ppmv and 4 ppmv, respectively. Compliance with this condition shall be based on annual fuel gas sampling and analysis.

(ii) *Fuel Type Restrictions*. The Capstone C60 micro-turbines shall only be operated using PUC quality natural gas. The permittee shall comply with the following fuel gas operational restrictions: The four Capstone C60 micro-turbines combined shall not use more than 73,508 scf/day, 6.71 MMscf/qtr, and 26.83 MMscf/yr of natural gas.

(c) **Monitoring:** The permitted equipment is subject to the following monitoring requirements:

(i) *Fuel Usage Metering*. The permittee shall install and operate a dedicated, temperature and pressure-corrected, totalizing, non-resettable type fuel meter, to measure the amount of natural gas used.

(ii) *Heating Value Data*. On an annual basis maintain record of the heat content (HHV) basis of the fuel gas in units of Btu/scf.

(iii) *Fuel Gas Sulfur Data*. The permittee shall measure the total sulfur and H_2S content of the fuel gas annually in accordance with EPA Methods 15/16/16A.

(iv) *Source Testing*. When requested in writing by the District the permittee shall source test the C60 micro-turbines to demonstrate compliance with Condition 9.C.3 (a) above. Table.4.4 of this PTO shows the pollutants and process parameters that are to be monitored when the micro-turbines are source tested.

(d) **Recordkeeping**: The following records shall be maintained by the permittee and shall be made available to the District upon request:

(i) *Fuel Gas Use*. The total amount of PUC quality natural gas used between the four Capstone C60 micro-turbines shall be recorded on a monthly, quarterly, and annual basis in units of standard cubic feet and million Btus.

(ii) *Heat Content*. Record the annual heating value results of the fuel gas.

(iii) *Operational Days*. For each month, the number of days each micro-turbine operated.

(iv) *Sulfur Content*. The annual measured total sulfur and H_2S content, both in units of ppmvd, of the fuel gas burned in the micro-turbines.

(e) **Reporting:** On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the Semi-Annual Compliance Verification Reports condition of this permit.

C.4 **Process Heaters:** The following items are included in this emissions unit category:

Table C.4 — Process Heaters

District ID#	Plant ID#	Equipment Item (IC Engine) Description
001214	HOH #1	Fulton Thermal Corporation 3.500 MMBtu/hr hot oil heater
107535 113985 113987	HOH #2	American Heating Company 2.200 MMBtu/hr hot oil heater Parker 2.000 MMBtu/hr gas pre-heater Parker 2.000 MMBtu/hr gas pre-heater

(a) **Emission Limitations.** The emissions from the equipment permitted herein shall not exceed the values listed in Tables 5.1-3 B and 5.1-4 B. Compliance shall be based on the operational, monitoring, recordkeeping and reporting conditions of this permit.

(b) **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

(i) *Heat Input Limits*. The hourly, daily and annual heat input limits to each unit shall not exceed the values listed in Table 5.1-1 B. These limits are based on the design rating of the unit and the annual heat input value as listed in the permit application. Unless otherwise designated by the District 1,050 Btu/scf shall be used for determining compliance.

(ii) *Public Utility Natural Gas Fuel Sulfur Limit.* The total sulfur and hydrogen sulfide (H_2S) content (calculated as H_2S at standard conditions, 60°F and 14.7 psia) of the public utility natural gas fuel shall not exceed 80 ppmv and 4 ppmv respectively. Compliance with this condition shall be based on billing records or other data showing that the fuel gas is obtained from a public utility gas company.

(iii) *Rule 360 Compliance*. Any boiler or hot water heater rated at or less than 2.000 MMBtu/hr and manufactured after October 17, 2003 shall be certified per the provisions of Rule 360.

(iv) *Rule 361 Compliance – Existing Units*. The owner or operator of any unit requesting the low use exemption in Section D.2 shall comply with the requirement to submit a Rule 361 Compliance Plan for District review and approval prior to March 15, 2016. Fuel meters installed pursuant to the approved Rule 361 Compliance Plan shall be installed prior to December 31, 2016.

On or before January 20, 2019, the owner or operator of any existing unit shall:

A. For units subject to Section D.1 emission standards, apply for an Authority to Construct permit.

B. For units subject to the Section D.2 low use provision, provide the annual fuel heat input data for years 2017 and 2018.

Any existing unit that is replaced or modified is subject to requirements of Rule 361 and shall first obtain a District ATC permit prior to installation or modification.

(v) *External Combustion Units – Permits Required.*

A. An ATC/PTO permit shall be obtained prior to installation of any grouping of Rule 360 applicable boilers or hot water heaters whose combined system design heat input rating exceeds 2.000 MMBtu/hr.

B. An ATC permit shall be obtained prior to installation, replacement, or modification of any existing Rule 361 applicable boiler or water heater rated over 2.000 MMBtu/hr.

C. An ATC shall be obtained for any size boiler or water heater if the unit is not fired on natural gas or propane.

(c) **Monitoring.** The equipment permitted herein is subject to the following monitoring requirements:

(i) *Default Rating Method*. The volume of natural gas used (in units of standard cubic feet) shall be reported as permitted annual heat input limit for the unit (Btu/year) divided by the District-approved heating value of the fuel (Btu/scf).

(ii) *Fuel Use Meter*. The volume of fuel gas (in units of standard cubic feet) used in device IDs 113985 and 113987 shall be measured through the use of a dedicated District-approved fuel meter. Each heater is equipped with its own fuel meter. The meters shall be temperature and pressure corrected. The fuel meters shall be accurate to within five percent (5%) of the full scale reading. The meters shall be calibrated according to manufacturer's specifications and/or SoCal Gas Company procedures, and the calibration records shall be made available to the District upon request.

(iii) *Existing Units Rated Between 2.000 - 5.000 MMBtu/hr.* These units are not subject to tuning or source testing requirements.

(iv) *Units Rated at 2.000 MMBtu/hr or Below.* Any unit manufactured after October 17, 2003 shall be tuned once every 12 months following the manufacturer's recommended tuning procedure or by an alternative tuning procedure approved by the District.

(d) **Recordkeeping.** The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request:

(i) *Fuel Use – Device IDs 1214 and 107535.* The volume of fuel gas used each year (in units of standard cubic feet) as determined by the Default Rating Method.

(ii) *Fuel Use – Device IDs 113985 and 113987.* The volume of fuel gas used each year (in units of standard cubic feet) as determined by the fuel meters.

(iii) *Fuel Use Meter Calibration Records*. Calibration records of District-approved fuel use meters.

(iv) *Tuning Records*. For units subject to Rule 360, maintain documentation verifying the required tune-ups, including a complete copy of each tune-up report.

(v) *Maintenance Logs*. Maintenance logs for the unit(s) and fuel meter (as applicable).

(e) **Reporting.** On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the Semi-Annual Compliance Verification Reports condition of this permit.

C.5 **Flares.** The following equipment items are included in this emissions unit category:

Table C.5 - List of Flares

District ID#	Equipment Item Description
001211	Flare – serving Glycol unit; 1.600 MMBtu/hr, pilot fired with PUC natl. gas
001212	Flare – serving Glycol unit; 1.600 MMBtu/hr, pilot fired with PUC natl. gas
001215	Flare; 1.600 MMBtu/hr, pilot fired with PUC natural gas
104915	SulfaTreat Unit; Cameron, Kleen Air, 46” dia. by 88” high, 4950 lbs.
113418	SulfaTreat Unit; Cameron, Kleen Air, 46” dia. by 88” high, 4,950 lbs. (back-up)
104916	‘CEI-KMN’ Unit B; Cameron, Kleen Air, 46” diam. by 64” high, 2,850 lbs
107706	‘CEI-KMN’ Unit C; Cameron, Kleen Air, 46” diam. by 64” high, 2,850 lbs

(a) **Emission Limits:** Mass emissions from the equipment items listed above shall not exceed the limits listed in Tables 5.1-3B and 5.1-4B for the items. Compliance with these limits shall be assessed through compliance with the monitoring, recordkeeping and reporting conditions listed below in this permit.

(b) **Operational Limits:** The operational limitations listed below shall apply to the equipment items listed above. Compliance with these limits shall be assessed through compliance with the monitoring, recordkeeping and reporting conditions listed in this permit section.

(i) Flare units 1211 and 1212 shall not combust any waste gases that have not been treated by one of the SulfaTreat units (104915 or 113418) operating in series with one of the CEI-KMN units B (104916) or C (107706). CEI-KMN units B and C are designed to operate in parallel with each other; either one of these units shall operate all the time the waste gas stream is processed. SoCalGas must receive written District approval prior to using any alternate media in these units.

(ii) *Smokeless Operation*: All flares shall operate “smokeless,” as defined in District Rule 359.C.

(iii) *Automatic Ignition:* All flares shall operate equipped with an automatic ignition system including a pilot-light gas source or equivalent system, or shall operate with pilot flames present at all times with the exception of purge periods for automatic ignition equipped flares.

(iv) *Flame Monitoring*: The presence of the flame in the flare pilots shall be continuously monitored using thermocouples or equivalent devices that detect the presence of flames.

(v) *Flame Operation*: The flare flames shall be operating at all times when combustible gases are vented through the flares.

(vi) *Heat Input:* The maximum hourly heat input to each flare is limited to the value listed below:

Flare ID#	Max. Hourly Heat Input (MMBtu/hr)
1211, 1212, 1215	1.600 (each flare)

(vii) *Gaseous Fuel Sulfur Limit:* The gases combusted in the flares shall not contain sulfur compounds in excess of 15 gr./100 scf (239 ppmv), calculated as H_2S under standard conditions (i.e., 14.7 psia and 60°F). Only PUC-quality natural gas shall be used as pilot fuel gas, with total sulfur content less than 80 ppmv.

(viii) The drains off of the SulfaTreat unit and the CEI-KMN units shall remain connected to the existing low pressure condensate piping system at all times. No liquids shall be drained to the atmosphere from the two units when they are operational; and no flash-offs to the atmosphere shall occur from these two units while operating and draining collected water.

(c) **Monitoring:** The following monitoring conditions apply to the flare equipment items:

(i) *Heating Value:* The heating value of the 'gaseous fuel' (Btu/scf) shall be analyzed annually using the ASTM methods listed in Rule 359.E (test methods).

(ii) *Fuel Sulfur Content:* For flare unit 1215, 'gaseous fuel' sulfur content (H_2S and TRS) must be measured annually using the ASTM methods listed in Rule 359.E (test methods). For flare units 1211 and 1212, the total sulfur content in 'gaseous fuel' shall be measured semi-annually using the Rule 359.E listed methods.

(iii) *Purge Gas Sulfur Content:* The purge gas sulfur content must be measured annually using Rule 359.E-listed ASTM methods, if such gas is not PUC quality natural gas or an inert gas.

(iv) *Media Bed Changes:* SoCalGas shall maintain purchase records documenting the type of material purchased for the SulfaTreat units and the CEI-KMN units.

(d) **Recordkeeping**: SoCalGas shall keep the required logs, as applicable to this permit, which demonstrate compliance with emission limits, operation limits and monitoring requirements above. All logs shall be available to the District upon request. Written information (logs) shall include:

(i) *Heating Value*: Annual records documenting the higher heating value of the 'gaseous fuel.' Such documents shall be the results of the laboratory analyses using ASTM test methods prescribed in Rule 359.E.

(ii) *Fuel Sulfur Content:* Records documenting annually the 'gaseous fuel' sulfur content as measured periodically, and, if applicable, the purge gas sulfur content for each flare unit.

(iii) *Media Bed Change:* Records documenting any media bed changes for the SulfaTreat units and the CEI-KMN units. The records shall include the dates and times of each change-out, the quantity of material replaced, and the type of material placed in the unit.

(e) **Reporting:** On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.6 **Fugitive Hydrocarbon Emissions Components.** The following equipment units are addressed via the 'component-leak-path' methodology:

Table C.6 (Fugitive HC Components and Component-Leak-Paths)

District ID#	Equipment Item Name	Description
	Gas & Light Liquid Service Components	
100882	Valves	3,570 component-leak-paths
100883	Connections	16,918 component-leak-paths
100886	Pressure Relief Devices	49 component-leak-paths
100885	Compressor Seals	14 component-leak-paths
100884	Pump Seals	5 component-leak-paths

(a) **Emission Limits**: Mass emissions from the fugitive HC components listed above shall not exceed the limits listed in Table 5.1-3 B and 5.1-4 B for these components.

(b) **Operational Limits**: Operation of the equipment listed in this section shall conform to the requirements listed below. Compliance with these limits shall be assessed through compliance with the monitoring, record-keeping and reporting conditions in this permit.

(i) *Gas Collection System Use* - The gas collection (GC) system shall be in operation when any of the equipment which is connected to the GC system at the facility is in use. The GC system shall be maintained and operated to minimize the release of emissions from all systems, including separators and storage vessels.

(ii) *Leak-Path Count* - The total component and component-leak-path count listed in the SoCalGas I&M component and component-leak-path inventory shall not exceed the total leak-path component count assigned to these units in Table C.6 by more than five percent. This five percent range is to allow for minor differences due to component counting methods and does not constitute allowable emissions growth due to the addition of new equipment. The leak path count in Table C.6 will be verified by the District during inspections.

(c) **Recordkeeping**: SoCalGas shall keep a log of the changes in fugitive emissions component count and the associated emissions changes summarized on a quarterly basis. All inspection and/or repair records shall be retained at the plant for a minimum of five years. In addition SoCalGas shall maintain the following records:

(i) *Carbon Canister Change:* Records documenting carbon replacement for the canister serving the odorant system. The records shall include the dates of each change-out, the quantity of material replaced, and the type of material placed in the unit.

(d) **Reporting**: On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.7 **Hydrocarbon Liquid Storage Tanks.** The following equipment items at the dehydration units are included in this emissions unit category:

Table C.7 - List of Storage Tank Emissions Units

District ID#	Equipment Item Description
1219	Flotation Cell; 10,000 gallons capacity, 12’ diameter, 12’ high
1220	Flotation Cell; 10,000 gallons capacity, 12’ diameter, 12’ high
1217	HC condensate Storage Tank; 7,050 gallons, 10’ diameter, 12’ high
1218	Brine Water Storage Tank; 40,600 gallons, 24’ diameter, 12’ high
100899	Methanol Storage Tank; 500 gallons, blanketed with NG
100910	Glycol Contactor Control Tanks (3); pressurized, each 16” diam., 15.25’ long
100910	Glycol Contactor Control Tank (1); pressurized, 16” diam., 17’8”’ long
100901	Odorant Storage Tank (1); 1000 gallons, pressurized, storing Captan-50/thiophane

(a) **Emission Limits**: Mass emissions from the equipment items IDs# 1219, 1220 and 1217 listed above shall not exceed the limits listed in Tables 5.1-3 and 5.1-4 for the items. Compliance with these limits shall be assessed through compliance with the monitoring, record keeping and reporting conditions listed below in this permit.

(b) **Operational Limits**: The operational limitations listed below shall apply to the items listed above in this permit section. Compliance with these limits shall be assessed through compliance with the monitoring, record keeping and reporting conditions listed in this permit section.

(i) *Throughput Limitations*: Annual hydrocarbon condensate production (dry) shall not exceed 125,000 gallons.

(ii) *Vapor Recovery System Operation:* No volatile organic compound (VOC) liquid shall be stored in the hydrocarbon storage tanks (IDs# 1219, 1220 and 1217) or brine water storage tank (ID# 1218) listed in Table C.7, unless the tanks are connected to the gas collection system and all collected gas is combusted by a flare with a destruction efficiency of at least 95%. All tanks listed in Table C.7 shall be operated in a leak-free condition to minimize the release of reactive organic vapors.

(iii) *Tank Clean Out:* Prior to opening a tank for cleaning the tank shall be purged of ROC vapors and the purged gas shall be directed to a vapor control device with a destruction efficiency of at least 95%.

(iv) *Odorant Tank Filling:* Emissions of VOCs to the atmosphere resulting from any odorant storage tank (ID# 100901) filling operations shall be reduced by passing displaced vapors through a vapor recovery system with control efficiency greater than 90%. Odorant emissions shall not be detectable, by olfactory senses, at or beyond the property boundary at any time during tank filling operations.

(c) **Monitoring:** The following monitoring conditions apply to items listed in Table C.6 above:

(i) *Hydrocarbon Liquid (Condensate) Volume*: The volume of hydrocarbon liquid (condensate) produced annually shall be monitored by noting the volume (in gallons) flowing out of the hydrocarbon liquid storage tank (ID# 1217) into trucks on a monthly basis.

(ii) *API Gravity & True Vapor Pressure Of Stored HC* - The API gravity and the true vapor pressure at 67.2 degrees F of the stored hydrocarbon liquid in each storage tank (IDs# 1219, 1220 and 1217) shall be determined annually. Alternately, the Reid vapor pressure of the stored condensate may be measured by the ASTM D 323 Standard Method and the true vapor pressure calculated by API Bulletin 2517, or equivalent District-approved Reid/True vapor pressure correlation. The actual temperature of the stored hydrocarbon liquid shall be measured each time a sample is taken for API gravity and TVP analysis.

Note: The API gravity and TVP analysis for the HC Condensate Storage tank may be used as representative values for all three tanks instead of sampling from each tank individually.

(d) **Recordkeeping**: SoCalGas shall keep the required logs, as applicable to this permit, which demonstrate compliance with emission limits, operation limits and monitoring requirements above. All logs shall be available to the District upon request. Written information (logs) shall include:

(i) *Hydrocarbon Liquid (Condensate) Volume*: The volume of hydrocarbon liquid produced annually shall be recorded

(ii) *API Gravity & True Vapor Pressure Of Stored HC* - The API gravity, the true vapor pressure at 67.2 degrees F, and the actual storage temperature of the stored hydrocarbon liquid in each storage tank (IDs# 1219, 1220 and 1217) shall be recorded annually.

(iii) *Maintenance Records* — Records of maintenance performed per Sections B.3 and B.5 of Rule 326. These records contain, at a minimum, the following:

A. *Tank Identification*: Tank identification type of vapor controls used, and initials of personnel performing maintenance.

B. *Maintenance Performed*: Description of maintenance procedure performed.

C. *Estimated Excess Emissions*: Excess emissions caused by maintenance and how determined.

D. *Maintenance Dates & Times*: Times and dates of maintenance procedure.

(e) **Reporting**: On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.8 **Loading Station.** The following equipment item is included in this emissions unit category:

Table C.8 – Loading Station Unit

District ID#	Equipment Item Name/Description
8669	Loading Station; Grade level station to load tankers, not VRU equipped

(a) **Emission Limits**: Mass emissions from the equipment items listed above shall not exceed the emission limit listed for these items in Tables 5.1-3 and 5.1-4 of this permit. Compliance with these limits shall be assessed through compliance with the monitoring, record-keeping and reporting (MRR) conditions listed in this permit.

(b) **Operational Limits**: All process operations from the equipment listed in this section shall meet the requirements of District Rule 346. The following addition operational limits apply:

(i) All tanker trucks receiving organic liquids shall be equipped with a submerged fill pipe;

(ii) SoCalGas shall restrict the HC condensate loading station operations so that the hourly volume of condensate into tanker trucks shall not exceed 170 barrels;

(iii) The condensate volume loading shall be restricted to 476 barrels (i.e., 19,992 gallons) daily; and

(iv) Total condensate loading volume shall not exceed 2,976.19 barrels (i.e., 125,000 gallons) annually.

Compliance with these limits shall be assessed through compliance with the monitoring, record-keeping and reporting conditions in this permit.

(c) **Monitoring:** SoCalGas shall monitor, via a log or a shipping invoices document, the daily and total annual volumes of hydrocarbon condensate shipment from the truck loading station.

(d) **Recordkeeping**: SoCalGas shall record the daily and total annual volumes (in gallons) of HC condensate shipment from the loading station, in a log kept on-site. When vacuum trucks are used to empty the condensate tanks, the log shall include the operator's initials, date of loading operation, and the destination of the condensate. If vacuum trucks are not used to empty the condensate tanks, the log shall include the operator's initials, date of loading operation, transfer temperature, and method of determining throughput for each loading operation.

(e) **Reporting**: On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.9 **Wells.** The following equipment items are included in this emissions unit category:

Table C.9 (Gas Wells)

District ID#	Equipment Item Name/Description
008670	Miscellaneous Gas Wells: 21 in number, fugitive emissions
100903	Miscellaneous Stacks/Gas Vents: gas venting due to pipeline depressurization

(a) **Emission Limits**: Mass emissions from the emission units listed above shall not exceed the emission limit listed for these items in Tables 5.2B of this permit. Compliance with these limits shall be assessed through compliance with the monitoring, record-keeping and reporting (MRR) conditions listed in this permit.

(b) **Monitoring**: On an annual basis, SoCalGas shall (i) measure the reactive organic compound (ROC) content of the vented gas, using gas-liquid chromatography analysis, and the gas total sulfur (TRS) content, and (ii) annually record the computed volume of vented reservoir gas from each pipeline depressurization event.

(c) **Record Keeping**: SoCalGas shall record the following:

(i) The computed volume of gas (in units of scf) vented annually to the atmosphere resulting from all pipeline depressurizations; and the ROC and TRS content (by weight percent) of this gas.

(ii) The dates and volumes of venting attributed to emergency events, and documentation of each emergency.

(d) **Reporting**: On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.10 **Solvent Usage.** The following equipment are included in this emissions unit category:

District ID#	Equipment Name/Description
8680	Cleaning/Degreasing

(a) **Emission Limits**: ROC mass emissions from solvent usage shall not exceed the limits listed in Tables 5.1-3 and 5.1-4.

(b) **Operational Limits**: Use of solvents for cleaning/degreasing shall conform to the requirements of District Rules 317, 321, and 324. Compliance with these rules shall be assessed through compliance with the monitoring, recordkeeping and reporting conditions in this permit and through facility inspections.

(i) *Containers* - Vessels or containers used for storing materials containing organic solvents shall be kept closed unless adding to or removing material from the vessel or container.

(ii) *Materials* - All materials that have been soaked with cleanup solvents shall be stored, when not in use, in closed containers that are equipped with tight seals.

(iii) *Solvent Leaks* **-** Solvent leaks shall be minimized to the maximum extent feasible or the solvent shall be removed to a sealed container and the equipment taken out of service until repaired. A solvent leak is defined as either the flow of three liquid drops per minute or a discernible continuous flow of solvent.

(iv) *Reclamation Plan* - SoCalGas may submit a Plan to the District for the disposal of any reclaimed solvent. If the Plan is approved by the District, all solvent disposed of pursuant to the Plan will not be assumed to have evaporated as emissions into the air and, therefore, will not be counted as emissions from the source. SoCalGas shall obtain District approval of the procedures used for such a disposal Plan. The Plan shall detail all procedures used for collecting, storing and transporting the reclaimed solvent. Further, the ultimate fate of these reclaimed solvents must be stated in the Plan.

(c) **Recordkeeping**: SoCalGas shall record in a log the following on a monthly basis for each solvent used: amount used; the percentage of ROC by weight (as applied); the solvent density; the amount of solvent reclaimed for District-approved disposal; whether the solvent is photochemically reactive; and, the resulting emissions to the atmosphere in units of pounds per month and pounds per day. Product sheets (MSDS or equivalent) detailing the constituents of all solvents shall be readily available.

(d) **Reporting**: On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must list all data required by the *Semi-Annual Compliance Verification Reports* condition of this permit.

C.11 **Process Monitoring Systems - Operation and Maintenance.** All Plant process monitoring devices listed in Section 4.9.2 of this permit shall be properly operated and maintained according to manufacturer recommended specifications. SoCalGas shall implement a District-approved *Process Monitor Calibration and Maintenance Plan* for the life of the Plant.

C.12 **Process Stream Sampling and Analysis.** SoCalGas shall sample analyze the process streams listed in Section 4.10 of this permit according to the methods and frequency detailed in that Section. All process stream samples shall be taken according to ASTM or other District-approved methods and must follow traceable chain of custody procedures.

C.13 **Source/Performance Testing.** The following source testing provisions shall apply:

(a) SoCalGas shall conduct 'third party' source/performance testing of air emissions and process parameters listed in Section 4.10 and Table 4.1 of this Permit to Operate. More frequent source testing may be required if the equipment does not comply with permitted limitations or if other compliance problems, as determined by the APCO, occur. A source test shall not be required for equipment that is documented to have been in out-of-service status, and is not operational at the time of annual source testing. However, when such equipment becomes operational, a source test shall be performed within 30 calendar days of start-up. The District shall be notified in writing at least 3 working days before the affected equipment will become operational.

(b) SoCalGas shall submit a written source/performance test plan to the District for approval at least thirty (30) calendar days prior to initiation of each source test. The source test plan shall be prepared consistent with the District's *Source Test Procedures Manual* (revised May 1990 and any subsequent revisions). SoCalGas shall obtain written District approval of the source/performance test plan prior to commencement of source/performance testing. The District shall be notified at least fourteen (14) calendar days prior to the start of source/performance testing activity to arrange for a mutually agreeable source test date when District personnel may observe the test.

(c) A source/performance test for an item of equipment shall be performed on the scheduled day of testing (the test day mutually agreed to) unless circumstances beyond the control of the operator prevent completion of the test on the scheduled day. Such circumstances include but are not limited to mechanical malfunction of the equipment to be tested, malfunction of the source test equipment, delays in source test contractor arrival and/or set-up, or unsafe conditions on site. Except in cases of an emergency, the operator shall seek and obtain District approval before deferring or discontinuing a scheduled test, or performing maintenance on the equipment item on the scheduled test day. Once the sample probe has been inserted into the exhaust stream of the equipment unit to be tested (or extraction of the sample has begun), the test shall proceed in accordance with the approved source test plan. In no case shall a test run be aborted except in the case of an emergency or unless approval is first obtained from the District. If the test cannot be completed on the scheduled day, then the test shall be rescheduled for another time with prior authorization by the District. Failing to perform the source test of an equipment item on the scheduled test day without a valid reason and without District's authorization shall constitute a violation of this permit.

(d) Source/Performance tests of Gas Compressors #2 through #8 shall be conducted in accordance to 40 CFR 63 Subpart ZZZZ Table 4 and §63.6620.

(e) The engine percent load during a source/performance test must be determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. A written report of the average percent load determination must be included in the notification of compliance status. The following information must be included in the written report: the engine model number, the engine manufacturer, the year of purchase, the manufacturer's site-rated brake horsepower, the ambient temperature, pressure, and humidity during the performance test, and all assumptions that were made to estimate or calculate percent load during the performance test must be clearly explained. If measurement devices such as flow meters, kilowatt meters, beta analyzers, stain gauges, etc. are used, the model number of the measurement device, and an estimate of its accurate in percentage of true value must be provided.

(f) A source test report shall be submitted to the District within forty-five (45) calendar days following the date of source test completion and shall be consistent with the requirements approved within the source test plan. The source test report shall include all data and calculations to determine compliance with emission rates in Sections 5 and 9 and applicable permit conditions. All reasonable District costs associated with the review and approval of all plans and reports and the witnessing of tests shall be paid by SoCalGas as provided for by District Rule 210.

(g) The timelines in (a), (b), and (c) may be extended for good cause provided a written request is submitted to the District at least three (3) days in advance of the deadline, and approval for the extension is granted by the District.

C.14 **IC Engine Inspection and Maintenance Plan.** To ensure compliance with District Rules 205.A, 302, 304, 309 and the California Health and Safety Code Section 41701 by the diesel-fired emergency fire-water pumps, SoCalGas shall implement its District-approved *IC Engine Inspection and Maintenance Plan* for the life of the project. [*Re: District Rules 205.A, 302, 304, 309*]

C.15 **Semi-Annual Compliance Verification Reports.** Twice a year, SoCalGas shall submit a compliance verification report to the District. Each report shall be used to verify compliance with the prior two calendar quarters. The first report shall cover calendar quarters 1 and 2 (January through June) and shall be submitted no later than September 1st. The second report shall cover calendar quarters 3 and 4 (July through December) and shall be submitted no later than March 1st. Each report shall contain information necessary to verify compliance with the emission limits and other requirements of this permit (if applicable for that reporting period). These reports shall be in a format approved by the District, with one hard copy and one PDF copy. All logs and other basic source data not included in the report shall be available to the District upon request. The second report shall also include an annual report summarizing the activities for the calendar year. Pursuant to Rule 212, a completed *District Annual Emissions Inventory* questionnaire shall be included in the annual report or submitted electronically via the District web site.

The report shall include the following information:

(a) *Internal Combustion Engines.*

(i) Records documenting hours of operation and days of operation for each IC engine each month. The record shall document any 60-minute start-up period.

(ii) Records documenting each permitted IC engine's monthly fuel consumption (scf/month).

(iii) The higher heating value of the fuel (Btu/scf) as measured by the most recent fuel analysis.

(iv) The fuel sulfur content as measured by the most recent fuel analysis.

(v) Documentation of any equivalent routine IC engine replacement.

(vi) Summary results of all compliance emission source testing and inspections performed.

(vii) A summary of CAM monitoring, including a count of all excursions each quarter.

Information required by 40 CFR 63 Subpart ZZZZ Table 7 and §63.6650 are as follows:

a. The compliance report must contain the information below:

i. Company name and address.

ii. Statement by a responsible official, with that official's name, title, and signature, certifying the accuracy of the content of the report.

iii. Date of report and beginning and ending dates of the reporting period.

iv. If the equipment had a malfunction during the reporting period, the compliance report must include the number, duration, and a brief description for each type of malfunction which occurred during the reporting period and which caused or may have caused any applicable emission limitation to be exceeded. The report must also include a description of actions taken by an owner or operator during a malfunction of an affected source to minimize emissions in accordance with 40 CFR 63 Subpart ZZZZ §63.6605(b), including actions taken to correct a malfunction.

v. If there are no deviations from any emission or operating, a statement that there were no deviations from the emission or operating limitations during the reporting period.

b. For each deviation from an emission or operating limitation that occurs for a stationary RICE where the owner or operator are not using a CMS to comply with the emission or operating limitations, the Compliance report must contain the information in Conditions 5.a.i-iv and the information below:

i. The total operating time of the stationary RICE at which the deviation occurred during the reporting period.

ii. Information on the number, duration, and cause of deviations (including unknown cause, if applicable), as applicable, and the corrective action taken.

c. If any emergency stationary RICE with a site rating of more than 100 brake HP (Firewater Pumps - Device IDs #008666 and #008668; Emergency Generator - Device ID #008665) operates or is contractually obligated to be available for more than 15 hours per calendar year, for the purposes specified in 40 CFR 63 Subpart ZZZZ §63.6640(f)(2)(ii) and (iii) or that operates for the purpose specified in §63.6640(f)(4)(ii), the owner or operator must submit an annual report containing the following information:

i. Company name and address where the engine is located.

ii. Date of the report and beginning and ending dates of the reporting period.

iii. Engine site rating and model year.

iv. Latitude and longitude of the engine in decimal degrees reported to the fifth decimal place.

v. Hours operated by type of operation (maintenance, testing, emergency, non-emergency, etc.), including the date, start time, and end time for engine operation. The report shall also identify the entity that dispatched the engine and the situation that necessitated the dispatch of the engine, as applicable.

vi. Number of hours the engine is contractually obligated to be available.

vii. If there were no deviations from the fuel requirements that apply to the engine (if any), a statement that there were no deviations from the fuel requirements during the reporting period.

xiii. If there were deviations from the fuel requirements that apply to the engine (if any), information on the number, duration, and cause of deviations, and the corrective action taken.

(b) *Micro-Turbines*.

(i) *Fuel Gas Use*. The total amount of PUC quality natural gas used between the four Capstone C60 micro-turbines shall be recorded on a monthly, quarterly, and annual basis in units of standard cubic feet and million Btus.

(ii) *Heat Content*. The annual measured heating value of the fuel gas.

(iii) *Operational Days*. For each month, the number of days each micro-turbine operated.

(iv) *Sulfur Content*. The annual measured total sulfur and H_2S content, both in units of ppmv, of the fuel gas burned in the Capstone C60 micro-turbines.

(c) *Process Heaters.*

(i) *Hot Oil Heaters:* The volume of natural gas used (in units of standard cubic feet) shall be reported as permitted annual heat input limit for each unit (Btu/year) divided by the District-approved heating value of the fuel (Btu/scf).

(ii) *Gas Pre-Heaters Fuel Use:* The volume of natural gas used (in units of standard cubic feet) shall be reported as recorded by the fuel meters.

(iii) *Gas Pre-Heaters Fuel Use Meter Calibration Records*. Calibration records of District-approved fuel use meters.

(iv) *Gas Pre-Heaters Tuning Records*. Documentation verifying the required tune-ups, including a complete copy of each tune-up report.

(v) *Gas Pre-Heaters Maintenance Logs*. Maintenance logs for the unit(s) and fuel meter (as applicable).

(d) *Flares.*

(i) *Heating Value*: Results of the most recent high heating value analysis.

(ii) *Fuel Sulfur Content:* Records of the fuel gas and, if conducted, the purge gas sulfur analyses for each flare.

(iii) *Media Bed Change:* Records documenting any media bed changes for the SulfaTreat unit and the CEI-KMN units. The records shall include the dates of each change-out, the quantity of material replaced, and the type of material placed in the unit.

(e) *Fugitive Hydrocarbon Emission Components.*
Changes in the fugitive emissions component count, the total component count, and the associated emission changes at the stationary source.

(f) *Hydrocarbon Liquid Storage Tanks.*

(i) The hydrocarbon liquid throughput for the prior two calendar quarters.

(ii) The API gravity, true vapor pressure at 67.2 degrees F, and the actual storage temperature of the stored hydrocarbon liquid in each storage tank.

(iii) Records of each tank maintenance.

(g) *Loading Station.*
The daily and annual volume of HC condensate loaded and the dates of shipments from the loading rack.

(h) *Wells/Venting*.
The volume (scf) of gas vented, the ROC and TRS content of the gas, and the weight (in pounds) of ROC and TRS vented.

(i) *Glycol Unit*
The total volume (in MMSCF units) of gas flow through the unit.

(j) *Solvent Usage*.
On a semi-annual basis: the amount of solvent used; the percentage of ROC by weight (as applied); the solvent density; the amount of solvent reclaimed; whether the solvent is photo-chemically reactive; and, the resulting emissions of ROC and photo-chemically reactive solvents to the atmosphere in units of pounds per month.

(k) *General Reporting Requirements*.
  (i) On an annual basis, the emissions from each exempt emission unit for ROC and NO_X.

  (ii) A summary of each and every occurrence of non-compliance with the provisions of this permit, District rules, and any other applicable air quality requirement (*for this purpose, any breakdown report submitted to the District per Regulation V for the non-compliance event need not be repeated; a brief reference will be sufficient*)

  (iii) A summary list of breakdowns and variances reported/obtained per Regulation V along with the excess emissions that accompanied each occurrence.

(l) *Odorant System.*
Records documenting carbon replacement for the canister serving the odorant system. The records shall include the dates of each change-out, the quantity of material replaced, and the type of material placed in the unit.

C.16 **Documents Incorporated by Reference.** The documents listed below, including any District-approved updates thereof, are incorporated herein and shall have the full force and effect of a permit condition for this operating permit. These documents shall be implemented for the life of Gas Plant.

(i) *IC Engine Inspection and Maintenance Plan*. (11/04/2017 Ref: Permit condition 9.C.14)

(ii) *Emergency Episode Plan* (Rule 603) (*12/09/2008*).

(iii) *Process Monitor Calibration and Maintenance Plan*. (02/08/2012)

(iv) *Processed Gas Flow Measurement Plan.* (02/08/2012)

(v) *Compliance Assurance Monitoring (CAM) Plan*. (12/12/2011)

9.D District-Only Conditions

The following section lists permit conditions that are not enforceable by the USEPA or the public. However, these conditions are enforceable by the District and the State of California. These conditions are issued pursuant to District Rule 206 (*Conditional Approval of Authority to Construct or Permit to Operate*), which states that the Control Officer may issue an operating permit subject to specified conditions. These permit conditions have been deemed necessary to ensure that operation of the facility complies with all applicable local, and state air quality rules, regulations and laws. Failure to comply with any condition specified pursuant to the provisions of Rule 206 shall be a violation of that rule, this permit, as well as any applicable section of the California Health & Safety Code.

D.1 **Condition Acceptance.** Acceptance of this operating permit by SoCalGas shall be considered as acceptance of all terms, conditions, and limits of this permit. [*Re: District Rule 206*]

D.2 **Compliance.** Nothing contained within this permit shall be construed to allow the violation of any local, State or Federal rule, regulation, ambient air quality standard or air quality increment.

D.3 **Consistency with Analysis.** Operation under this permit shall be conducted consistent with all data, specifications and assumptions included with the application and supplements thereof (as documented in the District's project file) and the District's analyses, as shown in this permit, of the same under which this permit is issued.

D.4 **Consistency with Federal, State and Local Permits.** Nothing in this permit shall relax any applicable air pollution control requirement or mitigation requirement imposed on SoCalGas by any other governmental agency.

D.5 **Odorous Organic Sulfides.** SoCalGas shall not discharge into atmosphere H_2S and organic sulfides that result in a ground level impact beyond the SoCalGas property boundary in excess of either 0.06 ppmv averaged over 3 minutes or 0.03 ppmv averaged over 1 hour.

D.6 **Throughput Limit.** The total gas processed by Dehy Plant 14 shall not exceed 680 MMscf/day, calculated as monthly total gas processed at the plant divided by the number of gas processing days. The monthly gas volume flow shall be measured, using District-approved flow meter(s)/device(s). SoCalGas shall monitor the monthly total volume (in MMscf units) of gas processed and the number of processing days via a log to be kept on site. The calculated daily average volume of gas withdrawn/processed shall also be recorded in this log each month.

D.7 **Gas Venting.** Only gas from planned pipeline depressurizations may be vented without control. The total volume of gas vented from the facility due to planned pipeline depressurization shall not exceed 10 MMscf annually. If gas is vented without control from unplanned pipeline depressurizations the permittee may seek relief from this requirement under the provisions of Rule 505 or Rule 1303 F.

D.8 **Emergency Standby Firewater Pump Engines.** The two equipment items listed below belong to this emissions unit category.

District ID#	Plant ID #	Equipment Item Name/Description
008666	#12A	133 bhp Cummins Model V-378-F2 diesel-fired emergency standby firewater pump engine.
008668	#13A	133 bhp Cummins Model V-378-F2 diesel-fired emergency standby firewater pump engine.

(a) **Emission Limitations.** The mass emissions from the E/S DICE unit #s 008666 and 008668 listed above shall not exceed the values listed in Tables 5.1-3 and 5.1-4. Compliance shall be based on the operational, monitoring, recordkeeping and reporting conditions of this permit.

(b) **Operational Restrictions.** The E/S DICE unit #s 008666 and 008668 listed above are subject to the following operational restrictions listed below. Emergency use operations, as defined in Section (d)(25) of the ATCM[6], have no operational hours limitations.

(i) Maintenance & Testing Use Limit: The in-use stationary emergency standby diesel-fueled CI engines subject to this permit shall not be operated for more than 20 hours/year for maintenance and testing.

(ii) Fuel and Fuel Additive Requirements: The permittee may only add fuel and/or fuel additives to the engine or any fuel tank directly attached to the engine that comply with Section (e)(1)(B) of the ATCM.

(iii) Change the oil and filter every 500 hours of operation or annually, whichever comes first. Alternatively, the owner or operator may utilize an oil analysis program specified in 40 CFR 63 Subpart ZZZZ §63.6625(i). If all the requirements detailed in this section of the regulation are satisfied, the owner or operator shall not be required to change the oil. If any of the limits are exceeded the engine owner or operator must change the oil within 2 business days of receiving the results of the analysis. If the engine is not in operation when the results of the analysis are received, the engine owner or operator must change the oil within 2 business days or before commencing operation, whichever is later.

(c) **Monitoring.** The E/S DICE unit #'s 008666 and 008668 listed above are subject to the following monitoring requirements:

(i) Non-Resettable Hour Meter: Each in-use stationary emergency standby diesel-fueled CI engine(s) subject to this permit shall have installed a non-resettable hour meter with a minimum display capability of 9,999 hours, unless the District has determined (in writing) that a non-resettable hour meter with a different minimum display capability is appropriate in consideration of the historical use of the engine and the owner or operator's compliance history.

[6] As used in the permit, "ATCM" means Section 93115, Title 17, California Code of Regulations. Airborne Toxic Control Measure for Stationary Compression Ignition (CI) Engines

(d) **Recordkeeping.** The permittee shall record and maintain the information listed below. Log entries shall be retained for a minimum of 36 months from the date of entry. Log entries made within 24 months of the most recent entry shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request. Log entries made from 25 to 36 months from most recent entry shall be made available to District staff within 5 working days from request. District Form ENF-92 (*Diesel-Fired Emergency Standby Engine Recordkeeping Form*) can be used for this requirement.

(i) emergency use hours of operation;

(ii) maintenance and testing hours of operation;

(iii) hours of operation for emission testing to show compliance with Section (e)(2)(B)(3) {if specifically allowed for under this permit}.

(iv) initial start-up hours {if specifically allowed for under this permit}.

(v) hours of operation to comply with the requirements of NFPA 25/100 {if applicable}.

(vi) hours of operation for all uses other than those specified in items (i) – (iv) above along with a description of what those hours were for.

(vii) The owner or operator shall document fuel use through the retention of fuel purchase records that account for all fuel used in the engine and all fuel purchased for use in the engine, and, at a minimum, contain the following information for each individual fuel purchase transaction:

A. identification of the fuel purchased as either CARB Diesel, or an alternative diesel fuel that meets the requirements of the Verification Procedure, or an alternative fuel, or CARB Diesel fuel used with additives that meet the requirements of the Verification Procedure, or any combination of the above.

B. amount of fuel purchased.

C. date when the fuel was purchased.

D. signature of owner or operator or representative of owner or operator who received the fuel.

E. signature of fuel provider indicating fuel was delivered.

(e) **Reporting.** By March 1st of each year, a written report documenting compliance with the terms and conditions of this permit and the ATCM for the previous calendar year shall be provided by the permittee to the District (Attn: *Annual Report Coordinator*). All logs and other basic source data not included in the report shall be made available to the District upon request. The report shall include the information required in the *Recordkeeping* condition above.

(f) **Temporary Engine Replacements - DICE ATCM.** Any reciprocating internal combustion engine subject to this permit and the stationary diesel ATCM may be replaced temporarily only if the requirements (i - vi) listed herein are satisfied.

(i) The permitted engine is in need of routine repair or maintenance.

(ii) The permitted engine that is undergoing routine repair or maintenance is returned to its original service within 180 days of installation of the temporary engine.

(iii) The temporary replacement engine has the same or lower manufacturer rated horsepower and same or lower potential to emit of each pollutant as the permitted engine that is being temporarily replaced. At the written request of the permittee, the District may approve a replacement engine with a larger rated horsepower than the permitted engine if the proposed temporary engine has manufacturer guaranteed emissions (for a brand new engine) or source test data (for a previously used engine) less than or equal to the permitted engine.

(iv) The temporary replacement engine shall comply with all rules and permit requirements that apply to the permitted engine that is undergoing routine repair or maintenance.

(v) For each permitted engine to be temporarily replaced, the permittee shall submit a completed *Temporary IC Engine Replacement Notification* form (Form ENF-94) within 14 days of the temporary engine being installed. This form may be sent hardcopy, or can be e-mailed (e-mail: engr@sbcapcd.org) to the District (Attn: Engineering Supervisor).

(vi) Within 14 days upon return of the original permitted engine to service, the permittee shall submit a completed *Temporary IC Engine Replacement Report* form (Form ENF-95). This form may be sent hardcopy, or can be e-mailed (e-mail: engr@sbcapcd.org) to the District (Attn: Engineering Supervisor).

Any engine in temporary replacement service shall be immediately shut down if the District determines that the requirements of this condition have not been met. This condition does not apply to engines that have experienced a cracked block (unless under manufacturer's warranty), to engines for which replacement parts are no longer available, or new engine replacements {including "reconstructed" engines as defined in Section (d)(44) of the ATCM}. Such engines are subject to the provisions of New Source Review and the new engine requirements of the ATCM.

(g) **Permanent Engine Replacements.** The permittee may install a new engine in place of a permitted E/S engine, fire water pump engine or engine used for an essential public service that breaks down and cannot be repaired, without first obtaining an ATC permit only if the requirements (i - v) listed herein are satisfied.

(i) The permitted stationary diesel IC engine is an E/S engine, a fire water pump engine or an engine used for an essential public service (as defined by the District).

(ii) The engine breaks down, cannot be repaired and needs to be replaced by a new engine.

(iii) The facility provides "good cause" (in writing) for the immediate need to install a permanent replacement engine prior to the time period before an ATC permit can be obtained for a new engine. The new engine must comply with the requirements of the ATCM for new engines. If a new engine is not immediately available, a temporary engine may be used while the new replacement engine is being procured. During this time period, the temporary replacement engine must meet the same guidelines and procedures as defined in the permit condition above (*Temporary Engine Replacements - DICE ATCM*).

(iv) An Authority to Construct application for the new permanent engine is submitted to the District within 15 days of the existing engine being replaced and the District permit for the new engine is obtained no later than 180 days from the date of engine replacement (these timelines include the use of a temporary engine).

(v) For each permitted engine to be permanently replaced pursuant to the condition, the permittee shall submit a completed *Permanent IC Engine Replacement Notification* form (Form ENF-96) within 14 days of either the permanent or temporary engine being installed. This form may be sent hardcopy, or can be e-mailed (e-mail: engr@sbcapcd.org) to the District (Attn: Engineering Supervisor).

Any engine installed (either temporally or permanently) pursuant to this permit condition shall be immediately shut down if the District determines that the requirements of this condition have not been met.

(h) **Notification of Non-Compliance.** Owners or operators who have determined that they are operating their stationary diesel-fueled engine(s) in violation of the requirements specified in Sections (e)(1) or (e)(2) of the ATCM shall notify the District immediately upon detection of the violation and shall be subject to District enforcement action.

(i) **Notification of Loss of Exemption.** Owners or operators of in-use stationary diesel-fueled CI engines, who are subject to an exemption specified in Section (c) from all or part of the requirements of Section (e)(2) of the ATCM, shall notify the District immediately after they become aware that the exemption no longer applies and pursuant to Section (e)(4)(F)(1) of the ATCM shall demonstrate compliance within 180 days after notifying the District.

D.9 **Equipment Identification**. Identifying tag(s) or name plate(s) shall be displayed on the equipment to show manufacturer, model number, and serial number. The tag(s) or plate(s) shall be issued by the manufacturer and shall be affixed to the equipment in a permanent and conspicuous position

D.10 **Emission Factor Revisions**. The District may update the emission factors for any calculation based on USEPA AP-42 or District emission factors at the next permit modification or permit reevaluation to account for USEPA and/or District revisions to the underlying emission factors.

D.11 **CARB-Registered Portable Equipment.** State-registered portable equipment shall comply with State registration requirements. A copy of the State registration shall be readily available whenever the equipment is at the facility. [*Re: District Rule 202*]

D.12 **Abrasive Blasting Equipment.** All abrasive blasting activities performed on La Goleta facility shall comply with the requirements of the California Administrative Code Title 17, Sub-Chapter 6, Sections 92000 through 92530.

D.13 **Internal Combustion Engines.** The following IC engine equipment items are included in this emissions unit category:

District ID#	Plant ID#	Equipment Item (IC Engine) Description
1199	#2	Ingersoll-Rand LVG-82, SN 8AL126; 650 hp gas compressor
1200	#3	Ingersoll-Rand LVG-82, SN 8AL129; 650 hp gas compressor
1201	#4	Ingersoll-Rand LVG-82, SN 8AL128; 650 hp gas compressor
1202	#5	Ingersoll-Rand LVG-82, SN 8AL127; 650 hp gas compressor
1203	#6	Ingersoll-Rand KVG-62, SN 6EL265; 660 hp gas compressor
1204	#7	Ingersoll-Rand KVG-62, SN 6EL266; 660 hp gas compressor
1205	#8	Ingersoll-Rand KVG-62, SN 6EL267; 660 hp gas compressor
1206	#9	Cooper-Bessemer GMV-10C; 1,100 hp gas compressor

(a) **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

(i) By January 1, 2019, any reciprocating natural gas compressor with a rod packing or seal with a measured emission flow rate greater than two (2) standard cubic feet per minute (scfm), or a combined rod packing or seal emission flow rate greater than the number of compression cylinders multiplied by two (2) scfm, shall be controlled with a vapor collection system or successfully repaired according to the timelines specified in Sections 95668(c)(4)(D) and 95668(c)(4)(F) of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

(b) **Monitoring**: The equipment permitted herein is subject to the following monitoring requirements:

(i) The reciprocating natural gas compressor rod packing or seal emission flow rate through the rod packing or seal vent stack shall be measured annually pursuant to the requirements of Section 95668(c)(4) of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

(ii)

(c) **Recordkeeping**: The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request:

(i) The records of each rod packing or seal emission flow rate measurement.

(ii) For rod packing or seal measurement delays authorized pursuant to Section 95668(c)(4)(B)3 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation, the records that document the date(s) and hours of operation a compressor is operated in order to demonstrate compliance with the rod packing leak concentration or emission flow rate measurement in the event that the compressor is not operating during a scheduled inspection.

(iii) For rod packing or seal repair delays authorized pursuant to Section 95668(c)(4)(D)1 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation, the records that provide proof that parts or equipment required to make necessary repairs have been ordered.

(d) **Reporting.** By March 1st of each year, a written report documenting compliance with the terms and conditions of this permit for the previous calendar year shall be provided by the permittee to the District. The report must include all data required by the Annual Report condition of this permit.

D.14 **Fugitive Hydrocarbon Emissions Components.** The following equipment units are addressed via the 'component-leak-path' methodology:

District ID#	Equipment Item Name	Description
	Gas & Light Liquid Service Components	
100882	Valves	3,571 component-leak-paths
100883	Connections	16,918 component-leak-paths
100884	Pump Seals	5 component-leak-paths
100885	Compressor Seals	14 component-leak-paths
100886	Pressure Relief Devices	49 component-leak-paths

(a) **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

(i) Any component with a leak concentration measured above the standards in Section 95669 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation shall be repaired within the time period specified in this Section.

(ii) The permittee shall comply with the *Additional Requirements* (l) – (o) of Section 95669 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

(b) **Monitoring**: The equipment permitted herein is subject to the following monitoring requirements:

(i) All components, including components found on tanks, separators, wells, and pressure vessels not identified in Section 95669(b) of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation shall be inspected and repaired within the timeframes specified in Section 95669 of the regulation.

(c) **Recordkeeping**: The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request:

(i) A record of each leak detection and repair inspection as specified in Table A4 of the California Greenhouse Gas Emission Standard for Crude Oil and Natural Gas Facilities regulation.

(ii) A component leak concentration and repair for each inspection as specified in Table A5 of the California Greenhouse Gas Emission Standard for Crude Oil and Natural Gas Facilities regulation.

(iii) Records that provide proof that parts or equipment required to make necessary repairs have been ordered.

(iv) Gas service utility records that demonstrate that a system has been temporarily classified as critical to reliable public gas operation throughout the duration of the classification period.

(d) **Reporting.** By March 1st of each year, a written report documenting compliance with the terms and conditions of this permit for the previous calendar year shall be provided by the permittee to the District. The report must include all data required by the Annual Report condition of this permit.

(e) **Critical Components**. Critical components used in conjunction with a critical process unit shall be approved by the District and the ARB Executive Officer if SoCalGas wishes to claim any critical component exemptions available under the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation. SoCalGas shall provide sufficient documentation demonstrating that a critical component is required as part of a critical process unit and that shutting down the critical component or process unit would impact safety or reliability of the natural gas system. SoCalGas shall maintain, and make available upon request, a record of all critical components or process units located at the facility. Each critical component or critical process unit shall be identified according to the methods specified in Section 95670(e) of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

D.15 **Continuous Bleed Natural Gas Powered Pneumatic Devices**. The following equipment items are included in this emissions unit category:

District ID#	Equipment Item Name	Description
371977	Continuous Bleed Devices	3 Devices

(a) **Operational Restrictions.** Beginning January 1, 2019, the equipment permitted herein is subject to the following operational restrictions:

(i) No device shall vent natural gas at a rate greater than six (6) standard cubic feet per hour (scfh) when the device is idle and not actuating.

(ii) All devices shall clearly marked with a permanent tag that identifies the natural gas flow rate as less than or equal to six (6) scfh.

(iii) Any device with a measured emissions flow rate greater than six (6) scfh shall be successfully repaired within 14 calendar days from the date of the initial emission flow rate measurement.

(b) **Monitoring**: Beginning January 1, 2019, the equipment permitted herein is subject to the following monitoring requirements:

(i) All devices shall be tested annually using a direct measurement method (high volume sampling, bagging, calibrated flow measuring instrument).

(c) **Recordkeeping**: Beginning January 1, 2019, the permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request:

(i) SoCalGas shall maintain, and make available upon request by the District, a record of the flow rate measurement as specified in Appendix A, Table A7 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

(d) **Reporting.** By March 1st of each year, a written report documenting compliance with the terms and conditions of this permit for the previous calendar year shall be provided by the permittee to the District. The report must include all data required by the Annual Report condition of this permit.

D.16 **Intermittent Bleed Natural Gas Powered Pneumatic Devices**. The following equipment items are included in this emissions unit category:

District ID#	Equipment Item Name	Description
391978	Intermediate Bleed Devices	51 Devices

(a) **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

(i) All intermittent bleed natural gas powered pneumatic devices shall comply with the leak detection and repair requirements specified in Section 95669 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation when the device is idle and not controlling.

(b) **Reporting.** By March 1st of each year, a written report documenting compliance with the terms and conditions of this permit for the previous calendar year shall be provided by the permittee to the District. The report must include all data required by the Annual Report condition of this permit.

D.17 **Well Casing Vents**. The following equipment items are included in this emissions unit category:

District ID#	Equipment Item Name	Description
391979	Well Casing Vents	19 Well Casing Vents

(a) **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

(i) The well casing vents shall not continuously vent to the atmosphere.

D.18 **Natural Gas Underground Storage Facility Monitoring Requirements**.

(a) **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

(i) All leaks shall be successfully repaired within the repair timeframes specified for each leak threshold as specified in Section 95669 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

(b) **Monitoring**: The equipment permitted herein is subject to the following monitoring requirements:

(i) Within 180 days of CARB approval, owners or operators of natural gas underground storage facilities shall begin monitoring according to the monitoring plan specified in Section 95668(h)(5) of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

(c) **Recordkeeping**: The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request:

(i) Records of the initial and final leak concentration measurements for leaks identified during daily leak inspections or identified by a continuous leak monitoring system and measured above the minimum allowable leak threshold as specified in Appendix A Table A5 of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

(ii) Records of both meteorological and upwind and downwind air monitoring data.

(c) **Reporting.** By March 1st of each year, a written report documenting compliance with the terms and conditions of this permit for the previous calendar year shall be provided by the permittee to the District. The report must include all data required by the Annual Report condition of this permit. In addition, the permittee shall comply with the following reporting requirements:

(i) Within 24 hours of receiving an alarm or identifying a leak that is measured above 50,000 ppmv total hydrocarbons or above 10,000 ppmv total hydrocarbons for more than 5 consecutive calendar days at a natural gas injection/withdrawal wellhead assembly and attached pipelines, SoCalGas shall notify the ARB, the Department of Oil, Gas, and Geothermal Resources, and the District to report the leak concentration measurement.

(ii) Within 24 hours of receiving an alarm signaled by a downwind air monitoring sensor(s) that detects a reading that is greater than four (4) times the downwind sensor(s) baseline, SoCalGas shall notify CARB, the Department of Oil, Gas, and Geothermal Resources, and the District to report the emissions measurement.

(iii) Quarterly, report the initial and final leak concentration measurement for leaks identified during daily inspections or identified by a continuous leak monitoring system and measured above the minimum allowable leak threshold.

D.19 **General CARB GHG Regulation Recordkeeping**. The permittee shall maintain at least 5 years of records that document the following:

(a) The number of crude oil or natural gas wells at the facility.

(b) A list identifying all pressure vessels, tanks, separators, sumps, and ponds at the facility, including the size of each tank and separator in units of barrels.

(c) The annual crude oil, natural gas, and produced water throughput of the facility.

(d) A list identifying all reciprocating and centrifugal natural gas compressors at the facility.

(e) A count of all natural gas powered pneumatic devices and pumps at the facility.

D.20 **Annual Report**. By March 1st of each year, a written report documenting compliance with the terms and conditions of this permit for the previous calendar year shall be provided by the permittee to the District (Attn: *Annual Report Coordinator*). The report shall contain information necessary to verify compliance with the emission limits and other requirements of this permit. The report shall be in a format approved by the District. All logs and other basic source data not included in the report shall be made available to the District upon request. The report shall include the following information:

(a) Internal Combustion Engines

(i) The emission flow rate measurement for each reciprocating natural gas compressor rod packing or seal.

(b) Fugitive Hydrocarbon Components

(i) The results of each leak detection and repair inspection conducted during the calendar year.

(ii) The initial and final leak concentration measurements for components measured above the minimum allowable leak threshold.

(c) Continuous Bleed Natural Gas Powered Pneumatic Devices

(i) The emission flow rate measurement for each pneumatic device with a designed emission flow rate of less than six (6) scfh.

(d) Underground Natural Gas Storage

(i) Meteorological data and data gathered by the upwind and downwind monitoring sensors.

(e) General CARB GHG Regulation

(i) The permittee shall report all throughput data and any updates to the information recorded pursuant to the *General CARB GHG Regulation Recordkeeping* Condition above using District Annual Report Form ENF-108.

(f) Plant-wide Gas Processing

(i) Volume of gas withdrawn/processed per month, the number of days of withdrawal/processing per month and average daily volume (in MMscf) of gas withdrawn/processed for the month.

(g) The March annual report shall list total tons per year of each criteria pollutant emitted from each emissions unit.

D.21 **Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities.** The equipment permitted herein shall be operated in compliance with the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation (CCR Title 17, Section 95665 *et. Seq*.).

D.22 **Documents Incorporated by Reference.** The documents listed below, including any District-approved updates thereof, are incorporated herein and shall have the full force and effect of a permit condition for this operating permit. These documents shall be implemented for the life of Gas Plant.

(a) *Natural Gas Underground Storage Facility Monitoring Plan.* (pending approval)

(b) *Critical Component List* (approved December 27, 2017, and any approved updates).

AIR POLLUTION CONTROL OFFICER

____

____
Date

Notes:

(A) This permit supersedes PT-70/Reeval 9584 R5 and PTO 14840.
(B) Permit Reevaluation Due Date: June 2021

RECOMMENDATION:

It is recommended that this PTO be issued with the conditions as specified in the permit.

Phil Sheehan			
AQ Engineer		Engineering Supervisor	

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10.0 Attachments

10.1 Emission Calculation Documentation

10.2 Calculation Spreadsheets

10.3 Fee Calculations

10.4 IDS Database Emission Tables

10.5 Equipment List

10.6 Permittee Comments on the Draft Permit and the District Responses

10.1 Emission Calculation Documentation

This attachment contains all relevant emission calculation documentation used for the emission tables in Section 5. Refer to Section 4 for the general equations. The letters A through E below refer to Tables 5.1-1 and 5.1-2.

<u>Reference A – Internal Combustion Engines</u>

- The maximum operating schedule is in units of hours.

- The default fuel HHV is 1,050 Btu/scf.

- Emission factors (lb/MMBtu) are based on HHV.

- For conversion from ppmv to lb/MMBtu see section 10.2 calculations

- <u>NO_X</u>
  EF = 0.46 lb/MMBtu (lean-burn ICE);
  EF = 0.324 lb/MMBtu (rich burn ICEs), this EF is not based on the 50 ppmv exhaust concentration limit, it was established by the ERC agreement and is based on 90% reduction of uncontrolled emissions.

- <u>CO</u>
  EF = 10.125 lb/MMBtu (lean burn ICE);
  EF = 3.825 lb/MMBtu (rich burn ICEs)

- <u>ROC</u>
  EF = 2.495 lb/MMBtu (lean burn ICE);
  EF = 0.321 lb/MMBtu (rich burn ICEs)

- <u>$PM/PM_{10}/PM_{2.5}$</u>
  EF = 0.048 lb/MMBtu (lean burn ICE) USEPA AP-42 [Table 3.2-1 (7/00)];
  EF = 0.014 lb/MMBtu (rich burn ICEs) USEPA AP-42 [Table 3.2-3 (7/00)]

- <u>SO_X</u>
  SO_x (as SO_2) = [0.169] × [ppmvd S ÷ (HHV of fuel]
  EF = 0.0129 lb/MMBtu

- Q (fuel use/time period) = (BSFC) * (bhp) □ (hours/time period) □ (HHV in Btu/scf)

- H (heat input / hour) = (Rated bhp) * (BSFC)

Eqpt.ID#	Plant ID#	IC Engine Description	Rated bhp	BSFC	MMBtu/hr Input
1199	# 2	I-R LVG-82; SN 8AL126	650	11,231	7.30
1200	# 3	I-R LVG-82; SN 8AL129	650	11,231	7.30
1201	# 4	I-R LVG-82; SN 8AL128	650	11,231	7.30
1202	# 5	I-R LVG 82; SN 8AL127	650	11,231	7.30
1203	# 6	I-R KVG-62; SN 6EL265	660	11,061	7.30
1204	# 7	I-R KVG-62; SN 6EL266	660	11,061	7.30
1205	# 8	I-R KVG-62; SN 6EL267	660	11,061	7.30
1206	# 9	Cooper-Bessemer GMV-10C	1100	9,109	10.02

HAP Emission Factors:
Hazardous air pollutant (HAP) emission factors for the IC engines are obtained from USEPA, Appendix A of the background report for Section 3.2 of AP-42. The database of source test results contained in appendix A can be downloaded from http://www.epa.gov/ttn/chief/ap42/ch03/related/c03s02.html. For MU 2-8, the average of all source test results in the database for each species for NSCR-controlled, four-cycle, rich-burn, IC engines at 90% load or greater was used as the emission factor. For MU 9, the average of all source test results for two stroke lean burn IC engines at 90% load or greater was used. For acrolein only source test reports based on FTIR were considered. The background report for Section 3.2 states that the EPA has identified possible interference problems with quantifying aldehyde emissions using CARB method 430 and recommends basing emission factors on FTIR measurements. For acetaldehyde and formaldehyde the source test results were non-detect, for these pollutants the emissions factors in this permit were based on the detection level of the source tests.

These emission factors are updated from permit reevaluation 9584-R2, which used emission factors from AP-42, Section 3.2 (January 1995).

GHG Emission Factors:
GHG emissions from combustion sources are calculated using emission factors found in Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials found in Table A-1 of 40 CFR Part 98. CO_2 equivalent emission factors are calculated for CO_2, CH_4, and N_2O individually then summed to calculate a total CO_{2e} emission factor. Annual CO_{2e} emission totals are presented in short tons.

For natural gas combustion the emission factor is:

(53.02 kg CO_2/MMBtu) (2.2046 lb/kg) = 116.89 lb CO_2/MMBtu

(0.001 kg CH_4/MMBtu) (2.2046 lb/kg)(21 lb CO_{2e}/lb CH4) = 0.046 lb CO_{2e}/MMBtu

(0.0001 kg N_2O/MMBtu) (2.2046 lb/kg)(310 lb CO_2e/lb N_2O) = 0.068 lb CO_{2e}/MMBtu

Total CO_{2e}/MMBtu = 116.89 + 0.046 + 0.068 = 117.00 lb CO_{2e}/MMBtu

Reference B – ‘C-60’ Micro-turbines

- The maximum operating schedule is in units of hours.

- The default fuel HHV is 1,050 Btu/scf.

- Emission factors units (lb/MMBtu) are based on HHV.

- For conversion from lb/MW-hr to lb/MMBtu, *see section 10.2 calculations*

- NO_X
  EF = 0.5 lb/MW-hr
  EF = 0.0373 lb/MMBtu

- ROC
  EF = 1 lb/MW-hr
  EF = 0.0746 lb/MMBtu

- CO
  EF = 6 lb/MW-hr
  EF = 0.4478 lb/MMBtu

- $PM/PM_{10}/PM_{2.5}$ emission factors, based on CA: DG-02 guidelines, are 0.0066 lb/MMBtu

- SO_X emissions based on mass balance:
  SO_X (as SO_2) = [0.169] × [ppmvd S ÷ (HHV of fuel]
  EF = 0.0129 lb/MMBtu

- Q (fuel use/time period) = 12.8 scf/min

- H (MMBtu/hour) = Q (scf/min) * 60 (min/hour) * 1050 (Btu/scf) / 1,000,000

HAP Emission Factors:
Hazardous air pollutant (HAP) emission factors for the micro-turbines are obtained from USEPA, AP-42 Table 3.1-3 (April 2000). These factors are listed in Table 5.4-2A of this permit.

GHG Emission Factors:
GHG emissions from combustion sources are calculated using emission factors found in Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials found in Table A-1 of 40 CFR Part 98. CO_2 equivalent emission factors are calculated for CO_2, CH_4, and N_2O individually, then summed to calculate a total CO_{2e} emission factor. Annual CO_{2e} emission totals are presented in short tons.

For natural gas combustion the emission factor is:

(53.02 kg CO_2/MMBtu) (2.2046 lb/kg) = 116.89 lb CO_2/MMBtu

(0.001 kg CH_4/MMBtu) (2.2046 lb/kg)(21 lb CO_{2e}/lb CH_4) = 0.046 lb CO_{2e}/MMBtu

(0.0001 kg N_2O/MMBtu) (2.2046 lb/kg)(310 lb CO_{2e}/lb N_2O) = 0.068 lb CO_{2e}/MMBtu

Total CO_{2e}/MMBtu = 116.89 + 0.046 + 0.068 = 117.00 lb CO_{2e}/MMBtu

Reference C1 - Flares

The maximum operating schedule is in units of hours
The flare gas properties are:

⇒ HHV = 985 Btu/scf (estimated)
⇒ Fuel S = 80 ppmv (as total sulfur) for flare pilots and 239 ppmvd for flare gas

The flare emission factors are based on Rule 359 limits for NO_X, ROC and CO
SO_x emissions based on mass balance:
SO_X (as SO_2) = [0.169] × [ppmvd S ÷ (HHV of fuel]
EF = 0.041 lb/MMBtu

HAP Emission Factors:
VCAPCD AB 2588 Combustion Emission Factors (May 2001) for Natural Gas Fired External Combustion Emission Factors Flare

GHG Emission Factors:
GHG emissions from combustion sources are calculated using emission factors found in Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials found in Table A-1 of 40 CFR Part 98. CO_2 equivalent emission factors are calculated for CO_2, CH_4, and N_2O individually, then summed to calculate a total CO_{2e} emission factor. Annual CO_{2e} emission totals are presented in short tons.

For natural gas combustion the emission factor is:

(53.02 kg CO_2/MMBtu) (2.2046 lb/kg) = 116.89 lb CO_2/MMBtu

(0.001 kg CH4/MMBtu) (2.2046 lb/kg)(21 lb CO_{2e}/lb CH4) = 0.046 lb CO_{2e}/MMBtu

(0.0001 kg N_2O/MMBtu) (2.2046 lb/kg)(310 lb CO_{2e}/lb N_2O) = 0.068 lb CO_{2e}/MMBtu

Total CO_{2e}/MMBtu = 116.89 + 0.046 + 0.068 = 117.00 lb CO_{2e}/MMBtu

Reference C2 – Hot Oil Heaters

The maximum operating schedule is in units of hours
The emission factors for NO_X, CO, ROC, PM PM_{10}, and $PM_{2.5}$ are based on AP-42 emission factors for small natural gas-fired boilers (Tables 1.4-1 and 1.4-2 dated July 1998).
SO_2 emission limits (factors) are based on the combustion of PUC natural gas.

HAP Emission Factors:
VCAPCD AB 2588 Combustion Emission Factors (May 2001) for Natural Gas Fired External Combustion Emission Factors <10 MMBTU/h.

GHG Emission Factors:
GHG emissions from combustion sources are calculated using emission factors found in Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials found in Table A-1 of 40 CFR Part 98. CO_2 equivalent emission factors are calculated for CO_2, CH_4, and N_2O individually, then summed to calculate a total CO_{2e} emission factor. Annual CO_{2e} emission totals are presented in short tons.

For natural gas combustion the emission factor is:

(53.02 kg CO_2/MMBtu) (2.2046 lb/kg) = 116.89 lb CO_2/MMBtu

(0.001 kg CH_4/MMBtu) (2.2046 lb/kg)(21 lb CO_{2e}/lb CH4) = 0.046 lb CO_{2e}/MMBtu

(0.0001 kg N_2O/MMBtu) (2.2046 lb/kg)(310 lb CO_{2e}/lb N_2O) = 0.068 lb CO_{2e}/MMBtu

Total CO_{2e}/MMBtu = 116.89 + 0.046 + 0.068 = 117.00 lb CO_{2e}/MMBtu

Reference D – HC condensate Storage Tanks

The maximum operating schedule is in units of hours;
The hourly/daily/annual emissions scenario is based on the following assumptions:

Hydrocarbon Condensate Tank:

1. Maximum True vapor pressure: 5.5 psia @ 70°F
2. API Gravity = 39
3. Emissions occur 24 hours/day and 365 days/year.
4. The annually-averaged HC throughput rate is 8.154 barrels/day corresponding to the annual throughput of 125,000 gallons/year

Flotation Cells:

1. Maximum True vapor pressure: 5.5 psia @ 70°F
2. API Gravity = 39
3. Emissions occur 24 hours/day and 365 days/year.
4. The combined HC and brine water 'annual average' throughput rate is 48.924 barrels/day, corresponding to an annual throughput of 750,000 gallons for the entire facility.

Emission factors are based on the *USEPA's AP-42, Section 7* guidelines.

HAP Emission Factors:
Hazardous air pollutant (HAP) weight fractions for the HC condensate storage tank emissions are obtained from the *CARB Speciation Manual (2nd Edition, 9/91), Profile Number 297(Crude Oil Evaporation).* The weight fractions contained in the speciation manual are for total organic gases, therefore the weight fractions have been corrected to exclude methane and ethane. An example for benzene is given below:

ROC $\text{fraction}_{benzene}$ = TOG $\text{fraction}_{benzene}$ / (1 – TOG $\text{fraction}_{methane}$ – TOG fraction_{ethane})
ROC $\text{fraction}_{benzene}$ = 0.0240 /(1-0.0880-0.0270) = 0.0240 / 0.8850 = 0.0271

Reference E -- Loading Station

The maximum operating schedule is in units of hours;
The daily/annual emissions scenario is computed, based on the following assumptions:

1. The liquid condensate loading rate occurs at a maximum rate of 7,140 gallons/hour, and 20,000 gallons/day (2.8 hours of operation) and 125,000 gal/year (17.51 hours of operation). The hourly loading rate and daily and annual hours of operation are not permit limits, they are just used to calculate daily and annual mass emissions.
2. The loading at the NGL station is uncontrolled.
3. The emission factors are derived from USEPA's AP-42, Chapter 5.2 (*Transportation and Marketing of Petroleum Liquids*) guidelines

$$L_L = 12.46 \frac{SPM}{T} \qquad (1)$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)
P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Figure 7.1-5, Figure 7.1-6, and Table 7.1-2)
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Table 7.1-2)
T = temperature of bulk liquid loaded, °R (°F + 460)

S = 0.60 (submerged loading, dedicated normal service)
P = 5.5 psia
M = 37 lb/lb-mole
T = 530 deg R

Loading loss THC emissions are then corrected to ROC using an ROC/THC ratio of 0.960.

HAP Emission Factors:
Hazardous air pollutant (HAP) weight fractions for the HC loading station emissions are obtained from the *CARB Speciation Manual (2nd Edition, 9/91), Profile Number 756 (Oil & Gas Production Fugitives – Liquid Service).* The weight fractions contained in the speciation manual are for total organic gases, therefore the weight fractions have been corrected to exclude methane and ethane. An example for benzene is given below:

ROC $\text{fraction}_{\text{benzene}}$ = TOG $\text{fraction}_{\text{benzene}}$ / (1 – TOG $\text{fraction}_{\text{methane}}$ – TOG $\text{fraction}_{\text{ethane}}$)
ROC $\text{fraction}_{\text{benzene}}$ = 0.0010 /(1-0.0640-0.3760) = 0.0010 / 0.5600 = 0.0018

Reference F - Gas Venting from Wells

- The maximum operating schedule is in units of hours.
- All venting emissions are credited with zero percent emission control efficiency, since the venting operation is not subjected to any ROC emissions control.

- The specific volume of the PUC quality natural gas vented is 19.59 scf/lb. (9/14/99 data).

- Thus, each million standard cubic foot (MMscf) of gas vented at the facility weighs 10^6/19.59 = 51046.45 lbs.

- Field data (9/14/99) show the ROC mass fraction in the facility natural gas to be 13.3 percent.

- The ROC emission factor of the natural gas vented at the SoCalGas facility is, therefore, 51046.45 lbs.*0.133 = 6789 lb/MMscf.

- Assuming a methane weight fraction of 0.6130 (see HAP discussion), the methane content of each MMScf of gas is 51046.45 lb x 0.6130 = 31291.47 lb methane/MMscf

- The CO_{2e} emission factor for gas venting is 31291.47 lb CH_4/MMscf x 21 lb CO_{2e}/lb CH_4 = 657,121 lb CO_{2e}/MMscf

HAP Emission Factors:
Hazardous air pollutant (HAP) emission factors for hexane are based on monthly gas composition analyses performed by SoCalGas for their PUC quality gas as well as the gas stored in their wells. Twenty-four data points were taken from the analytical results obtained during 2001 – 2002; these yielded a mean value of 0.05 for the 'hexane plus' fraction in the ROC. These analytical results were not reported as individual compounds, just as all compounds with the molecular weight of hexane or higher. Therefore the hexane emission factor listed in the tables is very conservative. The emission factor for benzene is based on the ROC content of the emissions, as speciated in *CARB Speciation Manual (2nd Edition, 9/91), Profile Number 757 (Oil & Gas Production Fugitives – Gas Service)*. The weight fraction for benzene contained in the speciation manual is a fraction of total organic gases, therefore the weight fraction has been corrected to exclude methane and ethane.

ROC $\text{fraction}_{\text{benzene}}$ = TOG $\text{fraction}_{\text{benzene}}$ / (1 – TOG $\text{fraction}_{\text{methane}}$ – TOG $\text{fraction}_{\text{ethane}}$)
ROC $\text{fraction}_{\text{benzene}}$ = 0.0010 /(1-0.6130-0.0790) = 0.0010 / 0.3080 = 0.0032

PTO 9584 R2 contained a column in the HAP tables for iso-octane (2,2,4 trimethylpentane). Iso-octane is a product of petroleum refining, since this facility receives and handles PUC quality natural gas, and the dehydration and separation processes at the facility do not include any refining, iso-octane is not expected in the gas handled at the facility.

SoCalGas has conducted sampling showing that iso-octane levels in the gas are non-detect. This sampling may also be used to further refine the emission factors for the other species.

<u>Reference G - Fugitive Components</u>

- The maximum operating schedule is in units of hours.

- All fugitive emission components are credited with zero percent emission control efficiency, since none of the equipment is subject to any fugitive emissions I&M program.

- The component leak path definition differs from the District Rule 331 definition of a component. A typical leak path count for a valve could be equal to 4 (one valve stem, a bonnet connection and two flanges).

- Leak path counts are provided by applicant and verified by facility inspections.

- Emission factors based on the District *P&P Document 6100.061.1996.* Production Field emission factors from Table 2 are used, but the ROC/THC ratio is 0.133, based on facility-specific data.

- Consistent with *P&P 6100.061*, an emission control efficiency of eighty (80) percent is applied to all components since the La Goleta facility is subject to an Inspection and Maintenance program for leak detection and repair required by the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation.

- Sample calculation spreadsheets are attached.

HAP Emission Factors:
Hazardous air pollutant (HAP) emission factors for hexane are based on monthly gas composition analyses performed by SoCalGas for their PUC quality gas as well as the gas stored in their wells. Twenty-four data points were taken from the analytical results obtained during 2001 – 2002; these yielded a mean value of 0.05 for the 'hexane plus' fraction in the ROC. These analytical results were not reported as individual compounds, just as all compounds with the molecular weight of hexane or higher. Therefore the hexane emission factor listed in the tables is very conservative. The emission factor for benzene is based on the ROC content of the emissions, as speciated in *CARB Speciation Manual (2nd Edition, 9/91), Profile Number 757 (Oil & Gas Production Fugitives – Gas Service)*. The weight fraction for benzene contained in the speciation manual is a fraction of total organic gases, therefore the weight fraction has been corrected to exclude methane and ethane.

$\text{ROC fraction}_{\text{benzene}} = \text{TOG fraction}_{\text{benzene}} / (1 - \text{TOG fraction}_{\text{methane}} - \text{TOG fraction}_{\text{ethane}})$
$\text{ROC fraction}_{\text{benzene}} = 0.0010 / (1\text{-}0.6130\text{-}0.0790) = 0.0010 / 0.3080 = 0.0032$

PTO 9584 R2 contained a column in the HAP tables for iso-octane (2,2,4 trimethylpentane). Iso-octane is a product of petroleum refining, since this facility receives and handles PUC quality natural gas, and the dehydration and separation processes at the facility do not include any refining, iso-octane is not expected in the gas handled at the facility.

SoCalGas has conducted sampling showing that iso-octane levels in the gas are non-detect. This sampling may also be used to further refine the emission factors for the other species.

Reference H - Solvents

- All solvents not used to thin surface coatings are included in this equipment category.

- Quarterly and annual ROC emission rates are based on estimated maximum solvent use (*see below*).

- Hourly emission limits are not provided; the facility operates 'JRI Model TL-21' parts washing unit using non-ROC solvents.'

- ROC emissions are estimated as: 2.20 lb/day and 0.4 ton/year; this is based on the estimated 'wipe cleaning' use of about 200 gallons of solvents per year containing about 800 lbs of ROC.

- No District-approved solvent reclamation program operates at the facility.

HAP Emission Factors:
Solvents assumed to contain 5% benzene, 5% toluene, 5% xylene.

Reference I: Internal Combustion Engines – *District permit-exempt, Gas-fired engines*

- The maximum operating schedule is in units of hours.
- The default fuel (PUC quality natural gas) characteristics are:

  density = 0.0459lb/scf
  LHV = 950 Btu/scf
  HHV = 1,050 Btu/scf

- Emission factors units (lb/MMBtu) are based on HHV.

- LCF (conversion of LHV to HHV) values are not required to be used for fuel listed.

- *NO_X and ROC emission factors are consistent with those established for gas-fired, uncontrolled IC engines* — pursuant to a 1991 field study and agreed to by the District and the oil & gas industry in Santa Barbara, namely:

  - NO_X
    $EF_{lb/MMBtu}$ = 1.905 (rich-burn ICE's: SCC# 20200202);

  - ROC
    $EF_{lb/MMBtu}$ = 0.103 (rich-burn ICE's: SCC# 20200202)

  - CO emission factors are consistent with AP-42 , Section 3.2 Tables

  - For conversion from lb/MMscf to lb/MMBtu, used AP-42 (2/97) listed fuel HHV of 1019.4 Btu/scf

  - CO
    $EF_{lb/MMBtu}$ = 1.6 (rich-burn ICE's; SCC# 20200253);

  - $PM/PM_{10}/PM_{2.5}$ emission factors based on USEPA AP-42;

  - For rich-burn engines = 0.01275 lb/MMBtu [Table 3.2-4 (2/97)];

  - SO_X emissions based on mass balance:
    SO_X (as SO_2) = [0.169] × [ppmvd S ÷ (HHV of fuel]

HAP Emission Factors:
Gas Fired Engines: Used AP-42 Table 3.2-3. Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines. Previously used the FIRE database. The emission factors did not change. However, additional HAPs were added.

Diesel Fired Engines: Used VCAPCD emission factors. Use of the VCACPD factors results in a change in units and additional pollutants.

<u>GHG Emission Factors</u>:
GHG emissions from combustion sources are calculated using emission factors found in Tables C-1 and C-2 of 40 CFR Part 98 and global warming potentials found in Table A-1 of 40 CFR Part 98. CO_2 equivalent emission factors are calculated for CO_2, CH_4, and N_2O individually, then summed to calculate a total CO_{2e} emission factor. Annual CO_{2e} emission totals are presented in short tons.

For natural gas combustion the emission factor is:

(53.02 kg CO_2/MMBtu) (2.2046 lb/kg) = 116.89 lb CO_2/MMBtu

(0.001 kg CH_4/MMBtu) (2.2046 lb/kg)(21 lb CO_{2e}/lb CH4) = 0.046 lb CO_{2e}/MMBtu

(0.0001 kg N_2O/MMBtu) (2.2046 lb/kg)(310 lb CO_{2e}/lb N_2O) = 0.068 lb CO_{2e}/MMBtu

Total CO_{2e}/MMBtu = 116.89 + 0.046 + 0.068 = 117.00 lb CO_{2e}/MMBtu

10.2 Calculation Spreadsheets

Combustion Equipment Emissions Calculations
ICE Emission Factor Derivation -- Conversion from ppmv to lb/MMBtu

ppmv to lb/MMBTU:

@ 15% exhaust oxygen (dry basis) & standard conditions (1.0 atm., 60 °F)

lb_i /MMBTU = $ppmv_i$ (SCF_i /$MMSCF_{exhaust}$) * (F, SCF $_{exhaust}$ /MMBTU) * (MW_i, lb_i /lb-mole) / (379 SCF_i /lb-mole) / (10^6/MM) / (XSA)

Acronym Description and Reference:

F	=	fuel expansion factor @ 0% excess exhaust oxygen, dry basis and 60 °F = 8608 scf/MMBtu (District ICE Technical Reference Document).
MW	=	Average molecular weight of exhaust pollutant specie(s), lb_i/lb-mole
XSA	=	Excess air correction factor from O% to 15% exhaust oxygen {dimensionless constant = [20.9-15.0]/[20.9-0.0] = 0.282}.

Average Exhaust Pollutant Molecular Weights:

		lb_i/lb-mole
1.	NO_X as NO_2:	46
2.	CO	28
3.	ROC	41.31

The ROC molecular weight is an assumed average molecular weight for the non-methane, non-ethane organic compounds in the engine exhausts.

Combustion Equipment Emissions Calculations

Supplemental Information for Micro-turbines

TABLE 10.2 - EMISSION FACTOR DERIVATION FROM ARB DG-002

C60 Microturbines - PUC Quality Natural Gas

DATA:

Parameter	Symbol	Value	Units	Reference
Power Output	kW	60	kW	Permit application
Heat Rate (LHV based)	HRL	12,182	Btu/kWh	Permit application
Fuel Correction Factor	FCF	1.1	dimensionaless	Permit application
Heat Rate (HHV based)	HRH	13,400	Btu/kWh	Manufacturer Specifications
F-Factor (F_D)	FD	8,608	(dscf/MMBtu)	SBCAPCD ICE Tech Ref Doc
Molar Volume of Gasses	mv	379	(scf/lb-mole)	Attach. 5-5 USEPA Combustion Manual
Stack NOx (as NO2)	ppmvN	0.5	lb/MW-hr	Executive Order DG-002
Stack ROC (as CH4)	ppmvR	1	lb/MW-hr	Executive Order DG-002
Stack CO	ppmvC	6	lb/MW-hr	Executive Order DG-002
Molec Weight NOx	MWN	46	lb/lbmole	NOx as NO2
Molec Weight ROC	MWR	16	lb/lbmole	ROC as methane
Molec Weight CO	MWC	28	lb/lbmole	

CALCULATIONS:

Parameter	Symbol	Value	Units	Calculation
Hourly Heat Input	QH	0.804	MMBtu/hr	QH = (kW*HRH)/10^6
Stack Flow (0% O2)	S1	6,921	dscf/hr	S1 = FD * QH
Stack Flow (15% O2):	S2	24,516	dscf/hr	S2 = S1 * {(20.9-0)/(20.9-15)}
NOx Mass Emissions	EN	0.030	lb/hr	EN = {(ppmvN/10^6)*S2*MWN/mv}
ROC Mass Emissions	ER	0.060	lb/hr	ER = {(ppmvR/10^6)*S2*MWR/mv}
CO Mass Emissions	EC	0.360	lb/hr	EC = {(ppmvC/10^6)*S2*MWC/mv}
NOx Emission Factor	EFNOX	0.0373	lb/MMBtu	EFNOX = EN/QH
ROC Emission Factor	EFROC	0.0746	lb/MMBtu	EFROC = ER/QH
CO Emission Factor	EFCO	0.4478	lb/MMBtu	EFCO = EC/QH
Stack NOx (as NO2)	ppmvN	10	ppmv	ppmvN = {(EN*{mv/MWN}*(10^6/S2)}
Stack ROC (as CH4)	ppmvR	58	ppmv	ppmvR = {(ER*{mv/MWR}*(10^6/S2)}
Stack CO	ppmvC	199	ppmv	ppmvC = {(EC*{mv/MWC}*(10^6/S2)}

FIXED ROOF TANK CALCULATION (AP-42: Chapter 7 Method)

Attachment:	10.2
Permit:	ATC/PTO10980
Date:	01/27/09
Tank:	Flotation-1
Name:	SoCalGas
Filename:	...\flot-tank1-calc.xls
District:	Santa Barbara
Version:	Tank-2c.xls

PRINT

ATC' PROPOSED EMISSIONS

Basic Input Data	
liquid {1:G13, 2:G10, 3:G7, 4:C, 5:JP, 6:ker, 7:O2, 8:O6} =	4
liquid TVP =	5.5
if TVP is entered, enter TVP temperature (°F) =	70
tank heated {yes, no} =	no
if tank is heated, enter temp (°F) =	
vapor recovery system present? {yes, no} =	yes
is this a wash tank? {yes, no} =	no
will flashing losses occur in this tank? {yes, no} =	no
breather vent pressure setting range (psi) (def = 0.06):	0.06

Tank Data		
diameter (feet) =		12
capacity (enter barrels in first col, gals will compute) =	238	10,000
conical or dome roof? {c, d} =		c
shell height (feet) =		12
roof height (def = 1):		1
ave liq height (feet):		6
color {1:Spec Al, 2:Diff Al, 3:Lite, 4:Med, 5:Rd, 6:Wh} =		4
condition {1: Good, 2: Poor} =		1

Liquid Data	A	B
maximum daily throughput (bopd) =		49
Ann thruput (gal): (enter value in Column A if not max PTE)		7.500E+05
RVP (psia):		7.0119
°API gravity =		39

Computed Values		
roof outage [1] (feet):		0.3
vapor space volume [2] (cubic feet):		713
turnovers [3] :		75
turnover factor [4] :		0.57
paint factor [5] :		0.68
surface temperatures (°R, °F)		
average [6] :	527.2	67.2
maximum [7] :	539	79
minimum [8] :	515.4	55.4
product factor [9] :		0.75
diurnal vapor ranges		
temperature [10] (fahrenheit degrees):		47.2
vapor pressure [11] (psia):		2.175608
molecular weight [12] (lb/lb-mol):		50
TVP [13] (psia) [adjusted for ave liquid surface temp]:		5.23685
vapor density [14] (lb/cubic foot):		0.046283
vapor expansion factor [15] :		0.313
vapor saturation factor [16] :		0.363824
vented vapor volume (scf/bbl):		13.3
fraction ROG - flashing losses:		0.308
fraction ROG - evaporative losses:		0.885

Paint Factor Matrix		
	paint condition	
paint color	good	poor
spec alum	0.39	0.49
diff alum	0.60	0.68
lite grey	0.54	0.63
med grey	0.68	0.74
red	0.89	0.91
white	0.17	0.34

Molecular Weight Matrix	
liquid	mol wt
gas rvp 13	62
gas rvp 10	66
gas rvp 7	68
crude oil	50
JP-4	80
jet kerosene	130
fuel oil 2	130
fuel oil 6	190

Adjusted TVP Matrix	
liquid	TVP value
gas rvp 13	7.908
gas rvp 10	5.56
gas rvp 7	3.932
crude oil	5.23685
JP-4	1.516
jet kerosene	0.0103
fuel oil 2	0.009488
fuel oil 6	0.0000472

RVP Matrix	
liquid	RVP value
gas rvp 13	13
gas rvp 10	10
gas rvp 7	7
crude oil	7.011897
JP-4	2.7
jet kerosene	0.029
fuel oil 2	0.022
fuel oil 6	0.00019

Long-Term VRU_Eff = 95.00%

Short-Term VRU_Eff = 95.00%

Emissions	Uncontrolled ROC emissions			Controlled ROC emissions		
	lb/hr	lb/day	ton/year	lb/hr	lb/day	ton/year
breathing loss [17] =	0.14	3.33	0.61	0.01	0.17	0.03
working loss [18] =	0.20	4.85	0.88	0.01	0.24	0.04
flashing loss [19] =	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS =	**0.34**	**8.17**	**1.49**	**0.02**	**0.41**	**0.07**

FIXED ROOF TANK CALCULATION (AP-42: Chapter 7 Method)

Basic Input Data	
liquid {1:G13, 2:G10, 3:G7, 4:C, 5:JP, 6:ker, 7:O2, 8:O6} =	4
liquid TVP =	5.5
if TVP is entered, enter TVP temperature (°F) =	70
tank heated {yes, no} =	no
if tank is heated, enter temp (°F) =	
vapor recovery system present? {yes, no} =	yes
is this a wash tank? {yes, no} =	no
will flashing losses occur in this tank? {yes, no} =	no
breather vent pressure setting range (psi) (def = 0.06):	0.06

Attachment:	10.2
Permit:	ATC/PTO 10980
Date:	01/27/09
Tank:	HC storage tank
Name:	SoCalGas
Filename:	...\HC-tank-calc.xls
District:	Santa Barbara
Version:	Tank-2c.xls

PRINT

Tank Data		
diameter (feet) =		10
capacity (enter barrels in first col, gals will compute) =	168	7,050
conical or dome roof? {c, d} =		c
shell height (feet) =		12
roof height (def = 1):		1
ave liq height (feet):		6
color {1:Spec Al, 2:Diff Al, 3:Lite, 4:Med, 5:Rd, 6:Wh} =		4
condition {1: Good, 2: Poor} =		1

ATC' PROPOSED EMISSIONS

Paint Factor Matrix	paint condition	
paint color	good	poor
spec alum	0.39	0.49
diff alum	0.60	0.68
lite grey	0.54	0.63
med grey	0.68	0.74
red	0.89	0.91
white	0.17	0.34

Molecular Weight Matrix	
liquid	mol wt
gas rvp 13	62
gas rvp 10	66
gas rvp 7	68
crude oil	50
JP-4	80
jet kerosene	130
fuel oil 2	130
fuel oil 6	190

Liquid Data	A	B
maximum daily throughput (bopd) =		8
Ann thruput (gal): (enter value in Column A if not max PTE)		1.250E+05
RVP (psia):		7.0119
°API gravity =		39

Computed Values		
roof outage [1] (feet):		0.3
vapor space volume [2] (cubic feet):		495
turnovers [3]:		17.73
turnover factor [4]:		1
paint factor [5]:		0.68
surface temperatures (°R, °F)		
average [6]:	527.2	67.2
maximum [7]:	539	79
minimum [8]:	515.4	55.4
product factor [9]:		0.75
diurnal vapor ranges		
temperature [10] (fahrenheit degrees):		47.2
vapor pressure [11] (psia):		2.175608
molecular weight [12] (lb/lb-mol):		50
TVP [13] (psia) [adjusted for ave liquid surface temp]:		5.23685
vapor density [14] (lb/cubic foot):		0.046283
vapor expansion factor [15]:		0.313
vapor saturation factor [16]:		0.363824
vented vapor volume (scf/bbl):		13.3
fraction ROG - flashing losses:		0.308
fraction ROG - evaporative losses:		0.885

Adjusted TVP Matrix	
liquid	TVP value
gas rvp 13	7.908
gas rvp 10	5.56
gas rvp 7	3.932
crude oil	5.23685
JP-4	1.516
jet kerosene	0.0103
fuel oil 2	0.009488
fuel oil 6	0.0000472

RVP Matrix	
liquid	RVP value
gas rvp 13	13
gas rvp 10	10
gas rvp 7	7
crude oil	7.011897
JP-4	2.7
jet kerosene	0.029
fuel oil 2	0.022
fuel oil 6	0.00019

Long-Term VRU_Eff = 95.00%

Short-Term VRU_Eff = 95.00%

Emissions	Uncontrolled ROC emissions			Controlled ROC emissions		
	lb/hr	lb/day	ton/year	lb/hr	lb/day	ton/year
breathing loss [17] =	0.10	2.31	0.42	0.00	0.12	0.02
working loss [18] =	0.06	1.42	0.26	0.00	0.07	0.01
flashing loss [19] =	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS =	**0.16**	**3.73**	**0.68**	**0.01**	**0.19**	**0.03**

10.3 Fee Statement

Emission fees for the La Goleta facility are based on District Rule 210, Schedule A (July 2017).

FEE STATEMENT

PT-70/Reeval No. 09584 - R6
FID: 01734 La Goleta / SSID: 05019

Santa Barbara County
Air Pollution Control District

Device Fee

Device No.	Device Name	Fee Schedule	Qty of Fee Units	Fee per Unit	Fee Units	Max or Min. Fee Apply?	Number of Same Devices	Pro Rate Factor	Device Fee	Penalty Fee?	Fee Credit	Total Fee per Device
100893	Electric Motors Driving Glycol Pumps	A2	20.000	35.73	Per total rated hp	No	3	1.000	2,143.80	0.00	0.00	2,143.80
100892	Electric Motors Driving Glycol Rectifier Pumps	A2	5.000	35.73	Per total rated hp	No	2	1.000	357.30	0.00	0.00	357.30
100874	Gas/Glycol Contactor	A6	1.000	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
100873	Gas/Glycol Contactors	A6	1.000	3.95	Per 1000 gallons	Min	3	1.000	205.41	0.00	0.00	205.41
113417	Glycol Particulate Filters	A1.a	2.000	68.92	Per equipment	No	2	1.000	275.68	0.00	0.00	275.68
100889	Glycol Rectifier	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
100876	Accumulator Stack	A1.a	1.000	68.92	Per equipment	No	2	1.000	137.84	0.00	0.00	137.84
100897	Blower	A2	1.750	35.73	Per total rated hp	Min	1	1.000	68.47	0.00	0.00	68.47
008670	Underground Gas Storage Wells	A1.a	1.000	68.92	Per equipment	No	21	1.000	1,447.32	0.00	0.00	1,447.32
100903	Gas Stacks/Vents	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
008669	Grade Level Loading Station	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
001218	Brine Water Storage Tank	A6	40.600	3.95	Per 1000 gallons	No	1	1.000	160.37	0.00	0.00	160.37
100887	Condensate Surge Tank	A6	1.000	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
001219	Flotation Cell #1	A6	10.000	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
100901	Odorant Storage Tank	A6	1.000	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
113420	Odorant Expansion Tanks	A1.a	1.000	68.92	Per equipment	No	2	1.000	137.84	0.00	0.00	137.84
100899	Methanol Storage Tank	A6	0.500	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
001220	Flotation Cell #2	A6	10.000	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
001217	Liquid Hydrocarbon Storage Tank	A6	7.050	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
001211	Flare #1 (Plant #14)	A3	1.600	517.04	Per 1 million Btu input	No	1	1.000	827.26	0.00	0.00	827.26
001212	Flare #2 (Plant #14)	A3	1.600	517.04	Per 1 million Btu input	No	1	1.000	827.26	0.00	0.00	827.26
001215	Flare #3 (Tank Farm)	A3	1.600	517.04	Per 1 million Btu input	No	1	1.000	827.26	0.00	0.00	827.26
100909	Flare Gas Sulfur Removal Units	A1.a	2.000	68.92	Per equipment	No	2	2.000	551.36	0.00	0.00	551.36
100866	Cooling Motor Fan in Heat Exchanger	A2	40.000	35.73	Per total rated hp	No	1	1.000	1,429.20	0.00	0.00	1,429.20
001206	IC Engine: Gas Compressor # 9	A3	10.020	517.04	Per 1 million Btu input	No	1	1.000	5,180.74	0.00	0.00	5,180.74
008666	E/S Diesel Firewater Pump # 12A	A3	0.930	517.04	Per 1 million Btu input	No	1	1.000	480.85	0.00	0.00	480.85
001199	IC Engine: Gas Compressor # 2	A3	7.300	517.04	Per 1 million Btu input	No	1	1.000	3,774.39	0.00	0.00	3,774.39

001201	IC Engine: Gas Compressor # 4	A3	7.300	517.04	Per 1 million Btu input	No	1	1.000	3,774.39	0.00	0.00	3,774.39
001205	IC Engine: Gas Compressor # 8	A3	7.300	517.04	Per 1 million Btu input	No	1	1.000	3,774.39	0.00	0.00	3,774.39
001204	IC Engine: Gas Compressor # 7	A3	7.300	517.04	Per 1 million Btu input	No	1	1.000	3,774.39	0.00	0.00	3,774.39
001203	IC Engine: Gas Compressor # 6	A3	7.300	517.04	Per 1 million Btu input	No	1	1.000	3,774.39	0.00	0.00	3,774.39
107546	Micro-turbine Generator, Unit 4	A3	0.804	517.04	Per 1 million Btu input	No	1	1.000	415.70	0.00	0.00	415.70
001202	IC Engine: Gas Compressor # 5	A3	7.300	517.04	Per 1 million Btu input	No	1	1.000	3,774.39	0.00	0.00	3,774.39
001200	IC Engine: Gas Compressor # 3	A3	7.300	517.04	Per 1 million Btu input	No	1	1.000	3,774.39	0.00	0.00	3,774.39
008668	E/S Diesel Firewater Pump # 13A	A3	0.930	517.04	Per 1 million Btu input	No	1	1.000	480.85	0.00	0.00	480.85
107543	Micro-turbine Generator, Unit 1	A3	0.804	517.04	Per 1 million Btu input	No	1	1.000	415.70	0.00	0.00	415.70
107544	Micro-turbine Generator, Unit 2	A3	0.804	517.04	Per 1 million Btu input	No	1	1.000	415.70	0.00	0.00	415.70
107545	Micro-turbine Generator, Unit 3	A3	0.804	517.04	Per 1 million Btu input	No	1	1.000	415.70	0.00	0.00	415.70
100865	Cooling Motor Fan in Heat Exchanger	A2	40.000	35.73	Per total rated hp	No	1	1.000	1,429.20	0.00	0.00	1,429.20
100867	Cooling Motor Fan in Heat Exchanger	A2	40.000	35.73	Per total rated hp	No	1	1.000	1,429.20	0.00	0.00	1,429.20
100869	Glycol Unit Condenser Fan Motor	A2	6.000	35.73	Per total rated hp	No	1	1.000	214.38	0.00	0.00	214.38
100870	Glycol Unit Condenser Fan Motor	A2	5.000	35.73	Per total rated hp	No	1	1.000	178.65	0.00	0.00	178.65
100872	Oil Heater Blower Fan	A2	7.500	35.73	Per total rated hp	No	1	1.000	267.98	0.00	0.00	267.98
107541	Oil Heater Blower Fan, New	A2	1.000	35.73	Per total rated hp	Min	1	1.000	68.47	0.00	0.00	68.47
100868	Oil Heater Circulation Pump Motors	A2	40.000	35.73	Per total rated hp	No	1	1.000	1,429.20	0.00	0.00	1,429.20
100898	Condensate Pump	A2	5.000	35.73	Per total rated hp	No	1	1.000	178.65	0.00	0.00	178.65
100871	Condensate Pumps	A2	1.500	35.73	Per total rated hp	Min	1	1.000	68.47	0.00	0.00	68.47
100904	Vent Stack Sump Pump	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
100900	Pneumatic Pumps	A1.a	1.000	68.92	Per equipment	No	2	1.000	137.84	0.00	0.00	137.84
100879	High Pressure Separator	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
100878	Glycol/Gas Separator	A6	1.000	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
100881	Low Pressure Separator	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
100888	Horizontal Separator	A6	1.000	3.95	Per 1000 gallons	Min	1	1.000	68.47	0.00	0.00	68.47
100895	High Pressure Separator	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92

100896	Low Pressure Separator	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
100880	Sand Trap	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
100875	Vapor Condensing Coils	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
100894	Vapor Condensing Coils	A1.a	1.000	68.92	Per equipment	No	1	1.000	68.92	0.00	0.00	68.92
113985	Heater #1	A3	2.000	517.04	Per 1 million Btu input	No	1	1.000	1,034.08	0.00	0.00	1,034.08
113987	Heater #2	A3	2.000	517.04	Per 1 million Btu input	No	1	1.000	1,034.08	0.00	0.00	1,034.08
107535	Hot Oil Heater #2	A3	2.200	517.04	Per 1 million Btu input	No	1	1.000	1,137.49	0.00	0.00	1,137.49
001214	Hot Oil Heater #1	A3	4.000	517.04	Per 1 million Btu input	No	1	1.000	2,068.16	0.00	0.00	2,068.16
391977	Continuous Bleed Devices	A1.a	1.000	68.92	Per equipment	No	3	1.000	206.76	0.00	0.00	206.76
113419	Odorant Metering Pumps	A1.a	2.000	68.92	Per equipment	No	2	1.000	275.68	0.00	0.00	275.68
391978	Intermediate Bleed Devices	A1.a	1.000	68.92	Per equipment	No	51	1.000	3,514.92	0.00	0.00	3,514.92
	Device Fee Sub-Totals =								**$59,669.91**	**$0.00**	**$0.00**	
	Device Fee Total =											**$59,669.91**

Permit Fee

Fee Based on Devices **$59,669.91**

Fee Statement Grand Total = $59,669

Notes:

(1) Fee Schedule Items are listed in District Rule 210, Fee Schedule "A".
(2) The term "Units" refers to the unit of measure defined in the Fee Schedule.

10.4 IDS Database Emission Tables

Table 10.4-1
Permitted Potential to Emit (PPTE)

	NO_X	ROC	CO	SO_X	TSP	PM_{10}	$PM_{2.5}$
Part 70/District PTO 9584-R6 – La Goleta							
lb/day	555.18	1,367.78	7,213.19	27.81	32.99	32.99	32.99
tons/year	98.39	239.51	1,315.78	5.09	5.83	5.83	5.83

Table 10.4-2
Facility Potential to Emit (FPTE)

	NO_X	ROC	CO	SO_X	TSP	PM_{10}	$PM_{2.5}$
Part 70/District PTO 9584-R6 – La Goleta							
lb/day	555.18	1,367.78	7,213.19	27.81	32.99	32.99	32.99
tons/year	98.39	239.51	1,315.78	5.09	5.83	5.83	5.83

Table 10.4-3
Facility 'Federal" Potential to Emit

	NO_X	ROC	CO	SO_X	TSP	PM_{10}	$PM_{2.5}$
Part 70/District PTO 9584-R6 – La Goleta							
lb/day	600.90	1,301.10	7,251.59	28.12	33.33	33.33	33.33
tons/year	106.74	227.34	1,322.79	5.15	5.89	5.69	5.89

10.5 Equipment List

Thursday, May 17, 2018
Santa Barbara County Air Pollution Control District – Equipment List

PT-70/Reeval 09584 R6 / FID: 01734 La Goleta / SSID: 05019

A PERMITTED EQUIPMENT

1 Glycol Dehydration Unit

1.1 Electric Motors Driving Glycol Pumps

Device ID #	**100893**	***Device Name***	**Electric Motors Driving Glycol Pumps**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Rated at 20 hp each.		

1.2 Electric Motors Driving Glycol Rectifier Pumps

Device ID #	**100892**	***Device Name***	**Electric Motors Driving Glycol Rectifier Pumps**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Rated at 7.5 hp each.		

1.3 Gas/Glycol Contactor

Device ID #	**100874**	***Device Name***	**Gas/Glycol Contactor**
Rated Heat Input		*Physical Size*	
Manufacturer	Braun & Lacy	*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	One (1) unit 4.5’ dia. by 38.9’ long; with a control tank 16” dia. by 17.67’ long.		

1.4 Gas/Glycol Contactors

Device ID #	**100873**	***Device Name***	**Gas/Glycol Contactors**
Rated Heat Input		*Physical Size*	
Manufacturer	Braun & Lacy	*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Three (3) units each 4.5’ dia. by 37.8’ long; with three (3) control tanks, each 16” dia. by 15.25’ long.		

1.5 Glycol Particulate Filters

Device ID #	**113417**	***Device Name***	**Glycol Particulate Filters**
Rated Heat Input		*Physical Size*	
Manufacturer	Eaton Corporation	*Operator ID*	F-GL3A and F-GL3B
Model	MBF 0402	*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	1.83' dia by 3.04' tall, replace two Rol-Pak filters (Device ID 100877)		

1.6 Glycol Rectifier

Device ID #	**100889**	***Device Name***	**Glycol Rectifier**
Rated Heat Input		*Physical Size*	
Manufacturer	Fisher-Klosterman	*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	18” diameter.		

2 Equipment Units at the Dehydration Plant

2.1 Accumulator Stack

Device ID #	**100876**	***Device Name***	**Accumulator Stack**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Closed. 2 stacks.		

2.2 Blower

Device ID #	**100897**	***Device Name***	**Blower**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	For VRU at Tank Farm: electric motor, 1.75 hp.		

2.3 Underground Gas Storage Wells

Device ID #	**008670**	***Device Name***	**Underground Gas Storage Wells**
Rated Heat Input		*Physical Size*	21.00 Total Wells
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

2.4 Gas Stacks/Vents

Device ID #	**100903**	***Device Name***	**Gas Stacks/Vents**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	For pipeline depressurizing operations.		

2.5 Grade Level Loading Station

Device ID #	**008669**	***Device Name***	**Grade Level Loading Station**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Grade level loading station to load HC condensate to tanker trucks by motor driven pump; not equipped with VRU.		

3 Fixed Roof Tanks

3.1 Brine Water Storage Tank

Device ID #	**001218**	***Device Name***	**Brine Water Storage Tank**
Rated Heat Input		*Physical Size*	40600.00 Gallons
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	24’ dia. by 12’ height.		

3.2 Condensate Surge Tank

Device ID #	**100887**	***Device Name***	**Condensate Surge Tank**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	3’ dia by 32’ tall.		

3.3 Flotation Cell #1

Device ID #	**001219**	***Device Name***	**Flotation Cell #1**
Rated Heat Input		*Physical Size*	10000.00 Gallons
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	12’ dia. by 12’ height.		

3.4 Odorant Storage Tank

Device ID #	**100901**	***Device Name***	**Odorant Storage Tank**
Rated Heat Input		*Physical Size*	1000.00 Gallons
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Relief valve set @ 33 psig, odorant -- Captan 50/Thiophane.		

3.5 Odorant Expansion Tanks

Device ID #	**113420**	***Device Name***	**Odorant Expansion Tanks**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	10" by 13", serving the odorant metering system. Controlled by a 55 gallon carbon canister.		

3.6 Methanol Storage Tank

Device ID #	**100899**	***Device Name***	**Methanol Storage Tank**
Rated Heat Input		*Physical Size*	500.00 Gallons
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Pressurized with natural gas; with pressure relief valve.		

3.7 Flotation Cell #2

Device ID #	**001220**	***Device Name***	**Flotation Cell #2**
Rated Heat Input		*Physical Size*	10000.00 Gallons
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	12’ dia. by 12’ height.		

3.8 Liquid Hydrocarbon Storage Tank

Device ID #	**001217**	***Device Name***	**Liquid Hydrocarbon Storage Tank**
Rated Heat Input		*Physical Size*	7050.00 Gallons
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	10’ dia. by 12’ height.		

4 Flares

4.1 Flare #1 (Plant #14)

Device ID #	**001211**	***Device Name***	**Flare #1 (Plant #14)**
Rated Heat Input	1.600 MMBtu/Hour	*Physical Size*	
Manufacturer		*Operator ID*	#1
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Pilot w/ natural gas.		

4.2 Flare #2 (Plant #14)

Device ID #	**001212**	***Device Name***	**Flare #2 (Plant #14)**
Rated Heat Input	1.600 MMBtu/Hour	*Physical Size*	
Manufacturer		*Operator ID*	#2
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Pilot w/natural gas.		

4.3 Flare #3 (Tank Farm)

Device ID #	**001215**	***Device Name***	**Flare #3 (Tank Farm)**
Rated Heat Input	1.600 MMBtu/Hour	*Physical Size*	
Manufacturer		*Operator ID*	#3
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Pilot w/ natural gas.		

5 Flare Gas Sulfur Removal Units

Device ID #	**100909**	***Device Name***	**Flare Gas Sulfur Removal Units**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	SULFATREAT and CEI-KMN Units, for waste gas treatment.		

6 Fugitive Hydrocarbon Components - Gas/Light Liquid Svc - CLP

6.1 Valves - Accessible

Device ID #	**100882**	***Device Name***	**Valves - Accessible**
Rated Heat Input		*Physical Size*	3571.00 Component Leakpath
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

6.2 Compressor Seals - Accessible

Device ID #	**100885**	***Device Name***	**Compressor Seals - Accessible**
Rated Heat Input		*Physical Size*	14.00 Component Leakpath
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

6.3 Connections - Accessible

Device ID #	**100883**	***Device Name***	**Connections - Accessible**
Rated Heat Input		*Physical Size*	16918.00 Component Leakpath
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

6.4 Pump Seals - Accessible

Device ID #	**100884**	***Device Name***	**Pump Seals - Accessible**
Rated Heat Input		*Physical Size*	5.00 Component Leakpath
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

6.5 Pressure Relief Devices - Uncontrolled

Device ID #	**100886**	***Device Name***	**Pressure Relief Devices - Uncontrolled**
Rated Heat Input		*Physical Size*	49.00 Component Leakpath
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

7 IC Engines with Controlled Emissions

7.1 Catalytic Converter #3

Device ID #	**110815**	***Device Name***	**Catalytic Converter #3**
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#3
Model	DC74	*Serial Number*	164729
Location Note	SoCalGas - La Goleta		
Device Description			

7.2 Catalytic Converter #4

Device ID #	**110816**	***Device Name***	**Catalytic Converter #4**
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#4
Model	DC74	*Serial Number*	164724
Location Note	SoCalGas - La Goleta		
Device Description			

7.3 Catalytic Converter #5

Device ID #	**110817**	***Device Name***	**Catalytic Converter #5**
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#5
Model	DC74	*Serial Number*	164723
Location Note	SoCalGas - La Goleta		
Device Description			

7.4 Catalytic Converter #6

Device ID #	**110818**	***Device Name***	**Catalytic Converter #6**
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#6
Model	DC74	*Serial Number*	164727
Location Note	SoCalGas - La Goleta		
Device Description			

7.5 Catalytic Converter #7

Device ID #	**110819**	***Device Name***	**Catalytic Converter #7**
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#7
Model	DC74	*Serial Number*	164725
Location Note	SoCalGas - La Goleta		
Device Description			

7.6 Catalytic Converter #8

Device ID #	**110820**	***Device Name***	**Catalytic Converter #8**
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#8
Model	DC74	*Serial Number*	164726
Location Note	SoCalGas - La Goleta		
Device Description			

7.7 E/S Diesel Firewater Pump # 12A

Device ID #	**008666**	***Device Name***	**E/S Diesel Firewater Pump # 12A**
Rated Heat Input	0.930 MMBtu/Hour	*Physical Size*	133.00 Brake Horsepower
Manufacturer	Cummins	*Operator ID*	# 12A
Model	V-378-F2	*Serial Number*	20195869
Location Note	SoCalGas - La Goleta		
Device Description			

7.8 IC Engine: Gas Compressor # 2

Device ID #	**001199**	***Device Name***	**IC Engine: Gas Compressor # 2**
Rated Heat Input		*Physical Size*	650.00 Horsepower
Manufacturer	Ingersoll-Rand	*Operator ID*	Gas Compressor # 2
Model	LVG-82,	*Serial Number*	8AL126
Location Note	SoCalGas - La Goleta		
Device Description			

7.9 IC Engine: Gas Compressor # 4

Device ID #	**001201**	***Device Name***	**IC Engine: Gas Compressor # 4**
Rated Heat Input		*Physical Size*	650.00 Horsepower
Manufacturer	Ingersoll-Rand	*Operator ID*	Gas Compressor # 4
Model	LVG-82	*Serial Number*	8AL128
Location Note	SoCalGas - La Goleta		
Device Description			

7.10 IC Engine: Gas Compressor # 8

Device ID #	**001205**	***Device Name***	**IC Engine: Gas Compressor # 8**
Rated Heat Input		*Physical Size*	660.00 Horsepower
Manufacturer	Ingersoll-Rand	*Operator ID*	Gas Compressor # 8
Model	KVG-62	*Serial Number*	6EL267
Location Note	SoCalGas - La Goleta		
Device Description			

7.11 IC Engine: Gas Compressor # 7

Device ID #	**001204**	***Device Name***	**IC Engine: Gas Compressor # 7**
Rated Heat Input		*Physical Size*	660.00 Horsepower
Manufacturer	Ingersoll-Rand	*Operator ID*	Gas Compressor # 7
Model	KVG-62	*Serial Number*	6EL266
Location Note	SoCalGas - La Goleta		
Device Description			

7.12 IC Engine: Gas Compressor # 6

Device ID #	**001203**	***Device Name***	**IC Engine: Gas Compressor # 6**
Rated Heat Input		*Physical Size*	660.00 Horsepower
Manufacturer	Ingersoll-Rand	*Operator ID*	Gas Compressor # 6
Model	KVG-62	*Serial Number*	6EL265
Location Note	SoCalGas - La Goleta		
Device Description			

7.13 Micro-turbine Generator, Unit 4

Device ID #	**107546**	***Device Name***	**Micro-turbine Generator, Unit 4**
Rated Heat Input	0.804 MMBtu/Hour	*Physical Size*	
Manufacturer	Capstone	*Operator ID*	# 4
Model	C-60	*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	NG-fired unit		

7.14 IC Engine: Gas Compressor # 5

Device ID #	**001202**	***Device Name***	**IC Engine: Gas Compressor # 5**
Rated Heat Input		*Physical Size*	650.00 Horsepower
Manufacturer	Ingersoll-Rand	*Operator ID*	Gas Compressor # 5
Model	LVG-82	*Serial Number*	8AL127
Location Note	SoCalGas - La Goleta		
Device Description			

7.15 IC Engine: Gas Compressor # 3

Device ID #	**001200**	***Device Name***	**IC Engine: Gas Compressor # 3**
Rated Heat Input		*Physical Size*	650.00 Horsepower
Manufacturer	Ingersoll-Rand	*Operator ID*	Gas Compressor # 3
Model	LVG-82	*Serial Number*	8AL129
Location Note	SoCalGas - La Goleta		
Device Description			

7.16 E/S Diesel Firewater Pump # 13A

Device ID #	**008668**	***Device Name***	**E/S Diesel Firewater Pump # 13A**
Rated Heat Input	0.930 MMBtu/Hour	*Physical Size*	133.00 Brake Horsepower
Manufacturer	Cummins	*Operator ID*	# 13A
Model	V-378-F2	*Serial Number*	20195868
Location Note	SoCalGas - La Goleta		
Device Description			

7.16.1 Catalytic Converter #2

Device ID #	**110814**	***Device Name***	**Catalytic Converter #2**
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#2
Model	DC74	*Serial Number*	164728
Location Note	SoCalGas - La Goleta		
Device Description			

7.17 Micro-turbine Generator, Unit 1

Device ID #	**107543**	***Device Name***	**Micro-turbine Generator, Unit 1**
Rated Heat Input	0.804 MMBtu/Hour	*Physical Size*	
Manufacturer	Capstone	*Operator ID*	#1
Model	C-60	*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	NG-fired unit.		

7.18 Micro-turbine Generator, Unit 2

Device ID #	**107544**	***Device Name***	**Micro-turbine Generator, Unit 2**
Rated Heat Input	0.804 MMBtu/Hour	*Physical Size*	
Manufacturer	Capstone	*Operator ID*	# 2
Model	C-60	*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	NG-fired unit		

7.19 Micro-turbine Generator, Unit 3

Device ID #	**107545**	***Device Name***	**Micro-turbine Generator, Unit 3**
Rated Heat Input	0.804 MMBtu/Hour	*Physical Size*	
Manufacturer	Capstone	*Operator ID*	# 3
Model	C-60	*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	NG-fired unit		

8 Other Equipment Units (New) at Compressor Plant

8.1 Cooling Motor Fan in Heat Exchanger

Device ID #	**100865**	***Device Name***	**Cooling Motor Fan in Heat Exchanger**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMF-1
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 40 hp electric motor.		

8.2 Cooling Motor Fan in Heat Exchanger

Device ID #	**100867**	***Device Name***	**Cooling Motor Fan in Heat Exchanger**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMF-3
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 40 hp electric motor.		

8.3 Glycol Unit Condenser Fan Motor

Device ID #	**100869**	***Device Name***	**Glycol Unit Condenser Fan Motor**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMF-4 A/B
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 6 hp electric motor.		

8.4 Glycol Unit Condenser Fan Motor

Device ID #	**100870**	***Device Name***	**Glycol Unit Condenser Fan Motor**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMF-5
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 5 hp electric motor.		

8.5 Oil Heater Blower Fan

Device ID #	**100872**	***Device Name***	**Oil Heater Blower Fan**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMF-6
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 7.5 hp electric motor.		

8.6 Oil Heater Blower Fan, New

Device ID #	**107541**	***Device Name***	**Oil Heater Blower Fan, New**
Rated Heat Input		*Physical Size*	1.00 Horsepower (Electric Motor)
Manufacturer		*Operator ID*	None
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Additional blower fan at compressor plant for the oil heater		

8.7 Oil Heater Circulation Pump Motors

Device ID #	**100868**	***Device Name***	**Oil Heater Circulation Pump Motors**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMP-5 A/B
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 40 hp electric motor.		

9 Pumps

9.1 Condensate Pump

Device ID #	**100898**	***Device Name***	**Condensate Pump**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Serving the storage tanks; 5 hp electric motor drive.		

9.2 Condensate Pumps

Device ID #	**100871**	***Device Name***	**Condensate Pumps**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMP-6 A/B
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 1.5 hp electric motor.		

9.3 Vent Stack Sump Pump

Device ID #	**100904**	***Device Name***	**Vent Stack Sump Pump**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Pneumatic.		

9.4 Pneumatic Pumps

Device ID #	**100900**	***Device Name***	**Pneumatic Pumps**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Serving the methanol tank.		

10 Separator Units in Processes

10.1 High Pressure Separator

Device ID #	**100879**	***Device Name***	**High Pressure Separator**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	V-100, welded construction, vertical, 3' dia. by 14.3' tall; connected to gas collection system.		

10.2 Glycol/Gas Separator

Device ID #	**100878**	***Device Name***	**Glycol/Gas Separator**
Rated Heat Input		*Physical Size*	
Manufacturer	Southwest Welding	*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	4' dia. by 10.2' tall.		

10.3 Low Pressure Separator

Device ID #	**100881**	***Device Name***	**Low Pressure Separator**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	V-101, welded construction, vertical, 3’ dia. by 14.3’ tall; connected to gas collection system.		

10.4 Horizontal Separator

Device ID #	**100888**	***Device Name***	**Horizontal Separator**
Rated Heat Input		*Physical Size*	900.00 Gallons
Manufacturer	King	*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	With a separate bottom barrel.		

10.5 High Pressure Separator

Device ID #	**100895**	***Device Name***	**High Pressure Separator**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	V-100A, welded construction, vertical, 3’ dia. by 14.3’ tall; connected to gas collection system.		

10.6 Low Pressure Separator

Device ID #	**100896**	***Device Name***	**Low Pressure Separator**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	V-101A, welded construction, vertical, 3’ dia. by 14.3’ tall; connected to gas collection system.		

10.7 Sand Trap

Device ID #	**100880**	***Device Name***	**Sand Trap**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	V-200, welded construction, horizontal, 3’ dia. by 19.8’ long; connected to gas collection system.		

10.8 Vapor Condensing Coils

Device ID #	**100875**	***Device Name***	**Vapor Condensing Coils**
Rated Heat Input		*Physical Size*	
Manufacturer	Happy Co.	*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	4.0’ wide by 18’ long.		

10.9 Vapor Condensing Coils

Device ID #	**100894**	***Device Name***	**Vapor Condensing Coils**
Rated Heat Input		*Physical Size*	
Manufacturer	Air-X-Changer	*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	0.67’ wide by 7.3’ long.		

11 Wipe Cleaning Solvent Usage

Device ID #	**100914**	***Device Name***	**Wipe Cleaning Solvent Usage**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Also included in Part 70 Insignificant Activities.		

11.1 Solvent Usage

Device ID #	**008680**	***Device Name***	**Solvent Usage**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

12 External Combustion Units

12.1 Heater #1

Device ID #	**113985**	***Device Name***	**Heater #1**
Rated Heat Input	2.000 MMBtu/Hour	*Operator ID*	H-201A
		Serial Number	60449
Manufacturer	Parker		
Model	G-2304RL	*Stacked Unit?*	Yes
Location Note	SoCalGas - La Goleta		
Emission Control Basis	Uncontrolled		
Device Description	- Full Modulation - Low-NOx Burner - Fired on Natural Gas		

12.2 Heater #2

Device ID #	**113987**	***Device Name***	**Heater #2**
Rated Heat Input	2.000 MMBtu/Hour	*Operator ID*	H-201B
		Serial Number	60369
Manufacturer	Parker		
Model	G_2304RL	*Stacked Unit?*	Yes
Location Note	SoCalGas - La Goleta		
Emission Control Basis	Uncontrolled		
Device Description	- Full Modulation - Low-NOx Burner - Fired on Natural Gas		

12.3 Hot Oil Heater #2

Device ID #	**107535**	***Device Name***	**Hot Oil Heater #2**
Rated Heat Input	2.200 MMBtu/Hour	*Physical Size*	
Manufacturer	American Heating Company	*Operator ID*	HOH #2
Model	AHE-212-2P	*Serial Number*	670-A04
Location Note	SoCalGas - La Goleta		
Device Description	Gas-fired unit. Operates only when HOH #1 is not operating.		

12.4 Hot Oil Heater #1

Device ID #	**001214**	***Device Name***	**Hot Oil Heater #1**
Rated Heat Input	3.500 MMBtu/Hour	*Physical Size*	
Manufacturer	Fulton Thermal Corporation	*Operator ID*	HOH #1
Model	FT-0400C	*Serial Number*	2788C
Location Note	SoCalGas - La Goleta		
Device Description			

13 Continuous Bleed Devices

Device ID #	**391977**	***Device Name***	**Continuous Bleed Devices**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	3 devices		

14 Solvent Cleaning and Usage

Device ID #	**107542**	***Device Name***	**Solvent Cleaning and Usage**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	General solvent usage and cleaning.		

15 Odorant Metering Pumps

Device ID #	**113419**	***Device Name***	**Odorant Metering Pumps**
Rated Heat Input		*Physical Size*	19.50 MMcf/hr
Manufacturer	YZ Systems	*Operator ID*	
Model	NJEX 8000	*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Air actuated, w/positive displacement and reciprocating plunger. Replaces Device ID 100902		

16 Intermediate Bleed Devices

Device ID #	**391978**	***Device Name***	**Intermediate Bleed Devices**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	51 Devices		

17 Well Casing Vents

Device ID #	**391979**	***Device Name***	**Well Casing Vents**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	19 Well Casing Vents		

18 Cooling Motor Fan in Heat Exchanger

Device ID #	**100866**	***Device Name***	**Cooling Motor Fan in Heat Exchanger**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	EMF-2
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description	Powered by a 40 hp electric motor.		

19 IC Engine: Gas Compressor # 9

Device ID #	**001206**	***Device Name***	**IC Engine: Gas Compressor # 9**
Rated Heat Input		*Physical Size*	1100.00 Horsepower
Manufacturer	Cooper-Bessemer	*Operator ID*	Gas Compressor # 9
Model	GMV-10C	*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

B EXEMPT EQUIPMENT

1 IC Engine: Emergency Electrical Generator

Device ID #	**008665**	***Device Name***	**IC Engine: Emergency Electrical Generator**
Rated Heat Input		*Physical Size*	160.00 Horsepower
Manufacturer	Waukesha	*Operator ID*	
Model	F817GU	*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.F.1.d. Spark ignition piston-type ICEs for emergency electrical power generation	
Location Note	SoCalGas - La Goleta		
Device Description	Operated < 200 hours/year. Also included in Part 70 Insignificant Activities.		

2 Glycol/Glycol Heat Exchanger

Device ID #	**100890**	***Device Name***	**Glycol/Glycol Heat Exchanger**
Rated Heat Input		*Physical Size*	
Manufacturer	Brown Fin Tube	*Operator ID*	
Model		*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.L.1 Heat Exchangers	
Location Note	SoCalGas - La Goleta		
Device Description	Parts # E-301, E-302 & E-303, piped in series, 6.5’ tall by 24’ long.		

3 Diesel Tanks

Device ID #	**100911**	***Device Name***	**Diesel Tanks**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.V.2 Storage Of Refined Fuel Oil W/Grav <=40 Api	
Location Note	SoCalGas - La Goleta		
Device Description	Two 110 gallons and one 600 gallons capacity. Also included in Part 70 Insignificant Activities.		

4 IC Engine: Air Compressor # 4A

Device ID #	**001221**	***Device Name***	**IC Engine: Air Compressor # 4A**
Rated Heat Input		*Physical Size*	48.00 Horsepower
Manufacturer	Waukesha	*Operator ID*	Air Compressor # 4A
Model	VRG220U	*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.F.1.e. Compression ignition engines w/ bhp 50 or less	
Location Note	SoCalGas - La Goleta		
Device Description	48 hp air compressor engine.		

5 IC Engine: Air Compressor # 5A

Device ID #	**001222**	***Device Name***	**IC Engine: Air Compressor # 5A**
Rated Heat Input		*Physical Size*	48.00 Horsepower
Manufacturer	Waukesha	*Operator ID*	Air Compressor # 5A
Model	VRG220U	*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.F.1.e. Compression ignition engines w/ bhp 50 or less	
Location Note	SoCalGas - La Goleta		
Device Description	48 hp air compressor engine.		

6 Glycol/Oil Heat Exchanger

Device ID #	**100891**	***Device Name***	**Glycol/Oil Heat Exchanger**
Rated Heat Input		*Physical Size*	
Manufacturer	Brown Fin Tube	*Operator ID*	E-304
Model		*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.L.1 Heat Exchangers	
Location Note	SoCalGas - La Goleta		
Device Description	2.5’ tall by 20’ long, single pass, one component unit.		

7 Glycol Storage Tanks

Device ID #	**100910**	***Device Name***	**Glycol Storage Tanks**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 201.A No Potential To Emit Air Contaminants	
Location Note	SoCalGas - La Goleta		
Device Description	Two (2) glycol storage tanks and one glycol run tank. Also included in Part 70 Insignificant Activities.		

8 Lube Oil Tanks

Device ID #	**100912**	***Device Name***	**Lube Oil Tanks**
Rated Heat Input		*Physical Size*	5000.00 Gallons
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.V.3 Storage Of Lubricating Oils	
Location Note	SoCalGas - La Goleta		
Device Description	5000 gallons capacity each. Also included in Part 70 Insignificant Activities.		

9 Degreaser Unit

Device ID #	**100913**	***Device Name***	**Degreaser Unit**
Rated Heat Input		*Physical Size*	
Manufacturer	JRI	*Operator ID*	
Model	TL 21	*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 202.U.2.a. Degreasing Equipment W/Lqd Surf Area <929 Cm2	
Location Note	SoCalGas - La Goleta		
Device Description	Using non-ROC solvent. Also included in Part 70 Insignificant Activities.		

10 Hot Water Heaters

Device ID #	**100915**	***Device Name***	**Hot Water Heaters**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 201.A No Potential To Emit Air Contaminants	
Location Note	SoCalGas - La Goleta		
Device Description	Also included in Part 70 Insignificant Activities.		

11 Air Conditioning System

Device ID #	**100916**	***Device Name***	**Air Conditioning System**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Part 70 Insig?	Yes	*District Rule Exemption:* 201.A No Potential To Emit Air Contaminants	
Location Note	SoCalGas - La Goleta		
Device Description	Also included in Part 70 Insignificant Activities.		

12 Heat Exchanger

Device ID #	**114270**	***Device Name***	**Heat Exchanger**
Rated Heat Input		*Physical Size*	
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Part 70 Insig?	No	*District Rule Exemption:* 202.L.1 Heat Exchangers	
Location Note	SoCalGas - La Goleta		
Device Description	16" diameter x 192" long		

10.6 Permittee Comments on the Draft Permit and the District Responses

Table 1 Comments on Draft PTO 9594 R-6.

Comment Number	Section and Page	Current	Comment	District Response
1.	Page 12 Section 3.2.3	40 CFR Part 61 {NESHAP}: Gas compressors #2 through #8 are subject to NESHAP provisions to control formaldehyde emissions. Gas compressors #2 through #8 are equipped with NSCR as required by 40 CFR 63 Subpart ZZZZ. Exhaust concentrations of formaldehyde emissions are limited to 2.7 ppmvd at 15% oxygen.	This facility is not covered by 40 CFR Part 61, but is covered by 40 CFR Part 63 which is included in permit sections 3.2.4, 3.2.5, 3.2.6.	Section 3.2.3 updated to reflect that none of the equipment in this permit is subject 40 CFR Part 61 requirements.
2.	Page 12 Section 3.2.5	(1) Maintain the catalyst so that the pressure drop across the catalyst does not change by more than 2 inches of water from the pressure drop across the catalyst measured during the initial performance test when the engine is operated at 100% load plus or minus 10%; and; (2) Maintain the catalyst inlet temperature greater than or equal to 610 degrees F and less than or equal to 1,250 degrees F. To demonstrate continuous compliance with the operating parameters, the operator must: Measure the pressure drop across the catalyst once per month; and Collect the catalyst inlet temperature data and reduce the data to 4-hour rolling averages.	These are not the requirements for Main Units 2-8.	Section 3.2.5 updated to reflect the applicable requirements.

Comment Number	Section and Page	Current	Comment	District Response
3.	Page 13 Section 3.2.5	<u>40 CFR Part 70 {*Operating Permits*}</u>: This Subpart is applicable to the La Goleta Plant. Table 3.1 lists the federally enforceable District promulgated rules that are "generic" and apply to the EOF. Table 3.2 lists the federally enforceable District promulgated rules that are "unit-specific" that apply to the EOF. These tables are based on data available from the District's administrative files, from SoCalGas Part 70 Operating Permit 9584-R4 issued in June 2012 and their renewal application submitted in December 2014. **Table 3.4** includes the District's adoption dates of these rules.	Incorrect table reference	Correction made as requested.
4.	3.3.4 Page 15	The regulation requires SoCalGas to measure all well casing vent flows annually by direct measurement.	Requirement is only for vents open to atmosphere, vents at the facility are intermittent bleed	Section updated as requested.
5.	3.4.2 Page 16	Compliance will be assured by requiring all engines to be maintained according to a District-approved *IC Engine Particulate Matter Operation and Maintenance Plan.*	Requirements have been incorporated into I&M Plan	Change made as requested.
6.	3.4.2 Page 18	*Rule 603 - Emergency Episode Plans*: Section A of this rule requires the submittal of *Stationary Source Curtailment Plan* for all stationary sources that can be expected to emit more than 100 tons per year of hydrocarbons, nitrogen oxides, carbon monoxide or particulate matter. SoCalGas submitted such a plan December 2008.	The plan was approved on June 18, 2009.	Change made as requested.
7.	Table 3.1 Page 20	*Rule 204 adoption date: April 17, 1997*	Last amended 8/25/2016	Change made as requested.

Comment Number	Section and Page	Current	Comment	District Response
8.	Table 5.1-1 B	**Component count** Valves 2852 Connections 19889 Pressure Relief Devices 91 Compressor Seals 17 Pump Seals 2	Amended based on LDAR component inventory, amend emissions to reflect component counts	The component counts have been updated.
9.	Table 5.4-2 A Page 48	*Micro turbine HAP Emissions for Naphthalene = 4.56x10-4*	Update cell reference to sum Naphthalene rather than Toluene emissions, result should $4.58x10^{-6}$ rather than $4.58x10^{-4}$ tons per year	Change made as requested.
10.	Table 5.4-2 A Page 50	*Micro turbine HAP Emissions for Naphthalene = 4.56x10-4* *Total Naphthalene Emissions = 1.82x10-2*	Update cell reference to sum Naphthalene rather than Toluene emissions, result should $4.58x10^{-6}$ rather than $4.58x10^{-4}$ tons per year Total naphthalene emissions should reflect the lower emissions and total 1.63x10-2	Change made as requested.
11.	Section 9.B Page 59-60	*B.10 Adhesives and Sealants* *B.12 Large Water Heaters and Small Boilers* *B.13 Breakdowns* *B.14 Emergency Episode Plan* *B.15 CARB Registered Portable Equipment*	Sections miss-numbered	The numbering has been corrected.

Comment Number	Section and Page	Current	Comment	District Response
12.	Table C.6 Page 49	**Component count** Valves 2852 Connections 19889 Pressure Relief Devices 91 Compressor Seals 17 Pump Seals 2	Amended based on LDAR component inventory, amend emissions to reflect component counts.	The tables have been updated to reflect the revised component counts.
13.	Section 9.C.14 Page 83	**IC Engine Particulate Matter Operation & Maintenance Plan.** To ensure compliance with District Rules 205.A, 302, 304, 309 and the California Health and Safety Code Section 41701 by the diesel-fired emergency fire-water pumps, SoCalGas shall implement its District-approved *Engine Particulate Matter Operation and Maintenance Plan* for the life of the project. [*Re: District Rules 205.A, 302, 304, 309*]	The Engine Particulate Matter Operation and Maintenance Plan has been incorporated into the IC Engine Inspection and Maintenance Plan	Change made as requested.

Comment Number	Section and Page	Current	Comment	District Response
14.	Section 9.C.15	For emergency stationary RICE with a site rating of more than 100 brake HP that operates or is contractually obligated to be available for more than 15 hours per calendar year (Firewater Pumps- Device IDs #008666 and #008668; Emergency Generator-Device ID #008665), for the purposes specified in 40 CFR 63 Subpart ZZZZ §63.6640(f)(2)(ii) and (iii) or that operates for the purpose specified in §63.6640(f)(4)(ii), the owner or operator must submit an annual report containing the following information:	Correspondence with APCD indicates that Subpart ZZZZ reporting for emergency stationary RICE's is only is only required **if** the engines are used for the stated purposes (i.e. for the purposes specified in 40 CFR 63 Subpart ZZZZ §63.6640(f)(2)(ii) and (iii) or that operates for the purpose specified in §63.6640(f)(4)(ii)). The engines are not used for those purposes there for the requirement should be removed or clarified to reflect the fact that reporting is only required if they are used for the stated purposes.	Change made as requested.

Comment Number	Section and Page	Current	Comment	District Response
15.	Section C.16 Page 87	*Engine Particulate Matter Operation and Maintenance Plan.*	The Engine Particulate Matter Operation and Maintenance Plan has been incorporated into the IC Engine Inspection and Maintenance Plan	Change made as requested.
16.	Section C.16 Page 87	(vi) IC Engine Particulate Matter Operation and Maintenance Plan (ref: Permit condition 9.C.14) (vii) *Emergency Episode Plan* (Rule 603) (*12/9/2008*). (viii) *IC Engine I&M Plan* (12/12/2011) (ix) *Process Monitor Calibration and Maintenance Plan.* (2/8/2012) (x) *Processed Gas Flow Measurement Plan.* (2/8/2012) (xi) *Compliance Assurance Monitoring (CAM) Plan*. (12/12/2011)	A revised IC I&M Plan (11/4/2017) was submitted for review and approval with the renewal application, the revision date presented in the draft does not reflect this revision date. Requirements of the IC Engine Particulate Matter Operation and Maintenance Plan have been incorporated into the IC Engine I&M Plan.	This condition has been updated.
17.	D.14	**Component count** Valves 2852 Connections 19889 Pressure Relief Devices 91 Compressor Seals 17 Pump Seals 2	Amended based on LDAR component inventory, amend emissions to reflect component counts.	This condition has been updated to reflect the revised component counts.

Comment Number	Section and Page	Current	Comment	District Response
18.	D.14	Recordkeeping: The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of entry and made available to the District upon request: (i) A record of each leak detection and repair inspection. (ii) A component leak concentration and repair for each inspection.	The recordkeeping requirements of the ARB O&G Rule refer to Tables A4 and A5. These tables are helpful in defining the information that comprises the required record. For example per Table A5, the record required by (ii) is limited to comments with an initial leak concentration.	Condition updated as requested.
19.	D.16	All intermittent bleed natural gas powered pneumatic devices shall comply with the leak detection and repair requirements specified in Section 95669[…]	Requirements of 95669 do not apply to pneumatic devices	Change not made. Section 95668(e)(3) of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation requires intermittent bleed natural gas powered pneumatic devices to comply with the leak detection and repair requirements specified in Section 95669 of that regulation.

Comment Number	Section and Page	Current	Comment	District Response
20.	D.17	Well Casing Vents …	Discussions with APCD and CARB confirmed that Well Casing vent requirements only apply to vents that are open to the atmosphere, our facility does not have such components. Wells are rarely vented.	Condition updated as requested. In addition, a condition prohibiting continuous well venting to atmosphere was added.
21.	D.18	**Operational Restrictions:** All leaks shall be successfully repaired within the timeframes specified in Section 95669… **Reporting Requirements** Within 24 hours…	Requirements of 95669 (LDAR) do not apply to the facility monitoring plan requirements.	Changes not made as requested. The operational restriction condition comes directly from Section 95668(h)(5)(B)4. of the California Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation. The reporting requirements come directly from Section 98673(a)(8)-(10) of the regulation.
22.	D.20	(d) – well casing vents	Does not apply (facility does not have vents that are open to atmosphere)	Condition updated as requested.

May 28, 2020

Edward Wiegman
Southern California Gas Company
PO Box 818
Goleta, CA 93116-0818

FID: 01734
Permit: P 15298
SSID: 05019

Re: Draft Permit to Operate 15298

Dear Mr. Wiegman:

Enclosed is a draft Permit to Operate (PTO) No. 15298 for modifications to the applicable emissions standards of two existing boilers to show compliance with Rule 361 at 1171 More Ranch Road in Goleta. Please carefully review the enclosed documents to ensure that they accurately describe your facility and that the conditions are acceptable to you. Note that your permitted emission limits may, in the future, be used to determine emission fees.

The estimated permit issuance fee based on our analysis to date is $ 458; you can review our calculation of the fee in the enclosed Permit Evaluation. The final fee amount due will be specified when the final permit is issued. Please do not pay this fee now, as we will invoice you when the final permit is issued.

If you have any comments on this draft permit, submit them in writing to the Air Pollution Control District (District) within 21 days from the date of this letter. We will consider your comments before we issue your final permit. If we receive no comments within this period, we will issue a final permit with the enclosed conditions. If you have no comments and wish to receive the final permit earlier, please call the number below.

Operation of your facility beyond the time specified in your ATC without a final Permit to Operate is a violation of the District rules and the California Health and Safety Code.

Please include the facility identification (FID) and permit numbers as shown at the top of this letter on all correspondence regarding this permit. If you have any questions, please contact me at (805) 961-8826.

Sincerely,

Kevin Brown, Division Manager
Engineering Division

enc: Draft PTO 15298
Draft Permit Evaluation

cc: La Goleta 01734 Project File
Engr Chron File
21-Day Suspense File
Kevin Brown (Cover letter only)

\\sbcapcd.org\shares\Groups\ENGR\WP\Oil&Gas\Major Sources\SSID 05019 So Cal Gas - La Goleta\PTOs\PTO 15298\PTO 15298 - Draft Letter - 4-26-2020.docx

air pollution control district
SANTA BARBARA COUNTY

DRAFT

Permit to Operate 15298
and
Part 70 Minor Modification 15298

EQUIPMENT OWNER:

Southern California Gas Company

EQUIPMENT OPERATOR:

Southern California Gas Company

EQUIPMENT LOCATION:

1171 More Ranch Road, Goleta

STATIONARY SOURCE/FACILITY:

So Cal Gas - La Goleta	SSID:	05019
La Goleta	FID:	01734

EQUIPMENT DESCRIPTION:

External combustion equipment as listed in the table at the end of this permit.

PROJECT/PROCESS DESCRIPTION:

A 3.500 MMBtu/hr, PUC quality natural gas fired hot oil heater is used to provide heat to the heat exchangers in the dehydration process at the La Goleta facility. A complete facility description can be found in PT-70/Reeval 9584-R6.

CONDITIONS:

9.A Standard Administrative Conditions

The following federally enforceable administrative permit conditions apply to the La Goleta facility. In the case of a discrepancy between the wording of a condition and the applicable District rule, the wording of the rule shall control.

A.1 **Consistency with Analysis.** Operation under this permit shall be conducted by the permittee consistent with all written data, specifications and assumptions included with the application and supplements thereof (as documented in the District's project file) and with the District's analyses under which this permit is issued as documented in the permit analyses prepared for and issued with this permit. [*Ref: District Rule 206*]

A.2 **Grounds for Revocation.** Failure to abide by and faithfully comply with this permit shall constitute grounds for the Air Pollution Control Officer to petition for permit revocation pursuant to California Health and Safety Code Section 42307 et seq. [*Ref: District Rule 1303*]

A.3 **Equipment Maintenance.** The equipment listed in this permit shall be properly maintained and kept in good condition at all times. The equipment manufacturer's maintenance manual, maintenance procedures and/or maintenance checklists (if any) shall be kept on site. [*Ref: District Rule 206*]

A.4 **Access to Records and Facilities.** As to any condition that requires for its effective enforcement the inspection of records or facilities by the District or its agents, the permittee shall make such records available or provide access to such facilities upon notice from the District. Access shall mean access consistent with California Health and Safety Code Section 41510 and Clean Air Act Section 114A. [*Ref: District Rule 1303*]

A.5 **Compliance.** Nothing contained within this permit shall be construed by the permittee to allow the violation of any local, State or Federal rule, regulation, ambient air quality standard or air quality increment. [*Ref: District Rule 1303*]

A.6 **Severability.** In the event that any condition herein is determined to be invalid, all other conditions shall remain in force. [*Ref: District Rule 103; District Rule 1303.D.1.i*]

A.7 **Conflict Between Permits.** The requirements or limits that are more protective of air quality shall apply if any conflict arises between the requirements and limits of this permit and any other permitting actions associated with the equipment permitted herein. [*Ref: District Rule 1303*]

A.8 **Consistency with State and Local Permits.** Nothing in this permit shall relax any air pollution control requirements imposed on the project by the permits required by federal, state, or other local agencies and any subsequent modifications of those permits. [*Ref: District Rule 206*]

A.9 **Emission Factor Revisions.** The District may update the emission factors for any calculation based on USEPA AP-42 or District emission factors at the next permit modification or permit reevaluation to account for USEPA and/or District revisions to the underlying emission factors.

A.10 **Equipment Identification.** Identifying tag(s) or name plate(s) shall be displayed on the equipment to show manufacturer, model number, and serial number. The tag(s) or plate(s) shall be affixed to the equipment in a permanent and conspicuous position.

A.11 **Compliance with Permit Conditions.**

a. The permittee shall comply with all permit conditions in Sections 9.A, 9.B and 9.C.

b. This permit does not convey property rights or exclusive privilege of any sort.

c. Noncompliance with any permit conditions is grounds for permit termination, revocation and re-issuance, modification, enforcement action, or for denial of permit renewal. Any permit non-compliance constitutes a violation of the Clean Air Act and its implementing regulations or of District Rules or both, as applicable.

d. The permittee shall not use the "need to halt or reduce a permitted activity in order to maintain compliance" as a defense for noncompliance with any permit condition.

e. A pending permit action or notification of anticipated noncompliance does not stay any permit condition.

f. Within a reasonable time period, the permittee shall furnish any information requested by the Control Officer, in writing, for the purpose of determining:

i. Compliance with the permit, or

ii. Whether or not cause exists to modify, revoke and reissue, or terminate a permit or for an enforcement action.

g. In the event that any condition herein is determined to be in conflict with any other condition contained herein, then, if principles of law do not provide to the contrary, the condition most protective of air quality and public health and safety shall prevail to the extent feasible. [*Ref: 40 CFR §70.5(a)(6)(iii)*; *District Rules 1303.D.1.j, 1303.D.1.n, 1303.D.1.l, 1303.D.1.k, and 1303.D.1.o*]

A.12 **Emergency Provisions.** The permittee shall comply with the requirements of the District, Rule 505 (Upset/Breakdown Rule) and/or District Rule 1303.F, whichever is applicable to the emergency situation. In order to maintain an affirmative defense under Rule 1303.F, the permittee shall provide the District, in writing, a "notice of emergency" within two (2) working days of the emergency. The "notice of emergency" shall contain the information/documentation listed in Sections (1) through (5) of Rule 1303.F. [*Ref: 40 CFR §70.6(g); District Rule 1303.F*]

A.13 **Compliance Plan.**

a. The permittee shall comply with all federally enforceable requirements that become applicable during the permit term, in a timely manner.

b. For all applicable equipment, the permittee shall implement and comply with any specific compliance plan required under any rules or standards. [*Ref: District Rule 1302.D.2*]

A.14 **Right of Entry.** The Regional Administrator of USEPA, the Control Officer, or their authorized representatives, upon the presentation of credentials, shall be permitted to enter upon the premises where a Part 70 source is located or where records must be kept:

a. To inspect at reasonable times the stationary source, including monitoring and control equipment, work practices, operations, and emission-related activity;

b. To inspect and duplicate, at reasonable times, records required by this Permit to Operate;

c. To sample substances or monitor emissions from the source or assess other parameters to assure compliance with the permit or applicable requirements, at reasonable times. Monitoring of emissions can include source testing. [*Ref: District Rule 1303.D.2.a*]

A.15 **Permit Life.** The Part 70 permit shall become invalid three years from the date of issuance, unless a timely and complete renewal application is submitted to the District. Any operation of the source to which this Part 70 permit is issued beyond the expiration date of this Part 70 permit and without a valid Part 70 operating permit (or a complete Part 70 permit renewal application) shall be a violation of the CAAA, § 502(a) and 503(d) and of the District rules.

The permittee shall apply for renewal of the Part 70 permit no later than 6 months before the date of the permit expiration. Upon submittal of a timely and complete renewal application, the Part 70 permit shall remain in effect until the Control Officer issues or denies the renewal application. [*Re: District Rules 1304.D.1*]

A.16 **Payment of Fees.** The permittee shall reimburse the District for all its Part 70 permit processing and compliance monitoring expenses for the stationary source on a timely basis. Failure to reimburse on a timely basis shall be a violation of this permit and of applicable requirements and can result in forfeiture of the Part 70 permit. Operation without a Part 70 permit subjects the source to potential enforcement action by the District and the USEPA pursuant to section 502(a) of the Clean Air Act. [*Re: District Rules 1303.D.1.p, 1304.D.11 and 40 CFR 70.6(a)(7)*]

A.17 **Deviation from Permit Requirements.** The permittee shall submit a written report to the District documenting each and every deviation from the requirements of this permit or any applicable federal requirements within 7 days after discovery of the violation, but not later than 180 days after the date of occurrence. The report shall clearly document 1) the probable cause and extent of the deviation 2) equipment involved, 3) the quantity of excess pollutant emissions, if any, and 4) actions taken to correct the deviation. The requirements of this condition shall not apply to deviations reported to District in accordance with Rule 505 Breakdown Conditions, or Rule 1303.F Emergency Provisions. [*Re: District Rule 1303.D.1.g, 40 CFR 70.6(a)(3)(iii)(B)*]

A.18 **Federally-Enforceable Conditions.** Each federally enforceable condition in this permit shall be enforceable by the USEPA and members of the public. None of the conditions in the District-only enforceable section of this permit are federally enforceable or subject to the public/USEPA review [*Re: CAAA, § 502(b)(6), 40 CFR 70.6(b)*]

A.19 **Reporting Requirements/Compliance Certification.** The permittee shall submit compliance certification reports to the USEPA *annually* and to the Control Officer *semi-annually*. These reports shall be submitted on District forms and shall identify each applicable requirement/condition of the permit, the compliance status with each requirement/condition, the monitoring methods used to determine compliance, whether the compliance was continuous or intermittent, and include detailed information on the occurrence and correction of any deviations (excluding emergency upsets) from permit requirement. The reporting periods shall be each half of the calendar year, e.g., January through June for the first half of the year. These reports shall be submitted by September 1 and March 1, respectively, each year. Supporting monitoring data shall be submitted in accordance with the "Semi-Annual Compliance Verification Report" condition in section 9.C. The permittee shall include a written statement from the responsible official, which certifies the truth, accuracy, and completeness of the reports. [*Re: District Rules 1303.D.1, 1302.D.3, 1303.2.c*]

A.20 **Recordkeeping Requirements**. The permittee shall maintain records of required monitoring information that include the following:

a. The date, place as defined in the permit, and time of sampling or measurements;

b. The date(s) analyses were performed;

c. The company or entity that performed the analyses;

d. The analytical techniques or methods used;

e. The results of such analyses; and

f. The operating conditions as existing at the time of sampling or measurement;

The records (electronic or hard copy), as well as all supporting information shall be maintained for a minimum of five (5) years from date of initial entry by SoCalGas and shall be made available to the District upon request. [*Re: District Rule 1303.D.1.f*]

A.21 **Conditions for Permit Reopening.** The permit shall be reopened and revised for cause under any of the following circumstances:

a. Additional Requirements: If additional applicable requirements (e.g., NSPS or MACT) become applicable to the source which has an unexpired permit term of three (3) or more years, the permit shall be reopened. Such a reopening shall be completed no later than 18 months after promulgation of the applicable requirement. However, no such reopening is required if the effective date of the requirement is later than the date on which the permit is due to expire, unless the original permit or any of its terms and conditions has been extended. All such re-openings shall be initiated only after a 30 day notice of intent to reopen the permit has been provided to the permittee, except that a shorter notice may be given in case of an emergency.

b. Inaccurate Permit Provisions: If the District or the USEPA determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emission standards or other terms or conditions of the permit, the permit shall be reopened. Such re-openings shall be made as soon as practicable.

c. Applicable Requirement: If the District or the USEPA determines that the permit must be revised or revoked to assure compliance with any applicable requirement including a federally enforceable requirement, the permit shall be reopened. Such re-openings shall be made as soon as practicable.

Administrative procedures to reopen and revise/revoke/reissue a permit shall follow the same procedures as apply to initial permit issuance. Re-openings shall affect only those parts of the permit for which cause to reopen exists. If the permit is reopened, and revised, it will be reissued with the expiration date that was listed in the permit before the re-opening. [*Re: 40 CFR 70.7(f)(1)-(3), 40 CFR 70.6(a)(2)*]

A.22 **Recordkeeping.** All records and logs required by this permit and any applicable District, state or federal rule or regulation shall be maintained for a minimum of five calendar years from the date of information collection and log entry at the facility. These records or logs shall be readily accessible and be made available to the District upon request. [*Re: District Rule 1303, 40 CFR 70.6*]

9.B Generic Conditions

The generic conditions listed below apply to all emission units, regardless of their category or emission rates. In case of a discrepancy between the wording of a condition and the applicable District rule, the wording of the rule shall control.

B.1 **Circumvention (Rule 301).** A person shall not build, erect, install, or use any article, machine, equipment or other contrivance, the use of which, without resulting in a reduction in the total release of air contaminants to the atmosphere, reduces or conceals an emission which would otherwise constitute a violation of Division 26 (Air Resources) of the Health and Safety Code of the State of California or of these Rules and Regulations. This Rule shall not apply to cases in which the only violation involved is of Section 41700 of the Health and Safety Code of the State of California, or of District Rule 303. [*Ref: District Rule 301*]

B.2 **Visible Emissions (Rule 302).** The permittee shall not discharge into the atmosphere from any single source of emission any air contaminants for a period or periods aggregating more than three minutes in any 1 hour that is:

a. As dark or darker in shade as that designated as No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines, or

b. Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in subsection B.2.a above. [*Ref: District Rule 302*]

B.3 **Nuisance (Rule 303).** No pollutant emissions from any source at La Goleta shall create nuisance conditions. No operations shall endanger health, safety or comfort, nor shall they damage any property or business. [*Ref: District Rule 303*]

B.4 **PM Concentration - South Zone (Rule 305).** The permittee shall not discharge into the atmosphere, from any source, PM in excess of the concentrations listed in Table 305(a) of Rule 305. [*Ref: District Rule 305*]

B.5 **Specific Contaminants (Rule 309).** The permittee shall not discharge into the atmosphere, from any single source, sulfur compounds, combustion contaminants, NO_x and CO in excess of the standards listed in Sections A, E and G of Rule 309. [*Ref: District Rule 309*]

B.6 **Sulfur Content of Fuels (Rule 311).** The permittee shall not burn fuels with a sulfur content in excess of 0.5% (by weight) for liquid fuels and 239 ppmvd or 15 gr/100 scf (calculated as H_2S) for gaseous fuels. Compliance with this condition shall be based on billing records or other data showing that the fuel gas is obtained from a public utility gas company. [*Ref: District Rule 311*]

B.7 **Large Water Heaters and Small Boilers (Rule 360).** Any boiler, water heater, steam generator, or process heater rated greater than or equal to 75,000 Btu/hr and less than or equal to 2.000 MMBtu/hr and manufactured after October 17, 2003 shall be certified per the provisions of Rule 360. An ATC/PTO permit shall be obtained prior to installation of any grouping of boilers, water heaters, steam generators, or process heaters subject to Rule 360 whose combined system design heat input rating exceeds 2.000 MMBtu/hr.

B.8 **Breakdowns (Rule 505).** SoCalGas shall promptly report: (a) breakdowns that result in violations of emission limitations or restrictions prescribed by District Rules or by this permit, or (b) any in-stack, continuous monitoring equipment breakdowns; such reporting shall be made in conformance with the requirements of Rule 505, Sections A, B.1 and D.

B.9 **Emergency Episode Plan (Rule 603).** During emergency episodes, SoCalGas shall implement the most current District-approved *Emergency Episode Plan.*

9.C Requirements and Equipment Specific Conditions

Federally-enforceable conditions, including emissions and operations limits, monitoring, recordkeeping and reporting are included in this section for each specific group of equipment. This section may also contain other non-generic conditions.

C.1 **Process Heaters:** The following items are included in this emissions unit category:

District Device ID	Operator ID	Equipment Item Description
001214	HOH #1	Fulton Thermal Corporation 3.500 MMBtu/hr Hot Oil Heater

a. **Emission Limitations.** The emissions from the equipment permitted herein shall not exceed the values listed in Table 1 and Table 2. Compliance shall be based on the operational, monitoring, recordkeeping and reporting conditions of this permit.

b. **Operational Restrictions.** The equipment permitted herein is subject to the following operational restrictions:

i. *Heat Input Limits*. The hourly, daily and annual heat input limits to the unit shall not exceed the values listed in Table 3. These limits are based on the design rating of the unit and the annual heat input value as listed in the permit application. Unless otherwise designated by the District, the following fuel content shall be used for determining compliance: Natural Gas = 1,050 Btu/scf.

ii. *Public Utility Natural Gas Fuel Sulfur Limit.* The total sulfur and hydrogen sulfide (H_2S) content (calculated as H_2S at standard conditions, 60 °F and 14.7 psia) of the public utility natural gas fuel shall not exceed 80 ppmv and 4 ppmv respectively. Compliance with this condition shall be based on billing records or other data showing that the fuel gas is obtained from a public utility gas company.

c. **Monitoring.** The equipment permitted herein is subject to the following monitoring requirements:

i. *Fuel Usage – Units Rated Under 5.0 MMBtu/hr.* The volume of fuel gas used in the unit shall be determined by one of the methods listed below. Table 4 defines which method is approved for each permitted unit. Except for changing to the Default Rating Method, written District approval is required to change to a different method. Units subject to the Rule 361.D.2 low use exemption shall use the fuel meter option.

1. Fuel Use Meter. The volume of fuel gas (in units of standard cubic feet) used shall be measured through the use of a dedicated District-approved fuel meter. The meter shall be temperature and pressure corrected. The fuel meter shall be accurate to within five percent (5%) of the full-scale reading. The meter shall be calibrated according to manufacturer's specifications and the calibration records shall be made available to the District upon request.

2. Hour Meter. The volume of natural gas (in units of standard cubic feet) used in the unit shall be determined through the use of a dedicated District-approved hour meter or District-approved electronic management system that is capable of tracking and logging the unit's time on/off. Fuel usage shall be calculated based on the actual hours of operation (hours/year) times the heat input rating of the unit (Btu/hr) and divided by the District-approved heating value of the fuel (Btu/scf).

3. Default Rating Method. The volume of natural gas (in units of standard cubic feet) used shall be reported as permitted annual heat input limit for the unit (Btu/year) divided by the District-approved heating value of the fuel (Btu/scf).

ii. *Compliance Determination*. The following compliance determinations are applicable to the units subject to this permit:

1. Existing Units Rated Between 2.0 - 5.0 MMBtu/hr. Existing units (i.e., units installed prior to January 17, 2008), except those which qualify for the Rule 361.D.2 low use exemption, are subject to biannual tunings after January 1, 2020.

d. **Recordkeeping.** The permittee shall record and maintain the following information. This data shall be maintained for a minimum of five (5) years from the date of each entry and made available to the District upon request:

i. *Fuel Use - Units Rated Under 5.0 MMBtu/hr.* The volume of fuel gas used each year (in units of standard cubic feet) as determined by the fuel use monitoring option as listed in Table 4. Units that track fuel use using the Default Rating Method are not required to record the fuel usage. Units subject to the Rule 361.D.2 low use exemption shall record fuel use on a monthly and annual basis for each fuel type.

ii. *Tuning Records*. For units subject to Rule 361 tuning requirements, copies of all *Rule 361 Tune-Up Reports* as specified in Step 12 of Procedure A and/or Step 6 of Procedure B of the tuning Attachment to Rule 361.

iii. *Rule 361 Non-Operational Test Firing*. A log that documents the date and number of hours that the unit was test fired in accordance with Rule 361.I.3.

iv. *Maintenance Logs*. Maintenance logs for the hot oil heater and fuel meter (as applicable).

v. *Source Test Reports*. Source test reports for all District-required stack emission tests.

e. **Reporting.** On a semi-annual basis, a report detailing the previous six month's activities shall be provided to the District. The report must include all data required by the Semi-Annual Compliance Verification Reports condition of this permit.

C.2 **Semi-Annual Compliance Verification Reports.** Twice a year, SoCalGas shall submit a compliance verification report to the District. Each report shall be used to verify compliance with the prior two calendar quarters. The first report shall cover calendar quarters 1 and 2 (January through June) and shall be submitted no later than September 1st. The second report shall cover calendar quarters 3 and 4 (July through December) and shall be submitted no later than March 1st. Each report shall contain information necessary to verify compliance with the emission limits and other requirements of this permit (if applicable for that reporting period). These reports shall be in a format approved by the District, with one hard copy and one PDF copy. All logs and other basic source data not included in the report shall be available to the District upon request. The second report shall also include an annual report summarizing the activities for the calendar year. Pursuant to Rule 212, a completed *District Annual Emissions Inventory* questionnaire shall be included in the annual report or submitted electronically via the District website.

a. Process Heaters

i. *Fuel Use Data*. The fuel use data required in the Recordkeeping Condition above. Units that track fuel use using the Default Rating Method are required to submit an annual report identifying that they operate under the Default Rating Method.

ii. *Tune-Up Reports*. Tuning Records as required in the Recordkeeping Condition above.

iii. *Rule 361 Test Firing Records*. A copy of the Rule 361 Non-Operational Test Firing log.

iv. *Maintenance Logs*. Maintenance logs for the unit(s) and fuel meter (as applicable).

v. *Source Test Reports*. Source test reports for all District-required stack emission tests.

C.3 **Source Testing.** The following source testing provisions shall apply:

a. Source testing shall be performed upon District request. The permittee shall conduct source testing of air emissions and process parameters listed in Table 5 of this permit. More frequent source testing may be required if the equipment does not comply with permitted limitations or if other compliance problems, as determined by the District, occur.

b. The permittee shall submit a written source test plan to the District (e-mail to sourcetest@sbcapcd.org) for approval at least thirty (30) days prior to initiation of each source test. The source test plan shall be prepared consistent with the District's Source Test Procedures Manual (revised May 1990 and any subsequent revisions). The permittee shall obtain written District approval of the source test plan prior to commencement of source testing. The District shall be notified (e-mail to sourcetest@sbcapcd.org) at least ten (10) calendar days prior to the start of source testing activity to arrange for a mutually agreeable source test date when District personnel may observe the test.

c. Source test results shall be submitted to the District (e-mail to sourcetest@sbcapcd.org) within forty-five (45) calendar days following the date of source test completion and shall be consistent with the requirements approved within the source test plan. Source test results shall document the permittee’s compliance status with BACT requirements, mass emission rates in Table 1 and applicable permit conditions, rules and NSPS (if applicable). All District costs associated with the review and approval of all plans and reports and the witnessing of tests shall be paid by the permittee as provided for by District Rule 210.

d. A source test for an item of equipment shall be performed on the scheduled day of testing (the test day mutually agreed to) unless circumstances beyond the control of the operator prevent completion of the test on the scheduled day. Such circumstances include mechanical malfunction of the equipment to be tested, malfunction of the source test equipment, delays in source test contractor arrival and/or set-up, or unsafe conditions on site. Except in cases of an emergency, the operator shall seek and obtain District approval before deferring or discontinuing a scheduled test, or performing maintenance on the equipment item on the scheduled test day. If the test can not be completed on the scheduled day, then the test shall be rescheduled for another time with prior authorization by the District. Once the sample probe has been inserted into the exhaust stream of the equipment unit to be tested (or extraction of the sample has begun), the test shall proceed in accordance with the approved source test plan. In no case shall a test run be aborted except in the case of an emergency or unless approval is first obtained from the District. Failing to perform the source test of an equipment item on the scheduled test day without a valid reason and without the District's authorization shall constitute a violation of this permit. If a test is postponed due to an emergency, written documentation of the emergency event shall be submitted to the District (e-mail to sourcetest@sbcapcd.org) by the close of the business day following the scheduled test day.

The timelines in (a), (b), and (c) above may be extended for good cause provided a written request is submitted to the District at least three (3) days in advance of the deadline, and approval for the extension is granted by the District.

9.D District-Only Conditions

The following section lists permit conditions that are not enforceable by the USEPA or the public. However, these conditions are enforceable by the District and the State of California. These conditions are issued pursuant to District Rule 206 (*Conditional Approval of Authority to Construct or Permit to Operate*), which states that the Control Officer may issue an operating permit subject to specified conditions. These permit conditions have been deemed necessary to ensure that operation of the facility complies with all applicable local, and state air quality rules, regulations and laws. Failure to comply with any condition specified pursuant to the provisions of Rule 206 shall be a violation of that rule, this permit, as well as any applicable section of the California Health & Safety Code.

D.1 **Condition Acceptance.** Acceptance of this operating permit by SoCalGas shall be considered as acceptance of all terms, conditions, and limits of this permit. [*Re: District Rule 206*]

D.2 **Odorous Organic Sulfides.** SoCalGas shall not discharge into atmosphere H_2S and organic sulfides that result in a ground level impact beyond the SoCalGas property boundary in excess of either 0.06 ppmv averaged over 3 minutes or 0.03 ppmv averaged over 1 hour.

D.3 **Permit Activation.** All aspects of this permit are enforceable by the District and the State of California upon the issuance date stamped below. The Part 70 aspects of this permit are not final until:

a. The USEPA has provided written comments to the District and these comments require no modification to this permit. The District will issue a letter stating that this permit is a final Part 70 permit. The effective date that this permit will be considered a final Part 70 permit will be the date stamped on the District's letter.

b. After the USEPA has provided the District written comments that require a modification to this permit, the District will modify this permit to address the USEPA's comments and issue the Part 70 permit as final. The re-issued permit will supersede this permit in its entirety.

AIR POLLUTION CONTROL OFFICER

DATE

Attachments:

- Table 1 – Mass Emission Limits
- Table 2 – Emission Standards
- Table 3 – Heat Input Limits
- Table 4 – Device Specific Requirements Summary
- Table 5 – Source Testing Requirements
- Permit Equipment List
- Permit Evaluation for Permit to Operate 15298 and Part 70 Minor Modification 15298

Notes:

- Reevaluation Due Date: June 2021
- Additional information can be located online at https://www.ourair.org/boiler-heater-generator/
- Stationary sources are subject to an annual emission fee (see Fee Schedule B-3 of Rule 210).
- Annual reports are due by March 1st of each year.
- This permit supersedes ATC 15298.

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TABLE 1. MASS EMISSION LIMITS

Device ID #	NO_x		ROC		CO		SO_x		PM		PM_{10}		$PM_{2.5}$	
	lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
001214	3.07	0.56	0.45	0.08	24.91	4.55	1.15	0.21	0.63	0.11	0.63	0.11	0.63	0.11

TABLE 2. EMISSION STANDARDS

Device ID #	NOx	CO	Units	Basis
001214	30	400	ppmvd @ 3% O_2	Rule 361

TABLE 3. HEAT INPUT LIMITS

Device ID #	Fuel	MMBtu/hr	MMBtu/day	MMBtu/yr
001214	Natural Gas - Utility	3.500	84.000	30,660.000

TABLE 4. DEVICE SPECIFIC REQUIREMENTS SUMMARY

Device ID #	Applicable Rule	Source Testing	Tune-Ups	Fuel Use Method	Low Use Exemption	BACT
001214	R361	Upon District Request	Biannual	Default Rating Method	No	No

Table Notes:

(a) Units subject to Rule 342 may comply with either the ppmvd or lb/MMBtu standards of the Rule.
(b) NO_x as NO_2, SO_x as SO_2, lb/day = pounds per day, tpy = tons per year
(c) Device ID # from permit equipment list.
(d) Emission data that round down to 0.00 has been set to a default of 0.01.

TABLE 5. SOURCE TESTING REQUIREMENTS

Emission & Limit Test Points	Pollutants	Parameters	Test Methods [a]	Limits
External Combustion Unit Stacks [b][c][d][e]	NO_x	ppmv, lb/hr	EPA Method 7E, ARB 100	30 ppmvd at 3% O_2, 0.128 lb/hr
	CO	ppmv, lb/hr	EPA Method 10, ARB 100	400 ppmvd at 3% O_2, 1.038 lb/hr
	Sampling Point Det.		EPA Method 1	
	Stack Gas Flow Rate		EPA Method 2 or 19	
	O_2, CO_2, Dry MW		EPA Method 3	
	Moisture Content		EPA Method 4	
	Stack Temperature	°F	Calibrated Thermocouple	
Fuel Gas [h]	Fuel Gas Flow Rate		Fuel Gas Meter [f]	
	Higher Heating Value	Btu/lb	ASTM D 1826 or 3588	
	Total Sulfur Content	ppmw	ASTM D 1072 or 5504 [g]	
	Gas Composition	CHONS%, F-factor	ASTM 1945	

Notes:

(a) Alternative methods may be acceptable on a case-by-case basis.
(b) The emission rates shall be based on EPA Methods 2 and 4, or Method 19 along with the heat input rate.
(c) For NO_x, CO and O_2 a minimum of three 40-minute runs shall be obtained during each test.
(d) See Tables 1 and 2 for the emission standards to be measured against during the test. Measured NO_x and CO shall not exceed the limit specified in the applicable Rule (e.g., Rule 361, Rule 342).
(e) All emission determinations shall be made in the as-found operating condition, at the maximum attainable firing rate to be approved by the source test plan. No determination shall be established within two hours after a continuous period in which fuel flow to the unit is shut off for 30 minutes or longer.
(f) Fuel meter shall meet the calibration requirements prior to testing.
(g) Total sulfur content fuel samples shall be obtained using EPA Method 18 with Tedlar Bags (or equivalent) equipped with Teflon tubing and fittings. Turnaround time for laboratory analysis of these samples shall be no more than 24 hours from sampling.
(h) Fuel gas heating value and composition are optional for Rule 361 applicable units. Sulfur content only required for units not run on utility purchased gas. For units rated at 5 MMBtu/hr or greater, heating value is required in all cases, but gas composition not required if Method 2 is used for stack flow.

PERMIT EQUIPMENT LIST - TABLE A

PTO 15298 / FID: 01734 La Goleta / SSID: 05019

A PERMITTED EQUIPMENT

1 Hot Oil Heater #1

Device ID #	**001214**	***Device Name***	**Hot Oil Heater #1**
Rated Heat Input	3.500 MMBtu/Hour	*Operator ID*	HOH #1
		Serial Number	2788C
Manufacturer	Fulton Thermal Corporation	*Rule 361 Status*	Existing
Model	FT-0400C		
Location Note	SoCalGas - La Goleta		
Emission Control Basis	Uncontrolled		
Device Description	Gas-fired unit		

B EXEMPT EQUIPMENT

1 Hot Oil Heater #2

Device ID #	**394789**	***Device Name***	**Hot Oil Heater #2**
Rated Heat Input	2.000 MMBtu/Hour	*Physical Size*	
Manufacturer		*Operator ID*	HOH #2
Model		*Serial Number*	
Part 70 Insig?	No	*District Rule Exemption:*	202.G.1 Combustion Equipment <= 2 MMBtu/hr
Location Note			
Device Description	Gas-fired unit, operates only when Hot Oil Heater #1 is not operating		

E DE-PERMITTED EQUIPMENT

1 Hot Oil Heater #2

Device ID #	**107535**	***Device Name***	**Hot Oil Heater #2**
Rated Heat Input	2.200 MMBtu/Hour	*Physical Size*	
Manufacturer	American Heating Company	*Operator ID*	HOH #2
Model	AHE-212-2P	*Serial Number*	670-A04
Depermitted		*Facility Transfer*	
Device Description	Gas-fired unit, operates only when Hot Oil Heater #1 is not operating		

air pollution control district
SANTA BARBARA COUNTY

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PERMIT EVALUATION FOR
PERMIT TO OPERATE 15298
and
PART 70 MINOR MODIFICATION 15298

1.0 BACKGROUND

1.1 General: On June 14, 2019, the District issued ATC 15298 to Southern California Gas for revisions to an existing 3.500 MMBtu/hr hot oil heater and 2.200 MMBtu/hr hot oil heater. This permit updated the Rule 361 applicability for both existing units which were subject to the revised Rule 361.D.1 emission standards and tuning requirements.

A SCDP inspection of the equipment was conducted on August 14, 2019. No deficiencies were noted and no recommended changes to the permit were made by the inspector. On October 1, 2019, Hot Oil Heater #1 was source tested. The unit complied with the NO_x and CO limits specified in ATC 15298. Hot Oil Heater #2 was not source tested because Southern California Gas planned on replacing the burner with a smaller unit rated below the Rule 202.G.1 exemption threshold with a permissive switch to prevent stacked operation of the two heaters. On December 31, 2019, Hot Oil Heater #2 was removed from service. This existing 2.200 MMBtu/hr Hot Oil Heater #2 has been depermitted as part of this PTO/PT-70 minor modification and the new Hot Oil Heater #2 has been added as an exempt device. The permittee submitted an application for a PTO on December 4, 2019 and the District deemed the application complete on December 26, 2019.

1.2 Permit History:

Permit	Final Issued	Permit Description
PT-70 ADM 15014	05/11/2017	Update Alternate Responsible Official to Mr. Glenn La Fevers.
PTO 14840	12/27/2017	Installation of additional fugitive components to allow for safety upgrades at the storage wells.
PT-70/Reeval 09584 R6	05/18/2018	Reevaluation
ATC 15298	06/14/2019	Demonstrate compliance with Rule 361 emission standards for two existing process heaters.

1.3 Compliance History:

VIOLATION TYPE	NUMBER	ISSUE DATE	DESCRIPTION OF VIOLATION
NOV	11380	09/17/2018	Deviation reported in second half 2017 CVR is a violation of Condition 9.C.1(c)1 of PT-70/Reeval 09584-R6

2.0 ENGINEERING ANALYSIS

2.1 Equipment/Processes: The PUC quality natural gas fired oil hot heater is used to heat a rich glycol process stream at the La Goleta facility. After the unit heats the oil, it is pumped to a heat exchanger. In the heat exchanger, the hot oil is used regenerate rich glycol indirectly.

2.2 Emission Controls: No emission controls are used.

2.3 Emission Factors: Mass emissions for the heater specified in Table 1 of the permit are based on Rule 361 limits for NO_x and CO, USEPA AP-42 (ref: Tables 1.4-1 and 1.4-2, July 1998) for ROC, PM, PM_{10} and $PM_{2.5}$, and mass balance was used for SO_x.

2.4 Reasonable Worst Case Emission Scenario: Daily emissions are based on operation of the heater at full capacity. The annual emissions are based on 8,760 hours of operation.

2.5 Emission Calculations: Daily emissions are calculated using the daily heat input (MMBtu/day) times the emission factor (lb/MMBtu). Annual emissions are calculated using the annual heat input (MMBtu/yr) times the emission factor (lb/MMBtu) and divided by 2000 lb/ton. Detailed emission calculation spreadsheets may be found in the Attachment A. These emissions define the Potential to Emit for the permitted equipment.

2.6 Special Calculations: There are no special calculations.

2.7 BACT Analyses: Best Available Control Technology was not required for this project.

2.8 Enforceable Operational Limits: The permit has enforceable operating conditions that ensure the equipment is operated properly.

2.9 Monitoring Requirements: Monitoring of the equipment's operational limits are required to ensure that these are enforceable.

2.10 Recordkeeping and Reporting Requirements: The permit requires that the data which is monitored be recorded and reported to the District.

3.0 REEVALUATION REVIEW (not applicable)

4.0 REGULATORY REVIEW

4.1 Partial List of Applicable Rules:

Rule 201.	Permits Required
Rule 202.	Exemptions to Rule 201
Rule 205.	Standards for Granting Permits
Rule 301.	Circumvention
Rule 302.	Visible Emissions
Rule 303.	Nuisance
Rule 311.	Sulfur Content of Fuels
Rule 361.	Small Boilers, Steam Generators, and Process Heaters
Rule 801.	New Source Review- Definitions and General Requirements
Rule 802.	New Source Review
Rule 809.	Federal Minor Source New Source Review
Rule 810.	Federal Prevention of Significant Deterioration

4.2 Rules Requiring Review: None.

5.0 AQIA

The project is not subject to the Air Quality Impact Analysis requirements of Regulation VIII.

6.0 OFFSETS/ERCs

6.1 Offsets: The SoCalGas – La Goleta stationary source exceeds the emission offset thresholds of Regulation VIII for NO_x. However, this permitting action is exempt from offsets per Rule 802.B.3.

6.2 ERCs: This source does not generate emission reduction credits.

7.0 AIR TOXICS

An air toxics health risk assessment was not performed for this permitting action.

8.0 CEQA / LEAD AGENCY

The District is the lead agency under CEQA for this project. This project is exempt from CEQA pursuant to the Environmental Review Guidelines for the Santa Barbara County APCD (revised April 30, 2015). Appendix A (*APCD Projects Exempt from CEQA* and *Equipment or Operations Exempt from CEQA*) provides an exemption specifically for Permits to Operate, and reevaluations thereof. No further action is necessary.

9.0 SCHOOL NOTIFICATION

A school notice pursuant to the requirements of Health and Safety Code Section 42301.6 was not required.

10.0 PUBLIC and AGENCY NOTFICATION PROCESS/COMMENTS ON DRAFT PERMIT

10.1 This project was not subject to public notice.

11.0 FEE DETERMINATION

Fees for the District's work efforts are assessed on a fee basis. The Project Code is *320000* (*Boilers/Steam Generat./Turbine*). See Attachment C for the fee calculations.

12.0 RECOMMENDATION

It is recommended that this permit be granted with the conditions as specified in the permit.

Kevin Brown	May 28, 2020		
AQ Engineer/Technician	Date	Supervisor	Date

13.0 ATTACHMENT(S)

A. Emission Calculations
B. IDS Tables
C. Fee Statement

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Permit to Operate 15298 and Part 70 Minor Modification 15298

ATTACHMENT A
Emission Calculations

BOILER AND STEAM GENERATOR EMISSION CALCULATIONS (Ver. 7.0)

Attachment: A-1
Permit Number: PTO 15298
Facility: La Goleta

Heater Input Data

Information	*Value*	*Units*	*Reference*
Maximum Hourly Heat Input........	3.500	MMBtu/hr	Permit Application
Daily Operating Schedule.............	24	hrs/day	Permit Application
Maximum Daily Heat Input..........	84.000	MMBtu/day	Calculated value
Yearly Load Factor (%)................	100	%	Permit Application
Maximum Annual Heat Input.......	30,660.000	MMBtu/yr	Calculated value

Fuel Information

Information	*Value*	*Units*	*Reference*
Fuel...	PUC N.G.	N/A	Permit Application
High Heating Value........................	1,050	Btu/scf	Permit Application
Sulfur Content of Fuel...................	80.00	ppmvd as H_2S	Permit Application

Emission Factors

Pollutant	*Value*	*Units*	*Reference*
NO_x Emission Factor....................	0.0365	lb/MMBtu	District Rule 361 (30 ppmvd @ 3% O_2)
ROC Emission Factor..................	0.0054	lb/MMBtu	AP-42, Section 1.4
CO Emission Factor.....................	0.2965	lb/MMBtu	District Rule 361 (400 ppmvd @ 3% O_2)
SO_x Emission Factor....................	0.0137	lb/MMBtu	Mass Balance Calculation
PM Emission Factor	0.0075	lb/MMBtu	AP-42, Section 1.4
PM_{10} Emission Factor..................	0.0075	lb/MMBtu	AP-42, Section 1.4
$PM_{2.5}$ Emission Factor.................	0.0075	lb/MMBtu	AP-42, Section 1.4

Boiler/Steam Generator Potential to Emit

Pollutant	lb/day	TPY
NO_x	3.07	0.56
ROC	0.45	0.08
CO	24.91	4.55
SO_x	1.15	0.21
PM	0.63	0.11
PM_{10}	0.63	0.11
$PM_{2.5}$	0.63	0.11

Processed By: KMB

Date: April 26, 2020

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Permit to Operate 15298 and Part 70 Minor Modification 15298

ATTACHMENT B
IDS Tables

PERMIT POTENTIAL TO EMIT

	NO_x	ROC	CO	SO_x	PM	PM_{10}	$PM_{2.5}$
lb/day	3.07	0.45	24.91	1.15	0.63	0.63	0.63
lb/hr							
TPQ							
TPY	0.56	0.08	4.55	0.21	0.11	0.11	0.11

FACILITY POTENTIAL TO EMIT

	NO_x	ROC	CO	SO_x	PM	PM_{10}	$PM_{2.5}$
lb/day	544.77	1,374.92	7,226.87	27.08	32.59	32.59	32.59
lb/hr							
TPQ							
TPY	96.49	240.82	1,318.27	4.98	5.76	5.76	5.76

STATIONARY SOURCE POTENTIAL TO EMIT

	NO_x	ROC	CO	SO_x	PM	PM_{10}	$PM_{2.5}$
lb/day	551.52	1,395.56	7,232.72	29.99	33.12	33.12	33.12
lb/hr							
TPQ							
TPY	97.72	243.65	1,319.34	5.49	5.86	5.86	5.86

Notes:
(1) Emissions in these tables are from IDS.
(2) Because of rounding, values in these tables shown as 0.00 are less than 0.005, but greater than zero.

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Permit to Operate 15298 and Part 70 Minor Modification 15298

ATTACHMENT C
Fee Statement

air pollution control district
SANTA BARBARA COUNTY

FEE STATEMENT
PTO No. 15298
FID: 01734 La Goleta / SSID: 05019

Permit Fee

Admin Change	**$458.00**

Fee Statement Grand Total = $458

Notes:

(1) Fee Schedule Items are listed in District Rule 210, Fee Schedule "A".
(2) The term "Units" refers to the unit of measure defined in the Fee Schedule.

APPENDIX C – PROPOSED PERMIT UPDATES

Proposed updates to the Title V permit for selected Table 2-6 items are indicated using **bold underline** format for new language and ~~strikethrough~~ format for deleted language.

Appendix C.1 – Requested Update Item 2

Item	Permit Section	Action
2	4.2.1	List correct CO emission factor for Ingersoll-Rand engines, 3.825 lb/MMBtu. Refer to CO emission factor value in Attachment 10.1 of the permit.

4.2.1 *Gas-Fired Piston IC Engines with Emissions Control:* IC engines operating at the La Goleta Plant and equipped with emissions control comprise of the following:

- Gas compressors #2 through #8 are rich-burn, non-cyclic, natural gas-fired Ingersoll-Rand IC engines (four Model LVG-82s and three Model KVG-62s), each equipped with a non-selective catalytic reduction (NSCR) system and an automatic air-fuel ratio controller, and each driving a gas compressor;
- One lean-burn, non-cyclic, two-stroke, natural gas-fired Cooper Bessemer Model GMV-10C engine, equipped with "Clean-Burn" emissions control technology (using leaner air-fuel ratio, turbo-charged unit, jet cell fuel ignitors and an AFRC unit regulating the turbocharger), driving a gas compressor;

The seven Ingersoll-Rand engines provided emission reduction credits (ERCs) to the Point Arguello project from 1989-2020. Their stipulated NO_X emission factor is 0.324 lb/MMBtu, which is higher than the emission factor which corresponds to 50 ppmv @ 15% O_2, but the engines may emit 0.324 lb NO_X/MMBtu and still comply with Rule 333 as long as they can demonstrate 90% control. The ROC emission factor is 0.32 lb/MMBtu, which corresponds to 250 ppmv @ 15% O_2 and a molecular weight of 16 lb/lb-mole for the organic compounds, and the CO emission factor is ~~3.815~~ **<u>3.825</u>** lb/MMBtu, which corresponds to 1,700 ppmvd @ 15% O_2.

Appendix C.2 – Requested Update Item 3

Item	Permit Section	Action
3	9.C.6	Update Table C.6 to include updated component leak-path information from Quarter 2, 2020 compliance check.

C.6 **Fugitive Hydrocarbon Emissions Components.** The following equipment units are addressed via the 'component-leak-path' methodology:

Table C.6 (Fugitive HC Components and Component-Leak-Paths)

District ID#	Equipment Item Name	Description
	Gas & Light Liquid Service Components	
100882	Valves	~~3,570~~ **3,527** component-leak-paths
100883	Connections	~~16,918~~ **16,296** component-leak-paths
100886	Pressure Relief Devices	49 component-leak-paths
100885	Compressor Seals	14 component-leak-paths
100884	Pump Seals	5 component-leak-paths

Appendix C.3 – Requested Update Items 4 - 6

Item	Permit Section	Action
4	9.C.16	Update documents incorporated by reference to include the 2020 version of Processed Gas Flow Measurement Plan, which has been updated to include the most recent fuel meter serial numbers.
5	9.C.16	Update documents incorporated by reference to include the 2020 version of Process Monitor Calibration and Maintenance Plan, which has been updated to include maximum oxygen sensor hours to match values listed in the facility IC Engine Inspection and Maintenance Plan.
6	9.C.16	Update documents incorporated by reference to include the 2014 version of Compliance Assurance Monitoring (CAM) Plan.

C.16 **Documents Incorporated by Reference.** The documents listed below, including any District-approved updates thereof, are incorporated herein and shall have the full force and effect of a permit condition for this operating permit. These documents shall be implemented for the life of Gas Plant.

(i) *IC Engine Inspection and Maintenance Plan.* (11/04/2017 Ref: Permit condition 9.C.14)

(ii) *Emergency Episode Plan* (Rule 603) (*12/09/2008*).

(iii) *Process Monitor Calibration and Maintenance Plan.* ~~(02/08/2012)~~ **(06/22/2020)**

(iv) *Processed Gas Flow Measurement Plan.* ~~(02/08/2012)~~ **(06/22/2020)**

(v) *Compliance Assurance Monitoring (CAM) Plan*. ~~(12/12/2011)~~ **(12/04/2014)**

Appendix C.4 – Requested Update Item 7

Item	Permit Section	Action
7	9.D.14	Update Table 9.D.14. to include updated component leak-path information from Quarter 2, 2020 compliance check.

Table D.14 (Fugitive HC Components and Component-Leak-Paths)

District ID#	Equipment Item Name	Description
	Gas & Light Liquid Service Components	
100882	Valves	~~3,570~~ **3,527** component-leak-paths
100883	Connections	~~16,918~~ **16,296** component-leak-paths
100886	Pressure Relief Devices	49 component-leak-paths
100885	Compressor Seals	14 component-leak-paths
100884	Pump Seals	5 Component-leak-paths

Appendix C.5 – Requested Update Items 9 – 10

Item	Permit Section	Action
9	Table 5.1-1A, Table 5.1-2A, Table 5.1-3A, Table 5.1-4A	Update equipment category for Device Nos. 001199-001205 to Internal Combustion Engine – NOx Controlled. Update equipment category for Device No. 001206 to Internal Combustion Engine – Uncontrolled.
10	Table 5.1-1A, Table 5.1-2A, Table 5.1-3A, Table 5.1-4A	Update Gas Compressor Engine #9: Cooper-Bessemer GMV-10C from Device No. 001209 to 001206.

Table 5.1-1 A

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584 IC Engines

Operating Equipment Description

			Device Specifications				Usage Data		Maximum Operating Schedule					
Equipment Category	ID#	Description	Fuel	ppmv S	Size	Units	Capacity	Units	Load	hr	day	qtr	year	References*
Internal Combustion Engines	001199	#2: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	A
- NOx *Controlled*	001200	#3: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001201	#4: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001202	#5: Ingersoll-Rand LVG-82:	NG	80	650.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001203	#6: Ingersoll-Rand KVG-62:	NG	80	660.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001204	#7: Ingersoll-Rand KVG-62:	NG	80	660.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	001205	#8: Ingersoll-Rand KVG-62:	NG	80	660.00	bhp	7.30	MMBtu/hr	1.000	1.0	24	2,190	8,760	
Internal Combustion Engines **- *Uncontrolled***	~~001209~~ **001206**	#9: Cooper-Bessemer GMV-10C	NG	80	1100.00	bhp	10.02	MMBtu/hr	1.000	1.0	24	2,190	8,760	
Micro-turbine generators	107543	#1: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	107544	#2: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	B
	107545	#3: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	
	107546	#4: Capstone C60	NG	80	60	kW	0.804	MMBtu/hr	1.000	1.0	24	2,190	8,760	
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	D	15	133	bhp	0.930	MMBtu/hr	1.000	1.0	2	5	20	
	008668	#13A: Cummins V-378-F2	D	15	133	bhp	0.930	MMBtu/hr	1.000	1.0	2	5	20	
Internal Combustion Engines	*001221*	*#4A: Waukesha VRG220U*	NG	80	48.00	bhp	0.50	MMBtu/hr	1.000	1.0	24	2,190	8,760	I
- Permit exempt but	*001222*	*#5A: Waukesha VRG220U*	NG	80	48.00	bhp	0.50	MMBtu/hr	1.000	1.0	24	2,190	8,760	
federally significant units														

Table 5.1-2 A
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584
IC Engines Emission Factors

Equipment Category	ID#	Equipment: Plant ID & Description	Emission Factors									
			NO_X	ROC	CO	SO_X	PM	PM_{10}	$PM_{2.5}$	GHG	Units	References*
Internal Combustion Engine	001199	#2: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
- NOx Controlled	001200	#3: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001201	#4: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001202	#5: Ingersoll-Rand LVG-82:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001203	#6: Ingersoll-Rand KVG-62:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001204	#7: Ingersoll-Rand KVG-62:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
	001205	#8: Ingersoll-Rand KVG-62:	0.324	0.321	3.825	0.0129	0.014	0.014	0.014	117.10	lb/MMBtu	
Internal Combustion Engine -Uncontrolled	~~001209~~ **1206**	#9: Cooper-Bessemer GMV-10C	0.4600	2.4950	10.125	0.0129	0.0480	0.0480	0.048	117.10	lb/MMBtu	
Micro-turbine generators	107543	#1: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
	107544	#2: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
	107545	#3: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
	107546	#4: Capstone C60	0.0373	0.0746	0.448	0.0129	0.0066	0.0066	0.0066	117.10	lb/MMBtu	
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	14.08	1.12	3.03	0.006	0.99	0.99	0.99	117.10	g/bhp-hr	
	008668	#13A: Cummins V-378-F2	14.08	1.12	3.03	0.006	0.99	0.99	0.99	117.10	g/bhp-hr	
Internal Combustion Engine	*001221*	*#4A: Waukesha VRG220U*	*1.905*	*0.1030*	*1.6000*	*0.0129*	*0.014*	*0.014*	*0.014*	*117.10*	lb/MMBtu	
- Permit exempt but federally significant units	*001222*	*#5A: Waukesha VRG220U*	*1.905*	*0.1030*	*1.6000*	*0.0129*	*0.014*	*0.014*	*0.014*	*117.10*	lb/MMBtu	

Table 5.1-3 A

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584 IC Engines Short-Term Permitted Emissions

			Mass Emission Limits															
			NO_X		ROC		CO		SO_X		PM		PM_{10}		$PM_{2.5}$		GHG	
Equipment Category	Equipment ID	Equipment: Plant ID & Description	lb/hr	lb/day	lb/hr	lb/day	lb/hr	lb/day	lb/hr	lb/day	lb/hr	lb/day	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/day
Internal Combustion Engine	001199	#2: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
- NOx *Controlled*	001200	#3: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001201	#4: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001202	#5: Ingersoll-Rand LVG-82:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001203	#6: Ingersoll-Rand KVG-62:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001204	#7: Ingersoll-Rand KVG-62:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
	001205	#8: Ingersoll-Rand KVG-62:	2.37	56.76	2.34	56.24	27.92	670.14	0.09	2.26	0.10	2.45	0.10	2.45	0.10	2.45	854.83	20,516
Internal Combustion Engine -Uncontrolled	001209 001206	#9: Cooper-Bessemer GMV-10C	4.61	110.62	25.00	600.00	101.45	2,434.86	0.13	3.10	0.48	11.54	0.48	11.54	0.48	11.54	1,173.34	28,160
Micro-turbine generators	107543	#1: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
	107544	#2: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
	107545	#3: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
	107546	#4: Capstone C60	0.03	0.72	0.06	1.44	0.36	8.64	0.01	0.25	0.01	0.13	0.01	0.13	0.01	0.13	94.15	2,260
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	4.12	8.25	0.33	0.66	0.89	1.78	0.00	0.00	0.29	0.58	0.29	0.58	0.29	0.58	108.90	218
	008668	#13A: Cummins V-378-F2	4.12	8.25	0.33	0.66	0.89	1.78	0.00	0.00	0.29	0.58	0.29	0.58	0.29	0.58	108.90	218
Total for Permitted Engines			29.54	527.35	42.30	1,000.74	300.13	7,163.97	0.83	19.89	1.80	30.38	1.80	30.38	1.80	30.38	7,751.55	181,246
Internal Combustion Engine	*001221*	*#4A: Waukesha VRG220U*	*0.95*	*22.86*	*0.05*	*1.24*	*0.80*	*19.20*	*0.01*	*0.15*	*0.01*	*0.17*	*0.01*	*0.17*	*0.01*	*0.17*	*58.55*	*1,405*
- Permit exempt but federally significant units	*001222*	*#5A: Waukesha VRG220U*	*0.95*	*22.86*	*0.05*	*1.24*	*0.80*	*19.20*	*0.01*	*0.15*	*0.01*	*0.17*	*0.01*	*0.17*	*0.01*	*0.17*	*58.55*	*1,405*
Total for permit exempt engines			*1.91*	*45.72*	*0.10*	*2.47*	*1.60*	*38.40*	*0.01*	*0.31*	*0.01*	*0.34*	*0.01*	*0.34*	*0.01*	*0.34*	*117.10*	*2,810.40*

Table 5.1-4 A

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584
IC Engines Long-Term Permitted Emissions

			Mass Emission Limits															
			NO_X		ROC		CO		SO_X		PM		PM_{10}		$PM_{2.5}$		GHG	
Equipment Category	Equipment ID	Equipment: Plant ID & Description	TPQ	TPY	TPQ	TPY	TPQ	TPY	TPQ	TPY	TPQ	TPY	TPQ	TPY	TPQ	TPY	TPQ	TPY
Internal Combustion Engine	001199	#2: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
- **NOx** *Controlled*	001200	#3: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001201	#4: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001202	#5: Ingersoll-Rand LVG-82:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001203	#6: Ingersoll-Rand KVG-62:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001204	#7: Ingersoll-Rand KVG-62:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
	001205	#8: Ingersoll-Rand KVG-62:	2.59	10.36	2.57	10.26	30.58	122.30	0.10	0.41	0.11	0.45	0.11	0.45	0.11	0.45	936	3,744
Internal Combustion Engine -Uncontrolled	~~001209~~ **001206**	#9: Cooper-Bessemer GMV-10C	5.05	20.19	27.37	109.50	111.09	444.36	0.14	0.57	0.53	2.11	0.53	2.11	0.53	2.11	1,285	5,139
Micro-turbine generators	107543	#1: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
	107544	#2: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
	107545	#3: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
	107546	#4: Capstone C60	0.03	0.13	0.07	0.26	0.39	1.58	0.01	0.05	0.01	0.02	0.01	0.02	0.01	0.02	103	412
Emergency Fire Pumps	008666	#12A: Cummins V-378-F2	0.01	0.04	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.27	1.09
	008668	#13A: Cummins V-378-F2	0.01	0.04	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.27	1.09
Total for Permitted Engines			23.33	93.31	45.60	182.42	326.70	1,306.80	0.91	3.65	1.34	5.35	1.34	5.35	1.34	5.35	8,250	33,000
Internal Combustion Engine	*001221*	*#4A: Waukesha VRG220U*	*1.04*	*4.17*	*0.06*	*0.23*	*0.88*	*3.50*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*64.1*	*256.4*
- Permit exempt but federally significant units	*001222*	*#5A: Waukesha VRG220U*	*1.04*	*4.17*	*0.06*	*0.23*	*0.88*	*3.50*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*0.01*	*0.03*	*64.1*	*256.4*
Total for permit exempt engines			*2.09*	*8.34*	*0.11*	*0.45*	*1.75*	*7.01*	*0.01*	*0.06*	*0.02*	*0.06*	*0.02*	*0.06*	*0.02*	*0.06*	*128.22*	*512.90*

Appendix C.6 – Requested Update Items 11 and 12

Item	Permit Section	Action
11	Table 5.1-1B, Table 5.1-2B, Table 5.1-3B, Table 5.1-4B,	In accordance with PTO 15298, update Rule 361 emission factors for Emission Unit ID 001214 and remove Emission Unit ID 107535, which is replaced by exempt Emission Unit ID 394789.
12	Table 5.1-1B, Table 5.1-2B, Table 5.1-3B, Table 5.1-4B,	Update to include updated component leak-path information from Quarter 2, 2020 compliance check.

Table 5.1-1 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584
Non-IC Engine Operating Emissions Units Description

			Device Specifications				Usage Data			Maximum Operating Schedule				
Equipment Category	**Description**	**ID #**	**Fuel**	**ppmv S**	**Size**	**Units**	**Capacity**	**Units**	**Load**	**hr**	**day**	**qtr**	**year**	**References***
Combustion - External	Flare: Field	001215	NG	239	--	--	1.600	MMBtu/hr	--	1.0	24	2,190	8,760	C1
	Flare: Field	001212	NG	239	--	--	1.600	MMBtu/hr	--	1.0	24	2,190	8,760	
	Flare: Field	001211	NG	239	--	--	1.600	MMBtu/hr	--	1.0	24	2,190	8,760	
	Hot Oil Heater #1	001214	NG	80	--	--	3.500	MMBtu/hr	--	1.0	24	2,190	8,760	C2
	~~Hot Oil Heater #2~~	~~107535~~	~~NG~~	~~80~~	~~--~~	~~--~~	~~2.200~~	~~MMBtu/hr~~	~~--~~	~~1.0~~	~~24~~	~~2,190~~	~~8,760~~	
	Heater #1	113985	NG	80	--	--	2.000	MMBtu/hr	--	1.0	24	2,190	8,760	
	Heater #2	113987	NG	80	--	--	2.000	MMBtu/hr	--	1.0	24	2,190	8,760	
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	--	12'd x 12'h	ft	10,000	gallons	--	1.0	24	2,190	8,760	D
	Flotation Cell: Tank 2	001220	--	--	12'd x 12'h	ft	10,000	gallons	--	1.0	24	2,190	8,760	
	HC Storage Tank	001217	--	--	10'd x 12'h	ft	7,050	gallons	--	1.0	24	2,190	8,760	
Loading Station	NGL Loading Station	008669	--	--	--	--	7.140	k-gallons/hour		1.0	3	4	18	E
Fugitive Components (Gas/Light Liquid Service)	Valves	100882	--	--	**3,527** ~~3,570~~	comp. leak-path	--	--	--	1.0	24	2,190	8,760	G
	Connections	100883	--	--	**16,296** ~~16,918~~	comp. leak-path	--	--	--	1.0	24	2,190	8,760	
	Pr. Relief Dev.	100886	--	--	49	comp. leak-path	--	--	--	1.0	24	2,190	8,760	
	Compressor Seals	100885	--	--	14	comp. leak-path	--	--	--	1.0	24	2,190	8,760	
	Pump Seals	100884	--	--	5	comp. leak-path	--	--	--	1.0	24	2,190	8,760	
				clp total:	~~20,556~~ **19,891**									
Emissions (Venting)	Wells -- Pipelines	100903	--	--	--	--	10	MMscf/year	--	1.0	24	2,190	8,760	G
Glycol Unit	Flash-tank Unit	100873	--	--	--	--	680	MMscf/day	--	1.0	24	2,190	8,760	H
Solvent Usage	Solvent Process Operations	008680	--	--	--	--	0.092	gal/hr (non-photochem)		1.0	6	548	2,190	I

Table 5.1-2 B
SoCalGas La Goleta Plant:
Part70/Permit to Operate 9584 Non-IC
Engine Equipment Emission Factors

Equipment Category	Description	ID#	Emission Factors NO_X	ROC	CO	SO_X	PM	PM_{10}	$PM_{2.5}$	GHG	Units	References*
Combustion – External	Flare: Field	001215	0.095	0.005	0.082	0.041	0.008	0.008	0.008	117.10	lb/MMBtu	C1
	Flare: Field	001212	0.095	0.005	0.082	0.041	0.008	0.008	0.008	117.10	lb/MMBtu	
	Flare: Field	001211	0.095	0.005	0.082	0.041	0.008	0.008	0.008	117.10	lb/MMBtu	
	Hot Oil Heater #1	001214	~~0.098~~ **0.037**	0.005	~~0.082~~ **0.297**	0.014	0.008	0.008	0.008	117.10	lb/MMBtu	C2
	~~Hot Oil Heater #2~~	~~107535~~	~~0.098~~	~~0.005~~	~~0.082~~	~~0.014~~	~~0.008~~	~~0.008~~	~~0.008~~	~~117.10~~	~~lb/MMBtu~~	
	Heater #1	113985	0.036	0.005	0.297	0.014	0.008	0.008	0.008	117.10	lb/MMBtu	
	Heater #2	113987	0.036	0.005	0.297	0.014	0.008	0.008	0.008	117.10	lb/MMBtu	
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	Calc's are	--	--	--	--	--	--	AP-42, Ch.7	D
	Flotation Cell: Tank 2	001220	--	based on	--	--	--	--	--	--	Eqn. Units --	
	HC Storage Tank	001217	--	AP42,Ch.7	--	--	--	--	--	--	multiple para.	
Loading Station	NGL Loading Station	008669	--	2.7557	--	--	--	--	--	--	lb/1000 gal	E
Fugitive Components	Valves	100882	--	0.008	--	--	--	--	--	--	lb/day-clp	G
(Gas/Light Liquid Service)	Connections	100883	--	0.002	--	--	--	--	--	--	lb/day-clp	
	Pr. Relief Dev.	100886	--	0.177	--	--	--	--	--	--	lb/day-clp	
	Compressor Seals	100885	--	0.057	--	--	--	--	--	--	lb/day-clp	
	Pump Seals	100884	--	0.030	--	--	--	--	--	--	lb/day-clp	
Emissions (Venting)	Wells – Pipelines	100903	--	6,789.0	--	--	--	--	--	--	lb/MMscf	G
Glycol Unit	Flash-tank Unit	100873	--	Gly-Calc 4.0	--	--	--	--	--	--		
Solvent Usage	Solvent Process Operations	008680	--	4.000	--	--	--	--	--	--	lbs./gal	H

Table 5.1-3 B

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584

Non-IC Engines Daily Emissions

Equipment Category	Description	ID#	NO_X lb/day	ROC lb/day	CO lb/day	SO_X lb/day	PM lb/day	PM_{10} lb/day	$PM_{2.5}$ lb/day	GHG lb/day
Combustion - External	Flare: Field	001215	3.66	0.20	3.16	1.57	0.29	0.29	0.29	4,497
	Flare: Field	001212	3.66	0.20	3.16	1.57	0.29	0.29	0.29	4,497
	Flare: Field	001211	3.66	0.20	3.16	1.57	0.29	0.29	0.29	4,497
	Hot Oil Heater #1	001214	~~8.23~~ **3.07**	0.45	~~6.89~~ **24.91**	1.15	0.63	0.63	0.63	9,836
	~~Hot Oil Heater #2~~	~~107535~~	~~5.17~~	~~0.29~~	~~4.33~~	~~0.72~~	~~0.40~~	~~0.40~~	~~0.40~~	~~6,183~~
	Heater #1	113985	1.73	0.26	14.26	0.66	0.36	0.36	0.36	5,621
	Heater #2	113987	1.73	0.26	14.26	0.66	0.36	0.36	0.36	5,621
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	0.21	--	--	--	--	--	--
	Flotation Cell: Tank 2	001220	--	0.21	--	--	--	--	--	--
	HC Storage Tank	001217	--	0.19	--	--	--	--	--	--
Loading Station	NGL Loading Station	008669	--	55.09	--	--	--	--	--	--
Fugitive Components	Valves	100882	--	**27.699** ~~28.01~~	--	--	--	--	--	--
(Gas/Light Liquid Service)	Connections	100883	--	**30.343** ~~31.50~~	--	--	--	--	--	--
	Pr. Relief Dev.	100886	--	8.69	--	--	--	--	--	--
	Compressor Seals	100885	--	0.80	--	--	--	--	--	--
	Pump Seals	100884	--	0.15	--	--	--	--	--	--
Emissions (Venting)	Wells -- Pipelines	100903	--	186.00	--	--	--	--	--	--
Glycol Unit	Flash-tank Unit	100873	--	52.13	--	--	--	--	--	--
Solvent Usage**	Solvent Process Operations	008680	--	2.21	--	--	--	--	--	--

Table 5.1-4 B

SoCalGas La Goleta Plant: Part70/Permit to Operate 9584 Non-IC Engines Annual Emissions

Equipment Category	Description		NO_X TPY	ROC TPY	CO TPY	SO_X TPY	PM TPY	PM_{10} TPY	$PM_{2.5}$ TPY	GHG TPY
Combustion - External	Flare: Field	001215	0.67	0.04	0.58	0.29	0.05	0.05	0.05	820.6
	Flare: Field	001212	0.67	0.04	0.58	0.29	0.05	0.05	0.05	820.6
	Flare: Field	001211	0.67	0.04	0.58	0.29	0.05	0.05	0.05	820.6
	Hot Oil Heater #1	001214	~~1.50~~ **0.56**	0.08	~~1.26~~ **4.55**	0.21	0.11	0.11	0.11	1,795.1
	~~Hot Oil Heater #2~~	~~107535~~	~~0.94~~	~~0.05~~	~~0.79~~	~~0.13~~	~~0.07~~	~~0.07~~	~~0.07~~	~~1,128.4~~
	Heater #1	113985	0.32	0.05	2.60	0.12	0.07	0.07	0.07	1,025.8
	Heater #2	113987	0.32	0.05	2.60	0.12	0.07	0.07	0.07	1,025.8
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	0.04	--	--	--	--	--	--
	Flotation Cell: Tank 2	001220	--	0.04	--	--	--	--	--	--
	HC Storage Tank	001217		0.03	--	--	--	--	--	--
Loading Station	NGL Loading Station	008669	--	0.17	--	--	--	--	--	--
Fugitive Components	Valves	100882	--	~~5.11~~ **5.05**	--	--	--	--	--	--
(Gas/Light Liquid Service)	Connections	100883	--	~~5.75~~ **5. 54**	--	--	--	--	--	--
	Pr. Relief Dev.	100886	--	1.59	--	--	--	--	--	--
	Compressor Seals	100885	--	0.15	--	--	--	--	--	--
	Pump Seals	100884	--	0.03	--	--	--	--	--	--
Emissions (Venting)	Wells -- Pipelines	100903	--	33.95	--	--	--	--	--	--
Glycol Unit	Flash-tank Unit	100873	--	9.51	--	--	--	--	--	--
Solvent Usage**	Solvent Process Operations	008680	--	0.40	--	--	--	--	--	--

Appendix C.7 – Requested Update Item 13

Item	Permit Section	Action
13	Table 5.4-1A	Update equipment category for Device Nos. 001199-001205 to Internal Combustion Engine – NOx Controlled. Update equipment category for Device No. 001206 to Internal Combustion Engine – Uncontrolled.

Table 5.4-1 A
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584 IC Engines
Hazardous Air Pollutant Emission Factors

Equipment Category	Description	Device ID	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Carbon tetrachloride	Chlorobenzene	Chloroform	1,3-Dichloropropene	Ethylbenzene	Ethylene dibromide	Ethylene dichloride	Ethylidene dichloride	Formaldehyde	Hexane	Hydrogen Chloride	Methanol	Methylene chloride	Naphthalene	PAHs (not incl. napthalene)	Propylene dichloride	Propylene oxide	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	Styrene	Toluene	Vinyl chloride	Xylenes	Arsenic	Cadmium	Chromium	Lead	Manganese	Mercury	Nickel	Selenium	Units	References
Internal Combustion Engines	#2: Ingersoll-Rand LVG-82	001199	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
- **NOx** *Controlled*	#3: Ingersoll-Rand LVG-82	001200	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#4: Ingersoll-Rand LVG-82	001201	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#5: Ingersoll-Rand LVG-82	001202	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#6: Ingersoll-Rand KVG-62	001203	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#7: Ingersoll-Rand KVG-62	001204	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
	#8: Ingersoll-Rand KVG-62	001205	1.88E-03	5.22E-03	8.68E-05	--	--	--	--	--	--	--	--	--	3.45E-04	--	--	2.32E-03	--	3.39E-05	--	--	--	--	--	--	4.46E-05	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
Internal Combustion Engines -Uncontrolled	#9: Cooper-Bessemer GMV-10C	~~001209~~ **001206**	4.79E-03	4.85E-03	1.17E-03	--	--	--	--	--	--	--	--	--	5.06E-02	--	--	2.49E-03	--	1.17E-04	--	--	--	--	--	--	1.05E-03	--	--	--	--	--	--	--	--	--	--	lb/MMBtu	A
Micro-turbine generators	#1: Capstone C60	107543	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
	#2: Capstone C60	107544	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
	#3: Capstone C60	107545	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
	#4: Capstone C60	107546	4.00E-05	6.40E-06	1.20E-05	4.30E-07	--	--	--	--	3.20E-05	--	--	--	7.10E-04	--	--	--	--	1.30E-06	9.00E-07	--	2.90E-05	--	--	--	1.30E-04	--	6.40E-05	--	--	--	--	--	--	--	--	lb/MMBtu	B
Emergency Fire Pumps	#12A: Cummins V-378-F2	008666	7.83E-01	3.39E-02	1.86E-01	2.17E-01	--	2.00E-04	--	--	1.09E-02	--	--	--	1.73E+00	2.690E-02	1.86E-01	--	--	1.97E-02	3.62E-02	--	--	--	--	--	1.05E-01	--	4.240E-02	1.60E-03	1.50E-03	6.00E-04	8.30E-03	3.10E-03	2.00E-03	3.90E-03	2.20E-03	lb/1000 gal	C
	#13A: Cummins V-378-F2	008668	7.83E-01	3.39E-02	1.86E-01	2.17E-01	--	2.00E-04	--	--	1.09E-02	--	--	--	1.73E+00	2.690E-02	1.86E-01	--	--	1.97E-02	3.62E-02	--	--	--	--	--	1.05E-01	--	4.240E-02	1.60E-03	1.50E-03	6.00E-04	8.30E-03	3.10E-03	2.00E-03	3.90E-03	2.20E-03	lb/1000 gal	C
Internal Combustion Engines	#4A: Waukesha VRG220U	001221	2.79E-03	2.63E-03	1.58E-03	6.63E-04	1.77E-05	1.29E-05	1.37E-05	1.27E-05	2.48E-05	2.13E-05	1.13E-05	1.13E-05	2.05E-02	--		3.06E-03	4.12E-05	9.71E-05	4.39E-05	1.30E-05	--	2.53E-05	1.53E-05	1.19E-05	5.58E-04	7.18E-06	1.95E-04	--		--	--	--	--	--	--	lb/MMBtu	D
- Permit exempt but federally significant units	#5A: Waukesha VRG220U	001222	2.79E-03	2.63E-03	1.58E-03	6.63E-04	1.77E-05	1.29E-05	1.37E-05	1.27E-05	2.48E-05	2.13E-05	1.13E-05	1.13E-05	2.05E-02	--		3.06E-03	4.12E-05	9.71E-05	4.39E-05	1.30E-05	--	2.53E-05	1.53E-05	1.19E-05	5.58E-04	7.18E-06	1.95E-04	--		--	--	--	--	--	--	lb/MMBtu	D

References:
A - USEPA, AP-42 Appendix A of the background report for Section 3.2, results for a similar engine (June 2000)
B - USEPA, AP-42 Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines (April 2000)
C - VCAPCD, AB 2588 Combustion Emission Factors, Diesel Combustion Factors - internal combustion (May 2001)
D - USEPA, AP-42 Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (August 2000)

Appendix C.8 – Requested Update Item 14

Item	Permit Section	Action
14	Table 5.4-1B	In accordance with PTO 15298, remove Emission Unit ID 107535, which is replaced by exempt Emission Unit ID 394789.

Table 5.4-1 B
SoCalGas La Goleta Plant: Part70/Permit to Operate 9584 Non-IC Engines Hazardous Air Pollutant Emission Factors

Equipment Category	Description	Device	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Hexane	Naphthalene	PAHs	Toluene	Xylenes	Arsenic	Beryllium	Cadmium	Chromium	Cobalt	Manganese	Mercury	Nickel	Selenium		
Combustion - External	Flare: Field	001215	4.30E-02	1.00E-02	1.59E-01	1.44E+00	1.17E+00	2.90E-02	1.10E-02	3.00E-03	5.80E-02	2.90E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	E
	Flare: Field	001212	4.30E-02	1.00E-02	1.59E-01	1.44E+00	1.17E+00	2.90E-02	1.10E-02	3.00E-03	5.80E-02	2.90E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	E
	Flare: Field	001211	4.30E-02	1.00E-02	1.59E-01	1.44E+00	1.17E+00	2.90E-02	1.10E-02	3.00E-03	5.80E-02	2.90E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	E
	Hot Oil Heater #1	001214	4.30E-03	2.70E-03	8.00E-03	9.50E-03	1.70E-02	6.30E-03	3.00E-04	1.00E-04	3.66E-02	2.72E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	F
	~~Hot Oil Heater #2~~	~~107535~~	~~4.30E-03~~	~~2.70E-03~~	~~8.00E-03~~	~~9.50E-03~~	~~1.70E-02~~	~~6.30E-03~~	~~3.00E-04~~	~~1.00E-04~~	~~3.66E-02~~	~~2.72E-02~~	~~2.00E-04~~	~~1.20E-05~~	~~1.10E-03~~	~~1.40E-03~~	~~8.40E-05~~	~~3.80E-04~~	~~2.60E-04~~	~~2.10E-03~~	~~2.40E-05~~	~~lb/MMcf~~	F
	Heater #1	113985	4.30E-03	2.70E-03	8.00E-03	9.50E-03	1.70E-02	6.30E-03	3.00E-04	1.00E-04	3.66E-02	2.72E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	F
	Heater #2	113987	4.30E-03	2.70E-03	8.00E-03	9.50E-03	1.70E-02	6.30E-03	3.00E-04	1.00E-04	3.66E-02	2.72E-02	2.00E-04	1.20E-05	1.10E-03	1.40E-03	8.40E-05	3.80E-04	2.60E-04	2.10E-03	2.40E-05	lb/MMcf	F
HC Liquid Storage Tanks	Flotation Cell: Tank 1	001219	--	--	2.71E-02	--	--	5.31E-02	--	--	1.58E-02	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	G
	Flotation Cell: Tank 2	001220	--	--	2.71E-02	--	--	5.31E-02	--	--	1.58E-02	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	G
	HC Storage Tank	001217	--	--	2.71E-02	--	--	5.31E-02	--	--	1.58E-02	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	G
Loading Station	NGL Loading Station	008669	--	--	1.79E-03	--	--	1.77E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	H
Fugitive Components	Valves	100882	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
(Gas/Light Liquid Service)	Connections	100883	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
	Pr. Relief Dev.	100886	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
	Compressor Seals	100885	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
	Pump Seals	100884	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
Emissions (Venting)	Wells -- Pipelines	100903	--	--	3.25E-03	--	--	4.41E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	lb/lb ROC	I
Glycol Unit[1]	Flash-tank Unit	100873	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	n/a	
Solvent Usage	Solvent Process Operations	008680	--	--	5.00E-02	--	--	--	--	--	5.00E-02	5.00E-02	--	--	--	--	--	--	--	--	--	lb/lb ROC	J

References:
E1 - VCAPCD, AB 2588 Combustion Emission Factors, Natural Gas Fired External Combustion Equipment - flare (May 2001) E2 - USEPA, AP-42 Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion (July 1998)
F1 - VCAPCD, AB 2588 Combustion Emission Factors, Natural Gas Fired External Combustion Equipment - <10 MMBTUh (May 2001) F2 - USEPA, AP-42 Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion (July 1998)
G - Emission factors for benzene, hexane and toluene are from CARB Speciation Manual Second Edition, Profile Number 297, Crude Oil Evaporation - Vapor Composite from Fixed Roof Tanks (August 1991); iso-octane (i.e., 2,2,4-trimethylpentane) was excluded because iso-octane is not exp H - Emission factors for benzene and hexane are from CARB Speciation Manual Second Edition, Profile Number 756, Oil & Gas Production Fugitives - Liquid Service (August 1991); iso-octane (i.e., 2,2,4-trimethylpentane) was excluded because iso-octane is not expected in the gas handled a I1 - Emission factor for hexane is based on the Hydrocarbon Analysis for Goleta Storage Field performed by the Engineering Analysis Center in April 2015
I2 - Emission factor for benzene is from CARB Speciation Manual Second Edition, Profile Number 757, Oil & Gas Production Fugitives - Gas Service (August 1991); iso-octane (i.e., 2,2,4-trimethylpentane) was excluded because iso-octane is not expected in the gas handled at this facility J - APCD: Solvents assumed to contain 5% benzene, 5% toluene, 5% xylene

Notes:
1. There are no hazardous air pollutants emitted from this equipment.

Appendix C.9 – Requested Update Items 15 - 17

Item	Permit Section	Action
15	10.5	Update equipment list to include updated component leak-path information from Quarter 2, 2020 compliance check.
16	10.5	Update equipment list with new catalyst serial numbers for devices 110815, 110816, 110817, 110818, 110819 and 110820.
17	10.5	Update equipment list with revisions from PTO 15298 by replacing Hot Oil Heater #2 (Emission Unit ID 107535) with new permit exempt unit (Emission Unit ID 394789).

10.5 Equipment List

Valves - Accessible

Device ID #	100882	*Device Name*	Valves - Accessible
Rated Heat Input		*Physical Size*	~~3571.00~~ **3,527.00** Component Leakpath
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

Connections – Accessible

Device ID #	100883	*Device Name*	Connections - Accessible
Rated Heat Input		*Physical Size*	~~16918.00~~ **16,296.00** Component Leakpath
Manufacturer		*Operator ID*	
Model		*Serial Number*	
Location Note	SoCalGas - La Goleta		
Device Description			

Catalytic Converter #3

Device ID #	110815	*Device Name*	Catalytic Converter #3
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#3
Model	DC74	*Serial Number*	~~164729~~ **360346**
Location Note	SoCalGas - La Goleta		
Device Description			

Catalytic Converter #4

Device ID #	110816	*Device Name*	Catalytic Converter #4
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#4
Model	DC74	*Serial Number*	~~164724~~ **193377**
Location Note	SoCalGas - La Goleta		
Device Description			

Catalytic Converter #5

Device ID #	110817	*Device Name*	Catalytic Converter #5
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#5
Model	DC74	*Serial Number*	~~164723~~ **198431**
Location Note	SoCalGas - La Goleta		
Device Description			

Catalytic Converter #6

Device ID #	110818	*Device Name*	Catalytic Converter #6
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#6
Model	DC74	*Serial Number*	~~164727~~ **198429**
Location Note	SoCalGas - La Goleta		
Device Description			

Catalytic Converter #7

Device ID #	110819	*Device Name*	Catalytic Converter #7
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#7
Model	DC74	*Serial Number*	~~164725~~ **7198428**
Location Note	SoCalGas - La Goleta		
Device Description			

Catalytic Converter #8

Device ID #	110820	*Device Name*	Catalytic Converter #8
Rated Heat Input		*Physical Size*	
Manufacturer	DCL International	*Operator ID*	#8
Model	DC74	*Serial Number*	~~164726~~ **336764**
Location Note	SoCalGas - La Goleta		
Device Description			

Hot Oil Heater #2

~~*Device ID #*~~	~~107535~~	~~*Device Name*~~	~~Hot Oil Heater #2~~
~~*Rated Heat Input*~~	~~2.200 MMBtu/Hour~~	~~*Physical Size*~~	
~~*Manufacturer*~~	~~American Heating Company~~	~~*Operator ID*~~	~~HOH #2~~
~~*Model*~~	~~AHE-212-2P~~	~~*Serial Number*~~	~~670-A04~~
~~*Location Note*~~	~~SoCalGas - La Goleta~~		
~~*Device Description*~~	~~Gas-fired unit. Operates only when HOH #1 is not operating.~~		

Device ID #	**394789**	***Device Name***	**Hot Oil Heater #2**
Rated Heat Input	**2.000MMBtu/Hour**	***Physical Size***	
Manufacturer		***Operator ID***	**HOH #2**
Model	**Eclipse WX0200**	***Serial Number***	**1667857-1**
Part 70 Insig?	**No**		
Location Note		**District Rule Exemption: 202.G.1 Combustion Equipment <= 2 MMBtu/hr**	
Device Description	**Gas-fired unit. Operates only when HOH #1 is not operating.**		

APPENDIX D – UPDATED DOCUMENTS INCORPORATED BY REFERENCE

Appendix D.1 – Processed Gas Flow Measurement Plan

Appendix D.2 – Process Monitor Calibration and Maintenance Plan

Appendix D.3 – Compliance Assurance Monitoring Plan

SOUTHERN CALIFORNIA GAS COMPANY
LA GOLETA FACILITY

PROCESSED GAS FLOW MEASUREMENT PLAN
PART 70/PTO # 9584-R7
Condition 9.C.16(iv)

June 22, 2020

Table of Contents

June 22, 2020

Southern California Gas Company

PTO #9584-R7 Processed Gas Flow Measurement Plan 9.C.16(iv)

"PROCESSED GAS FLOW MEASUREMENT PLAN"

This plan addresses the 680 MMscf/day limit of "withdrawal gas", and the 340 MMscf/day limit of gas that is dehydrated through the Plant #14 glycol dehydration unit.

Note: *The La Goleta Facility is permitted to withdraw a total of 680 MMscf/day, of that amount, there is a daily limit for gas dehydration (by glycol) of 340 MMscf/day. Gas volumes above 340 MMscf/day will bypass the glycol dehydration facilities.*

Withdrawn gas from the storage facility's wells is directed to Plant #14. At Plant #14 gas volumes up to 340 MMscfd can be "dried" via the glycol dehydration process.

Dehydrated gas is measured at the gas outlet of each gas/glycol contactor as follows:

Each of the four gas/glycol dehydration contactors is equipped with a fixed AGA 3 orifice plate and a Rosemount 3095 MV multivariable transmitter on the outlet. The transmitters are tagged FT-204, 206, 208 and 210. The transmitters calculate dynamically compensated volumetric flow (using static pressure, differential pressure and temperature). The compensated flow values are summed in a programmable logic controller to determine the total contactor throughput and provide alarm functionality. The summed output for these meters is tagged FI-212. This volume is transmitted to a server computer where it is stored on an hourly basis. The hourly volumes are then used to determine the daily volume. A report is generated locally (sample attached) showing the days of the month, the amount of gas dehydrated per day, total gas dehydrated for the month and the daily average volume of gas dehydrated per flow day.

Gas volumes above 340 MMscfd will "bypass" the contactors via the "Bypass Valve".

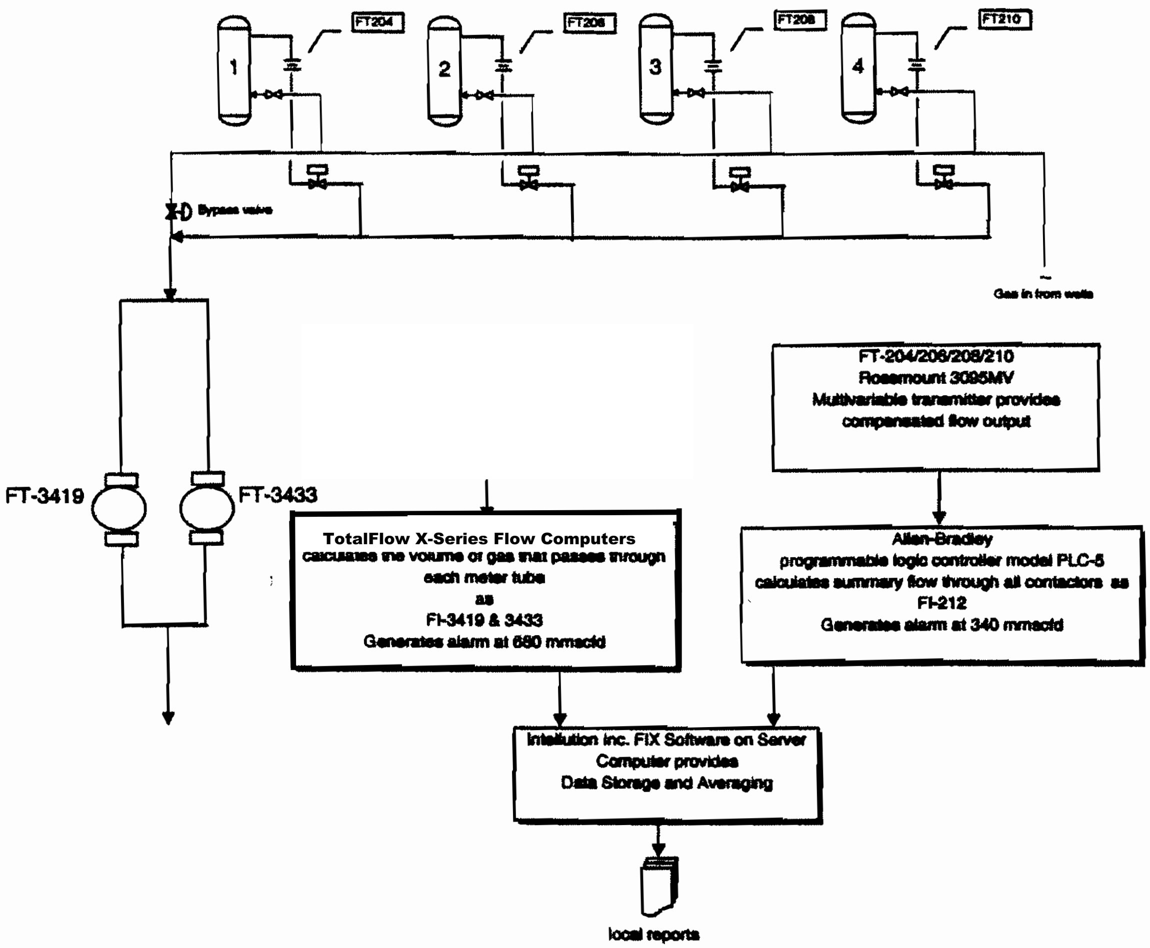
Dehydrated gas leaving the contactors and the bypassed gas is then directed to Plant #14 meter tubes # 3419 and # 3433 for measurement as follows:

Each meter tube is equipped with a TotalFlow X-Series Flow computer where a flow calculation is done to determine the volume of gas that passes through each meter tube. The results of the flow calculations are then sent to the facility server computer where they are monitored and recorded by Station operating personnel. Additionally, this information is transmitted to Los Angeles where it is monitored and recorded by the Gas Operations and Measurement Departments. Approximately 14 days after the end of the month, reports are generated; a portion of which includes the volumes of gas withdrawn. From this report, the Goleta Facility prepares a log (sample attached) showing the days of the month, the amount of gas withdrawn per day, total gas withdrawn for the month and the daily average volume for those days that the facility was on withdrawal.

Plant # 14 total gas withdrawn includes gas that has been dehydrated and any gas that was bypassed around the gas/glycol contactors.

June 22, 2020

GOLETA STORAGE FIELD
WITHDRAWAL GAS MEASUREMENT



FI-212 = FI-204+FI-206+FI-208+FI-210

Average hourly flow ⇨ Average daily flow

Bypass flow =
FI-3419 + FI-3433 - FI-212

$$\text{Average daily W/D for month per W/D flow day} = \frac{\text{Total daily W/D for month}}{\text{\# of flow days}}$$

SOUTHERN CALIFORNIA GAS COMPANY

La Goleta PTO #9584-R3

"Processed Gas Flow Measurement Plan"
Withdrawal/Dehydration Activity Log
Month of January 2004

(Combined daily total through meters 3419w, 3433w)

Gas Volume Withdrawal in MMSCFD

DATE	VOLUME
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	

0

Average daily withdrawal this month
r withdrawal flow day = #DIV/0! M2SCFD

(Combined daily total, F.I. #212)

Gas Volume Dehydrated in MMSCFD

DATE	VOLUME
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	

0

Average daily dehydration this month
per withdrawal flow day = #DIV/0! M2SCFD

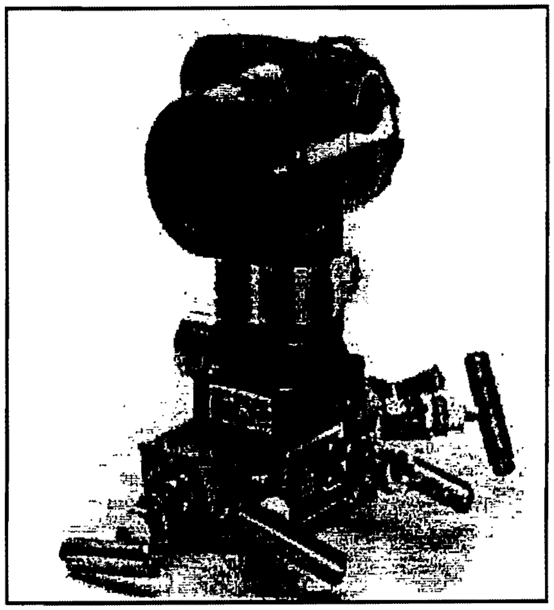
* total W/D for month
\# of W/D flow days

CONTACTORS 1, 2, 3 & 4

Rosemount 3095MV MultiVariable™ Mass Flow Transmitter

THE PROVEN LEADER IN MULTIVARIABLE MASS FLOW MEASUREMENT.

- *1.0% of Mass Flow rate accuracy over 8:1 Flow Range*
- *Five year stability of ±0.125%*
- *Four measurements in one device*
- *"Real-Time" compensated Mass Flow*
- *Coplanar™ platform enables DP Flowmeters*



Content

The Leader in Multivariable Mass Flow Measurement.

Rosemount delivers a tradition of excellence and technology leadership, featuring the state-of-the-art Rosemount 3095MV Multivariable Mass Flow transmitter. The Rosemount 3095MV delivers four measurements from one coplanar device with unmatched operating performance, including dynamically compensated mass flow. Engineered to combine best products with best installation practices, the fully compensated Rosemount 3095MV enables a complete offering of DP Flowmeters.

1.0% of Mass Flow rate accuracy over 8:1 Flow Range

Enabled by superior sensor technology and engineered for optimal flow performance, the Rosemount 3095MV delivers unprecedented ±0.075% reference accuracy, resulting in mass flow accuracy of ±1.0% over 8:1 flow range. Superior performance means reduced variability and improved plant safety.

Five year stability of ±0.125%

Through aggressive testing, the Rosemount 3095MV has proven its ability to maintain unprecedented performance under the most demanding conditions. Superior transmitter stability decreases calibration frequency for reduced maintenance and operation costs.

Four measurements in one device

The advanced Rosemount 3095MV measures three process variables simultaneously and dynamically calculates fully compensated mass flow. One transmitter means reduced process penetrations, inventory and installation costs.

"Real-Time" compensated Mass Flow

Fully compensated mass flow reduces sources of traditional DP flow uncertainty. Rosemount 3095MV calculates Mass Flow by measuring process pressure and temperature to perform 'real-time' calculation of all flow equation parameters including density, viscosity, velocity, Reynolds number, beta ratio, discharge coefficient, velocity of approach, and the gas expansion factor. Superior flow calculations yield more accurate measurements to reduce variability and increase profitability.

Coplanar platform enables DP Flowmeters

The flexible coplanar platform allows integration with the complete offering of Rosemount primary elements for any flow application. The solution arrives factory calibrated, pressure-tested, and ready to install right out of the box. Only Rosemount has a scalable coplanar transmitter design to reduce engineering and inventory costs.

Rosemount® Pressure Solutions

Rosemount 3051S Series of Instrumentation

Scaleable pressure, flow and level measurement solutions improve installation and maintenance practices. See product data sheet 00813-0100-4801.

Rosemount 305 and 306 Integral Manifolds

Factory-assembled, calibrated and seal-tested manifolds reduce on-site installation costs. See product data sheet 00813-0100-4733.

Rosemount 1195 Integral Orifice Plate and ProPlate/Mass ProPlate Flowmeters

Convenient ready-to-install assembly designed for small-bore flow measurement of any clean gas, liquid, or vapor. See product data sheet 00813-0100-4686.

Annubar® Flowmeter Series

A series of highly accurate and repeatable insertion-type flowmeters available in 2-in. to 72-in. (50.8 to 1829 mm) line sizes. See product data sheet 00813-0100-4809.

Rosemount 405 Compact Orifice

A wafer style primary element with an integral three-valve manifold. See product data sheet 00813-0100-4810.

Specifications

FUNCTIONAL SPECIFICATIONS

Service
Gas, liquid, or steam

Differential Sensor

Limits

Code 1: 0 to 25 inH2O (0 to 0,062 bar)
Code 2: –250 to 250 inH2O (–0,622 to 0,622 bar)
Code 3: –1000 to 1000 inH2O (–2,49 to 2,49 bar)

Absolute Sensor

Limits

Code 3: 0.5 to 800 psia (0,0344 to 55,2 bar)
Code 4: 0.5 to 3,626 psia (0,0344 to 250 bar)

Gage Sensor

Limits

Code C: 0–800 psig (0–55,2 bar)
Code D: 0–3,626 psig (0–250 bar)

Temperature Sensor

Process Temperature Range

–150 to 1500 °F (–101 to 816 °C)

Fixed Temperature Range

–459 to 3500 °F (–273 to 1927 °C)

Overpressure Limit
0 psia to two times the absolute pressure sensor range with a maximum of 3,626 psia (250 bar).

Static Pressure Limit
Operates within specifications between static line pressures of 0.5 psia and the URL of the absolute pressure sensor.

Configuration:

HART Communicator

- Performs traditional Smart transmitter functions

PC-Based Engineering Assistance (EA) software package

- Contains built-in physical property database
- Enables flow configuration, maintenance, and diagnostic functions

Primary Elements:
Supports over 25 different primary elements including:

Annubar Averaging Pitot Tube	AGA Flange Taps
Rosemount 1195 Integral Orifice Plate	ISO/ASME Venturi
Rosemount 405 Compact Orifice	ISO/ASME Venturi Nozzle
ISO/ASME Orifice Flange Taps	Area Averaging Meter
Calibrated and Custom Primary Elements	V-Cone
ISO/ASME Corner Taps	

Physical Properties Database:

- Maintained in Engineering Assistant Software Configurator
- Applicable physical properties for over 110 fluids
- Natural gas per AGA
- Steam and water per ASME
- Other database fluids per American Institute of Chemical Engineers (AIChE)
- Optional custom entry

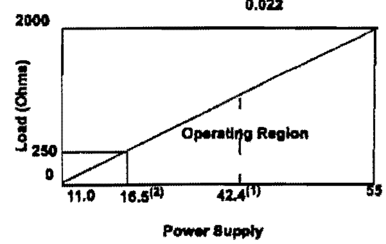
Output
Two-wire 4–20 mA, user-selectable for DP, AP, GP, PT, mass flow, or totalized flow. Digital HART protocol superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Power Supply
External power supply required. Transmitter operates on terminal voltage of 11–55 V dc.

Zero Suppression
Can be set anywhere within the sensor limits as long as the span is greater than or equal to the minimum span, the lower range value does not exceed the lower range limit, and the upper range value does not exceed the upper range limit.

Load Limitations
Loop resistance is determined by the voltage level of the external power supply, as described by:

$$\text{Max. Loop Resistance} = \frac{\text{Power Supply Voltage} - 11.0}{0.022}$$



(1) For CSA approval, power supply must not exceed 42.4 V dc.

(2) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.

Rosemount 3095MV

Temperature Limits

Process (at transmitter isolator flange for atmospheric pressures and above)

Silicone fill: –40 to 250 °F (–40 to 121 °C)

Inert fill: 0 to 185 °F (–18 to 85 °C)

(Process temperature above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.)

Ambient:

-40 to 185 °F (-40 to 85 °C)
with integral meter: -4 to 175 °F (-20 to 80 °C)

Storage:

-50 to 230 °F (-46 to 110 °C)
with integral meter: -40 to 185 °F (-40 to 85 °C)

Humidity Limits

0–100% relative humidity

Failure Mode Alarm

If self-diagnostics detect a non-recoverable transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. High or low alarm signal is user-selectable by internal jumper.

Turn-on Time

Digital and analog measured variables will be within specifications 7–10 seconds after power is applied to transmitter.

Digital and analog flow output will be within specifications 10–14 seconds after power is applied to transmitter.

Damping

Response to step input change can be user-selectable from 0 to 29 seconds for one time constant.

Steam Flow Calculations:

- Steam densities calculated per ASME steam tables.
- Saturated steam configurable using static pressure based density calculations.

Natural Gas Flow Calculations

- Flow calculations per 1992 AGA (American Gas Association) Report No 3 or ISO-5167 (2003).
- Compressibility Calculations per AGA Report No 8 or ISO-12213.

PERFORMANCE SPECIFICATIONS

(Zero-based spans, reference conditions, silicone oil fill, 316 SST isolating diaphragms, 4–20 mA analog output.)

Specification Conformance

The Rosemount 3095MV maintains a specification conformance of at least 3σ.

Mass Flow

Fully compensated for pressure, temperature, density, viscosity gas expansion, discharge coefficient, and thermal correction variances over operating range.

$Qm=NC_dEY_1d^2(DP(p))^{1/2}$.

Mass Flow Reference Accuracy

±1.0% of Mass Flow Rate over 8:1 flow range (64:1 DP range) for liquids and gases

Totalized Mass Flow

±1.0% of Total Mass Flow

NOTE:
Assume 64:1 DP range for liquids and gases.

(Uncalibrated differential producer (Orifice) installed per ASME MFC3M or ISO 5167-1. Uncertainties for discharge coefficient, producer bore, tube diameter, and gas expansion factor defined in ASME MFC3M or ISO 5167-1. Density uncertainty of 0.1%. Differential pressure calibrated at up to 1/10th full scale for optimum flow accuracy/rangeability.)

Differential Pressure (DP)

Range 1

0–0.5 to 0–25 inH2O (0–0,0344 to 0–0,0623 bar)
(50:1 rangeability is allowed)

Range 2

0–2.5 to 0–250 inH2O (0–6,22 to 0–622,7 mbar)
(100:1 rangeability is allowed)

Range 3

0–10 to 0–1000 inH2O (0–24,9 to 0–2490,9 mbar)
(100:1 rangeability is allowed)

Reference Accuracy (including Linearity, Hysteresis, Repeatability)

Range 2-3

±0.075% of span for spans from 1:1 to 10:1 of URL

For rangedowns greater than 10:1 of URL,

$$\text{Accuracy} = \left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right] \text{ \% of Span}$$

Range 1

±0.10% of span for spans from 1:1 to 15:1 of URL

For rangedowns greater than 15:1 of URL,

$$\text{Accuracy} = \left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right] \text{ \% of Span}$$

Ambient Temperature Effect per 50 °F (28 °C)

Range 2-3

±(0.025% of URL + 0.125% of span) for spans from 1:1 to 30:1
±(0.035% of URL – 0.175% of span) for spans from 30:1 to 100:1

Range 1

±(0.20% of URL + 0.25% of span) for spans from 1:1 to 30:1
±(0.24% of URL +0.15% of span) for spans from 30:1 to 50:1

Static Pressure Effects

Range 2-3

Zero error = ±0.05% of URL per 1,000 psi (68,9 bar)
Span error = ±0.20% of reading per 1,000 psi (68,9 bar)

Range 1

Zero error = ±0.05% of URL per 800 psi (55,1 bar)
Span error = ±0.40% of reading per 800 psi (55,1 bar)

DP Stability

Ranges 2-3

±0.125% URL for 5 years for 75°F (24°C)

±50°F (28°C) ambient temperature changes, and up to 1000 psi (6,9MPa) line pressure.

Range 1

±0.2% of URL for 1 year

Absolute/Gage Pressure

Range 3 (absolute)/Range C (gage)

0–8 to 0–800 psia (0–0,55 to 0–55,1 bar)
(100:1 rangeability is allowed)

Range 4 (absolute) /Range D (gage)

0–36.26 to 0–3,626 psia (0–2,5 to 0–250 bar)
(100:1 rangeability is allowed)

Reference Accuracy (Including Linearity, Hysteresis, Repeatability)

±0.075% of span for spans from 1:1 to 6:1 of URL
For rangedowns greater than 6:1 of URL,

$$\text{Accuracy} = \left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right] \text{ \% of Span}$$

Ambient Temperature Effect per 50 °F (28 °C)

±(0.050% of URL + 0.125% of span) spans from 1:1 to 30:1
±(0.060% of URL – 0.175% of span) spans from 30:1 to 100:1

Stability

±0.125% URL for 5 years for 75°F (24°C)

±50°F (28°C) ambient temperature changes, and up to 1000 psi (6,9MPa) line pressure.

Process Temperature (PT)

Specification for process temperature is for the transmitter portion only. Sensor errors caused by the RTD are not included. The transmitter is compatible with any PT100 RTD conforming to IEC 751 Class B, which has a nominal resistance of 100 ohms at 0 °C and α = 0.00385. Examples of compatible RTDs include the Rosemount Series 68 and 78 RTD Tempărature Sensors.

RTD Range

–150 to 1,500 °F (–101 to 816 °C)

PT Accuracy (Including Linearity, Hysteresis, Repeatability)

For 12 and 24 ft. Cables

±1.0 °F (0.56 °C) for process temperatures from –150 to 1200 °F (–101to 649 °C)

For process temperatures above 1200 °F (649 °C), add ±1.0 °F (0.56 °C) per 100 °F (38 °C)

For 75 ft. cables:

±2.0 °F (1.12 °C) for process temperatures from –150 to 1200 °F (–101 to 649 °C)

For process temperatures above 1200 °F (649 °C), add ±1.0 °F (0.56 °C) per 100 °F (38 °C)

PT Stability

±1.0 °F (0.56 °C) for 12 months

PHYSICAL SPECIFICATIONS

Security

- Transmitter security jumper mounted on electronics board, when enabled prevents changes to transmitter configuration.
- User Engineering Assistant provides two levels of optional password security

Electrical Connections

½–14 NPT, M20 × 1.5 (CM20), PG-13.5

RTD Process Temperature Input

100-ohm platinum RTD per IEC-751 Class B

Process Connections

Transmitter: ¼–18 NPT on 2$^1/_8$-in. centers $^1/_2$–14 NPT on 2-, 2$^1/_8$-, or 2$^1/_4$-in. centers with optional flange adapters
RTD: RTD dependent.

Process Wetted Parts

Isolating Diaphragms

316L SST or Hastelloy C-276®. CF-8M (last version of 316 SST, material per ASTM-A743)

Drain/Vent Valves

316 SST or Hastelloy C®

Flanges

Plated carbon steel, 316 SST, or Hastelloy C

Wetted O-rings

Glass-Filled TFE

Non-Wetted Parts

Electronics Housing

Low copper aluminum. NEMA 4X, CSA Enclosure Type 4X, IP 65, IP 66, IP 68

Bolts

Plated carbon steel per ASTM A449, Grade 5 or austenitic 316 SST

Fill Fluid

Silicone or halocarbon inert oil
(Inert oil only available for gage sensor modules.)

Paint (Aluminum Housing only)

Polyurethane

O-rings

Buna-N

Weight

Component	Weight in lb (kg)
Rosemount 3095MV Transmitter	6.0 (2.7)
SST Mounting Bracket	1.0 (0.4)
12 ft (3.66 m) RTD Shielded Cable	0.5 (0.2)
12 ft (3.66 m) RTD Armored Cable	1.1 (0.5)
24 ft (7.32 m) RTD Shielded Cable	1.0 (0.4
24 ft (7.32 m) RTD Armored Cable	2.2 (1.0)
75 ft (22.86 m) RTD Shielded Cable	1.9 (0.9)
75 ft (22.86 m) RTD Armored Cable	7.2 (3.2)
21 in (53 cm) RTD Armored Cable	0.5 (0.2)
12 ft (3.66 m) RTD CENELEC Cable	2.1 (0.9)
24 ft (7.32 m) RTD CENELEC Cable	3.0 (1.4)
75 ft (22.86 m) RTD CENELEC Cable	7.1 (3.2)
21 in (53 cm) RTD CENELEC Cable	1.2 (0.5)

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

Fisher-Rosemount GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific
Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., Limited – Beijing, China

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models 3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters
— QS Certificate of Assessment - EC No. PED-H-20
Module H Conformity Assessment

All other Model 3095_ Transmitters/Level Controller
— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (89/336/EEC)

Model 3095MV Flow Transmitters
— EN 50081-1: 1992; EN 50082-2:1995;
EN 61326-1:1997 – Industrial

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM)

A Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

B Combination of Approval Code A and the following: Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Canadian Standards Association (CSA) Approvals

C Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A, B, C, and D.Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

D Combination of Approval Code C and the following: Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C.

For input parameters see control drawing 03095-1020.

European Certifications

F ATEX Intrinsic Safety Certification
Certificate Number: BAS98ATEX1359X Ex II 1 G
EEx ia IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx ia IIC T4 (T_{amb} = –45 °C to 70 °C)
CE 1180

TABLE 1. Connection Parameters (Power/Signal Terminals)

U_i = 30V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 0

TABLE 2. Temperature Sensor Connection Parameters

U_o = 30V
I_o = 19 mA
P_o = 140 mW
C_i = 0.002 µF
L_i = 0

TABLE 3. Connection Parameters for Temperature Sensor Terminals

C_o = 0.066 µF	Gas Group IIC
C_o = 0.560 µF	Gas Group IIB
C_o = 1.82 µF	Gas Group IIA
L_o = 96 mH	Gas Group IIC
L_o = 365 mH	Gas Group IIB
L_o = 696 mH	Gas Group IIA
L_o/R_o = 247 µH/ohm	Gas Group IIC
L_o/R_o = 633 µH/ohm	Gas Group IIB
L_o/R_o= 633 µH/ohm	Gas Group IIA

Special Conditions for Safe Use

The Model 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 volts insulation test required by EN50 020, Clause 6.4.12 (1994). This condition must be accounted for during installation.

G ATEX Type N Certification
Certificate Number: BAS98ATEX3360X Ex II 3 G
EEx nL IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx nL IIC T4 (T_{amb} = –45 °C to 70 °C)
U_i = 55V
CE
The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD)

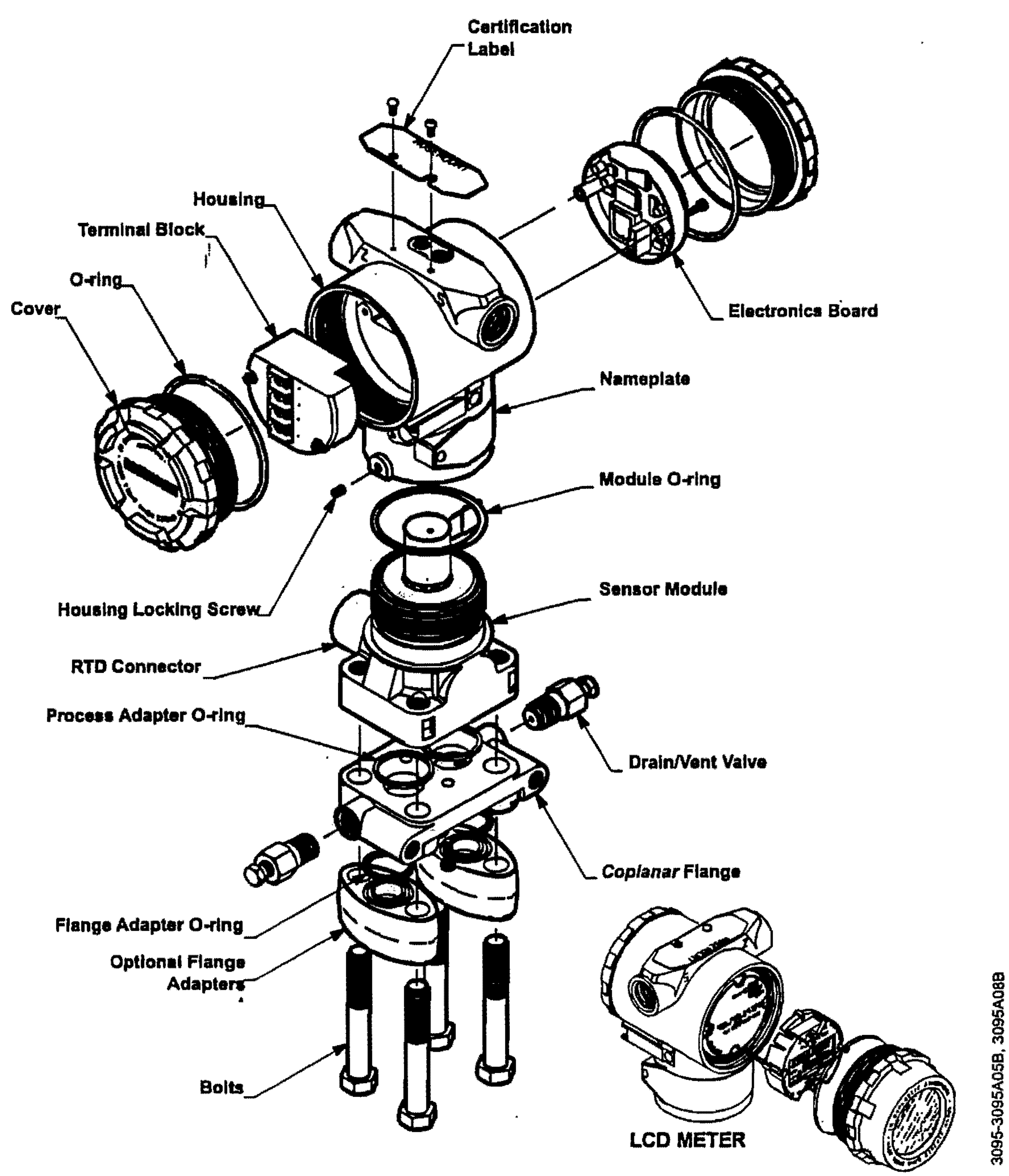
Special Conditions for Safe Use

The Model 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 volts insulation test required by EN50 021, Clause 9.1 (1995). This condition must be accounted for during installation.

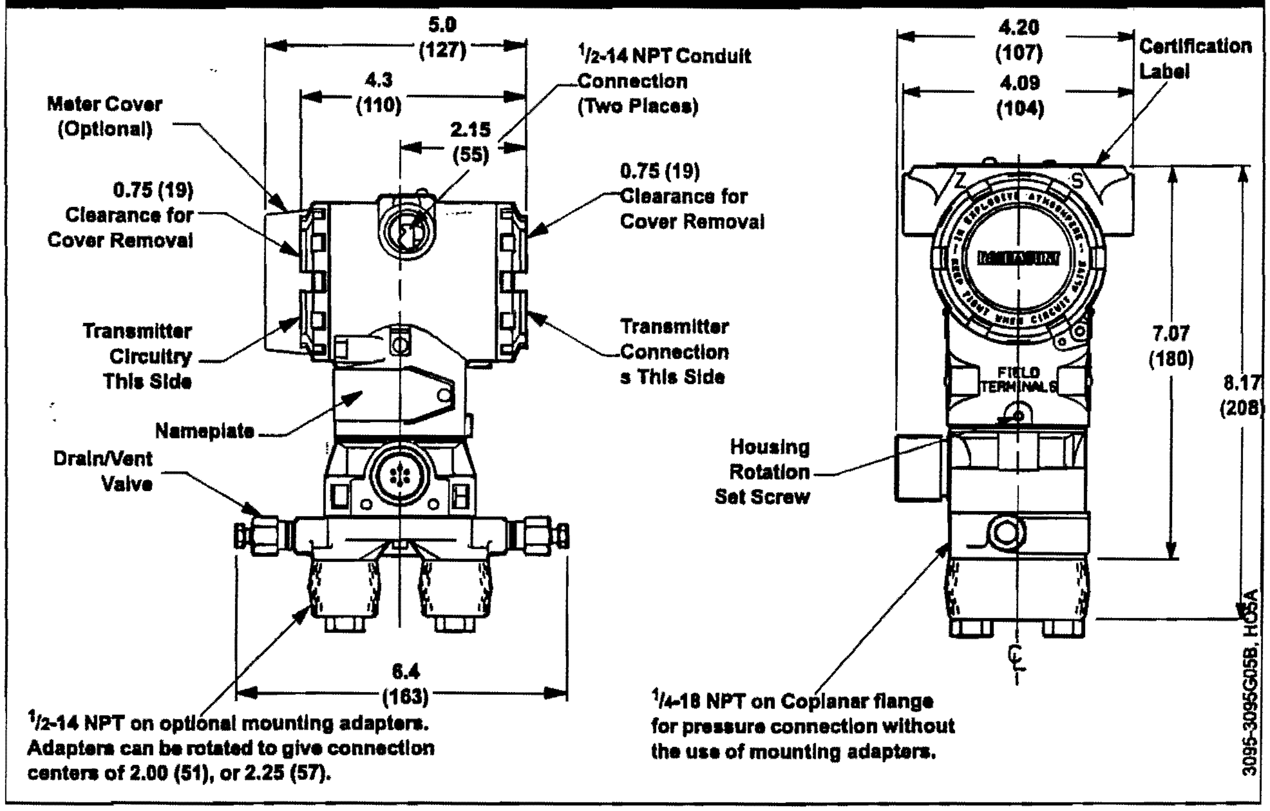
H ATEX Flameproof Certification
Certificate Number: KEMA02ATEX2320X Ex II 1/2 G
EEx d IIC T5 (-50°C ≤ T_{amb} ≤ 80°C)
T6 (-50°C ≤ T_{amb} ≤ 65°C)
CE 1180

Dimensional Drawings

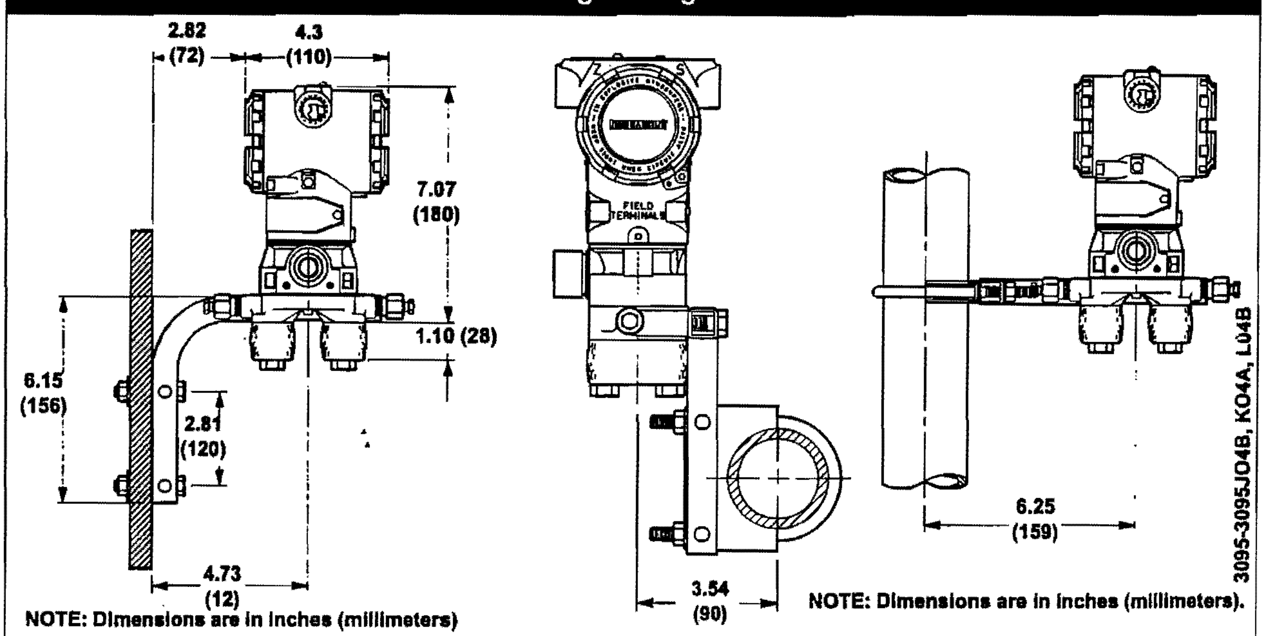
Exploded View of the Rosemount 3095MV



Rosemount 3095MV



Mounting Configurations



Ordering Information

Model	Product Description		
3095M	Multivariable Mass Flow Transmitter		
Code	**Output**		
A	4–20 mA with digital signal based on *HART* protocol		
Code	**Differential Pressure Range**		
1(1)	0–0.5 to 0–25 inH_2O (0–1,25 to 0–62,3 mbar)		
2	0–2.5 to 0–250 inH_2O (0–6,22 to 0–622,7 mbar)		
3	0–10 to 0–1000 inH_2O (0–0,024 to 0–2,49 bar)		
Code	**Static Pressure Ranges**		
3	0–8 to 0–800 psia (0–0,55 to 0–55,1 bar)		
4	0–36.26 to 0–3,626 psia (0–2,5 to 0–250 bar)		
C	0–8 to 0–800 psig (0–0,55 to 0–55,1 bar)		
D	0–36.26 to 0–3,626 psig (0–2,5 to 0–250 bar)		
Code	**Isolator Material**	**Fill Fluid**	
A	316L SST	silicone	
B(2)	*Hastelloy C-276*	silicone	
J(3)	316L SST	inert	
K(2)(3)	*Hastelloy C-276*	inert	
Code	**Flange Style**		**Material**
A	*Coplanar*		CS
B	*Coplanar*		SST
C	*Coplanar*		*Hastelloy C*
F(4)	*Coplanar*		SST, non-vented
J	DIN compliant traditional flange, SST 10 mm adapter/manifold bolting		SST, $^7/_{16}$ — 20 Bolting
0	None (required for option code S3 or S5)		
Code	**Drain/Vent Material**		
A	SST		
C(2)	Hastelloy C		
0	None (required for option code S3 or S5)		
Code	**O-ring**		
1	Glass-filled TFE		
Code	**Process Temperature Input (RTD ordered separately)**		
0	Fixed process temperature (no cable)		
1	RTD Input with 12 ft. (3,66 m) of Shielded cable (intended for use with conduit.)		
2	RTD Input with 24 ft. (7,32 m) of Shielded cable (intended for use with conduit.)		
7	RTD Input with 75 ft. (22,86 m) of Shielded cable		
3	RTD Input with 12 ft. (3,66 m) of Armored, Shielded cable		
4	RTD Input with 24 ft. (7,32 m) of Armored, Shielded cable		
5(5)	RTD Input with 21 in. (53 cm) of Armored, Shielded cable		
8	RTD Input with 75 ft. (22,86 m) of Armored, Shielded cable		
A	RTD Input with 12 ft. (3,66 m) of CENELEC Flameproof cable		
B	RTD Input with 24 ft. (7,32 m) of CENELEC Flameproof cable		
C	RTD Input with 75 ft. (22,86 m) of CENELEC Flameproof cable		
D(5)	RTD Input with 21 in. (53 cm) of CENELEC Flameproof cable (typically ordered with Approval Code H)		

(1) Available only with 3 or C sensor modules and A 316L SST/silicone, Isolator/Fill Fluid option.

(2) Materials of Construction meet NACE material recommendation per MR 01-75. Environmental limits apply to certain materials. Consult latest standard for details.

(3) Only available with C or D Gage Sensor Modules.

(4) Requires that Drain/Vent Material Code set to 0 (none).

(5) For use with Annubars with Integral RTDs.

Rosemount 3095MV

Code	Transmitter Housing Material	Conduit Entry Size
A	Polyurethane-covered aluminum	½–14 NPT
B	Polyurethane-covered aluminum	M20 × 1.5 (CM20)
C	Polyurethane-covered aluminum	PG 13.5
J	SST	½–14 NPT
K	SST	M20 × 1.5 (CM20)
L	SST	PG 13.5
Code	**Terminal Block**	
A	Standard	
B	With integral transient protection	
Code	**Meter**	
0	None	
1	LCD meter	
Code	**Bracket**	
0	None	
1	*Coplanar* SST flange bracket for 2-in. pipe or panel mount, SST bolts	
2	Traditional Flange Bracket for 2" Pipe Mounting, CS Bolts	
3	Traditional Flange Bracket for panel Mounting, CS Bolts	
4	Traditional Flange Flat Bracket for 2" Pipe Mounting, CS Bolts	
5	Traditional Flange Bracket for 2" Pipe Mounting, 300-Series, SST Bolts	
6	Traditional Flange Bracket for panel Mounting, 300-Series, SST Bolts	
7	Traditional Flange Flat Bracket for 2" Pipe Mounting, 300-Series, SST Bolts	
8	SST Traditional Flange Bracket for 2" Pipe Mounting, 300-Series, SST Bolts	
9	SST Traditional Flange Flat Bracket for 2" Pipe Mounting, 300-Series, SST Bolts	
Code	**Bolts**	
0	CS bolts	
1	Austenitic 316 SST bolts	
N	None (Required for Option Code S3 or S5)	
Code	**Approvals**	
0	None	
A	Factory Mutual (FM) Explosion-proof approval	
B	Factory Mutual (FM) Explosion-proof approval and non-incendive/intrinsic safety approval combination	
C	Canadian Standards Association (CSA) Explosion-proof approval	
D	Canadian Standards Association (CSA) Explosion-proof approval and non-incendive/intrinsic safety approval combination	
F	ATEX intrinsic safety certification	
G	ATEX Type N certification	
H	ATEX flameproof certification	
Code	**Engineered Measurement Solution (EMS)**	
B	Mass Flow and Measured Variables (DP, P, and T)	
Code	**Options**	
C2	Custom Flow Configuration (Requires completed Configuration Data Sheet 00806-0100-4716.)	
S3	Assembly with Rosemount 405 Compact Orifice (requires compact orifice model number, see 00813-0100-4810)	
S4[1]	Assembly with Rosemount Annubar Averaging Pitot Tubes or Rosemount 1195 Integral Orifice Plates (requires corresponding model number, see 00813-0100-4809, 00813-010004760, or 00813-0100-4686)	
S5	Assembly with Rosemount 305 Integral Manifold (Requires integral manifold model number – see 00813-0100-4733)	
S6	Assembly with Rosemount 309 Hookups (Required traditional Flange Style Options J, K, or L)	
P1	Hydrostatic Testing	
P2	Cleaning for Special Services	
Q4	Inspection Certificate for Calibration Data	
Q8[2]	Material Inspection Certificate per EN 10204 3.1B	
DF[3]	Flange Adapters — Adapter Type Determined by Selected Flange Material: Plated CS, SST, *Hastelloy C*	
Typical Model Number	**3095M A 2 3 A A A 1 3 A B 0 1 1 0 B**	

(1) With a primary element installed, the maximum operating pressure will be the lesser of either the transmitter or the primary element.

(2) This option is available for the sensor module housing, Coplanar and Coplanar flange adapters.

(3) Not available with assembly to Rosemount 1195 Integral Orifice Option Code S4.

OPTIONS

Standard Configuration

Unless otherwise specified, transmitter is shipped as follows

Engineering units:	
Differential	inH_2O (Range 2)
Absolute/gage	psi (all ranges)
Output:	4 - 20 mA HART
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
Flow Configuration Parameters:	Factory default
Software tag:	(Blank)

In addition, transmitter is shipped as follows:

The three process variables are digitally trimmed to the specified upper and lower range values.

For Mass Flow and Measured Variables (EMS Code B), process variable output order is set to Flow, DP, AP/GP, PT.

Flow is configured to measure air via ASME Orifice: Flange Tap, with a primary element minimum diameter of 0.5 in. (SST material), meter tube diameter of 2 in. (carbon steel material), flow range configured from 0–8,262 SCFH, 10–100 psia operating pressure range, and 50–100 °F operating temperature range.

Custom Configuration (Option Code C2)

If Option Code C2 is ordered, the customer specifies the custom flow configuration parameters in addition to the standard configuration parameters.
(See page 15)

Fixed Process Temperature

If process temperature input code is set to 0, the fixed process temperature is set to 68 °F unless specified during order entry.

Tagging

Three customer tagging options are available:

- Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3.18 mm),85 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request. Tag character height is 0.0625 in. (1.59 mm), 65 characters maximum.
- Tag may be stored in transmitter memory. Software tag (8 characters maximum) is left blank unless specified.
- Software tag (8 characters maximum) is left blank unless specified.

Assembly with Primary Elements (Option Code S3 or S4)

Rosemount 3095MV Flow Transmitters and either Annubar Averaging Pitot Tubes or Rosemount 1195 Integral Orifice Plates are fully assembled and calibrated by the factory.

Primary Element Product Data Sheets are listed below:

Annubar Flowmeter Series Includes:	
Rosemount 3051SFA Probar	00813-0100-4809
Rosemount 3095MFA Mass Probar	
Rosemount 485 Annubar Primary Element	
Proplate Flowmeter	
Mass Proplate Flowmeter	00813-0100-4686
Rosemount 1195 Integral Orifice Plate	
Rosemount 405P Compact Orifice	00813-0100-4810
Rosemount 1495 Orifice Plate	
Rosemount 1496 Flange Union	00813-0100-4792
Rosemount 1497 Meter Section	

Optional Rosemount 305 Integral Manifolds

Rosemount 3095MV Transmitter and 305AC (305BC) Integral Manifold are fully assembled, calibrated, and seal tested by the factory. Refer to PDS 00813-0100-4733 for additional information.

Temperature Sensors and Assemblies

Rosemount offers many types of temperature sensors and assemblies.

ACCESSORIES

Rosemount 333 HART Tri-Loop™ HART-to-Analog Signal Converter

The Rosemount 333 HART Tri-Loop can be installed with the 3095MV without disrupting existing device wiring. The Tri-Loop provides up to three additional analog outputs for monitoring or other controlling purposes without additional penetrations into the pipe.

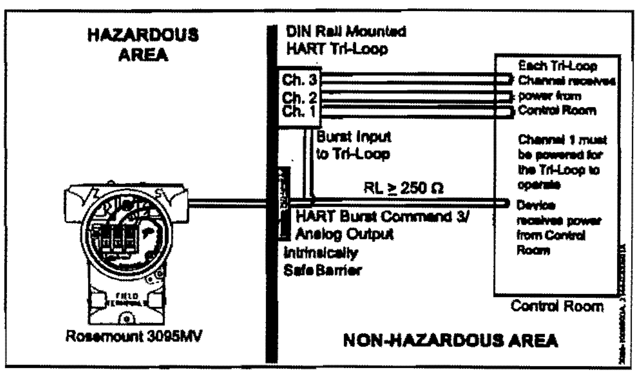
The HART Tri-Loop accepts the 3095MV digital signal and converts it to three independent isolated 4–20 mA analog signals. Any of the 3095MV process variables (DP, AP, GP, PT, or flow) can be provided via the Tri-Loop.

Rosemount 333 HART Tri-Loop Converter

Model	Product Description
333	HART Tri-Loop (standard configuration)
Code	**Alarm Option**
U	High Alarm
D	Low Alarm
Code	**Configuration Option**
(no code)	Standard Configuration
C2	Custom Configuration. Requires a completed Configuration Data Sheet (00806-0100-4754)
Typical Model Number: 333 U	

HART Tri-Loop Converter Accessories

Item Description	Part Number
HART Modem and Cables Only	03095-5105-0001



Rosemount 3095MV Engineering Assistant Software Packages

The Rosemount 3095MV Engineering Assistant software package is available with or without the HART modem and connecting cables. All configurations are packaged separately.

For best performance of the EA Software, the following computer hardware and software is recommended:

Optional Software Code W

- DOS-based 386 personal computer or above
- 640K Base RAM memory with 8 MB extended
- Mouse or other pointing device
- 4 MB of available hard disk space
- Color computer display
- DOS 5.0 or higher
- Windows™ 3.1, Windows for Workgroups 3.11, Windows 95

Option Code N:

- Pentium, 800MHz personal computer or above
- 512 MB RAM
- 350 MB of available hard disk space
- Mouse or other pointing device
- Color computer display
- Windows 98, NT, 2000 or XP

Engineering Assistant Software Packages

Code	Product Description
EA	MV Engineering Assistant Software program
Code	**Diskette Type**
1[1]	EA Rev. 4.0, 3.5-inch diskettes (2)
2[2]	EA Rev. 5, CD-ROM (includes HART Tri-Loop Configurator Software)
Code	**Language**
E	English
Code	**HART Modem and Connecting Cables**
O	None
H	HART Modem and Cables Included
Code	**Operating Software**
W	Windows Version 3.1, Windows Workgroup 3.11, or Windows 95
N	EA Rev. 5 [3]
Code	**License**
1	Single PC license
2	Site license
Code	**Additional Software**
0	None
Typical Model Number: EA1E0W10	

(1) Must be ordered with Code W Operating Software.

(2) Must be ordered with Code N Operating Software.

(3) Revision 5.2 supports Windows 98, NT, or 2000. Revision 5.3 supports Windows NT, 2000, or XP and upgrades only on Windows 98.

Configuration Data Sheet

Complete this form to define a Custom Flow Configuration for the Rosemount 3095MV. Unless Specified, the 3095MV will ship with the default values identified by the ★ symbol.For technical assistance in filling out this CDS, contact your local Rosemount representative.
Note: Any missing information will be processed with the indicated default values.

Customer Information

Customer________________________ P.O. No ________________________

Customer Line Item________________________ Model No. (1) ________________________

Tag Type ☐ SST Wire-on Tag (85 characters maximum) ☐ Stamped on Nameplate (65 characters maximum)

Tag Information________________________

Transmitter Information (Optional)

Software Tag |_|_|_|_|_|_|_|_| (8 characters)

Descriptor |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|(16 characters maximum)

Message |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_| (32 characters)

Date |_|_| (dd) |_|_|_| (MMM) |_|_| (yy)

Flow Configuration (required)

Select units for each Process Variable, then enter sensor Lower Trim Value (LTV) and sensor Upper Trim Value (UTV).
Note: LTV and UTV must be within the range limits.

Differential Pressure

DP Units
☐ inH_2O-68 °F ☐ inH_2O-0 °C ☐ ftH_2O-68 °F ☐ mmH_2O-68 °F
☐ mmH_2O-0 °C ☐ psi ☐ bar ☐ mbar
☐ g/SqCm ☐ Kg/SqCm ☐ Pa ☐ kPa
☐ torr ☐ Atm ☐ inH_2O-60 °F

Trim Values LTV________________(0 ★) UTV________________(URL in H2O-68 °F ★)

Static Pressure

Static Units
☐ inH_2O-68 °F ★ ☐ inH_2O-0 °C ☐ ftH_2O-68 °F ☐ mmH_2O-68 °F
☐ mmH_2O-0 °C ☐ psi ☐ bar ☐ mbar
☐ g/SqCm ☐ Kg/SqCm ☐ Pa ☐ kPa
☐ torr ☐ Atm ☐ inH_2O-60 °F

Trim Values(1) LTV________________(0 ★) UTV________________(URL psi ★)

Process Temperature

PT Units ☐ °F ★ ☐ °C

Trim Values LTV________________(-300 ★) UTV________________(1500 °F★)

Flow Rate

Flow Units
☐ StdCuft/s ☐ StdCuft/min ☐ StdCuft/h ☐ StdCuft/d
☐ StdCum/h ☐ StdCum/d ☐ lbs/sec ☐ lbs/min
☐ lbs./hour ★ ☐ lbs/day ☐ grams/sec ☐ grams/min
☐ grams/hour ☐ kg/sec ☐ kg/min ☐ kg/hour
☐ NmlCuM/hour ☐ NmlCuM/day ☐ Special (see Flow Rate Special Units)

Flow Rate Special (use if "Special" is checked in Flow Rate above)

NOTE: Flow Rate Special Units = Base Flow Unit multiplied by Conversion Factor.

Base Flow Units (select from above Flow Rate units)________________________

Conversion Factor________________________

Display As|_|_|_|_|_| *(available units A-Z, 0-9)*

Continued on Next Page

Flow Configuration (required) Continued

Flow Rate Output

Low PV (4 mA)________________________ (0.00 ★) High Pv (20 mA)________________________

(1) If absolute pressure module, then lower static pressure values must be ≥ 0.5 psia (34.5 mbar)

Flow Total

Flow Units

- ☐ Grams ☐ Kilograms ☐ Metric Tons ☐ Pounds
- ☐ Short Tons ☐ Long Tons ☐ Ounces ☐ NmlCuM
- ☐ Normal Liters ☐ StdCuM ☐ StdCuFt
- ☐ Special (see Flow Total Special Units)

Flow Total Special (use if "Special" is checked in Flow Total above)

NOTE: Flow Rate Special Units = Base Flow Unit multiplied by Conversion Factor.

Base Flow Units (select from above Flow Total units)________________________

Conversion Factor________________________

Display As|__|__|__|__|__| *(available units A-Z, 0-9)*

Fluid Type (Select One)

☐ Gas ☐ Liquid

Fluid Information (Complete one section only)

☐ **Steam (ASME Saturated and/or Superheated)**

☐ **Natural Gas *NOTE: If you selected Natural Gas, complete the Compressibility Factor Information on page 17***

☐ **Gas or Liquid from AIChE database: Circle ONE fluid name below:**

Acetic Acid	Cyclopropane	Isopropanol	n-Heptane	1-Dodecanol
Acetone	Divinyl Ether	Methane	n-Hexane	1-Heptanol
Acetonitrile	Ethane	Methanol	n-Octane	1-Heptene
Acetylene	Ethanol	Methyl Acrylate	n-Pentane	1-Hexene
Acrylonitrile	Ethylamine	Methyl Ethyl Ketone	Oxygen	1-Hexadecanol
Air	Ethylbenzene	Methyl Vinyl Ether	Pentafluorothane	1-Octanol
Allyl Alcohol	Ethylene	m-Chloronitrobenzene	Phenol	1-Octene
Ammonia	Ethylene GlycolEthylene	m-Dichlorobenzene	Propane	1-Nonanal
Argon	Oxide	Neon	Propadiene	1-Nonanol
Benzene	Fluorene	Meopentane	Pyrene	1-Pentadecanol
Benzaldehyde	Furan	Nitric Acid	Propylene	1-Pentanol
Benzyl Alcohol	Helium-4	Nitric Oxide	Styrene	1-Pentene
Biphenyl	Hydrazine	Nitrobenzene	Sulfur Dioxide	1-Undecanol
Carbon Dioxide	Hydrogen	Nitroethane	Toluene	1,2,4-Trichlorobenzene
Carbon Monoxide	Hydrogen Chloroide	Nitrogen	Trichloroethylene	1,1,2-Trichloroethane
Carbon Tetrachloride	Hydrogen Cyanide	Nitromethane	Vinyl Acetate	1,1,2,2-Tetrafluoroethane
Chlorine	Hydrogen Peroxide	Nitrous Oxide	Vinyl Chloride	1,2-Butadiene
Chlorotrifluoroethylene	Hydrogen Sulfide	n-Butane	Vinyl Cyclohexane	1,3-Butadiene
Chloroprene	Isobutane	n-Butanol	Water	1,2,5-Trichlorobenzene
Cycloheptane	Isobutene	n-Butyraldehyde	1-Butene	1,4-Dioxane
Cyclehexane	Isobutylbenzene	n-Butyronitrile	1-Decene	1,4-Hexadiene
Cyclopentane	Isopentane	n-Decane	1-Decanal	2-Methyl-1-Pentane
Cyclopentene	Isoprene	n-Dodecane	1-Decanol	2,2-Dimethylbutane
		n-Heptadecane	1-Dodecene	

☐ **Custom Gas or Liquid**

Enter your custom fluid name ________________________

NOTE: If you are defining a custom fluid, complete the density and viscosity information on page 18

Required For Natural Gas Only

Compressibility Factor Information

Choose desired characterization method, and only enter values for that method:

☐ Detail Characterization Method (AGA8 1992)			Mole	Valid Range
CH4	Methane mole percent	______	%	0-100 percent
N2	Nitrogen mole percent	______	%	0-100 percent
CO2	Carbon Dioxide mole percent	______	%	0-100 percent
C2H6	Ethane mole percent	______	%	0-100 percent
C3H8	Propane mole percent	______	%	0-12 percent
H2O	Water mole percent	______	%	0-Dew Point
H2S	Hydrogen Sulfide mole percent	______	%	0-100 percent
H2	Hydrogen mole percent	______	%	0-100 percent
CO	Carbon Monoxide mole percent	______	%	0-3.0 percent
O2	Oxygen mole percent	______	%	0-21 percent
C4H10	i-Butane mole percent	______	%	0-6 percent(2)
C4H10	n-Butane mole percent	______	%	0-6 percent(2)
C5H12	i-Pentane mole percent	______	%	0-4 percent(3)
C5H12	n-Pentane mole percent	______	%	0-4 percent(3)
C6H16	Hexane mole percent	______	%	0-Dew Point
C7H16	n-Heptane mole percent	______	%	0-Dew Point
C8H18	n-Octane mole percent	______	%	0-Dew Point
C9H20	n-Nonane mole percent	______	%	0-Dew Point
C10H22	n-Decane mole percent	______	%	0-Dew Point
He	Helium mole percent	______	%	0-3.0 percent
Ar	Argon mole percent	______	%	0-1.0 percent
☐ Gross Characterization Method, Option 1 (AGA8 Gr-Hv-Co2)		Valid Range		
Specific gravity at 14.73 psia and 60 °F		______		0.554-0.87
Volumetric Gross Heating Value at Base Conditions		______	BTU/SCF	477-1150 BTU/SCF
Carbon Dioxide mole percent		______	%	0-30 percent
Hydrogen mole percent		______	%	0-10 percent
Carbon Monoxide mole percent		______	%	0-3 percent
☐ Gross Characterization Method, Option 2 (AGA8 Gr-CO2-N2)		Valid Range		
Specific gravity at 14.73 psia and 60 °F		______		0.554-0.87
Carbon Dioxide mole percent		______	%	0-30 percent
Nitrogen mole percent		______	%	0-50 percent
Hydrogen mole percent		______	%	0-10 percent
Carbon Monoxide mole percent		______	%	0-3 percent

(2) *The summation of i-Butane and n-Butane cannot exceed 6 percent.*

(3) *The summation of i-Pentane and n-Pentane cannot exceed 4 percent.*

Rosemount 3095MV

Required for Custom Gas Only

Gas Compressibility and Viscosity Information

1. **Fill in the following operating pressures and operating temperatures. Min and max values must match values entered under Process Operating Conditions.**

Operating Pressures	Operating Temperatures	
(1)________min	(5)________min	(8)________[1/3(max-min)]+min
(2)________[1/3(max-min)]+min	(6)________[1/2(max-min)]+min	(9)________[2/3(max-min)]+min
(3)________[2/3(max-min)]+min	(7)________max	
(4)________max		

2. **Transfer the values from the above section to the numbered lines below.**
3. Check one Density/Compressibility box, then enter the 12 values for each pressure/temperature range.
4. Check one Viscosity box, then enter values for each temperature. (At least one viscosity value is required.)
5. Enter values for molecular weight, isentropic exponent, and standard density (or standard compressibility).

Pressure	Temp	☐ Density in Kg/CuM ☐ Density in Lbs/CuFt ☐ Compressibility	Temp.	☐ Viscosity in Centipoise ☐ Viscosity in Lbs/Ft Sec ☐ Viscosity in Pascal Sec
(1)________	(5)________	________	(5)________	________
(2)________	(5)________	________	(8)________	________
(3)________	(5)________	________	(9)________	________
(4)________	(5)________	________	(7)________	________
(1)________	(6)________	________		
(2)________	(6)________	________	Molecular Weight	________
(3)________	(6)________	________		
(4)________	(6)________	________	Isentropic Exponent	________1.4 ★
(1)________	(7)________	________		
(2)________	(7)________	________		
(3)________	(7)________	________		
(4)________	(7)________	________		

Standard density/compressibility ____________
(at standard reference conditions specified on page 21)

NOTE: Custom Gas Configuration order will be delayed if any fields on this page are left blank.

Required for Custom Liquid Only

Liquid Density and Viscosity Information

NOTE: Only fill out this page if you have selected a custom liquid.

1. Fill in the following operating temperatures. (Min and max values must match values entered under Process Operating Conditions)

Operating Temperatures

(a)______________min

(b)______________[$^1/_3$(max-min)]+min

(c)______________[$^2/_3$(max-min)]+min

(d)______________max

2. Transfer the values from the above section to the lettered lines below.

3. Check one Density box, then enter values for each temperature and the standard density.

4. Check one Viscosity box, then enter values for each temperature. (At least one viscosity value is required.)

				☐ Viscosity in Centipoise
	☐	Density in Lbs/CuFt		☐ Viscosity in Lbs/Ft Sec
Temp.	☐	Compressibility	Temp.	☐ Viscosity in Pascal Sec
(a)________		________	(a)________	________
(b)________		________	(b)________	________
(c)________		________	(c)________	________
(d)________		________	(d)________	________

Standard density/compressibility ________________
(at standard reference conditions specified on page 21)

NOTE: Custom Liquid Configuration order will be delayed if any fields on this page are left blank.

★ = Indicates default value

Rosemount 3095MV

Primary Element Information

Select Differential Producer (Select One)

- ☐ 405__ Compact Orifice
- ☐ 1195 Integral Orifice
- ☐ Annubar/Mass Probar ★
- ☐ Nozzle, Long Radious Wall Taps, ASME
- ☐ Nozzle, Long Radious Wall Taps, ISO
- ☐ Nozzle, ISA 1932, ISO
- ☐ Orifice, 2 1/2D & 8D Taps
- ☐ Orifice, Corner Taps, ASME
- ☐ Orifice d & D/2 Taps, ASME
- ☐ Orifice, D & D/2 Taps, ISO
- ☐ Orifice, Flange Taps, ASME
- ☐ Orifice, Flange Taps, AGA3
- ☐ Orifice, Flange Tape, ISO
- ☐ Small Bore Orifice, Flange Taps, ASME
- ☐ Venturi Nozzle, ISO
- ☐ Venturi, Rough Cast/Fabricated Inset, ASME
- ☐ Venturi, Rough Cast Inlet, ISO
- ☐ Venturi, Machined Inlet, ASME
- ☐ Venturi, Welded Inlet, ISO

Selecting Area Averaging Meter, V-Cone®, or calibrated primary element requires a constant value for discharge coefficient: ________ .

- ☐ Area Averaging Meter
- ☐ V-Cone ☐ Calibrated Venturi
- ☐ Calibrated output

Primary Element Minimum Diameter (d) ____________ ☐ in. ☐ mm

at ____________ ☐ °F ☐ °C In. at 68 °F ★

or

Sensor Series No. ____________________ Enter series designation

Differential Producer

Material (Select One) ☐ Carbon Steel ☐ SST 304 ☐ SST316

☐ *Hastelloy C* ☐ *Monel*

Pipe Tube Diameter (Pipe ID) (D)________________ ☐ in. ☐ mm at ____________ ☐ °F ☐ °C In. at 68 °F ★

Pipe Tube Material (Select One) ☐ Carbon Steel ★ ☐ SST 304 ☐ SST 316

☐ *Hastelloy C* ☐ *Monel*

Process Operating Conditions

Operating Pressure Range ________________ to ________________

☐ psia ☐ psig ☐ kPa (absolute) ☐ kPa (gage)

Operating Temperature Range ________________ to ________________ ☐ °F ☐ °C

For fixed process temperatures (Model Code = 0), enter value ________________

Valid range: -459 to 3500 °F (-273 to 1927 °C)

NOTE: For steam applications, temperatures must be equal to or greater than the saturation temperature at the given pressures.

Atmospheric Pressure

Atmospheric Pressure= ______________ ☐ psia ☐ kPa (absolute) ☐ Bar 14.696 psia ★

Standard Reference Conditions

NOTE: The information in only required if any of the following flow units were selected:
StdCuft/s, StdCuft/min, StdCuft/h, StdCuft/d, StdCum/h, StdCum/d

Standard Reference Conditions:

Standard Pressure= ______________ ☐ psia ☐ Bar 14.696 psia ★

(gas/steam only) ☐ kPa (absolute)

Standard Temperature ______________ ☐ °F★ ☐ °C 60 °F ★ (For steam, 212 °F ★)

Transmitter Information (Required)

Failure Mode Alarm Direction (select one) ☐ Alarm High★ ☐ Alarm Low

LCD Meter Configuration

Process variables displayed on LCD:

- ☐ Absolute Pressure
- ☐ Analog Output Current
- ☐ Differential Pressure
- ☐ Flow
- ☐ Flow Total
- ☐ Gauge Pressure
- ☐ Percent of Range
- ☐ Process Temperature

Number of seconds to display each variable: ______________

(available ranges from 2-10 seconds, in one second increments)

Burst Mode

☐ Disabled ☐ Enabled

If the transmitter is to be used with Rosemount Rosemount 333, burst mode must be enabled.

For RMD Internal Use Only

House Order No.: ______________

Line Item No.: ______________

Transmitter Serial No.: ______________

RCC Tech.: ______________

(1) *A complete model number is required before Rosemount Inc. can process this custom configuration order.*

Cover Photo: MV-3095001B, 3095-0619.

Approved by the Committee of Russian Federation for Standardization, Metrology and Certification (the Gosstandart of Russia) and registered in the Russian State Register of measuring instruments.

Emerson Process Management

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EMERSON.
Process Management

PTO #9584- R3

PTO #9584-R3, Processed Gas Flow Measurement Plan 9.C.16(v)

Maintenance and Calibration of the measurement devices that measure the withdrawal gas from dehydration Plant #14

February 8, 2012

Maintenance of the measurement system for withdrawn and dehydrated gas

Meter tubes 3419 and 3433 are equipped with Daniel Senior Orifice fittings installed horizontally at ground level and designed for orifice plate removal and inspection. The Contactor outlet gas piping is vertical and equipped with a fixed AGA 3 orifice plate, 14 feet above grade and is not designed for removal and inspection.

<u>Quarterly Visual inspection of M/T 3419 & 3433 Daniel Senior Orifice Plates</u> – (see attachment #1)

a. Check for nicks
b. Check for sharpness of inside edge
c. Check for flatness of plate
d. Check seal around orifice plate carrier
e. Clean orifice plate and parts
f. Document inspection results in facility files

<u>Semi-Annual Calibration of TotalFlow X-Series Flow Computers</u>
(installed on M/T 3419 & 3433)

a. TotalFlow X-Series Calibrations are done Semi-Annually. The Zero and Span values are calibrated per the TotalFlow Computer manufacturers recommended procedures.

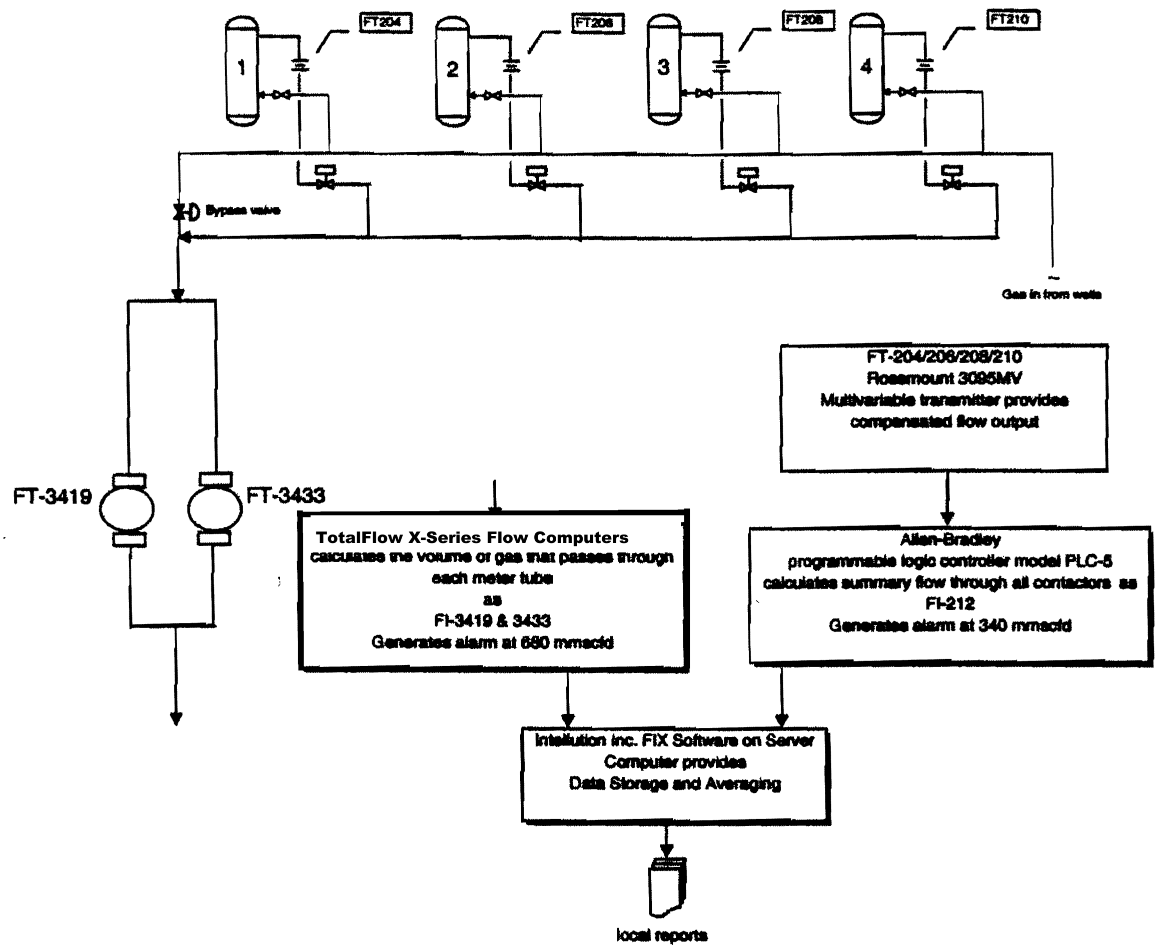
b. Calibration documentation will be maintained in facility files.

<u>Quarterly Calibration of Rosemount 3095 MV Multivariable transmitters</u>
(installed on contactors)

a. Using Rosemount manual # 00809-0100-4716 as reference (see attachment #3, excerpt of manual) transmitters will be calibrated for zero and span values.

b. Calibration documentation will be maintained in facility files.

GOLETA STORAGE FIELD
WITHDRAWAL GAS MEASUREMENT



FI-212 = FI-204+FI-206+FI-208+FI-210

Average hourly flow ⇒ Average daily flow

Bypass flow =
FI-3419 + FI-3433 - FI-212

Average daily W/D for month per W/D flow day = $\frac{\text{Total daily W/D for month}}{\text{\# of flow days}}$

2100726-001 (AF)

TOTALFLOW®

*X*Series Flow Computer

User's Manual

Copyright Notice

Table of Contents

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Introduction

About the Manual

This manual is written to provide an experienced flow meter technician with the requirements necessary to install, setup and operate a Totalflow X Series Series Flow Computer System.

Organization & Style

Each of the chapters in this manual presents information in an organized and concise manner. Readers are able to look at the headings and get a broad picture of the content without reading every word. Also, there are overviews at the beginning of each chapter that provides you with an idea of what is in the chapter, and how it fits into the overall manual.

Highlights

This manual provides the following information:

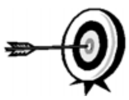
Chapter	Description
1. System Description	Provides a description of the Totalflow, X Series system components, specifications, and description of flow computer computation methods.
2. Installation	Includes unpacking and detailed procedures for setup and installation.
3. XFC Startup	Provides you with a tutorial on how to get a newly installed XFC system up and running.
4. Maintenance	Provides instructions on how to remove and replace major modules.
5. Troubleshooting	Provides a description of the XFC front panel error messages and provides a troubleshooting chart on how to correct most problems.
6. Definitions and Acronyms	Provides quick access to the majority of terms and acronyms, as well as their definitions.
7. Drawings	Provides a place to put drawings that accompany a unit.

Key Symbols

The following symbols are used frequently in the manual. These are intended to catch your eye and draw your attention to important information.

FYI  Intended to draw your attention to a statement that might clarify a point made earlier.

CAUTION  Intended to draw your attention to a statement that might keep you from making a mistake, keep you from destroying equipment or parts, or keep you from personal injury.

TIP  Intended to draw your attention to a fact that may be useful or helpful.

Getting Help

At Totalflow, we take pride in the on going support we provide our customers. When you purchase a product, you receive documentation which should answer your questions; however, your Totalflow technical support provides you an 800 number as an added source of information.

If you require assistance, call:

USA: (800) 442-3097 International: 001-918-338-4888

Before You Call

Know your Totalflow's serial number. Serial numbers can be found on the escutcheon plate located on the side of each unit.

Be prepared to give the customer service representative a detailed description of the problem.

Note any alarms or messages as they appear on the PCCU or front panel LCD.

Prepare a written description of problem.

Know your software version, board and AMU part numbers.

Safety Practices and Precautions

This manual contains information and warnings which have to be followed by the user to ensure safe operation and to retain the product in a safe condition.

Safety First

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

Symbols in This Manual

This symbol indicates where applicable safety, cautionary or other information is to be found.

Continued on Next Page

Terms Marked on Equipment

DANGER indicates a personal injury hazard immediately accessible as one reads the markings.

CAUTION indicates a personal injury hazard not immediately accessible as one reads the markings, or a hazard to property, including the equipment itself.

Symbols Marked on Equipment

Protective ground (earth) terminal

Grounding the Product

If a grounding conductor is required, it should be connected to the grounding terminal before any other connections are made.

Correct Operating Voltage

Before switching on the power, check that the operating voltage listed on the equipment agrees with the power being connected to the equipment.

Danger Arising From Loss of Ground

A grounding conductor may or may not be required depending on the hazardous classification. If required, any interruption of the grounding conductor inside or outside the equipment or loose connection of the grounding conductor can result in a dangerous unit. Intentional interruption of the grounding conductor is not permitted.

Safe Equipment

If it is determined that the equipment cannot be operated safety, it should be taken out of operation and secured against unintentional usage.

Fuse Replacement

Fuses used on Model X Series electronic boards are surface mount and field repair should not be attempted. Most fuses automatically reset themselves, but if a know problem exists, the board should be sent in for repair or replacement.

Safety Guidelines

DO NOT open the equipment to perform any adjustments, measurements, maintenance, parts replacement or repairs until all external power supplies have been disconnected.

Only a properly trained technician should work on any equipment with power still applied.

When opening covers or removing parts, exercise extreme care "live parts or connections can be exposed".

Capacitors in the equipment can still be charged even after the unit has been disconnected from all power supplies.

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Chapter 1
System Description

Overview

This Chapter introduces you to the Totalflow® X Series Flow Computers (XFC). The X Series are low power, microprocessor based units designed to meet a wide range of measurement, automation, monitor, control and alarming applications for remote oil and gas systems of many kinds. Six models of the X Series are available: Models XFC 6410, XFC 6413 and XFC 6713 are differential (Orifice) meters. Models XFC 6411, XFC 6414 and XFC 6714 are pulse (Linear) meters.

The models XFC 6410 and XFC 6411 are packaged in a small enclosure and are designed for only the XFC-195 Board (main electronic board) and a variety of batteries. When using these flow computers, communication devices can be installed in a separate enclosure, such as the model 6470, if needed. See Figures 1–1 and 1–2.

The models XFC 6413 and XFC 6414 are packaged in an enclosure that can accommodate the XFC-195 Board, a variety of remote communications devices, batteries, and up to 3 additional I/O modules. These I/O modules generally provide 8 I/O points per module. See Figures 1–3 and 1–4.

The models XFC 6713 and XFC 6714 that are packaged in an enclosure that can accommodate the XFC-195 Board, a variety of remote communications options, batteries, and up to 6 additional I/O modules. See Figures 1–5 and 1–6.

All of the X Series Flow Computers feature single or multi-tube capability, up to 5 per unit (8 tubes per unit in special cases) with custody transfer measurement features. These flow computers are also quite flexible and allow you to increase productivity and improve asset utilization. See Table 1–1 for the XFC Family Genealogy.

The letters XFC stand for Expandable Flow Computer. As their name implies, they are expandable to meet your needs, while maintaining backward compatibility with legacy Totalflow systems.

Highlights This Chapter covers the following topics:

Continued on Next Page

FYI

The XFC maintains a history of alarms as well as average differential pressure (DP), average static pressure (SP), average flowing temperature (Tf), accumulated volume and energy. Additionally, for Differential Meters an average extension is maintained while for Pulse (linear) Meters an uncorrected volume accumulator is maintained.

The Orifice (differential) XFC can be programmed to calculate flow rates and volumes in accordance with either AGA 3-85, AGA 3-92, or additional flow calculations methods available on request such as; ISO5167, Liquid, Vcone, FloNozzle, etc.

The Pulse (linear) XFC can be programmed to calculate flow rates and volumes in accordance with AGA 7.

Supercompressibility calculations can be performed in accordance with either NX-19 or AGA 8-92, gross or detail.

Capabilities

The XFC defaults to retention of daily and log period records for 40 days and retention of 200 events. These defaults can be extended, limited only by the file space on the device.

All models may be used in conjunction with the handheld FS/2 and/or a laptop computer running PCCU32 software. The FS/2 can do the basic setup parameters, but PCCU32 is required for many of the advanced features of the X Series devices.

Models XFC 6410 and XFC 6411 perform the basic functions and include additional I/O as provided on the Main Electronic Board (XFC-195).

Models XFC 6413 and XFC 6414 perform these same basic functions and additionally have the option for three TFIO modules.

Models XFC 6713 and XFC 6714 perform these same basic functions and additionally have the option for six TFIO modules.

Table 1–1 XFC Family Genealogy

XFC Model	XFC-195 Board	Orifice Meter	Pulse Meter	Max. Battery Capacity	Communication Equipment	Max. TFIO Modules
6410	●	●		26AH	N/A	N/A
6411	●		●	26AH	N/A	N/A
6413	●	●		26AH	Yes	3
6414	●		●	26AH	Yes	3
6713	●	●		42AH	Yes	6
6714	●		●	42AH	Yes	6

XFC General Specifications

Dimensions

XFC Model	Width	Height	Depth
6410	10.00” (254.00mm)	13.80” (350.72mm)	9.37” (237.99mm)
6411	10.00” (254.00mm)	12.15” (308.56mm)	9.37” (237.99mm)
6413	12.55” (318.77mm)	18.31” (465.07mm)	10.27” (260.86mm)
6414	12.55” (318.77mm)	16.65” (422.91mm)	10.27” (260.86mm)
6713	15.10” (383.54mm)	22.31” (566.67mm)	13.83” (351.28mm)
6714	15.10” (383.54mm)	20.64” (524.26mm)	13.83” (351.28mm)

Installed Depth

XFC Model	Pipe Mounted	Wall Mounted
6410/6411	10.68” (271.27mm)	10.12” (257.05mm)
6413/6414	11.58” (294.13mm)	11.02” (279.91mm)
6713/6714	14.56” (369.82mm)	14.00 (355.60mm)

Weight (w/o battery)

XFC Model	Pounds	Kilograms
6410	13.5	5.04
6411	11.5	4.29
6413	17.9	6.68
6414	15.9	5.93
6713	29.0	10.82
6714	27.0	10.08

Humidity 0-95% Non-condensing

Mounting Wall, pipe or direct

Oper. Temp. -40°F to 185°F (-40°C to 85°C)

Certifications & EMC Req. Please see Product Data Sheets:

Differential Flow Computer Part No. 2101101-001

Linear Flow Computer Part No. 2101102-001

XFC-195 Board

Power	Battery 12 VDC
External Power	SWVBAT: 1 fused with 2.5 amp PTC VBAT: 1 fused with 2.5 amp PTC
Charger	Solar or 16-18 VDC
Memory	• Data stored in 512K SRAM. RAM memory has lithium backup battery. • Applications programs stored in 512K Flash. • Flash loader stored in 512K PROM • Registry and Configuration files stored in 16/32K E^2PROM • Transducer factory calibration data stored in separate E^2PROM
Comm Ports	3 Ports Available: 1 - dedicated - PCCU 2 - RS232 or RS485 (via plug-in modules)
Microprocessor	High integration microcontroller with 20 bit address bus (1M), operating at 11 MHz
Analog Inputs	2 (0-5 VDC)
Digital Inputs	2 (State Change or Pulse to 10 kHz) operating at a 50% duty cycle with (Selectable De-bounce enabled 100 Hz)
Digital Outputs	2 FETs, sink = 2.5 Amp Max.Open Drain PTC, with 1500 W Transient protection
I/O Module Interface	Dedicated I^2C Serial I/O Bus for TFIO Modules
Keypad Interface	Dedicated interface for Optional Keypad Equipment
LCD Interface	Dedicated interface for Liquid Crystal Display (LCD)
Security Switch	On/Off Bi-level on-board Security (See Chapter 3 for details)
I/O Scan Rate	1 time per second
Time Base Stability	± 7.5 ppm (parts per million)
Pulse Input Bandwidth	Up to 20 KHz (Linear flow meter only)

Analog Measurement Unit (AMU) or IMV Specifications

Multivariable Unit

Temperature Limits	Compensated	-20 to 140°F (-29 to 60°C)
	Operational	-40 to 185°F (-40 to 85°C)
	Storage	-40 to 185°F (-40 to 85°C)

Analog to Digital Resolution
- 18 Bit Maximum Resolution (0.00038% FS)
- 18 Bit Nominal Resolution (0.0015% FS)

Vibration Performance
1.5 INW per G (2G maximum) at 1 Hz,
decreasing to zero at 1KHz in straight line mode.

Mounting Specification
Change from perpendicular (front to back/around X-axis) will be ≤1.5 INW (Can be corrected with calibration)

Temperature

Operating Range -80°F to 230°F (-62°C to 110°C)

Accuracy ± 1°F (0.56°C) over operating range

Static Pressure

Accuracy
- Includes the effects of linearity, hysteresis and repeatability
- Standard Accuracy: <= ±0.2% of URL (Upper Range Limit)
- Optional Accuracy: <= ±0.05% URL

Ambient Temp. Effect
- ± 0.15% of URL (per 160°F, 71°C)
- ± 0.125% of Reading

Stability ± 0.1% of URL for 12 months

Differential Pressure (Differentical Flow Computers only)

Accuracy
- Includes the effects of linearity, hysteresis and repeatability
- Standard Accuracy: <= ±0.2% of URL (Upper Range Limit)
- Optional Accuracy: <= ±0.05% URL

Ambient Temp. Effect
- ± 0.15% of URL (per 160°F, 71°C)
- ± 0.125% of Reading

Stability ± 0.1% of URL for 12 months

Static Pressure Effect
DP Zero per 1500 psi: ± 0.03% of Calibrated Span
DP Span per 1500 psi: ± 0.05% of URL

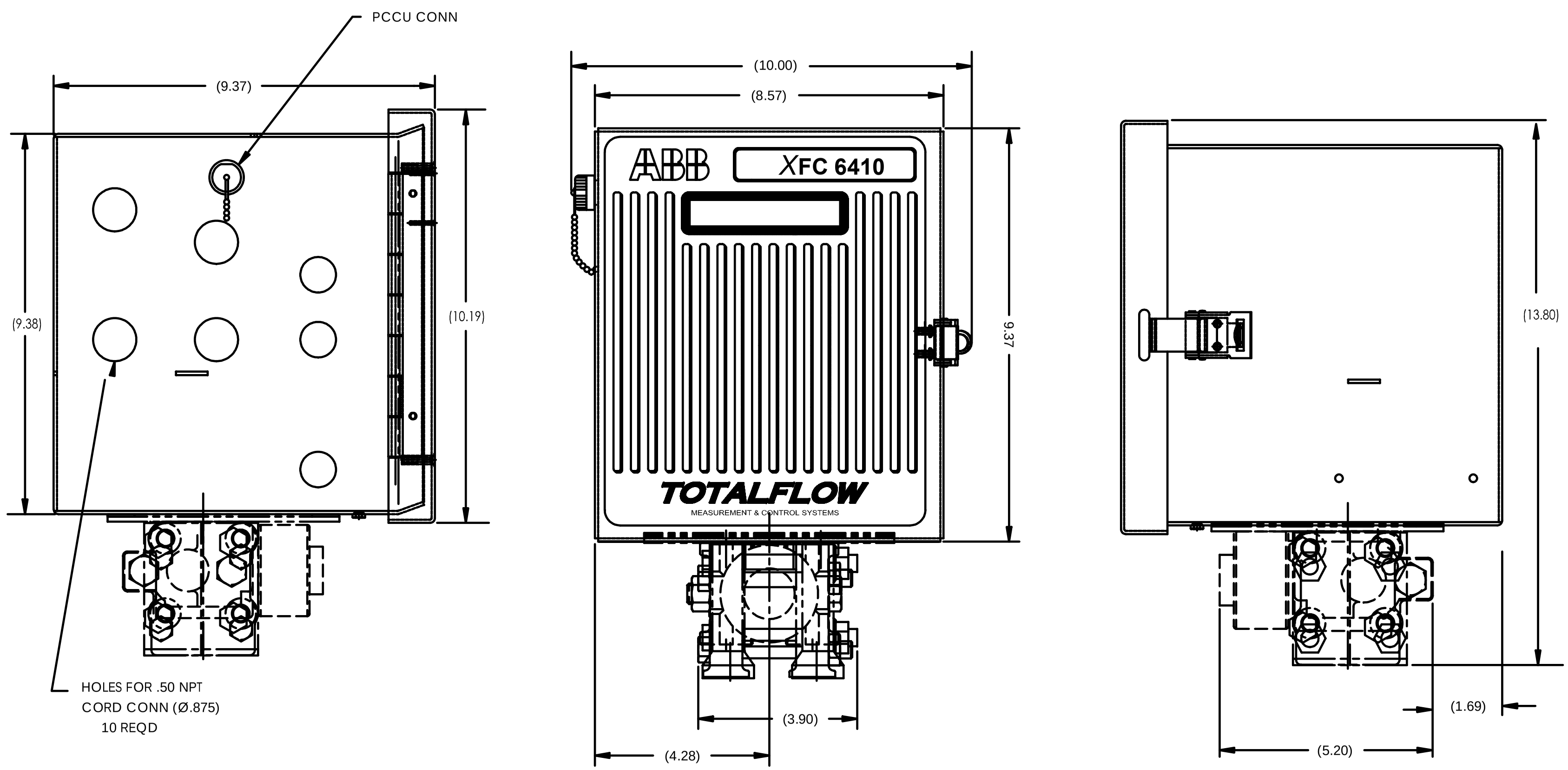


Figure 1–1 XFC Model 6410, Orifice Meter

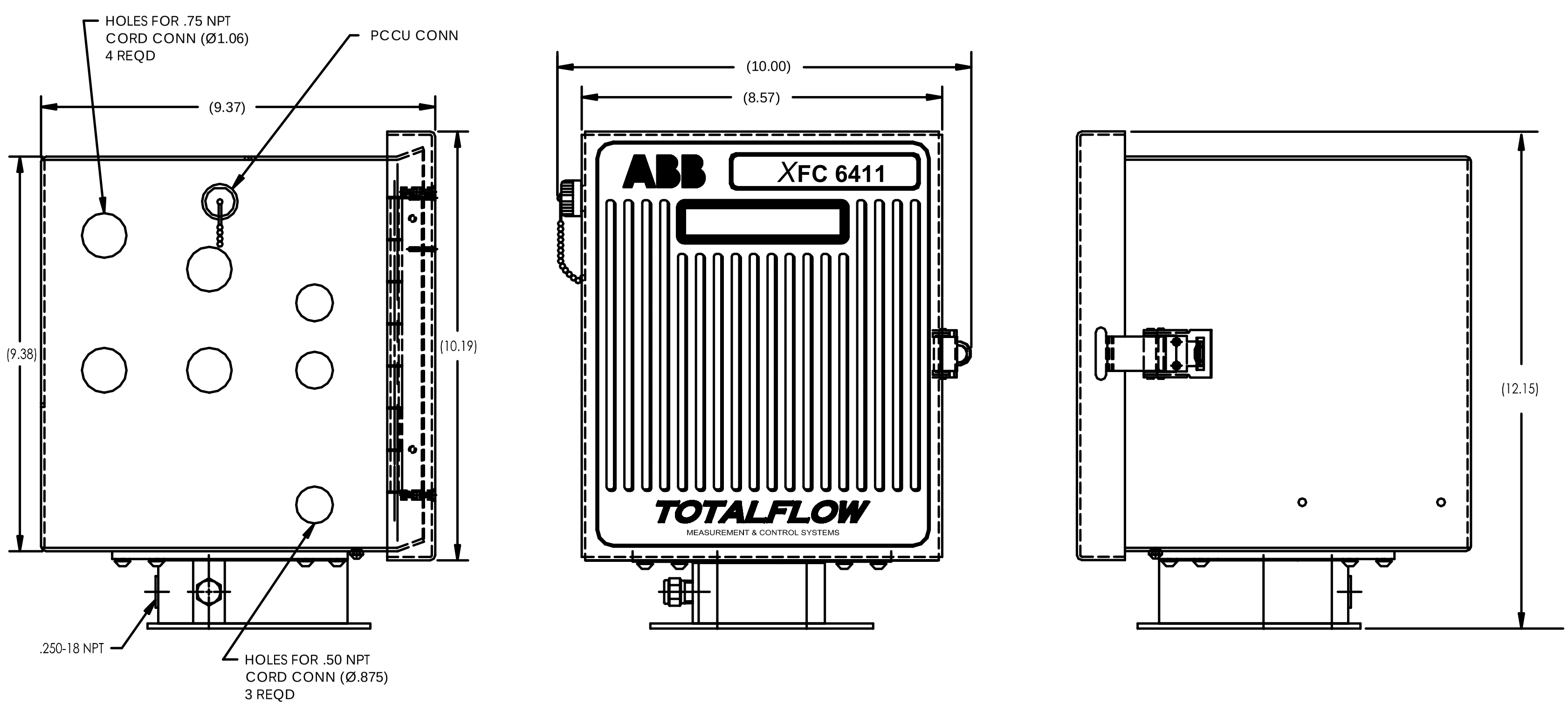


Figure 1–2 XFC Model 6411, Pulse Meter

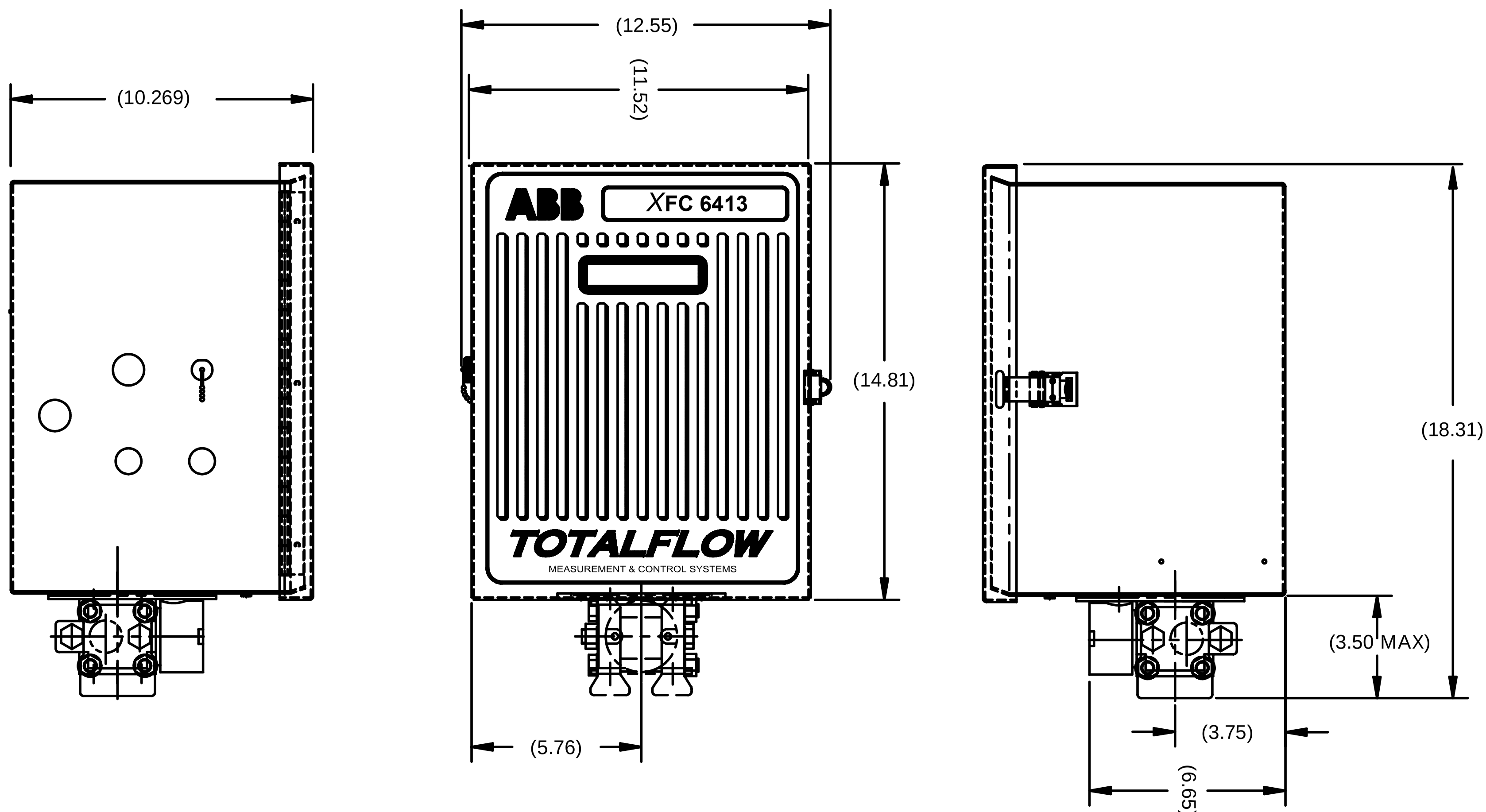


Figure 1–3 XFC Model 6413 Orifice Meter

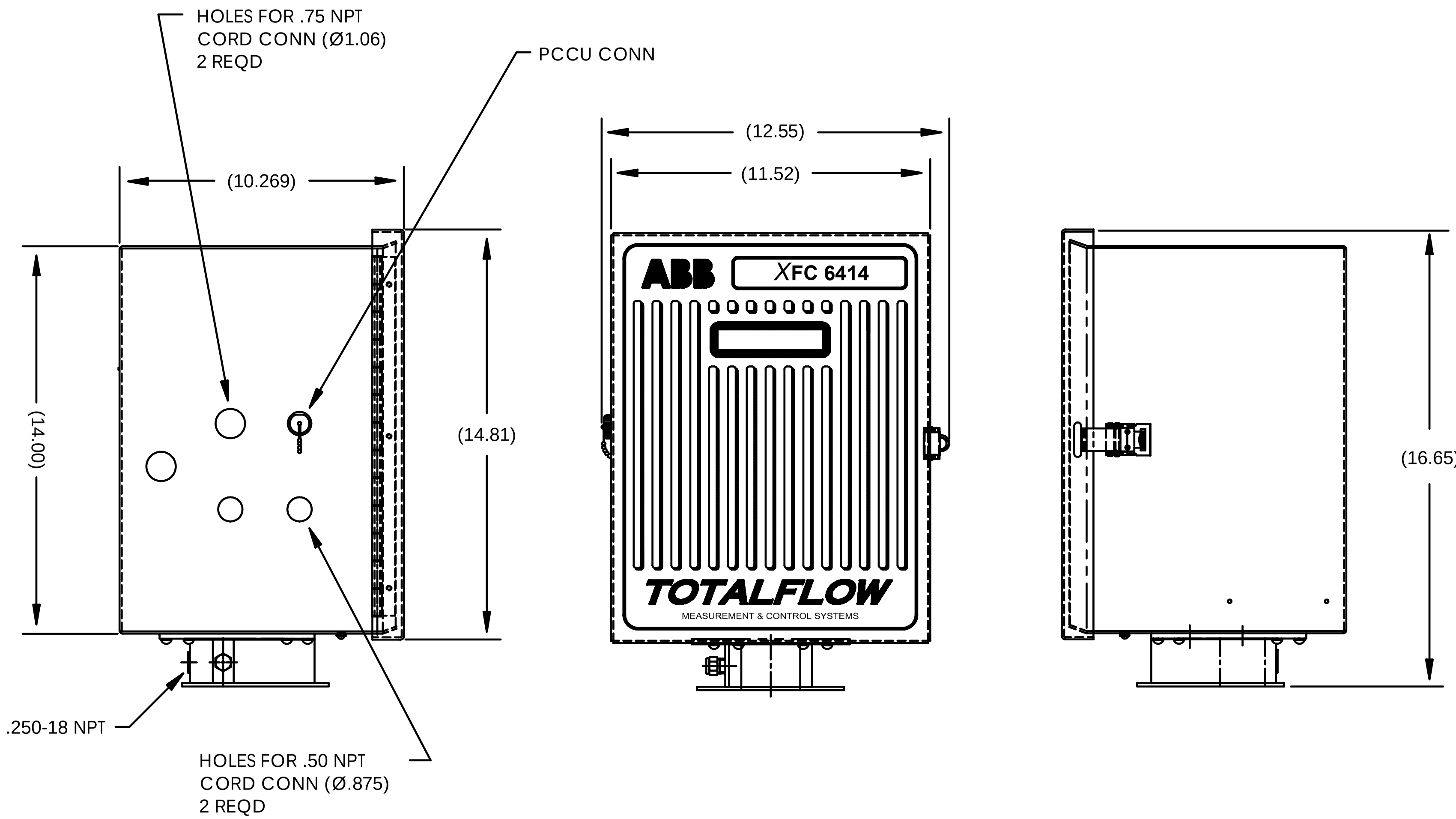


Figure 1–4 XFC Model 6414, Pulse Meter

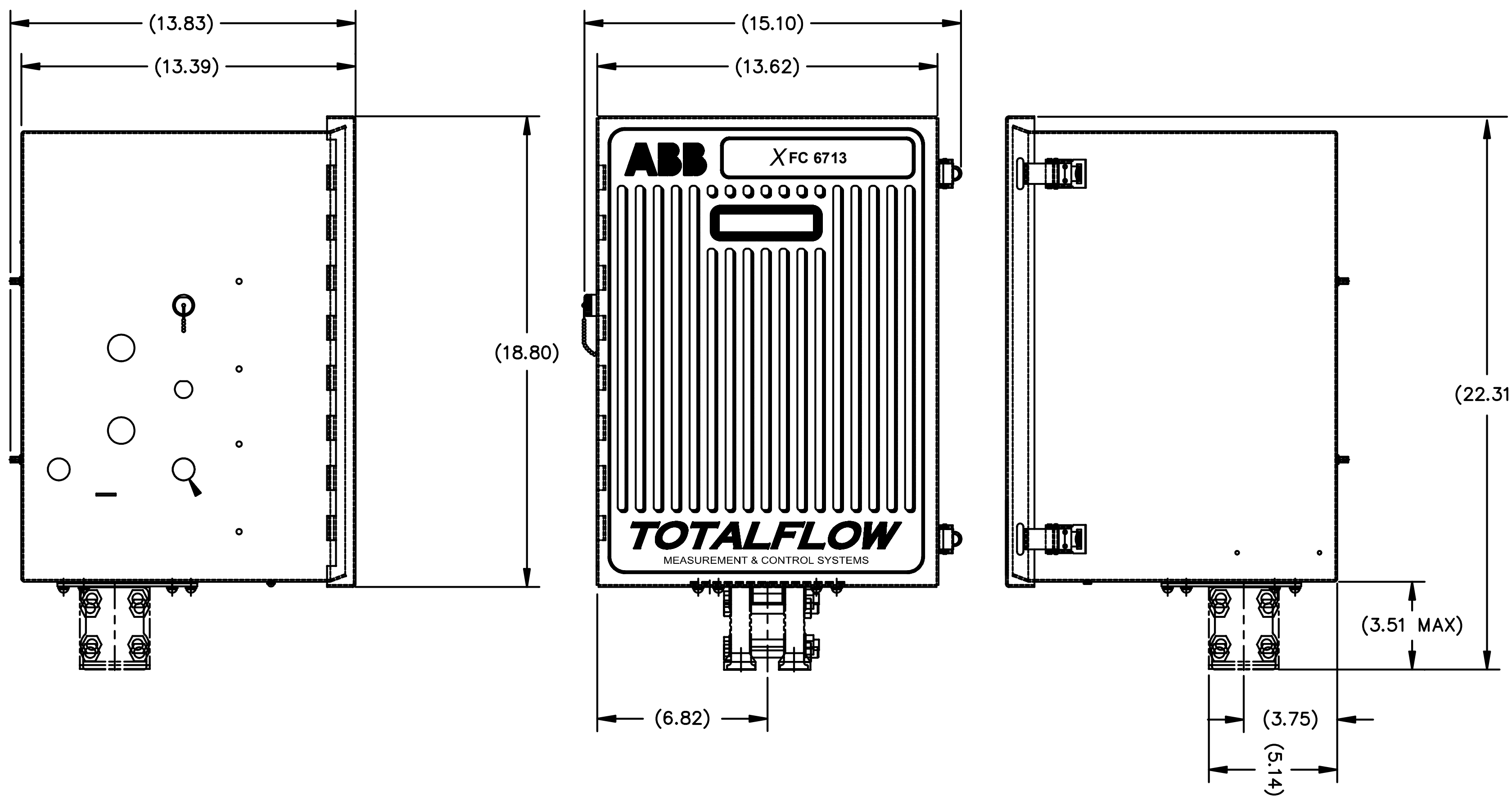


Figure 1–5 XFC Model 6713, Orifice Meter

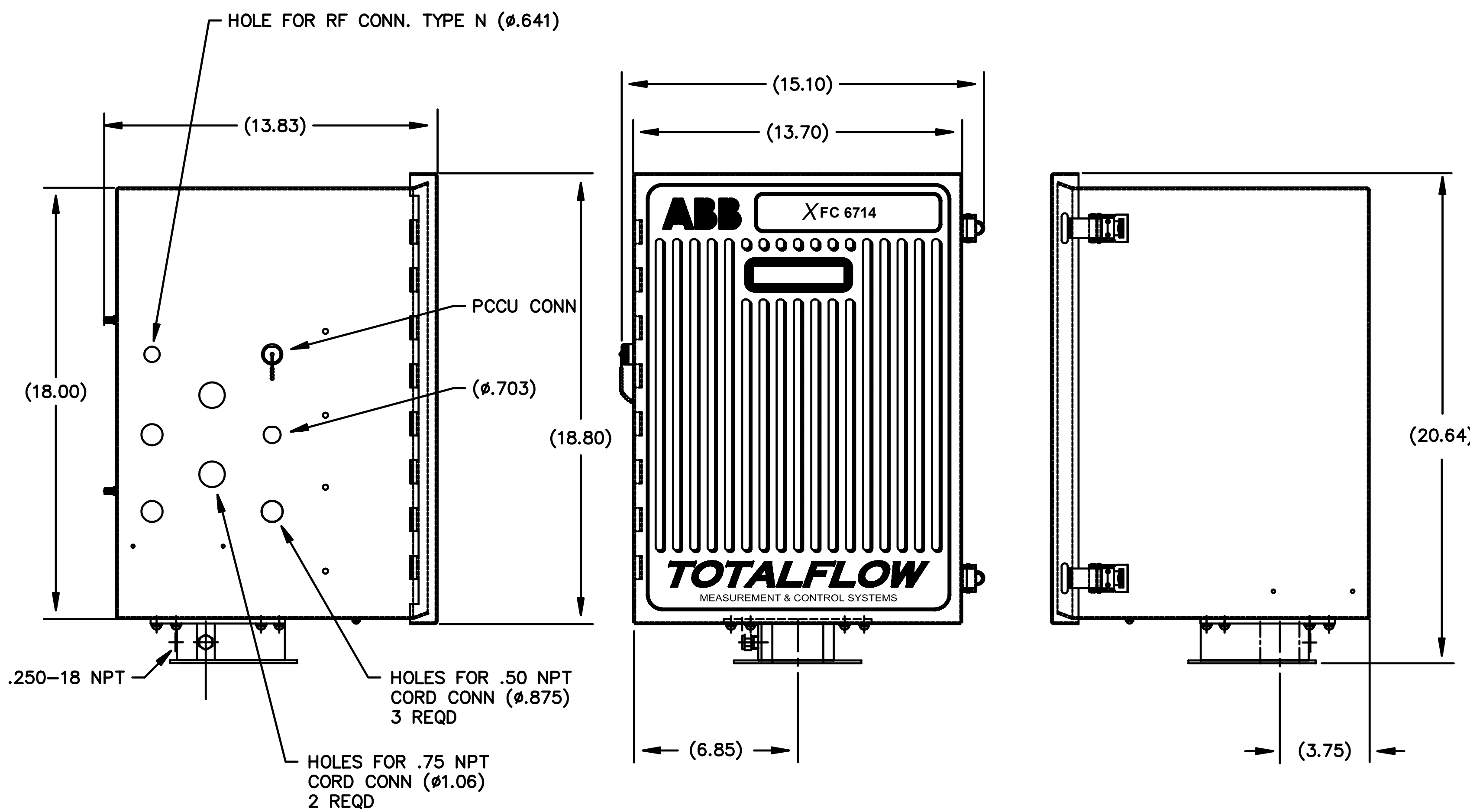
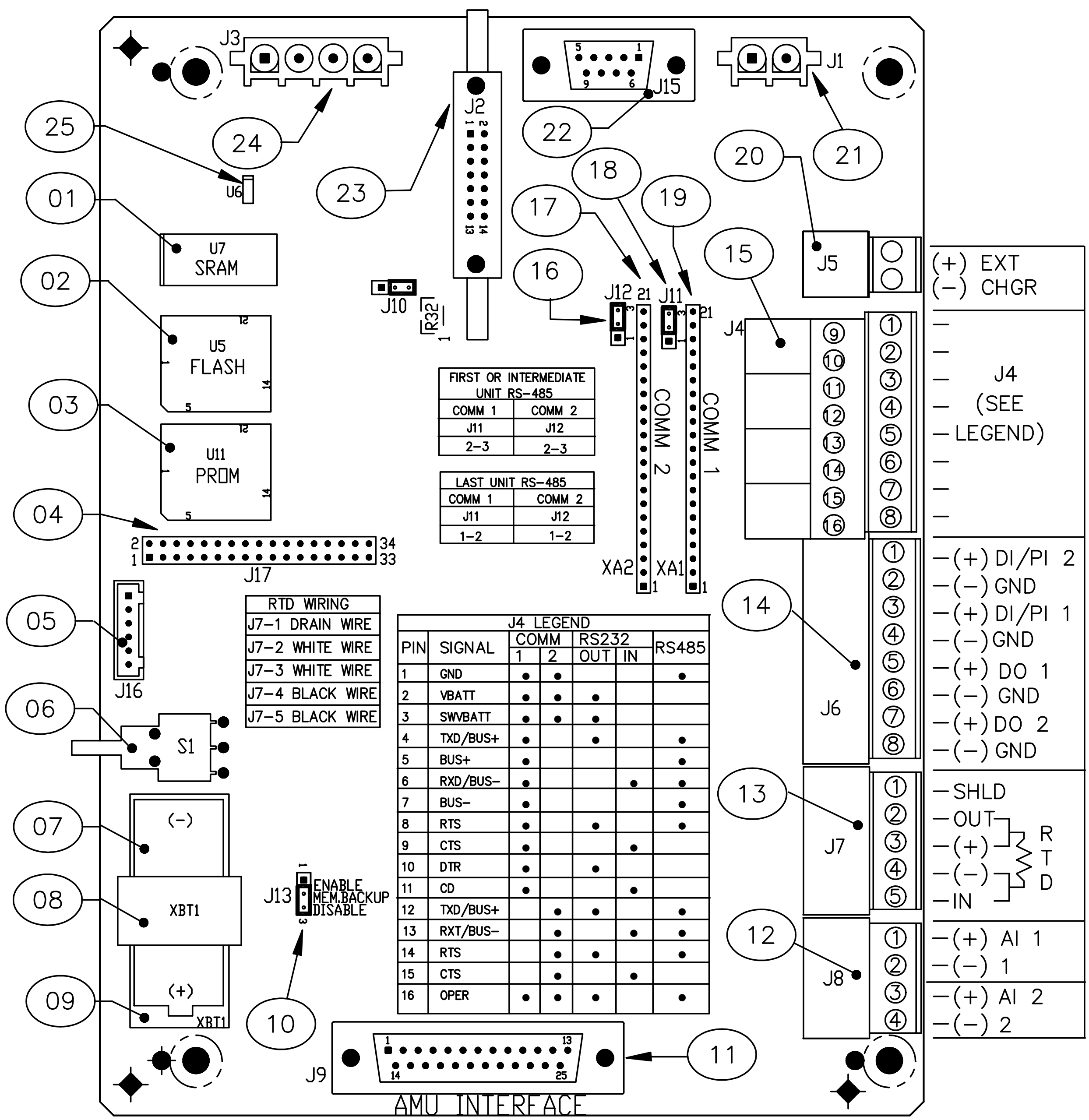


Figure 1–6 XFC Model 6714, Pulse Meter



PIN	SIGNAL	COMM 1	COMM 2	RS232 OUT	RS232 IN	RS485
1	GND	•	•			•
2	VBATT	•	•	•		
3	SWVBATT	•	•	•		
4	TXD/BUS+	•		•		•
5	BUS+	•				•
6	RXD/BUS−	•			•	•
7	BUS−	•				•
8	RTS	•		•		•
9	CTS	•			•	
10	DTR	•		•		
11	CD	•			•	
12	TXD/BUS+		•	•		•
13	RXT/BUS−		•		•	•
14	RTS		•	•		•
15	CTS		•		•	
16	OPER	•	•	•		•

Figure 1–7 XFC-195 Board, Complete Overview

Table 1–2 XFC-195 Board Identifications, Complete Overview

ID Number	Description
1	RDRIVE: SRAM (Lithium backed)
2	Flash Program Memory
3	Prom Loader and Utilities Memory
4	Factory Maintenance Interface
5	Keypad Connector
6	Security Switch
7	Lithium Battery
8	Battery Cover
9	Battery Mounting Bracket
10	Memory Backup Enable/Disable
11	AMU Interface
12	Analog Input Connectors
13	RTD Connectors
14	Pulse Input and Digital Output Connectors
15	Remote Communications Connectors
16	Remote Comm 2: RS-485 Termination Jumper
17	Remote Comm 2: Module Plug-in
18	Remote Comm 1: RS-485 Termination Jumper
19	Remote Comm 1: Module Plug-in
20	External Charger
21	Battery Connection
22	I/O Module Interface
23	LCD Display Interface
24	PCCU Interface
25	SDRIVE: 16/32 K E^2Prom for Registry and Configuration Files

XFC Flow Computer Hardware

The Totalflow® X Series Flow Computer Models XFC 6410, XFC 6411, XFC 6413, XFC 6414, XFC 6713 and XFC 6714 are housed in a lightweight two-compartment aluminum case. With the exception of the size of the cases the X Series Models use identical components, which are:

- Enclosure
- XFC-195 Board (See Figure1–7)
- Analog Measuring Unit (6410, 6413, 6713 only)
- Battery Compartment
- Communication Compartments (6413, 6414, 6713 and 6714 only)
- Liquid Crystal Display (LCD)
- Charger or Solar Panel
- Resistive Temperature Detector (RTD)
- Optional Modular I/O
- Optional Keypad

Enclosure

The enclosure consists of hinged-door box. The door provides a watertight, corrosion resistant seal between the outside elements and the XFC components. It is NEMA 4X rated. Opening the door's latch(s) allows access to electronics, battery and Analog Measurement Unit (AMU/IMV) components.

XFC-195 Board

The XFC-195 Board is mounted on the inside of the door. All XFC input and output connections are made with Phoenix style snap-in connector terminals mounted directly on the board. The XFC-195 Board uses a low power processor running at 11.0592 MHz with Data stored in 512K SRAM. RAM memory has lithium backup battery. The applications programs stored in 512K Flash, the flash loader stored in 512 K PROM, and Registry and Configuration files stored in 16K E^2PROM. Other circuitry processes the inputs from the Analog Measuring Unit and provides interfaces to the LCD and the PCCU. Remote communications are handled by the RS232 and RS485 communication modules that plug directly into the XFC-195 Board. See Figure 1–7.

Analog Measurement Unit (AMU)

The AMU contains circuitry for processing all analog measurements and provides the primary measurement capability for the XFC. The unit is designed to provide EMI/RFI protection of the low level signals, and to protect the circuitry from other environmental effects. The AMU contains a single circuit board which contains the analog to digital converter and analog conditioning circuitry necessary for the AMUs, the RTD and two general purpose Analog Inputs.

Because the AMU is characterized over temperature at the factory the unit is not field repairable. All repairs should be done at an authorized Totalflow depot service center or returned to the factory. The AMU is characterized over temperature so that any changes occurring in the AMU or in the electronics can be compensated.

FYI

For the purpose of clarity, the AMU acts as a multivariable transducer (includes a Static Pressure cell, a Differential cell and RTD input) and an AMU. In this manual, we reference the AMU when speaking generally. In the Input/Output chapter, we will discuss the AMU as a separate entity.

Continued on Next Page

Battery Compartment

The battery compartment houses the various optional battery packs that are available for the XFC; from 8 ampere hours up to 26 ampere hours. Installation of the battery requires only removing the battery plate, placing the battery in place, and connecting the battery cable to the XFC-195 Board. This is discussed in detail in Chapter 5-Maintenance.

Communication Compartment

Models XFC 6413 and XFC 6414, provide an enclosure to house a remote communication device; transceiver, cellular phone, etc.

Modular I/O

The hardware functionality of the X Series flow computers can be extended by using modular I/O packaged in DIN mount enclosures.

Solar Panel

The XFC can be configured for a 10-Watt, 20-Watt or 30-Watt solar panel. The panel is designed to be mounted on 2-inch extension pipe above XFC or mounted to the meter house.

Resistive Temperature Detector (RTD)

An optional 100-ohm platinum RTD measures real-time flowing temperature of the gas. The standard RTD is provided with a 10-foot cable. Other lengths of cable are available upon request.

Functions of the XFC

Functions of the XFC reflect a design that is practical, straight-forward and efficient. The XFC is simple to use and easy to learn - and it saves time usually spent on calculations and report preparation. The XFC allows you to perform the following with minimum effort, maximum speed and greater accuracy.

Complete log period flow and operational records reported (hourly, default) including -

- Average static pressure
- Average differential pressure
- Average flowing temperature
- Corrected volume total
- Corrected energy total
- Operating status and alarms

Complete daily flow records including -

- Average static pressure
- Average differential pressure
- Average flowing temperature
- Average Extension
- Corrected volume total
- Corrected energy total
- Operating status and alarms

Complete daily operation statistics including -

- Percent flowing time
- Percent back flow time
- Percent out of limits (programmable) on SP, DP, Tf and Flow Rate
- Minimum and maximum values for SP, DP, Tf and Flow Rate

Continued on Next Page

XFC Capabilities

The records and statistics generated are due to the following capabilities of the XFC:

- Calculation of flow rates, volume and coefficients per AGA-3, AGA-8 supercompressibility standards
- Calculation of flow extension $\sqrt{\frac{Dp^{*}Sp}{Tf}}$ once per second
- Extrapolation of flow accumulation during AMU calibration
- Selection of all coefficients for calculation; calculation of dynamic factors (dependent upon DP, SP and Tf) using averages based on one second samples
- Sample set of most recent calculations allowing subsequent verification
- Monitoring of the operational limits, minimums and maximums to insure detection and reporting of malfunctions or abnormal site conditions
- Acceptance and storage of system constants from the PCCU or remote communications protocols.
- Storage of data records and operational events determined by user (based on available SRAM)

Additional Features

Additional features of the Totalflow System enabling its flexibility include the following:

- Programmable differential pressure zero cutoff
- Two digital outputs
- Programmable bi-level security codes to prevent unauthorized communication and configuration of the XFC.
- Two state inputs configurable as either digital inputs or high speed pulse accumulator inputs.
- Automatic temperature compensation of electronic measurement circuitry
- Automatic internal calibration of the RTD, with programmable bias adjustment
- Quick, simple calibration procedures for AMU with steps outlined.
- Real time clock providing a highly stable time base for the system
- Battery operation period is determined by the size of battery, location of unit and power consumption for communications and I/O. Totalflow Project Engineers can configure your requirements and select the appropriate battery. Battery packs to extend operation for longer periods without power are available.
- Three available charging sources -
  External solar panel (standard)
  External AC/DC power
  External 24/12 VDC power

Continued on Next Page

Functions of the XFC, Continued

Additional Features, Cont.

- LCD (liquid crystal display) programmable to allow monitoring of the XFC operations and any variable that has a Register (for example, displays voltage level of batteries in XFC)
- Rugged, aluminum, powder coated, NEMA 4X enclosure, lockable to prevent internal access.
- Optional ability to allow rapid data collection over several communication links.
- 3 Comm ports are available on the XFC-195 Board: dedicated Local and Remote Comm 1 and Comm 2
- Additional I/O for communications, control, monitoring and alarming functions, such as valve control, plunger lift, pressure, level monitoring, remote communication ports, etc.

On-board Input/Output (XFC-195 Board)

Totalflow's X Series Flow Computers continue to be backward compatible with the same base I/O as earlier models but enhanced to include:

- AMU Interface: 1 SP, 1 DP, 1TF
- External Charger
- 2 User A/I's
- 2 User D/O's
- 2 User D/I’s or 2 User High Speed P/I’s
- 2 RS232 or 485 Comm Ports
- Interface for TFIO Modules

The Main Electronic Board (XFC-195 Board) is an enhanced replacement for previous versions of the FCU Main Electronic Board (see Figure4–1). In the next few pages, you will see the specifications for Digital/Pulse Input, Digital Output and Analog Input. To see a complete overview of the XFC-195 Board, see Figure1–7.

Communication Ports

You have the ability to program up to two communication ports on the XFC-195 Board. Normally COMM 0 is the local port required for reading the XFC with a laptop computer running PCCU32. COMM 1 and COMM 2 can be configured for any combination of RS 232 or RS 485. See Figure 4–1 for On-Board Communication Ports.

Digital Input

The Totalflow XFC provides two digital/pulse inputs as a means to monitor external equipment.

CAUTION When connecting or disconnecting any wires to the XFC-195 Board, you should remove all power sources and make sure that you are grounded properly.

Digital Input

The Digital Input reads an external contact. This is primarily used as a status input to read external equipment. This contact must be closed to be considered “ON”. The “ON” condition is recorded in the log period alarms and can trigger the action of the flow computer’s digital voltage (12 Vdc) output. “OFF” is defined as an open contact. Selectable de-bounce may be enabled or disabled within PCCU32. See the Help Files for additional information.

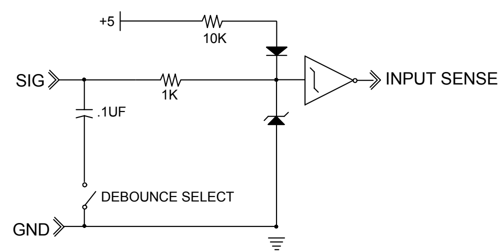
Electrical Specification (each point):

- Open circuit voltage: 5VDC (Internally pulled up to 5VDC Nom.)
- Short circuit leakage current: -395uA typical.
- Input capacitance: 0.1 ufd typical.
- Maximum allowable voltage range on input -0.5VDC to 15VDC.
- Maximum frequency input 100Hz @ 50% duty cycle with de-bounce enabled.
- Maximum frequency input 10KHz @ 50% duty cycle with de-bounce disabled.

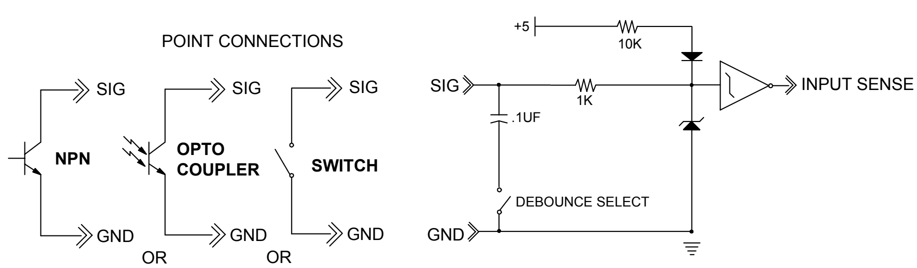
Input Specification

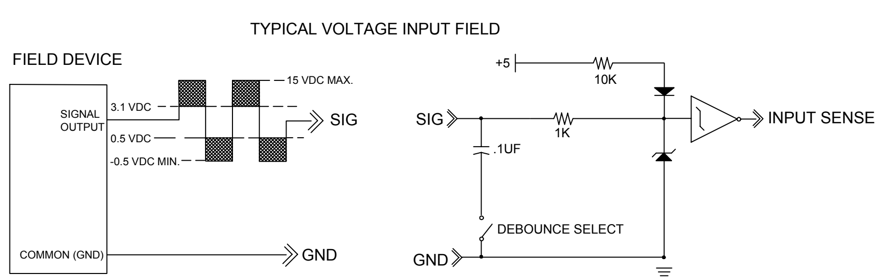
- Dry Contact, Open Collector or Active Voltage.
- Minimum contact resistance to activate input 1000Ω.
- Maximum voltage to deactivate the input: 3.1V (referenced to GND terminal.)
- Minimum voltage to activate the input: 0.5V (referenced to GND terminal.)
- Conductor pairs must be shielded to prevent spurious signals.

Typical Point Schematic



Example Connections





Digital Output

The Totalflow XFC provides two digital (12V dc) outputs as a means to control external equipment.

CAUTION When connecting or disconnecting any wires to the XFC-195 Board, you should remove all power sources and make sure that you are grounded properly.

Outputs

When the digital output is used as a measurement device; AGA3, AGA7 or Liquid Measurement, the following outputs can be set when the following conditions occur:

- Differential pressure over high limit
- Differential Pressure under low limit
- Static Pressure over high limit
- Static Pressure under low limit
- Low Charger voltage
- Remote Sense is On
- Volume Set point
- Flow Temperature Low
- Flow Temperature High
- Flow Rate Low
- Flow Rate High
- Trip on Digital Input
- Custom programmable by Totalflow or user programmable with IEC 1131 programming language.

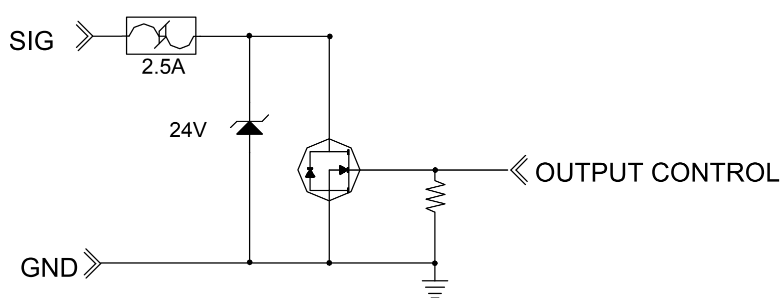
Electrical Specification (each point):

- Open circuit voltage: 0VDC
- Short circuit leakage current: 0uA typical.
- Output capacitance: 1000pF typical.
- Maximum allowable voltage range on output: - 0.5VDC to 26.5VDC.

Input Specification

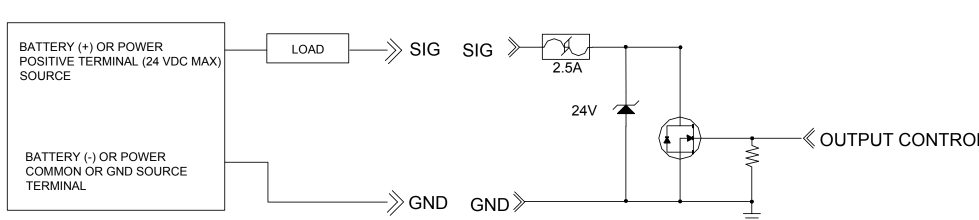
- Open Drain FET type
- "ON" Resistance: 0.1Ω Typical (Including PTC fuse resistance)
- Maximum pulse current: 3A for 5 seconds.
- Maximum continuous sink current: 2A.

Typical Point Schematic



Example Connections

TYPICAL SINK OUTPUT FIELD WIRING



Analog Input

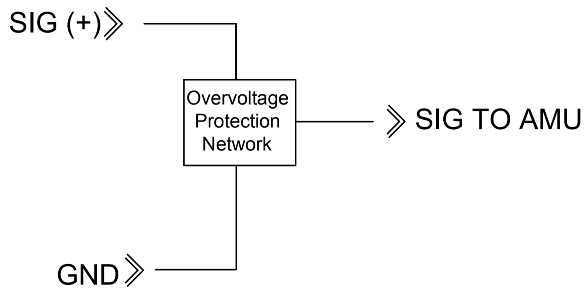
The Totalflow XFC provides two analog inputs as a means of receiving data represented by continuously varying voltage/current.

When connecting or disconnecting any wires to the XFC-195 Board, you should remove all power sources and make sure that you are grounded properly.

Electrical Specification (each point):

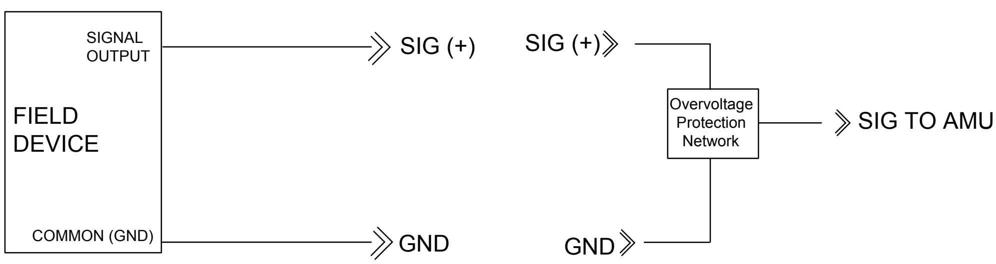
- Open circuit voltage: 0VDC
- Short circuit leakage current: 0uA typical.
- Input Impedance: 21KΩ typical (0-7.5V)
- Measurable input voltage range: -0.5V to 7.5V.
- Maximum voltage on input: 30VDC

Typical Point Schematic

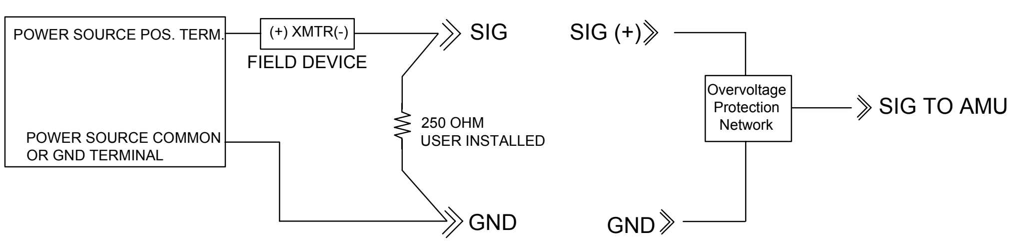


Example Connections

TYPICAL VOLTAGE ANALOG INPUT FIELD WIRING



TYPICAL 2 WIRE 4--20mA FIELD DEVICE WIRING



Log Period Records

Each record has entries that contain the following information:

- Average SP (static Pressure)
- Average DP (differential pressure)
- Average Ft (flow temperature)
- Calculated Volume

Log Period Data Entries

Log period data entries are made every 60 minutes by default. You may change this period to one of 6 other choices (1,2,5,10,20,30,60). Choosing a log period of less than 60 minutes will result in additional records being logged, thus requiring more storage space to hold a full day’s data. The log period must never be less than the volume calculation period.

Volume Calculation Period Entries

Volume Calculation period entries are made every 60 minutes by default. You may change this period to one of 6 other choices (1,2,5,10,20,30,60). The volume calculation period should never be greater than the log period and should be evenly divisible into the log period.

Volume calculations are completed, following the top of the current period. (ie. Top of the hour, top of the minute)

Changing XFC Clock

Changing XFC clock could affect the time when next log period entry is made. To protect integrity of accounting audit trail, XFC handles these types of clock changes as follows:

Clock Change Not Crossing an Hour Boundary:

When next log period entry is made, clock is not altered.

Example: If present time is 4:15 p.m. and clock is changed to 4:05 p.m. of the same day, the daily flow record is the same. Entry reflects averages accumulated over a 70 minute time period (15 minutes plus 55 minutes).

Forward Clock Change Crossing an Hourly Boundary:

Forces an log period entry for part of hour that has accumulated since last hourly entry. FCU then advances to newly defined data flow record boundary and begins maintaining balance of days' data in newly defined boundary.

Example: If present time is 4:55 p.m. and clock is changed to 5:05 p.m. of the same day, the entry reflects only a 55 minute average accumulation. Then a new flow record is written and this period is also based on a 55 minute accumulation.

Backward Clock Change Crossing an Hourly Boundary:

Hourly entry is made for part of hour that has accumulated since making last hourly entry. This is same as for a Forward Clock Change Crossing an Hourly Boundary. XFC advances to a new day’s data flow record and maintains balance of day’s data in new record.

Example: If present time is 5:05 p.m. and clock is changed to 4:55 p.m. of the same day, the log period record entry reflects only a 5 minute average accumulation. Then a new flow record is written and this log period is based on a 60 minute accumulation.

FYI

A backward clock change uses two (2) daily flow records to maintain data integrity. This assures that previously recorded data is not overwritten.

If it is necessary to make small backward time changes, less than one (1) hour, user should wait until current hour has progressed far enough to make change that does not cross an hour boundary.

Display Function

During operation, the front panel LCD continuously scrolls through the operating parameters. Table 1–3 shows typical displayed parameters, however any parameter with a Register Address can be displayed. The duration that the parameter is displayed can vary from 1 to 255 seconds (default is 5 seconds); a setting of 0 seconds will set any display to off. See "Program Display" in Chapter 3 (and PCCU32 help files) for more details.

Table 1–3 Typical XFC Display Options

Display	Description
DATE/TIME MM/DD/YY HH:MM:SS	Current Date and Time 24 hour clock
YEST DP LO NN PERCENT	Yesterday's Percent DP Low Limit Percent time below DP Low Set Point
YEST DP HI NN PERCENT	Yesterday's Percent DP High Limit Percent time below DP High Set Point
FLOWRATE NNNNNN.N SCF/HR	Current Flow Rate Programmable SCF or MCF or MMCF
ACCUM VOL NNNNNN.NN MCF	Total Accumulated Volume Programmable SCF or MCF or MMCF
BATTERY NN.N VOLTS	Battery Voltage Volts
DIFF PRESS NNN.N IN. H2O	Differential Pressure Inches H2O
PRESSURE NNN.N PSIA	Static Pressure Absolute PSIA
FLOW TEMP NN.N DEG. F	Flowing Temperature °F
YEST VOL NNNN.N MCF	Yesterday's Volume Programmable SCFM or MCF or MMCF
PERIOD VOL NNNN.N SCF	Previous Period Volume Last volume calculation period volume
CHARGER NN.N VOLTS	Charger Voltage
M_FLOWRATE NNNNNN.N SCF/HR	Minute Average Flow Rate

Sleep Mode

A unit will go into Sleep Mode if the main power source drops below 10.9 volts and stays there for a period of 2 minutes. Sleep Mode will preserve the unit's historical data that was collected prior to it going to sleep. The date/time will also be kept during the time the device is in Sleep Mode. The unit can be awaken by simply connecting the PCCU to it and the unit will stay awake as long as the PCCU is connected. If the battery is below 10.9 volts when you disconnect, the unit will go back to sleep after 2 minutes. For more information in troubleshooting this mode, see chapter 5, Troubleshooting.

Status and Alarm Conditions

Since a primary function of the XFC is to provide complete volume and operational records; it is important to indicate unusual or “alarm” conditions as they occur. See Figure 1–8. This is supported on the LCD using annunciators, these are listed in Table 1–4 XFC Status and Alarm Description. Instructions for using the display as a troubleshooting aid can be found in Chapter 6-Troubleshooting.

Whenever an alarm is indicated the XFC records it in the appropriate log period flow record. These are automatically retrieved when data is collected.

In X Series flow computers the status and alarm code annunciators are programmable. This allows the user to program each annunciator to reflect custom status information for different application or tube types. As supplied from the factory, a typical single tube device will come with a standard display configuration, but can be modified. Consult the PCCU32 help files for more instruction on programming the display.

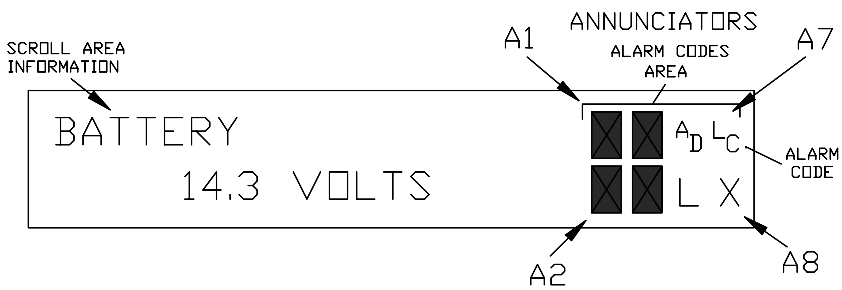


Figure 1–8 Liquid Crystal Display and Indicators

Table 1–4 XFC Status and Alarm Description

Indicator	Description
I/O Sub-System	
$^{L}{}_{L}$	*Low Lithium Battery Alarm*: When $^{L}{}_{L}$ (low lithium) is displayed, lithium battery voltage is below 2.5 Vdc. A new lithium battery measures approximately 3.6 Vdc.
$^{L}{}_{C}$	*Low Charger.* Displayed if XFC battery charging voltage is (+)0.4 Vdc or is less than or equal to battery voltage.
Display Application	
1	A number represents the Display Group number currently being displayed.
↑	The displayed item’s value is above the Data High Limit value specified on the display Item Setup screen.
↓	The displayed item’s value is below the Data Low Limit value specified on the display Item Setup screen.

Table Continued on Next Page

Table 1–4 XFC Status and Alarm Description, Continued

Indicator	Description
Communications Protocols	
→	*Transmitting Data*: Sending a response
←	*Receiving Data*: Processing request.
!	*Nak*. Negative Acknowledgement w/packet list.
+	*Ack*. Positive Acknowledge of receipt of request.
⫛	*Waiting for Ack*. Waiting for response after transmission.
?	*Exception Alarm Processing.*
Ŧ	*ID Recognized.* Recognized and receiving request.
ǂ	*Listen Cycle*. Flashes if this remote port is active and running Totalflow Remote Protocol. Flashes in sync with listening cycle that occurs at 1, 2 or 4 second intervals.
M	*MODBUS ASCII*: Modbus ASCII protocol is selected for the port assigned to this annunciator.
m	*MODBUS RTU*: Modbus RTU protocol is selected for the port assigned to this annunciator.
L	*Local Protocol.* Displayed when PCCU part is active and running TOTALFLOW Local Protocol.
¥	*ID Recognized.* The ID has been recognized but is waiting for "Sync".
R	*LevelMaster Protocol*: LevelMaster protocol is selected for the port assigned to this annunciator.
Measurement Application	
B_F	*Back Flow Condition.* Visible only when DP variable displayed.
Z	*Zero Flow Condition*: Visible only when Flow Rate displayed.
H	*Hold.* Displayed when PCCU has entered Calibration Mode on a Measurement Application in Hold mode.
A	*Alarm Condition.* Need to view alarm. You may need to compare application limits to current values to determine where the alarm condition is present.
A_D	*A to D Failure.* Displayed if A to D Converter Absolute Differential Pressure, Absolute Static Pressure or temperature readings exceed maximum counts or are less than minimum counts.

Table Continued on Next Page

Table 1–4 XFC Status and Alarm Description, Continued

Indicator	Description
Valve Control	
V	Displayed when Valve Control option is installed an no other valve control symbols are valid.
=	Displayed when Valve Control option is installed. Process Value (PV) is within the user set dead band. No control action required.
⌈	Displayed when Valve Control option is installed. Valve is in full open position.
⌋	Displayed when Valve Control option is installed. Valve is in full closed position.
↑	Displayed when Valve Control option is installed. Valve is opening (open signal is being sent to valve actuator).
↓	Displayed when Valve Control option is installed. Valve is closing. (close signal is being sent to valve actuator).
Ö	Displayed when Valve Control option is installed. Valve controller override conditions met (DP/SP override set point or Low Battery).
L_L	Displayed when Valve Control option is installed. Local Lock-out is initiated.

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Chapter 2
Installation

Overview

This Chapter provides you with the information for installation and setup. By the time you finish this Chapter you will have the XFC unpacked, installed, field wired and ready for operation. For safe and trouble free installation follow all instructions and advisories.

FYI

Read through this Chapter before you begin the installation, to plan your installation. Also before you begin, refer to the wiring diagrams delivered with the new XFC. You may store these under the tab “Drawings” in the back of this manual.

Installation procedures, presented within this Chapter, are applicable to Models XFC 6410, XFC 6411, XFC 6413, XFC 6414, XFC 6713 and XFC 6714.

Highlights

This Chapter covers the following topics:

Continued on Next Page

Unpacking & Inspection

Unpacking

The XFC and RTD are shipped in a specially designed shipping carton which contains the unit, mounting brackets, parts list and wiring and interconnect diagrams. The Solar Panel and the Battery Pack with applicable hardware are shipped in a separate carton.

- Carefully remove the items from each carton.

Inspection

- Inspect the shipping carton for damage. If the shipping carton is damaged, keep it until the contents have been inspected for damage.
- Inspect the unit's exterior for dents, chipped paint, etc.
- Inspect the LCD window for breakage.
- Open the housing by first removing the bolt and releasing the latch/latches.
- Visually inspect the Main Electronic Board (XFC-195 Board), cables, and Analog Measurement Unit for damage.

Damaged Components

If any components have been damaged or if there are noticeable defects, notify your Totalflow representative. Keep all shipping materials for the carrier's inspection. Totalflow will arrange for immediate repair or replacement; see 'Getting Help', page x.

Meter Run Installation Overview

The following procedures, unless otherwise stated, are applicable to all X Series Flow Computers. The XFC can either be pipe, direct or wall mounted. Use the procedure that fits your installation.

See Figures 2–1 through 2–3 for a bottom view of each orifice model.

See Figures 2–4 through 2–6 for a bottom view of each pulse model.

FYI When the XFC is pipe or wall mounted it should be located as close as possible to the orifice fittings. This keeps the stainless steel gauge lines as short as applicable.

Instructions

If you want to...	THEN use...	For Procedure See Page
Install on meter run	Pipe Mounting Procedure	2-2
Install on wall	Wall Mounting Procedure	2-15
Direct Mount-Orifice	Direct Mounting Gas Orifice	2-22
Direct Mount-Pulse	Direct Mounting Pulse Meters	2-27

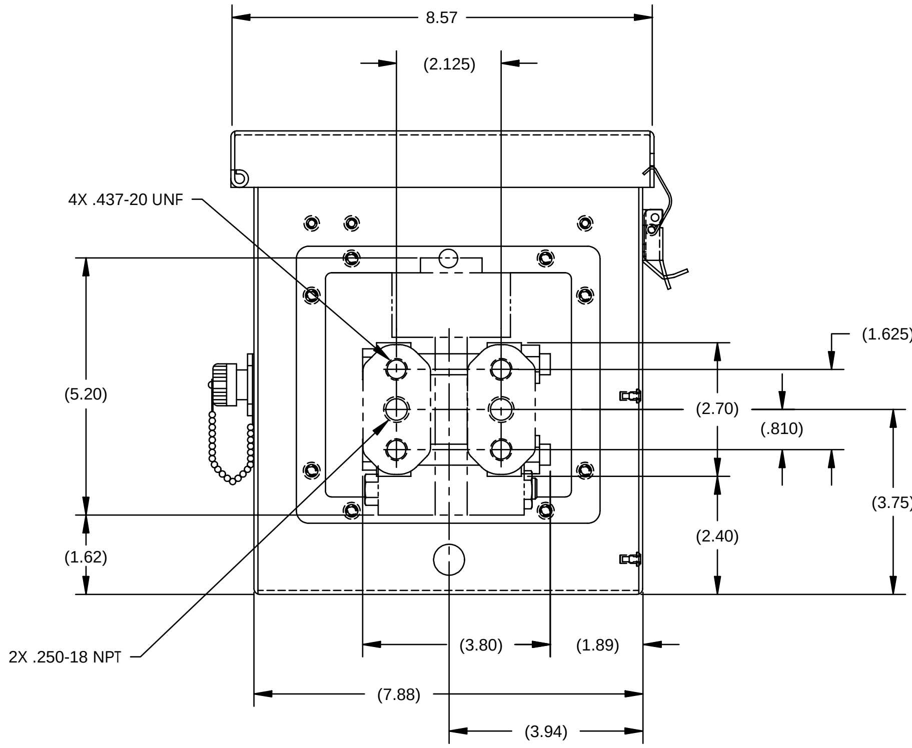

Figure 2–1 Bottom View Orifice Flow Computer XFC 6410

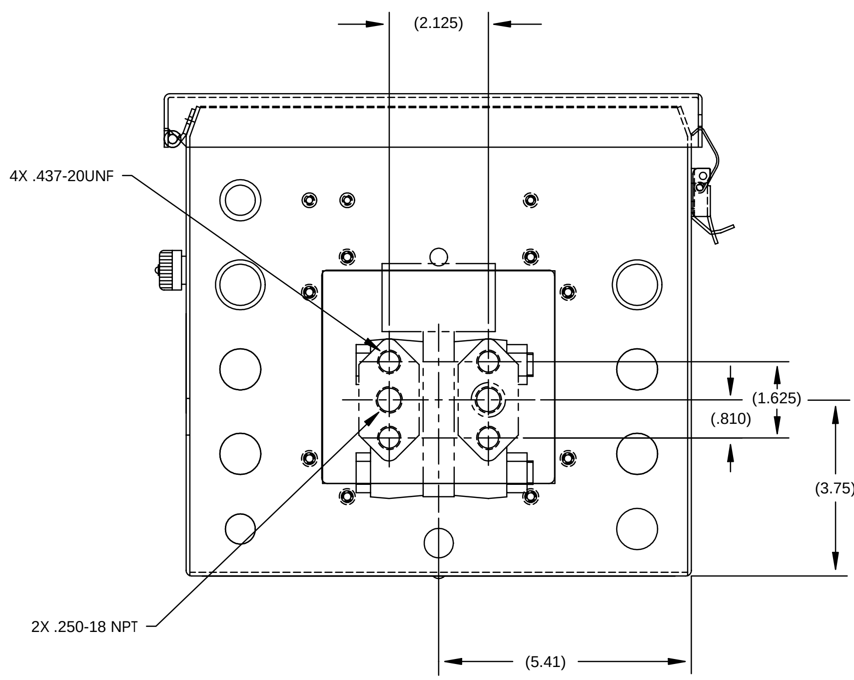

Figure 2–2 Bottom View Orifice Flow Computer XFC 6413

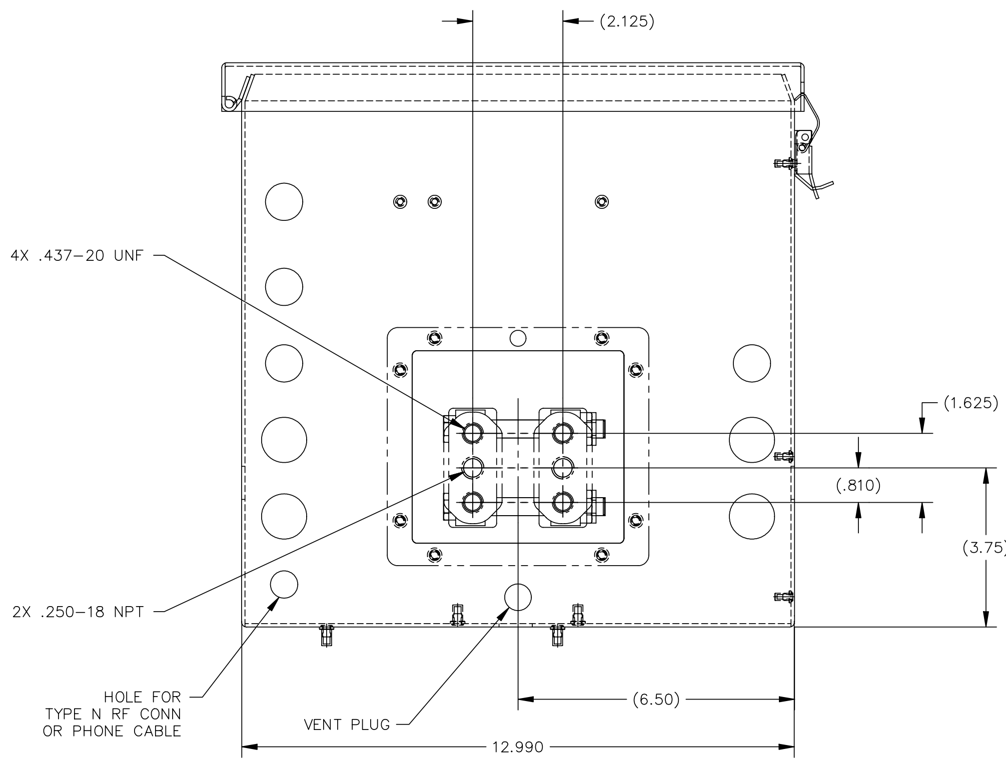

Figure 2–3 Bottom View Orifice Flow Computer XFC 6713

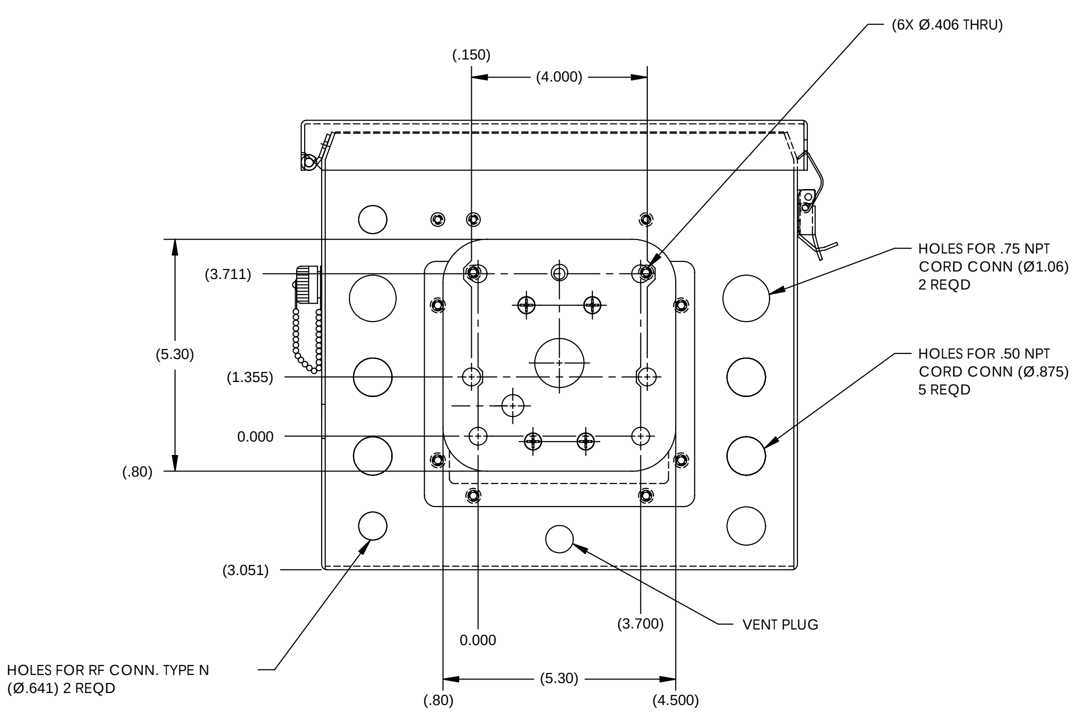

Figure 2–4 Bottom View Pulse Flow Computer XFC 6411

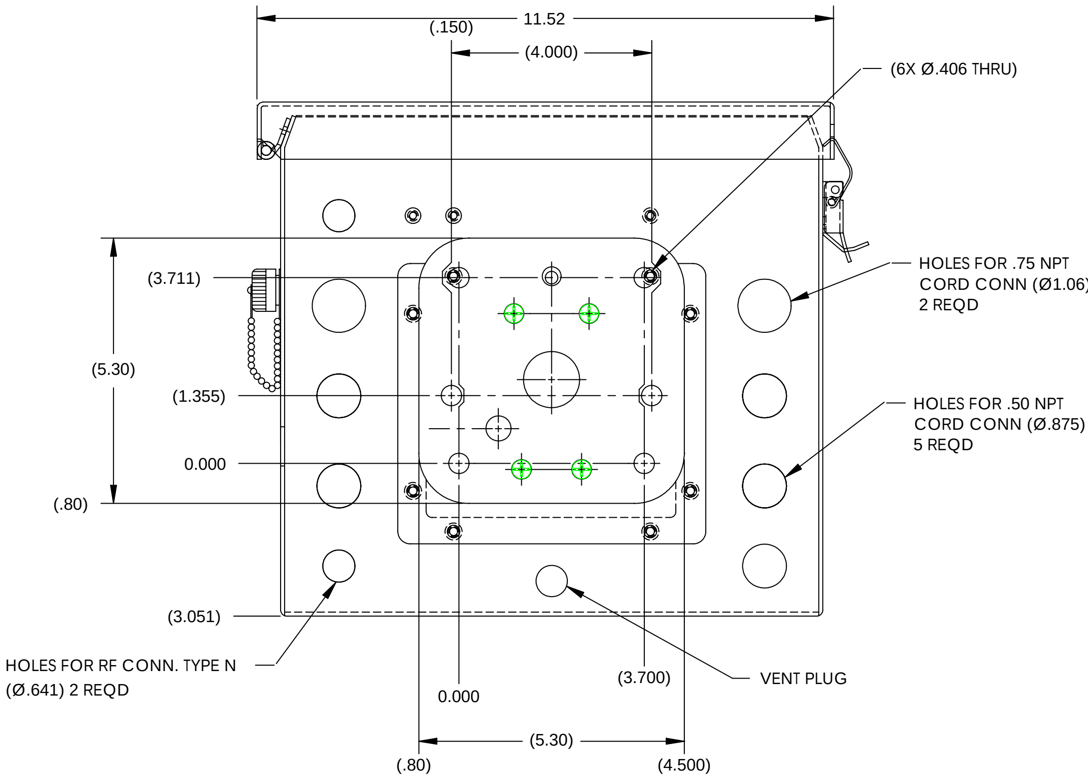

Figure 2–5 Bottom View Pulse Flow Computer XFC 6414

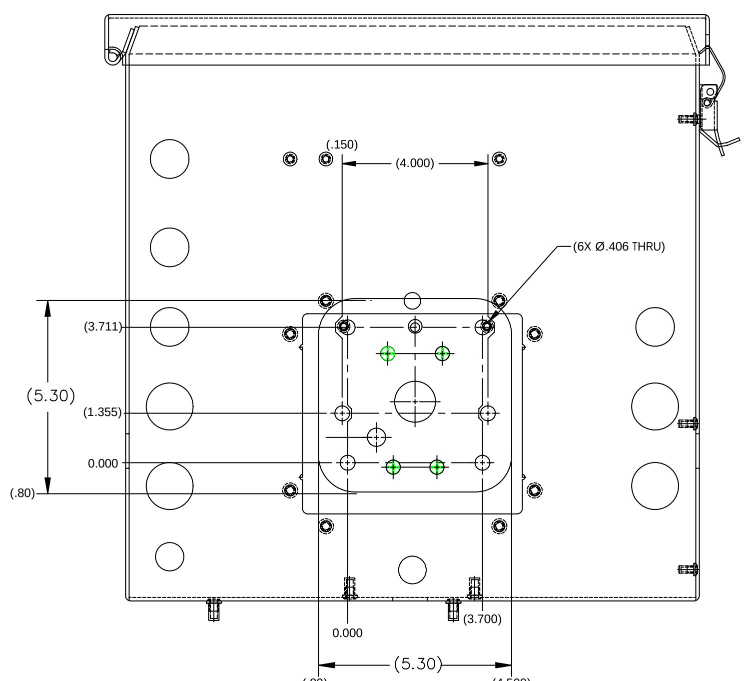

Figure 2–6 Bottom View Pulse Flow Computer XFC 6714

Pipe Mount Installation

If you are installing directly to the meter run use this procedure. Before you begin, review the procedure and the materials required for installation.

Materials Supplied

- Two U-bolts plus fastening hardware
- XFC mounting brackets

Material Not Supplied

- One pipe Saddle
- One 2" x 40" pipe
- Standard 3 or 5 valve manifold or Static Pressure Tap Valve
- Stainless steel tubing

FYI Optional equipment may be ordered from Totalflow.

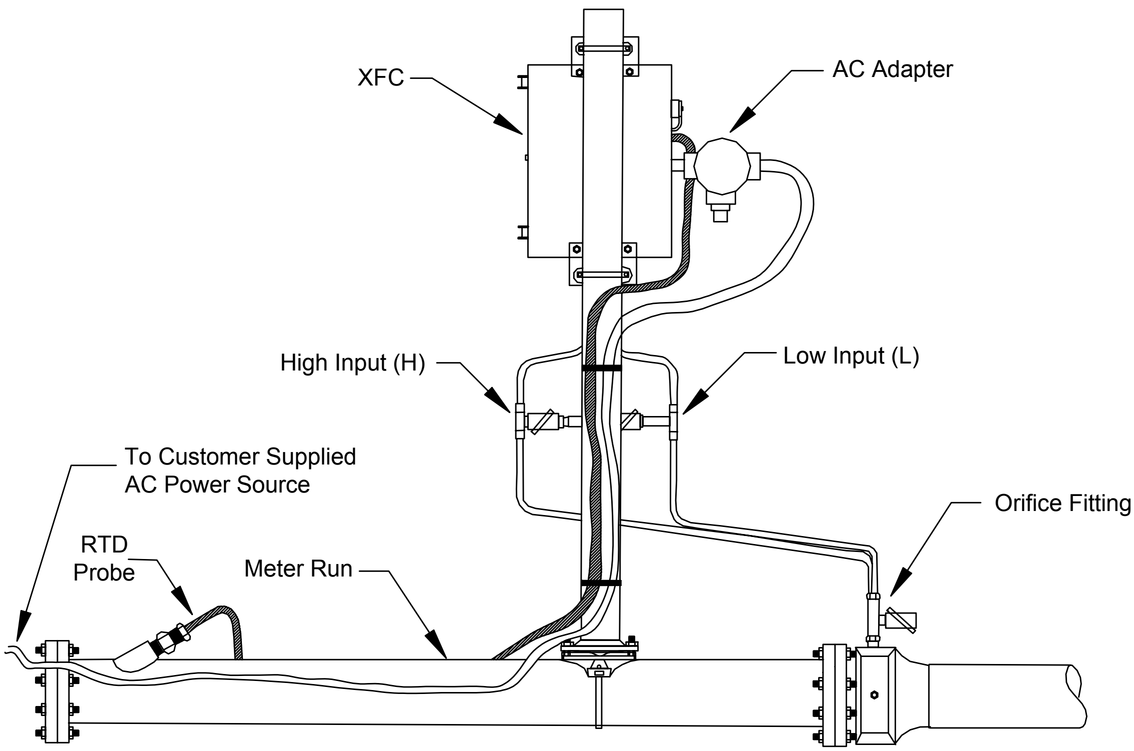

Figure 2–7 Typical Pipe Installation for Gas Orifice

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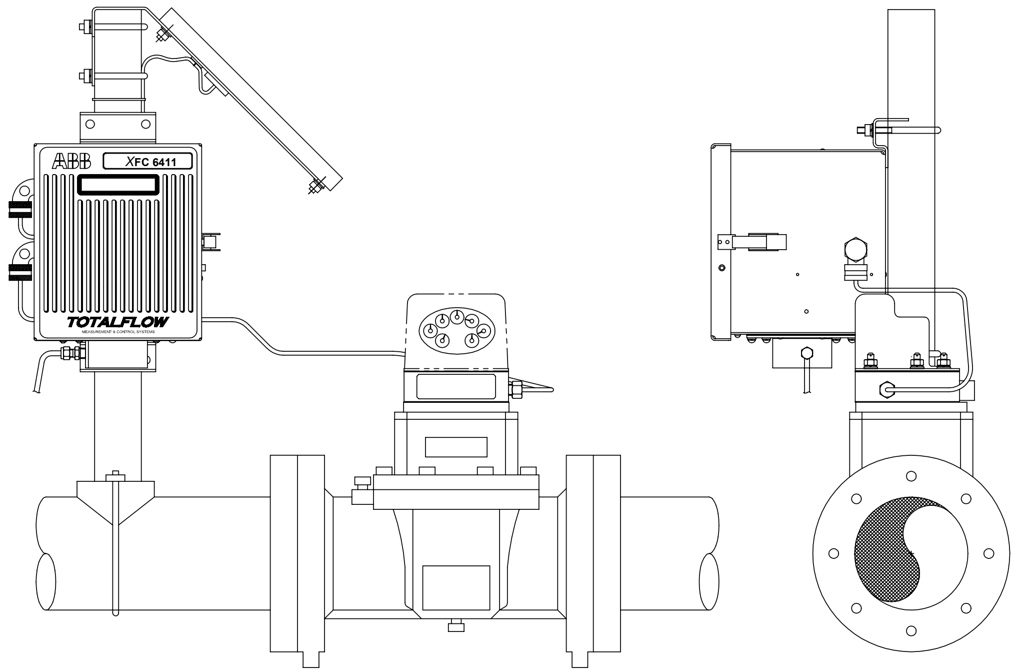

Figure 2–8 Typical Pipe Installation for Pulse Meter

Instructions

Step	Procedure
1.	Position pipe saddle on meter run. Select a location that allows easy user access and is close to the lines. Lines should be as short as possible.
2.	Temporarily attach Saddle on meter run pipe using U-bolt and associated hardware.
3.	Screw 2" by 40" mounting pipe into Saddle. Place level against pipe and vertically align. Adjust pipe, mounted in saddle, until vertical alignment is achieved.
4.	After vertical alignment, securely tighten 2" by 40" pipe in Saddle then securely tighten Saddle mounting bolts. Be certain pipe is securely installed in Saddle.

FYI

The following procedures are to be followed when installing XFC on 2" mounting pipe. To install XFC, it is recommended that two people make the installation. One to hold unit in position and the other to install and tighten mounting brackets.

Method of installation must be consistent with customers company policy.

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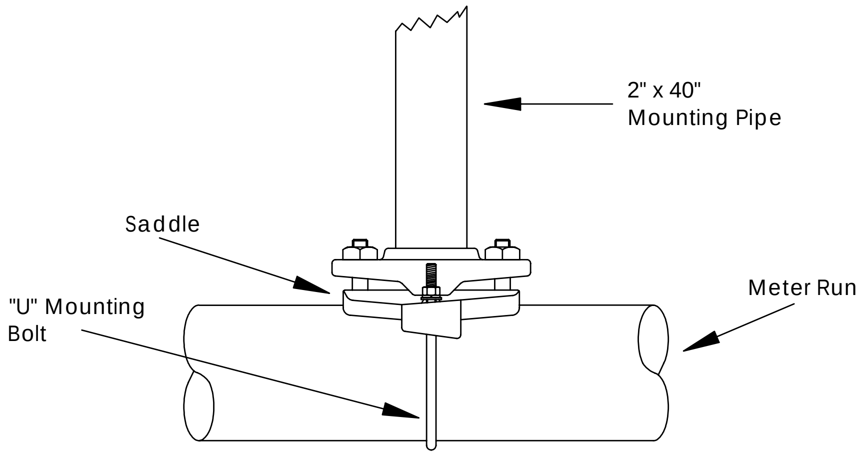

Figure 2–9 Typical Pipe Saddle Installation

Step	**Procedure,** Cont.
5.	Position XFC in position on 2” mounting pipe and secure in place with two U-bolts, flat washers, lock washers and two 9/16” bolts.

FYI

Orifice - Position XFC high enough on pipe to allow slope from externally mounted manifold to tap valves, refer to Figure 2–8.

Pulse – Position XFC high enough on pipe to allow slope from externally mounted static pressure tap valve. See Figure 2–9.

See Figures 2–11 through 2–16 for Pipe Mounted dimensions.

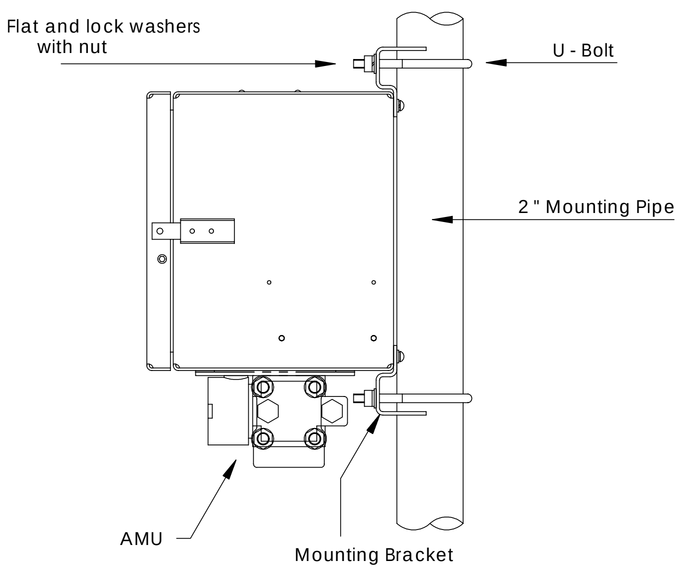

Figure 2–10 XFC Pipe Mounted

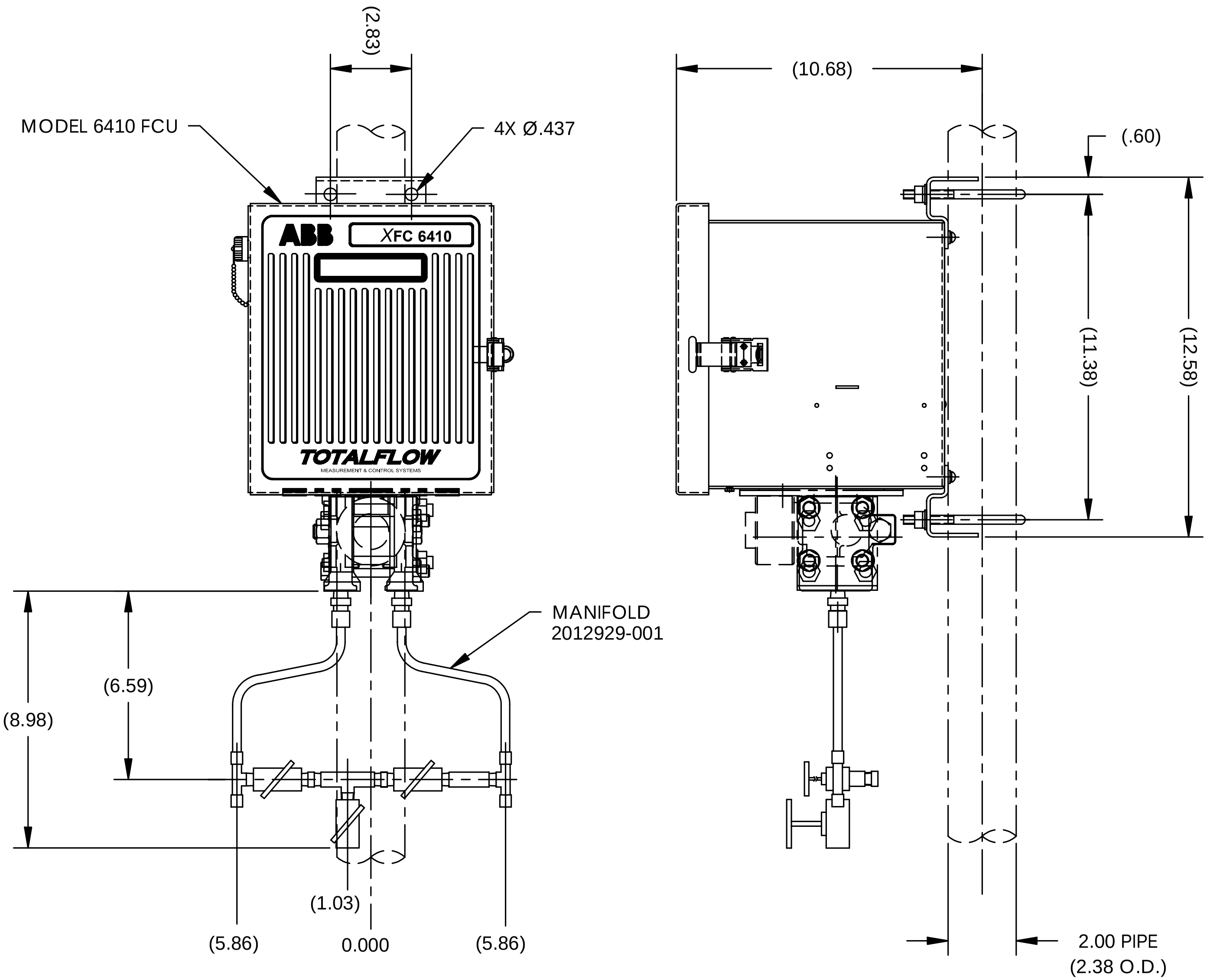

Figure 2–11 Model XFC 6410, Pipe Mounted W/Discrete Manifold

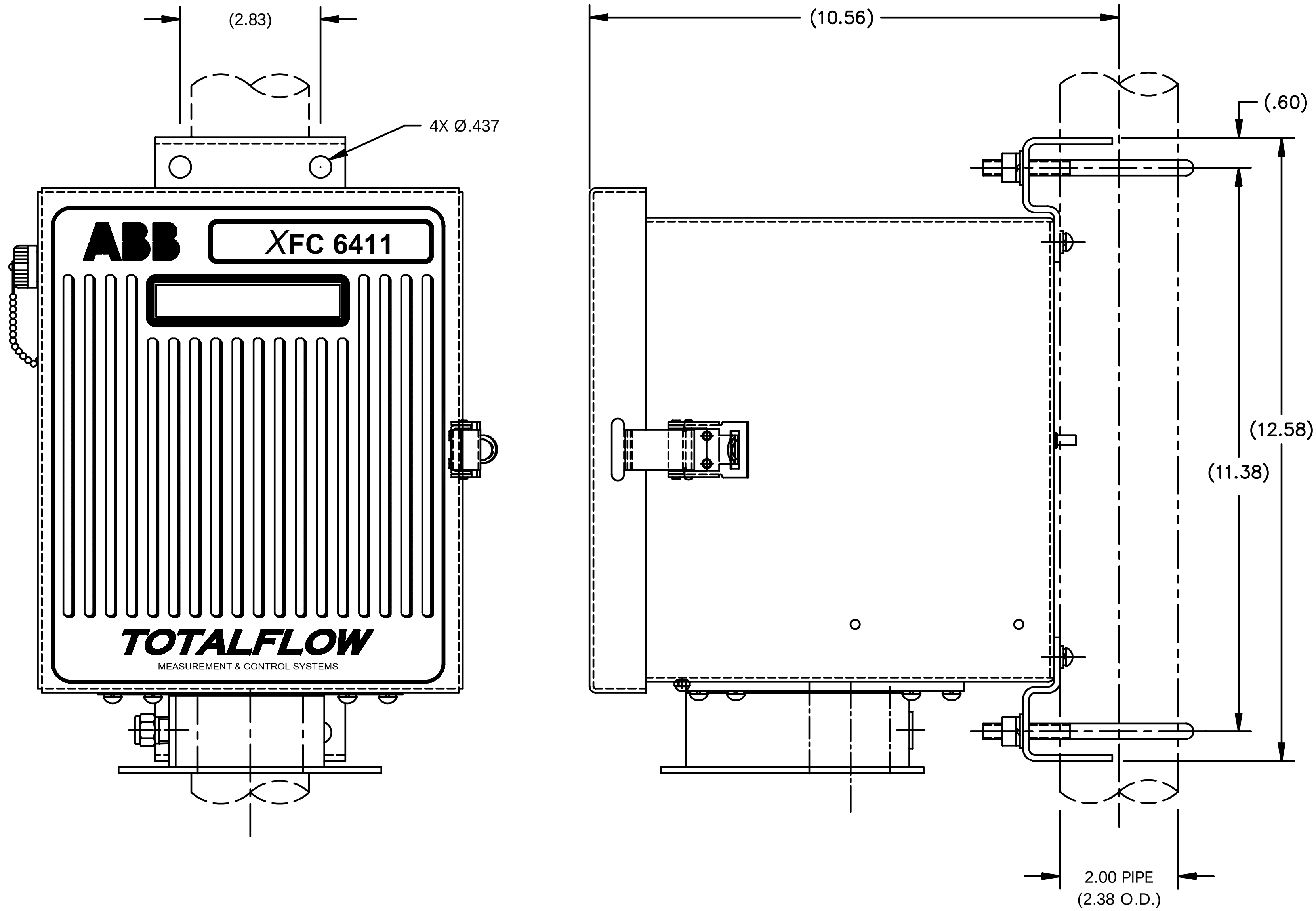

Figure 2–12 Model XFC 6411 Pipe Mounted

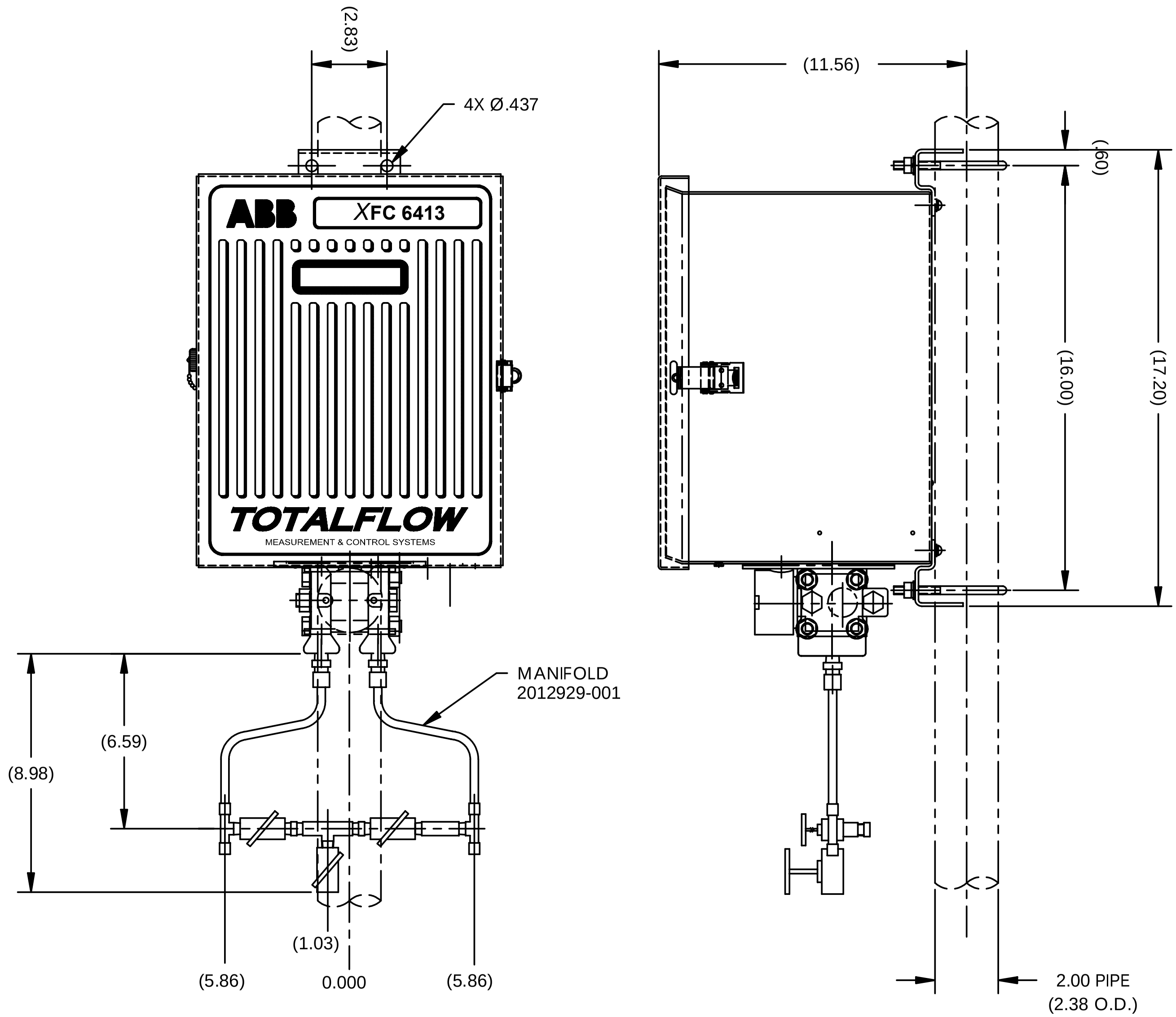

Figure 2–13 Model XFC 6413, Pipe Mounted W/Discrete Manifold

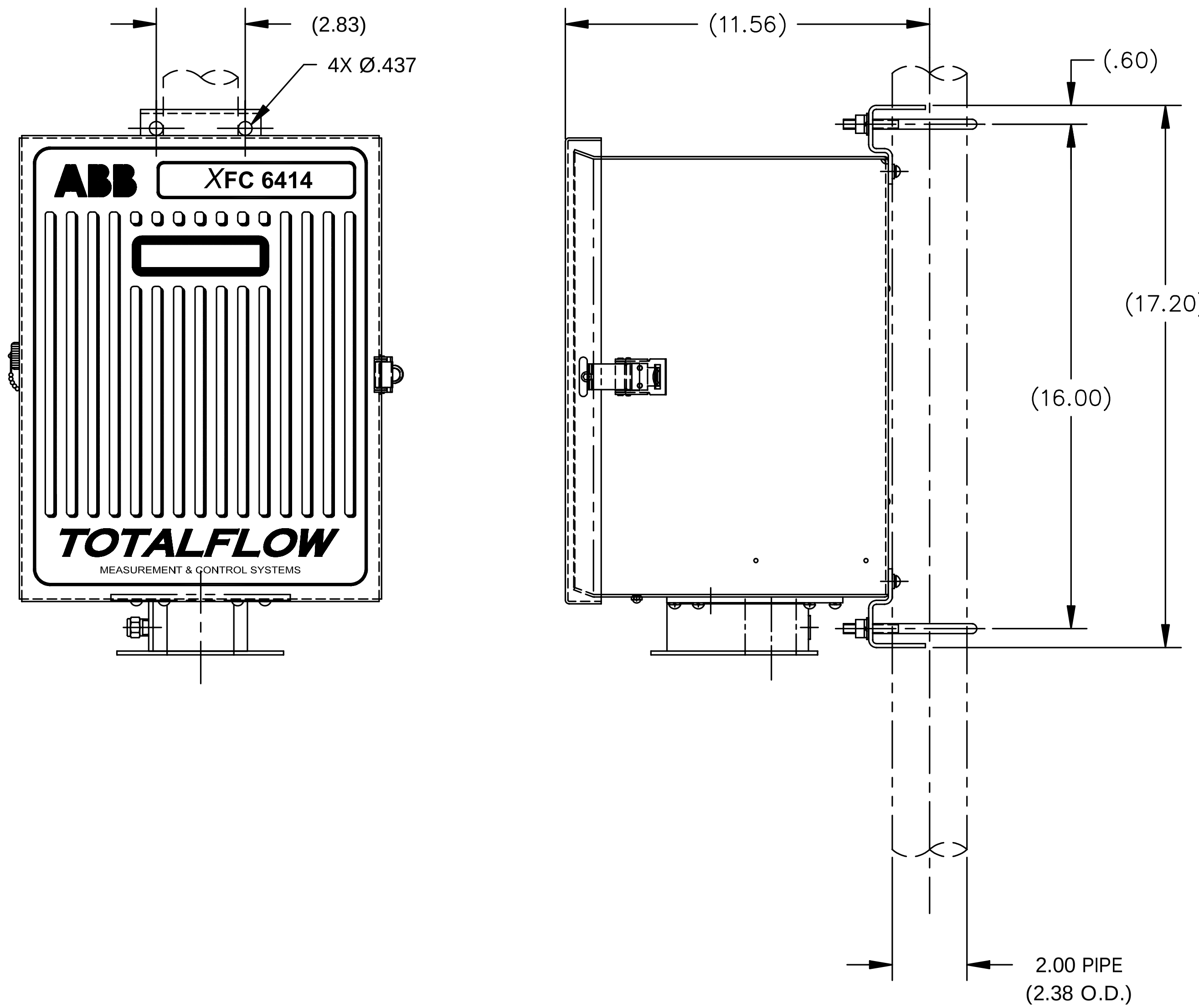

Figure 2–14 Model XFC 6414, Pipe Mounted

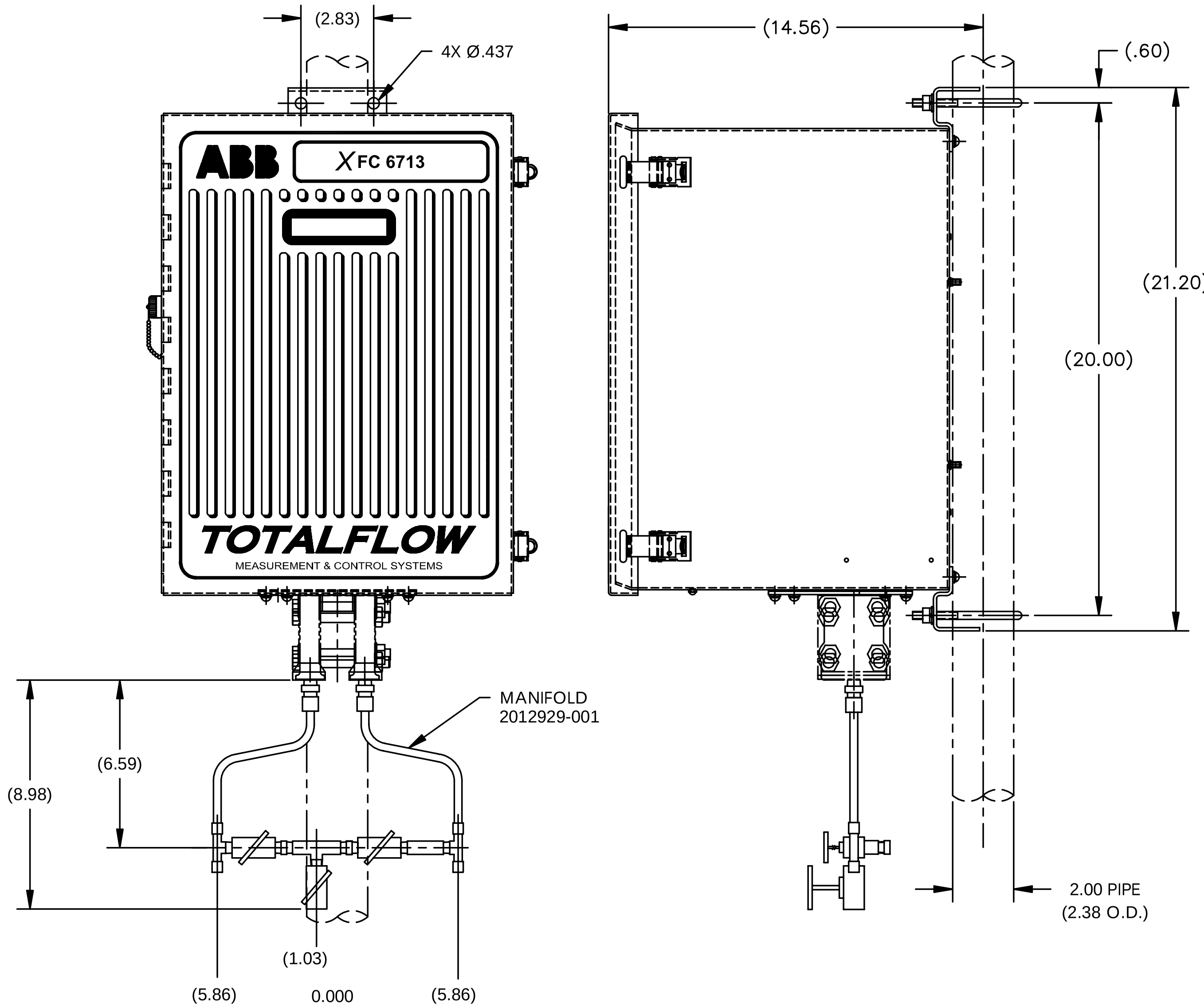

Figure 2–15 Model XFC 6713, Pipe Mounted

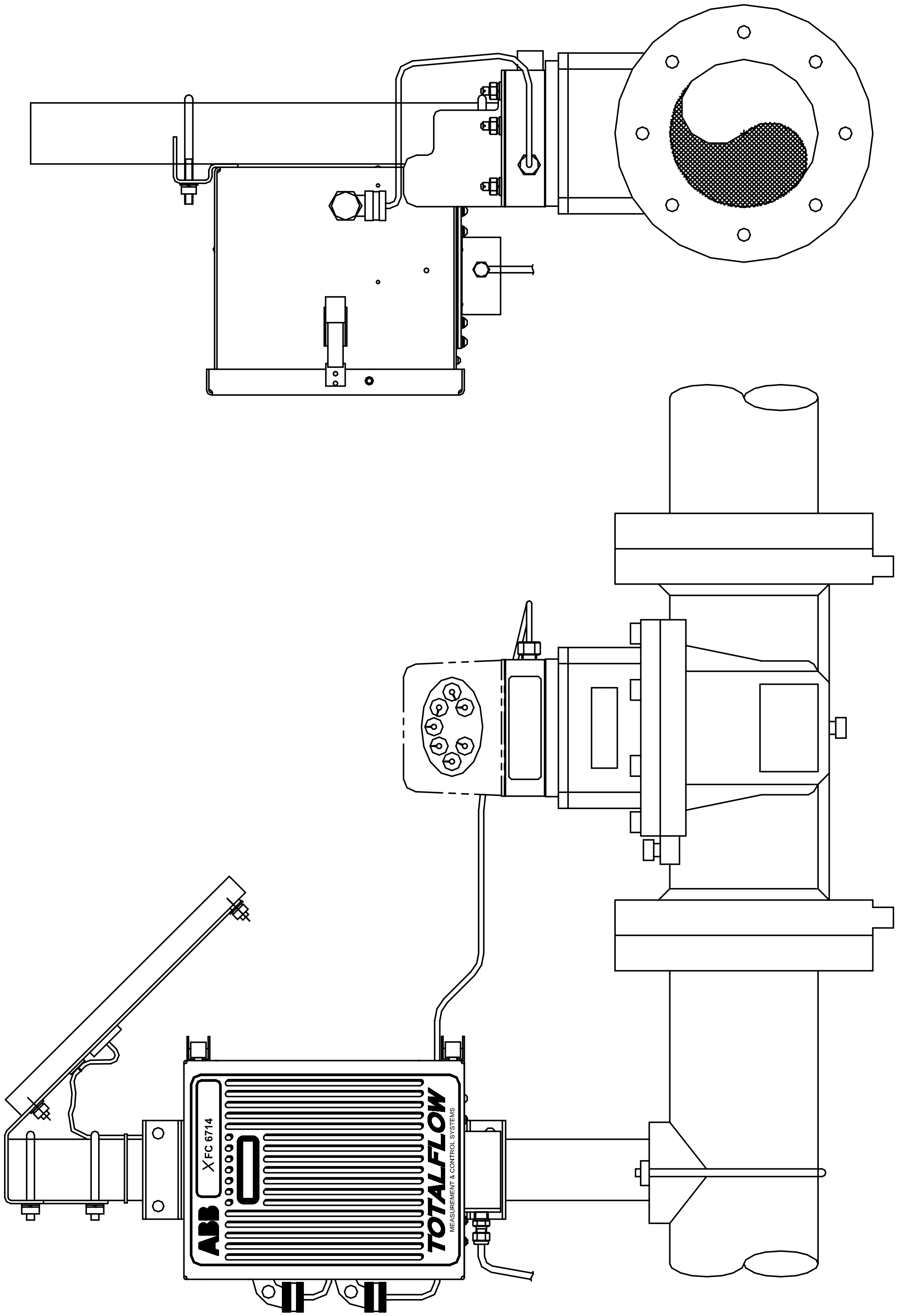

Figure 2–16 Model XFC 6714, Pipe Mounted

Wall Mount Installation

If you are installing to a wall near the meter run or inside a meter shed use this procedure. Before you begin, review the procedure and the materials required for installation. Refer to Figures 2–17 Through 2–22 for mounting dimensions requirements.

Optionally Supplied Materials

- XFC wall mounting brackets

Material Not Supplied

- Four 1/4” x 1/4” machine bolts
- Standard 3 or 5 valve manifold or Static Pressure Tap Valve
- 3/8-inch stainless steel tubing
- 1/4” x 3/8” tubing fittings

Caution

If XFC is to be wall mounted, the wall itself should have sufficient strength to support the hanging weight of the unit.

There should be no obstruction(s) that would prevent the XFC door from being opened to access interior installed components or to interfere with installation of the solar panel.

Instructions

Step	Procedure
1.	Refer to Figures 2–17 through 2–22 , drill mounting holes in wall supports.
2.	Install supplied wall mounting brackets on back of μFLO as shown in figures 2–17 through 2–22 .
3.	Lift and align XFC wall mounting brackets with mounting holes drilled in wall.
4.	Insert 1/4” x 1/4” diameter machine bolts through XFC mounting brackets into wall. Securely tighten all bolts to secure unit to wall.

FYI

Orifice - Position XFC high enough on wall to allow slope from externally mounted manifold to tap valves.

Pulse – Position XFC high enough on wall to allow slope from externally mounted static pressure tap valve.

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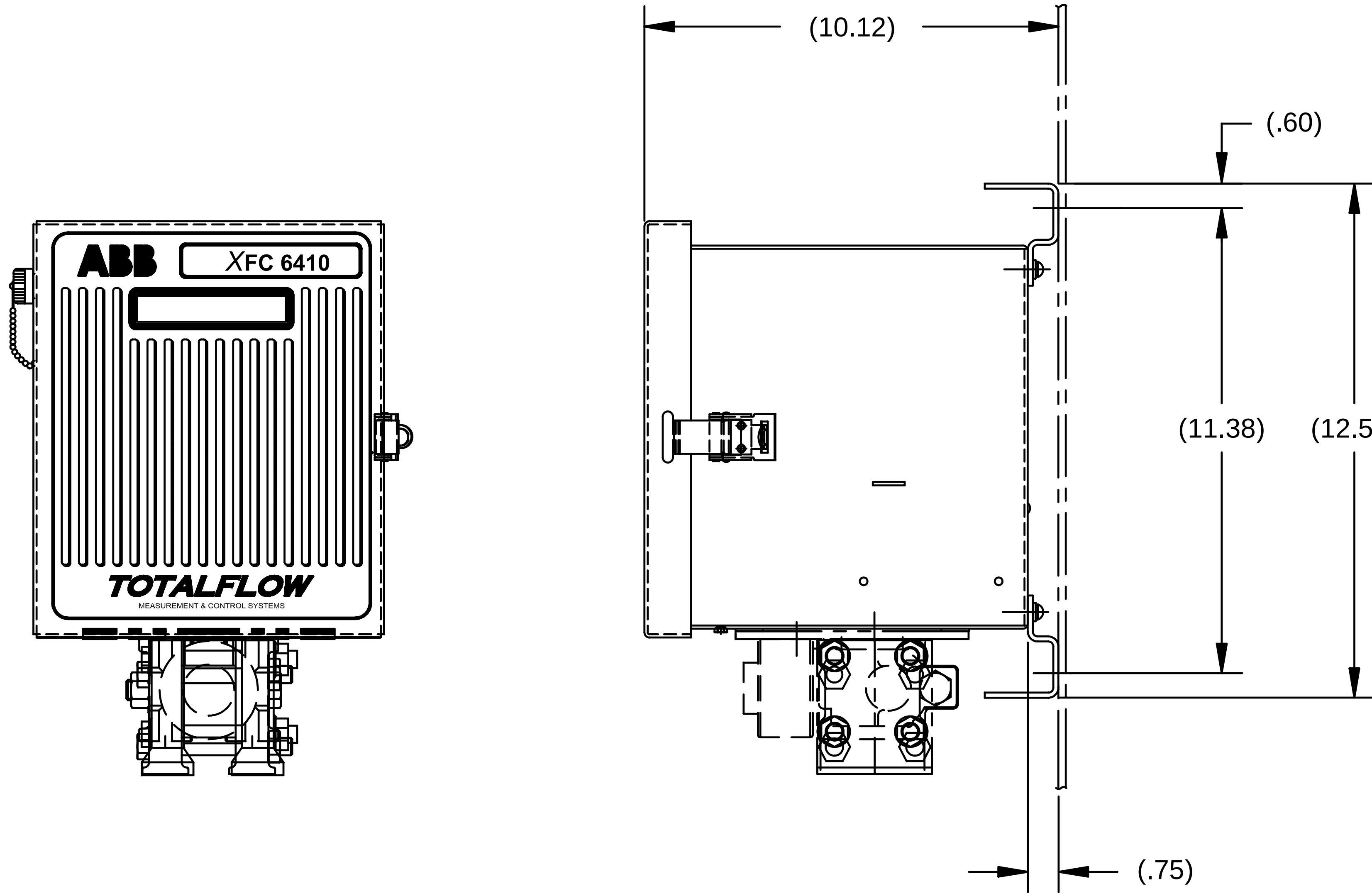

Figure 2–17 Model XFC 6410 Wall Mounted

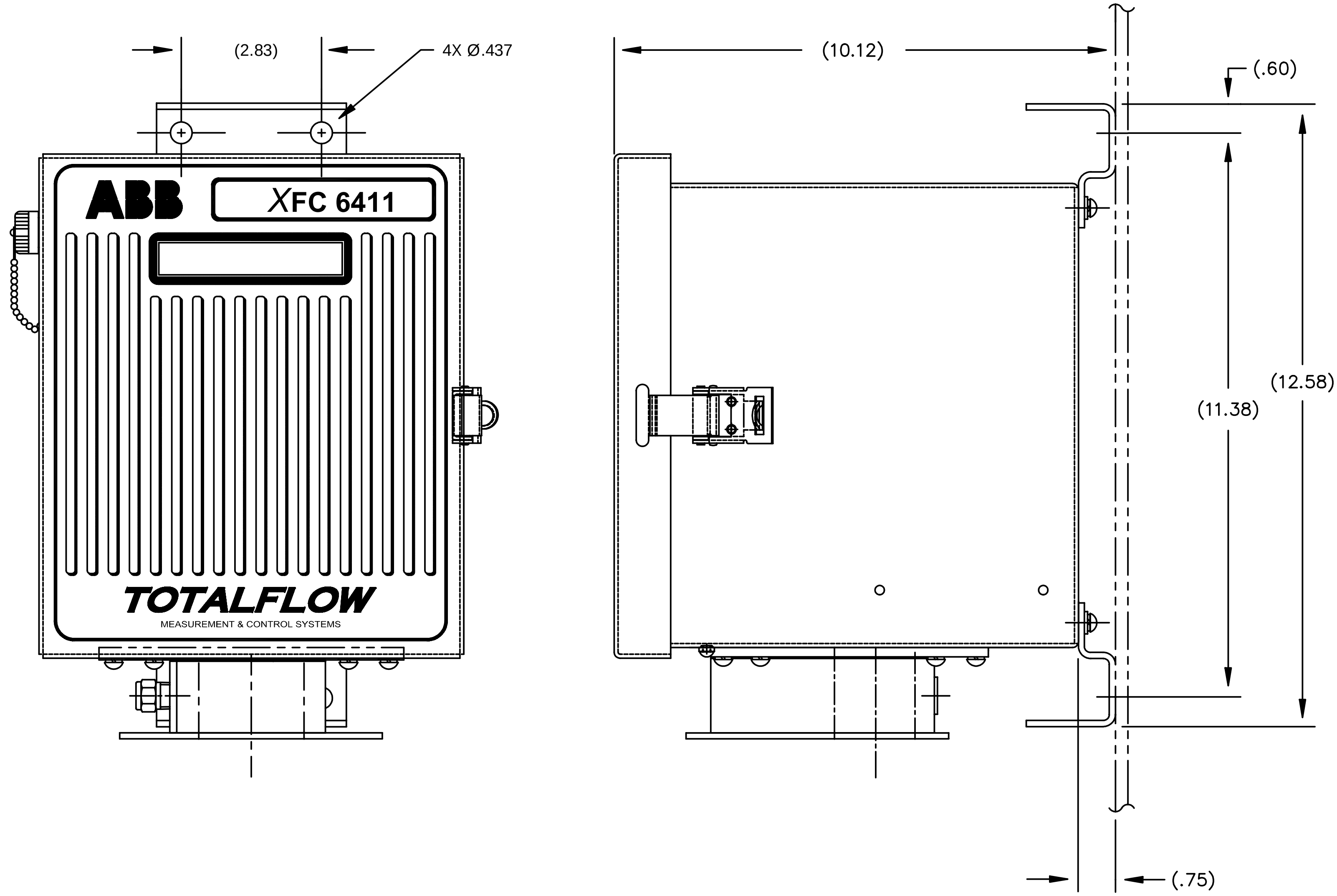

Figure 2–18 Model XFC 6411 Wall Mounted

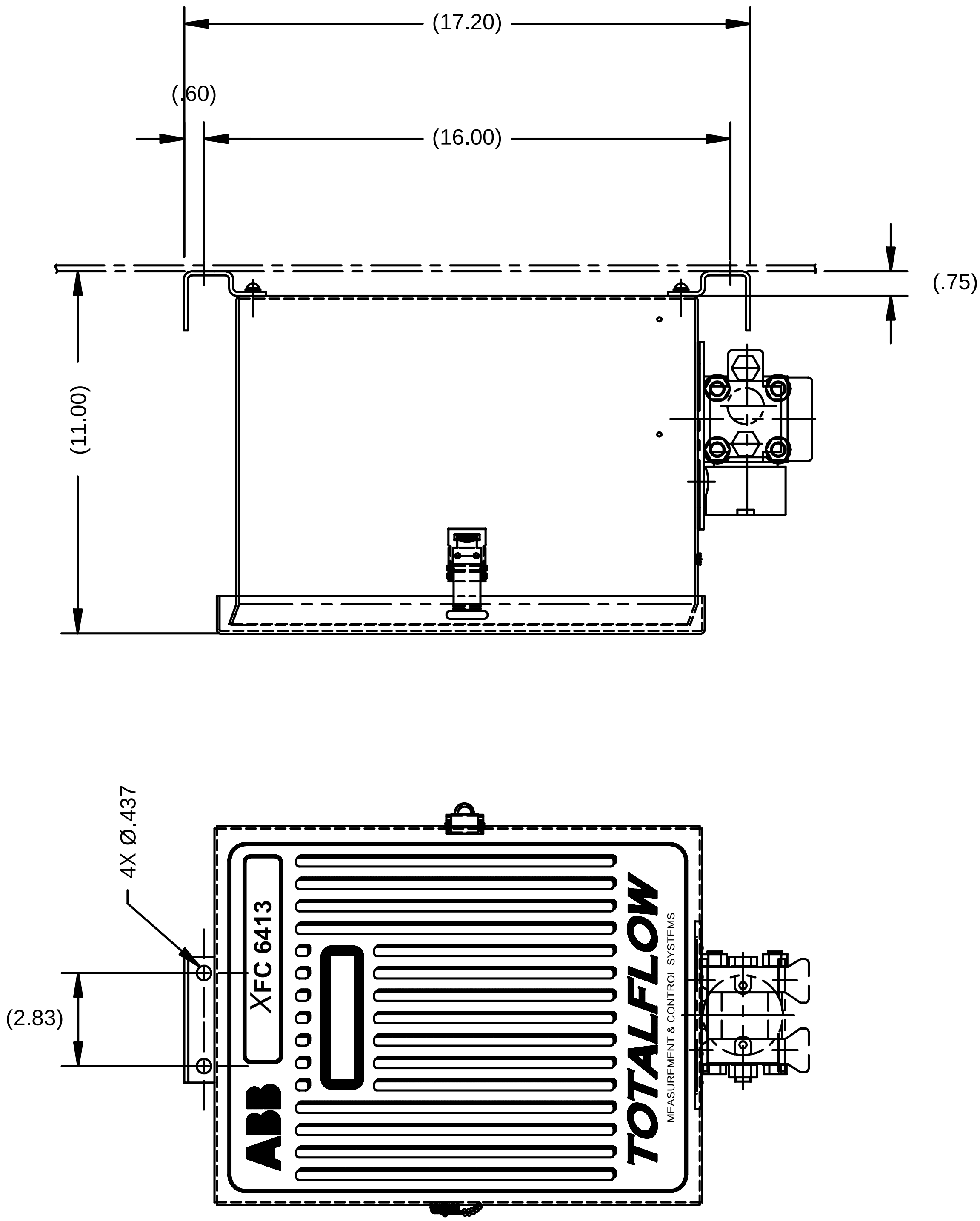

Figure 2–19 Model XFC 6413 Wall Mounted

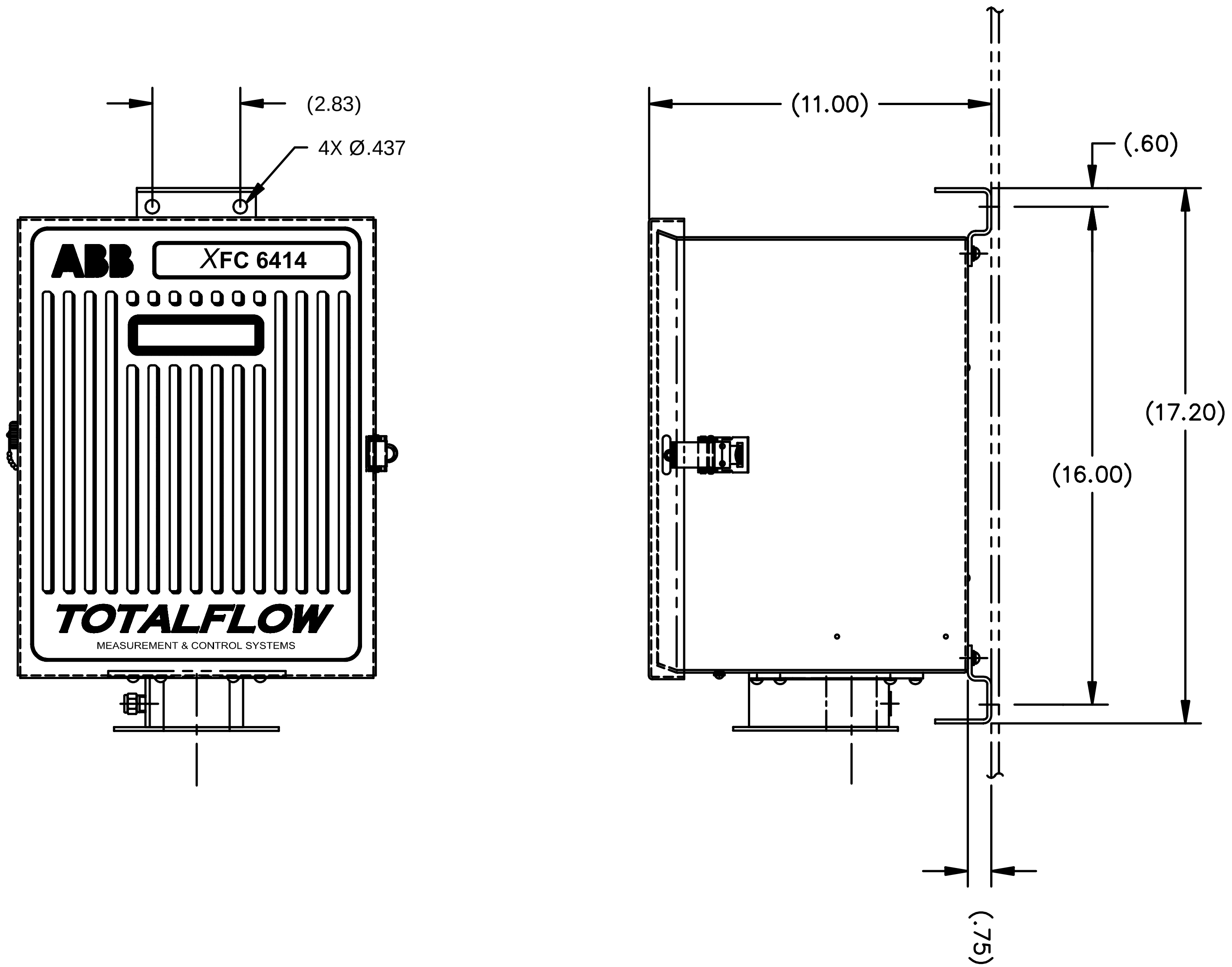

Figure 2–20 Model XFC 6414 Wall Mounted

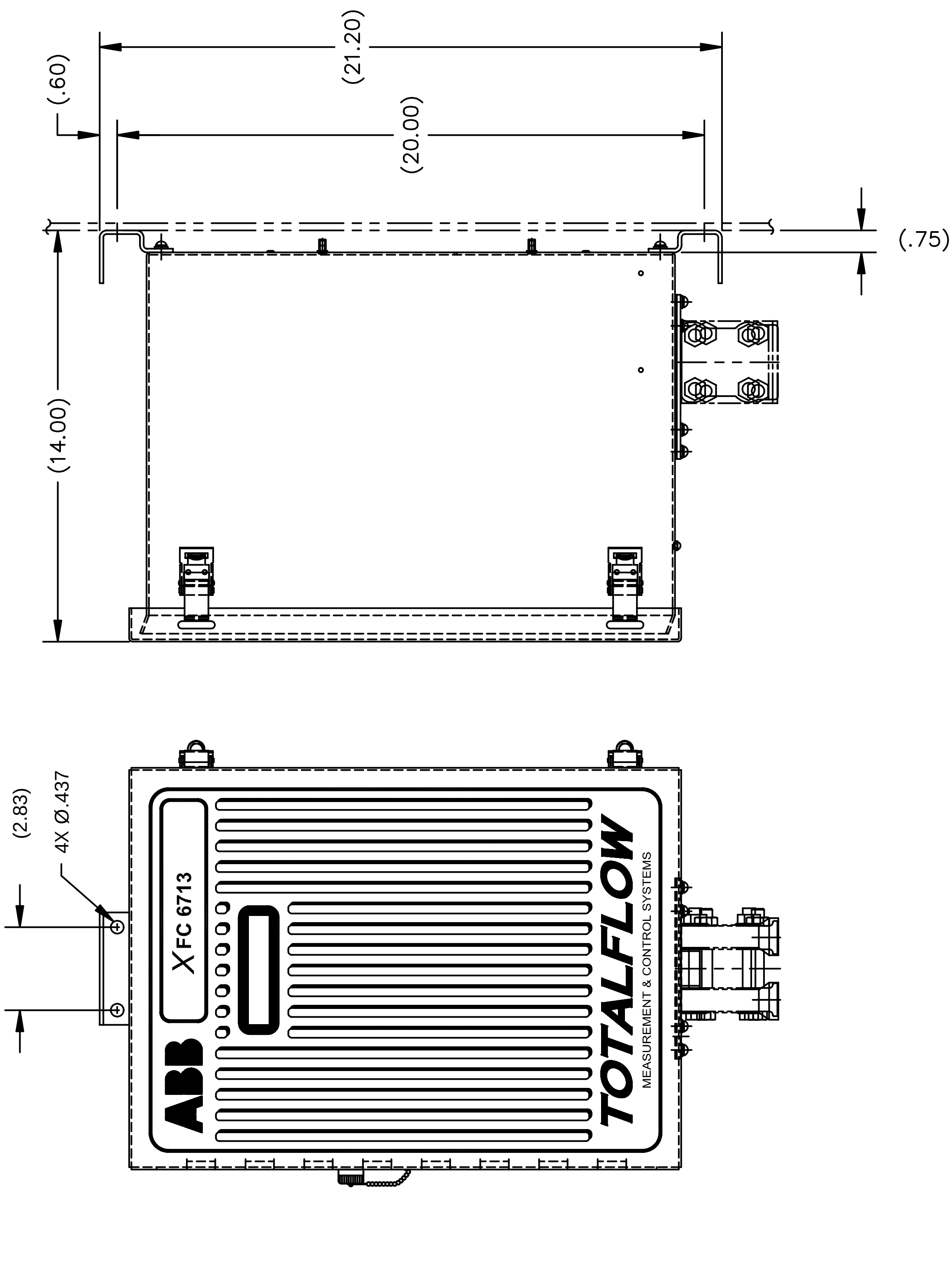

Figure 2–21 Model XFC 6713 Wall Mounted

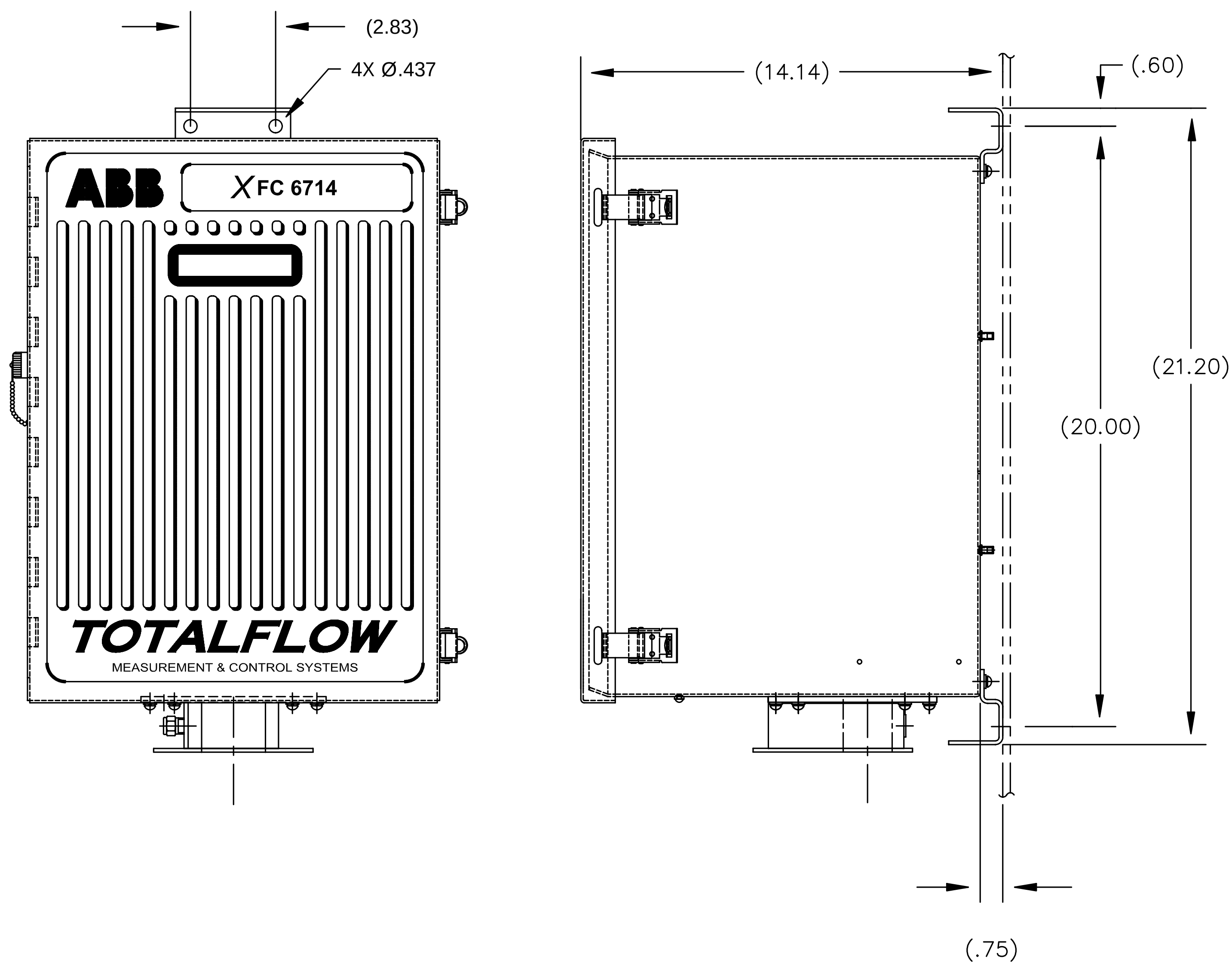

Figure 2–22 Model XFC 6714 Wall Mounted

Direct Mount Installation for Gas Orifice

If you are installing the XFC directly to an instrument manifold use this procedure. Before you begin, review the procedure and the Direct Mount Drawings, see figures 2–23 through 2–25 .

FYI All required hardware for mounting to the XFC to the manifold is to be supplied by the customer.

Instructions

Step	Procedure
1.	Refer to Figures 2–23 through 2–25 , attach the AMU to the manifold. Before aligning with the manifold ensure that Teflon seal rings are in place around the two process ports.
2.	Using the four 7/16-inch bolts supplied with the manifold secure the AMU to the manifold.
3.	Refer to Figure 2–23 through 2–25 and complete installation.

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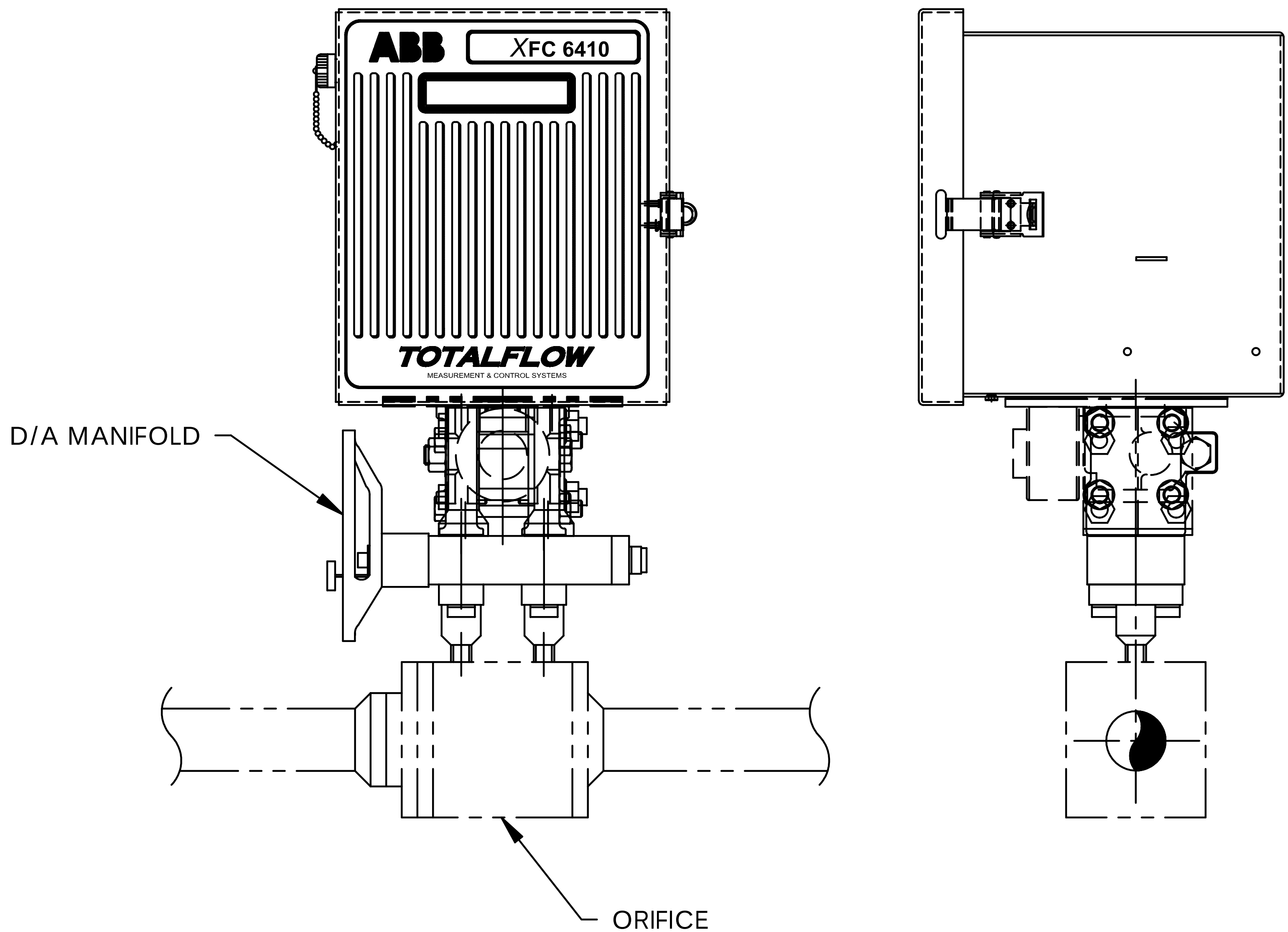

Figure 2–23 Model XFC 6410, Direct Mounted with D/A Manifold

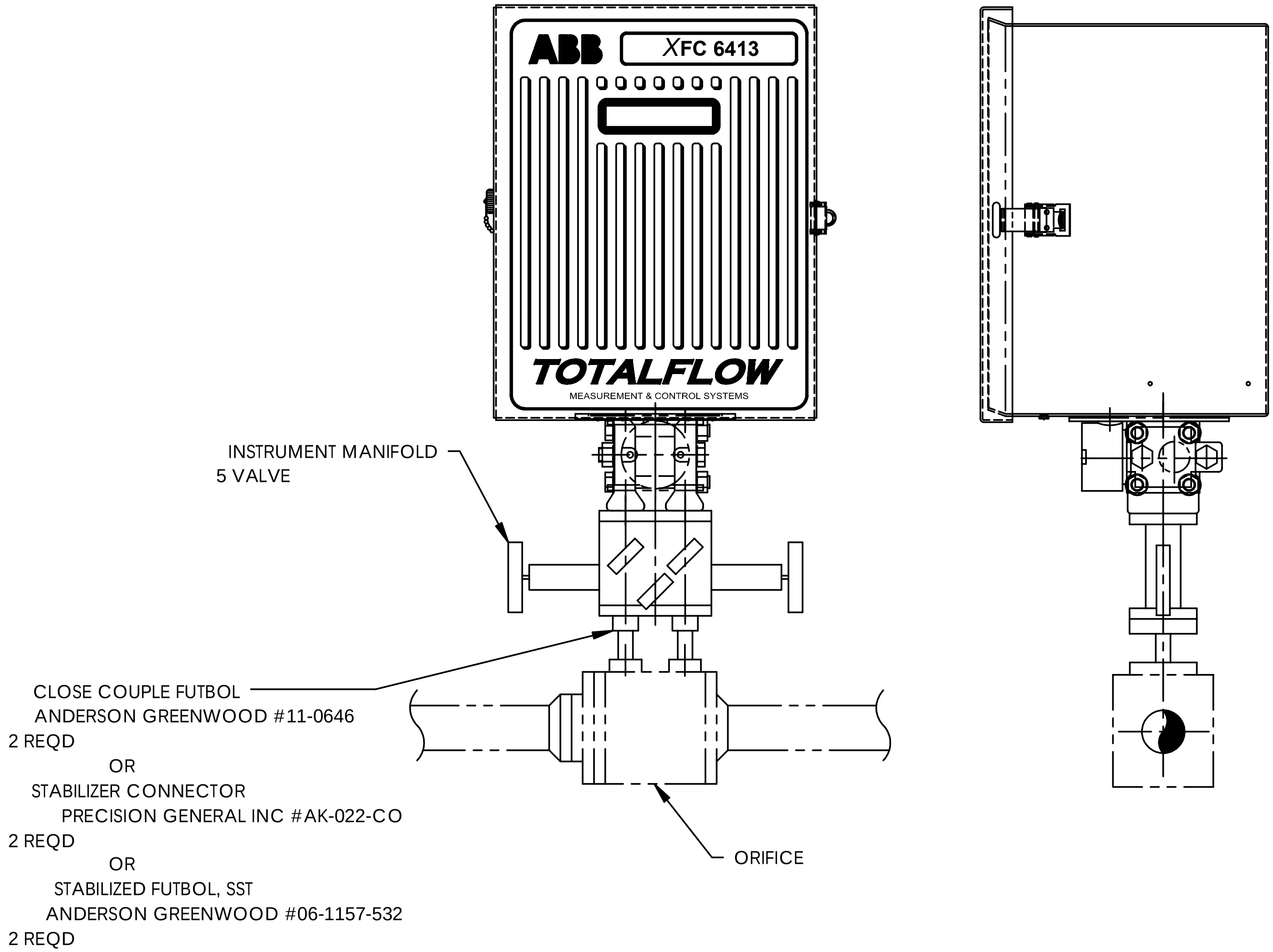

Figure 2–24 Model XFC 6413 Direct Mounted, Instrument Manifold

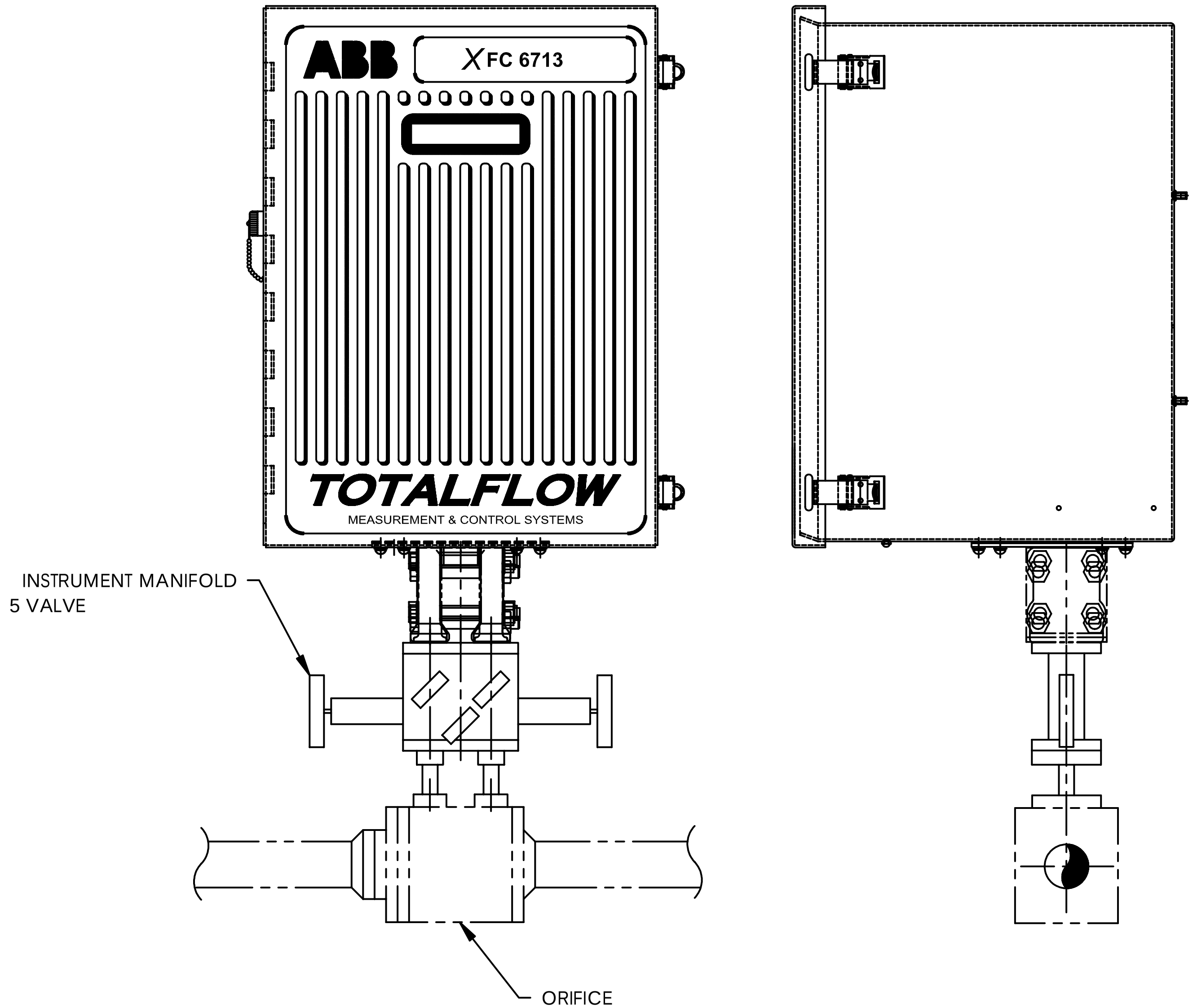

Figure 2–25 Model XFC 6713 Direct Mounted

Manifold Input Lines

The following instructions will provide procedural steps to install the manifold. The meter run manifold high (H) and low (L) pressures terminate in XFC H and L Differential Port cells. Differential Port cells are located on bottom of XFC. See Figure 2–26 .

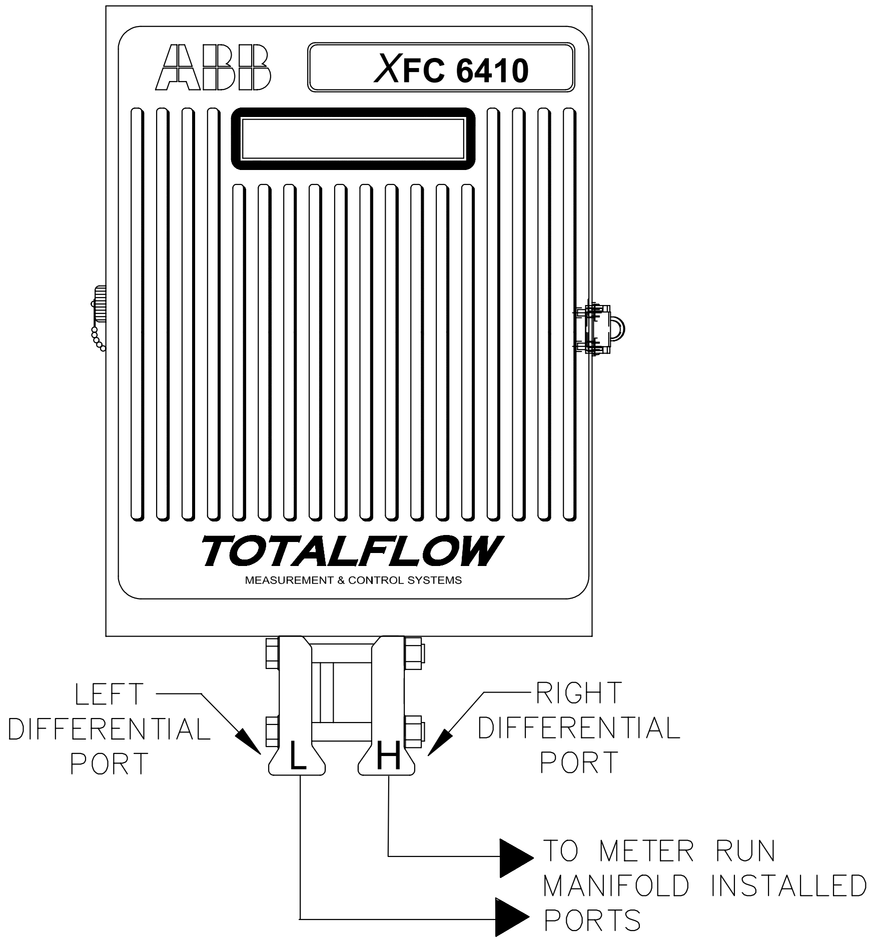

Figure 2–26 Flow Computer

Installation

Installation is customers responsibility.

The hardware required to connect to meter run to install manifold to XFC Differential Ports is as follows:

Customer Provided Materials

- Stainless steel tubing
- Tubing fittings

Caution

A backup wrench should always be used when working with stainless steel tubing and valves. This prevents fitting from turning and/or putting tension on stainless steel tubing.

Continued on Next Page

Manifold Input Lines, Continued

Instructions

Step	Procedure
1.	Install isolation valves on meter run (if using 5 or 3 way manifolds).
2.	Install manifold and tubing to meter run and XFC. (Note: Manifold to XFC fittings not supplied with XFC).
3.	Leak check all connections.

TIP Leaks in the tubing or manifold will introduce errors when calibrating AMUs.

Direct Mount Installation for Pulse Meter

If you are installing the XFC directly to a meter use this procedure. Before you begin, review the procedure and the Direct Mount Outline Drawings; see Figures 2–27 through 2–29 .

FYI All required hardware for mounting to the XFC to the meter is supplied by Totalflow, as ordered.

Instructions

Step	Procedure
1.	Refer to Figures 2–27 through 2–29 XFC Outline Drawings, attach the FCU to the meter. Before aligning with the manifold ensure that all seals are in place around the mounting hardware.
2.	Using the four 3/8-inch bolts supplied with the XFC secure the XFC to the meter.
3.	Refer to Figure 2–27 , 2–28 or 2–29 and complete installation.

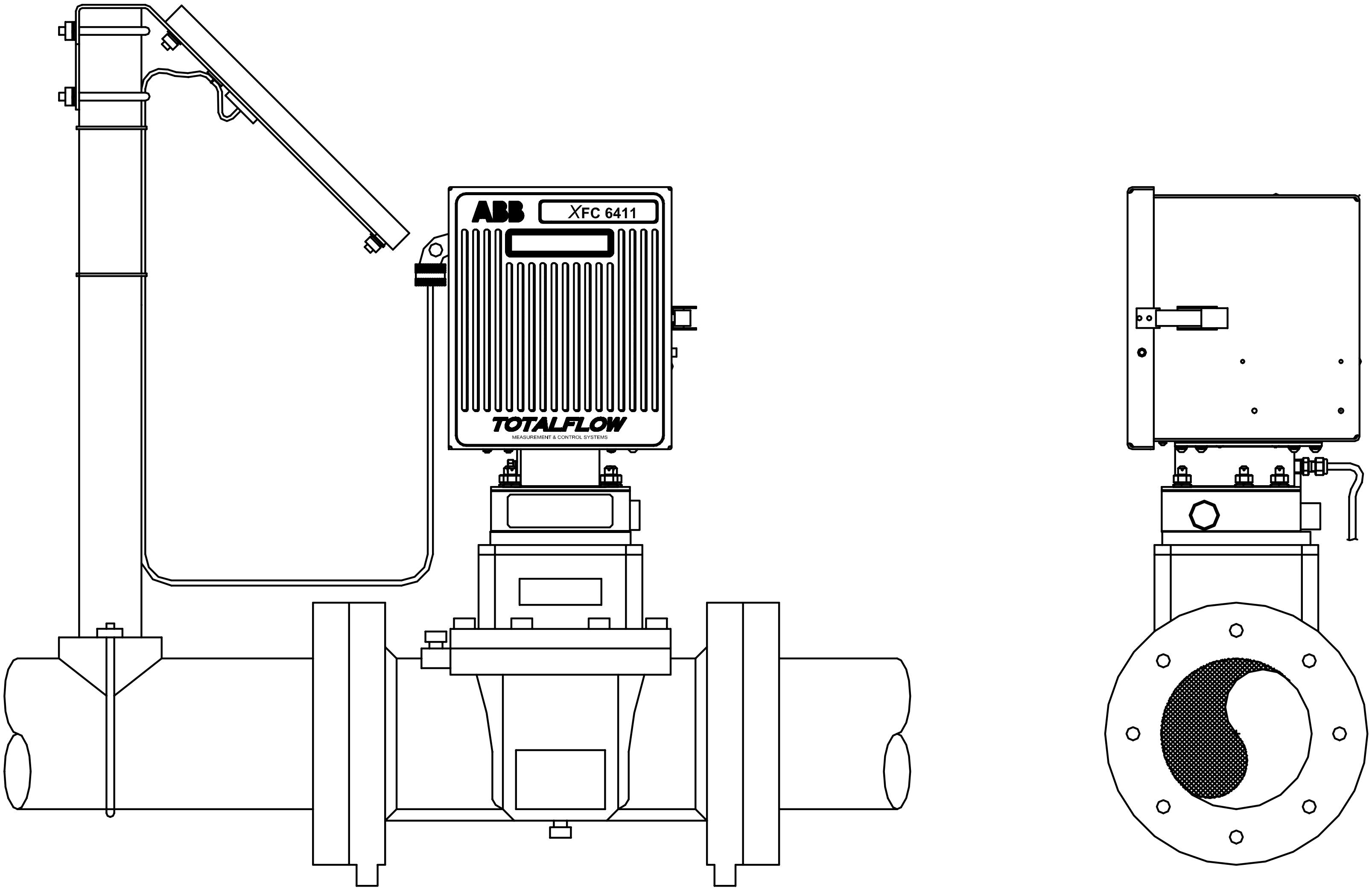

Figure 2–27 Model XFC 6411 Direct Mounted

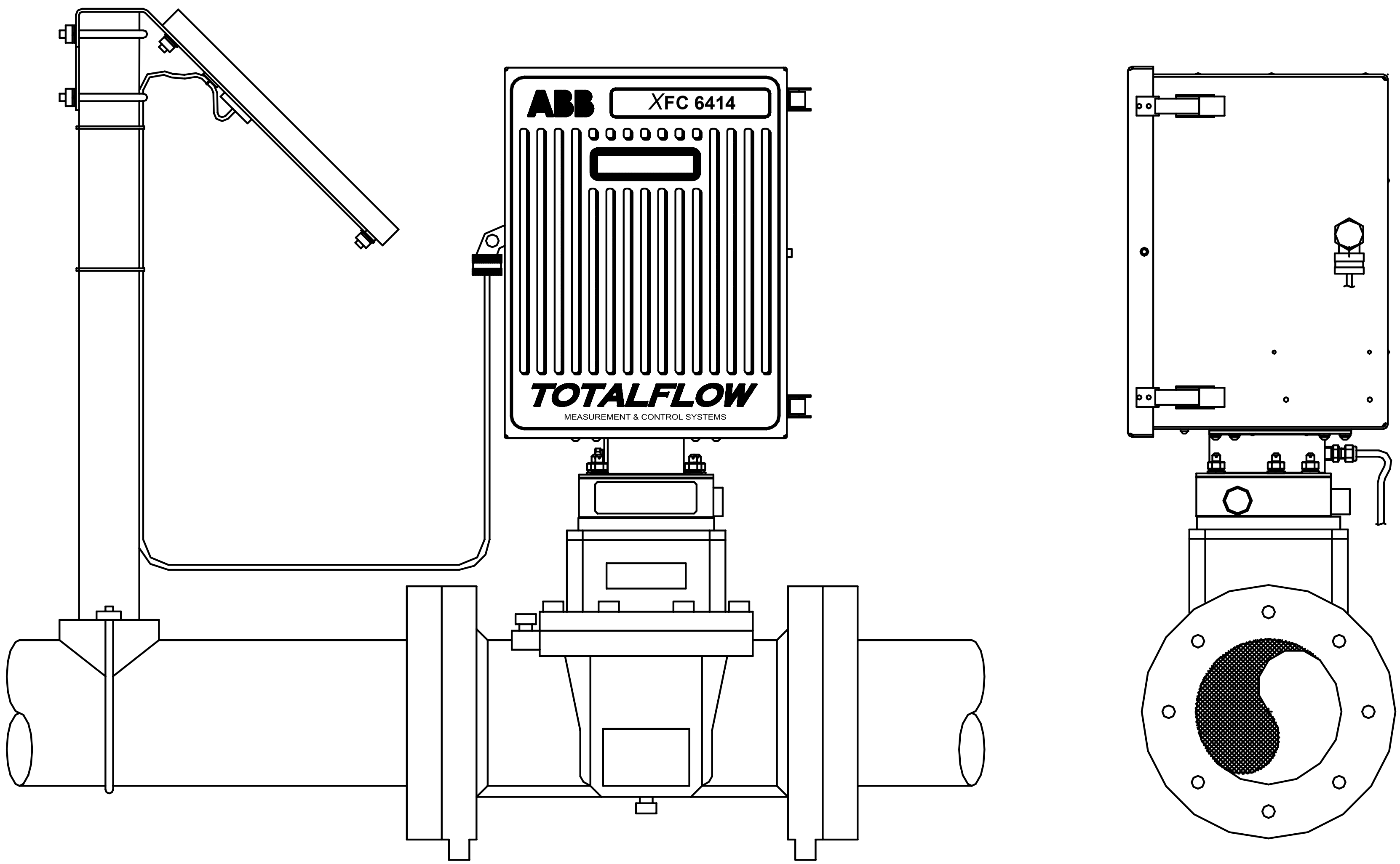

Figure 2–28 Model XFC 6414 Direct Mounted

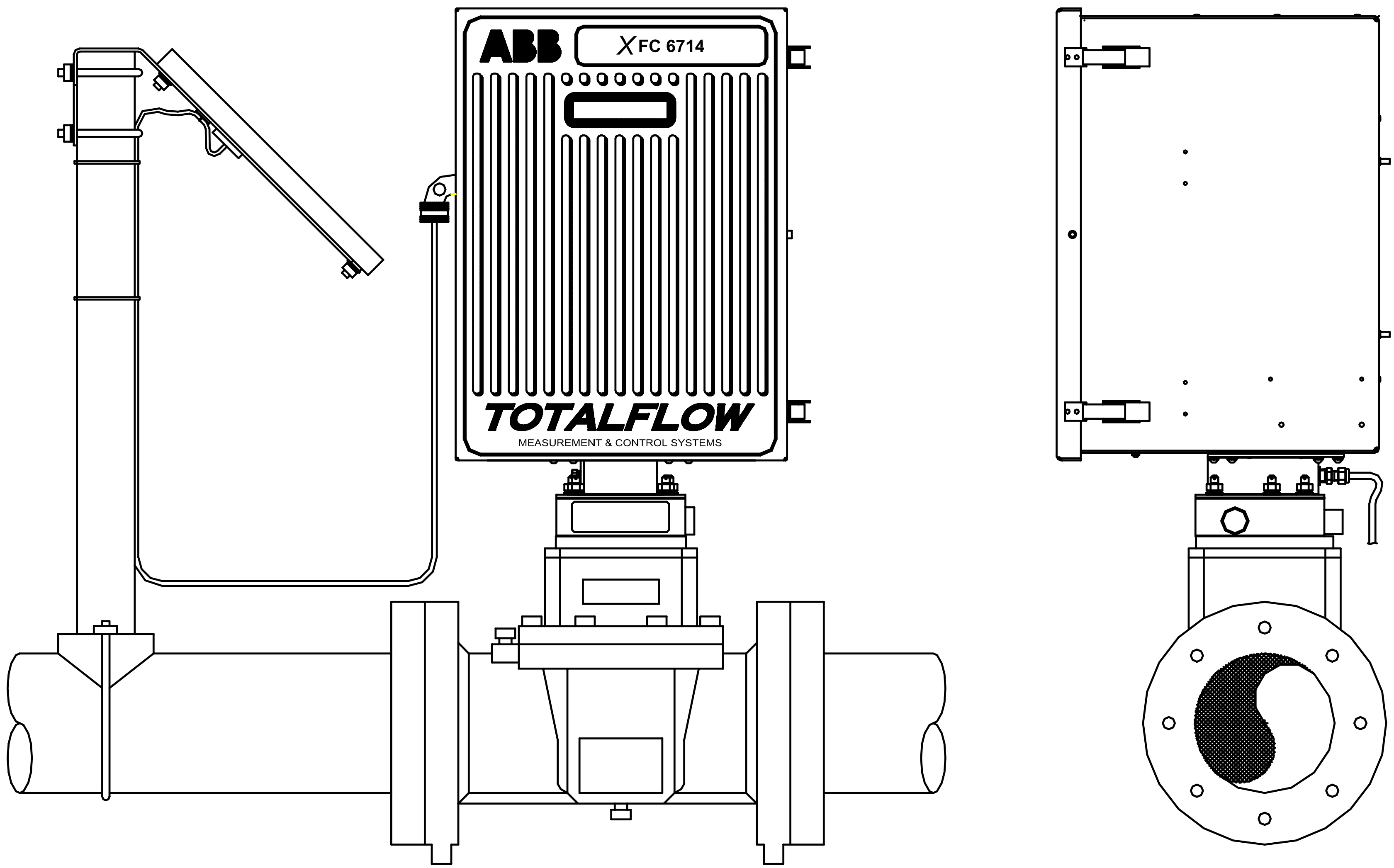

Figure 2–29 Model XFC 6714 Direct Mounted

Static Pressure Input Line

Description

The following instructions will provide procedural steps to install the static pressure input line. The static pressure input line terminates in either the rear or side pressure ports on the XFC mounting block located on the bottom of the XFC. See Figure 2–30 .

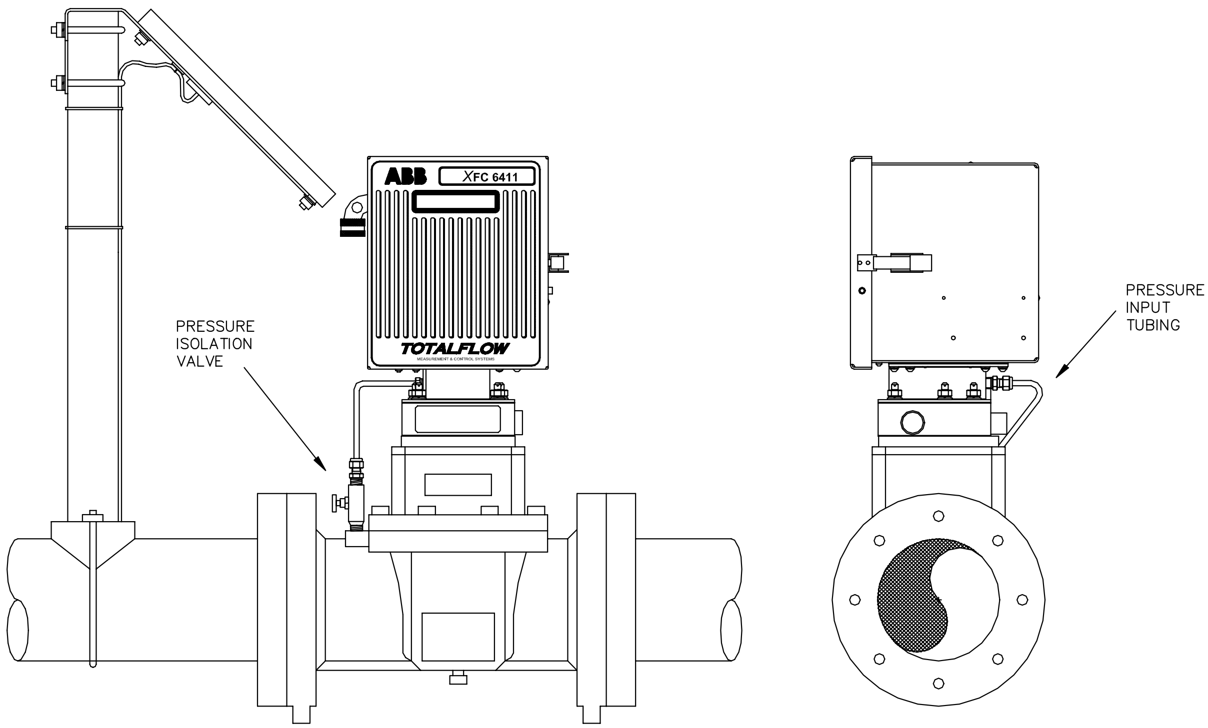

Figure 2–30 XFC Static Pressure Input Line

Installation

The hardware required to connect the FCU static pressure line to the FCU static pressure port is as follows. Installation is customers responsibility.

Customer Provided Materials

- Stainless steel tubing
- Static pressure isolation/shut off valve
- Tubing fittings

A backup wrench should always be used when working with stainless steel tubing and valves. This prevents fitting from turning and/or putting tension on stainless steel tubing.

Continued on Next Page

Instructions

Step	**Procedure**
1.	Install static pressure isolation valve on meter run.
2.	Install static pressure tubing to static pressure isolation valve and XFC static pressure input port connection. (Note: Valve to XFC fittings not supplied with XFC).
3.	Leak check all connections. Leaks in the tubing or connections will introduce errors when calibrating transducers.
4.	Mount XFC to direct mount manifold.
5.	Leak check all tubing connections before calibrating.

TIP Leaks in the static pressure connections and tubing will introduce errors in transducer readings.

RTD Probe Installation

The RTD measures flowing gas temperature. Procedures, presented in this Chapter, enable the user to install the RTD into the meter run.

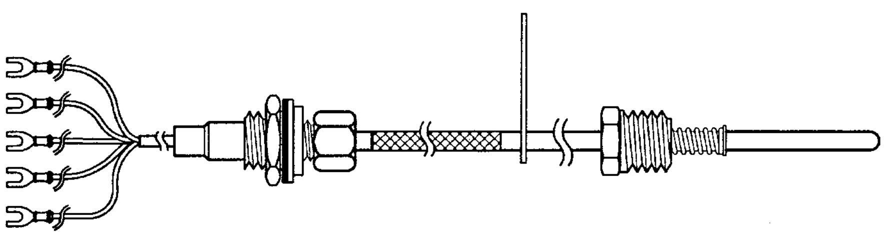

Figure 2–31 RTD Probe Wiring

Optionally Supplied Materials

- RTD probe with 10’ of cable. Optional lengths are 15’, 25’, 30’, 40’, and 50’.
- One (1) thermowell with 3/4” npt threads; optional threads are 1/2” and 1”.
- Nylon tie wraps.

Materials not Supplied

- Customer must specify Thermowell “U” length.
- Teflon tape

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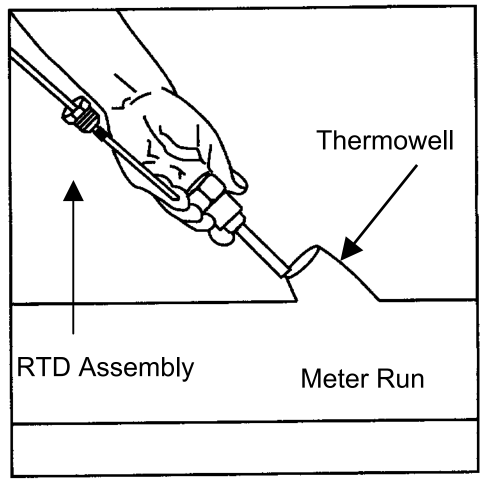
Instructions

Step	Procedure
1.	Install thermowell into meter run.

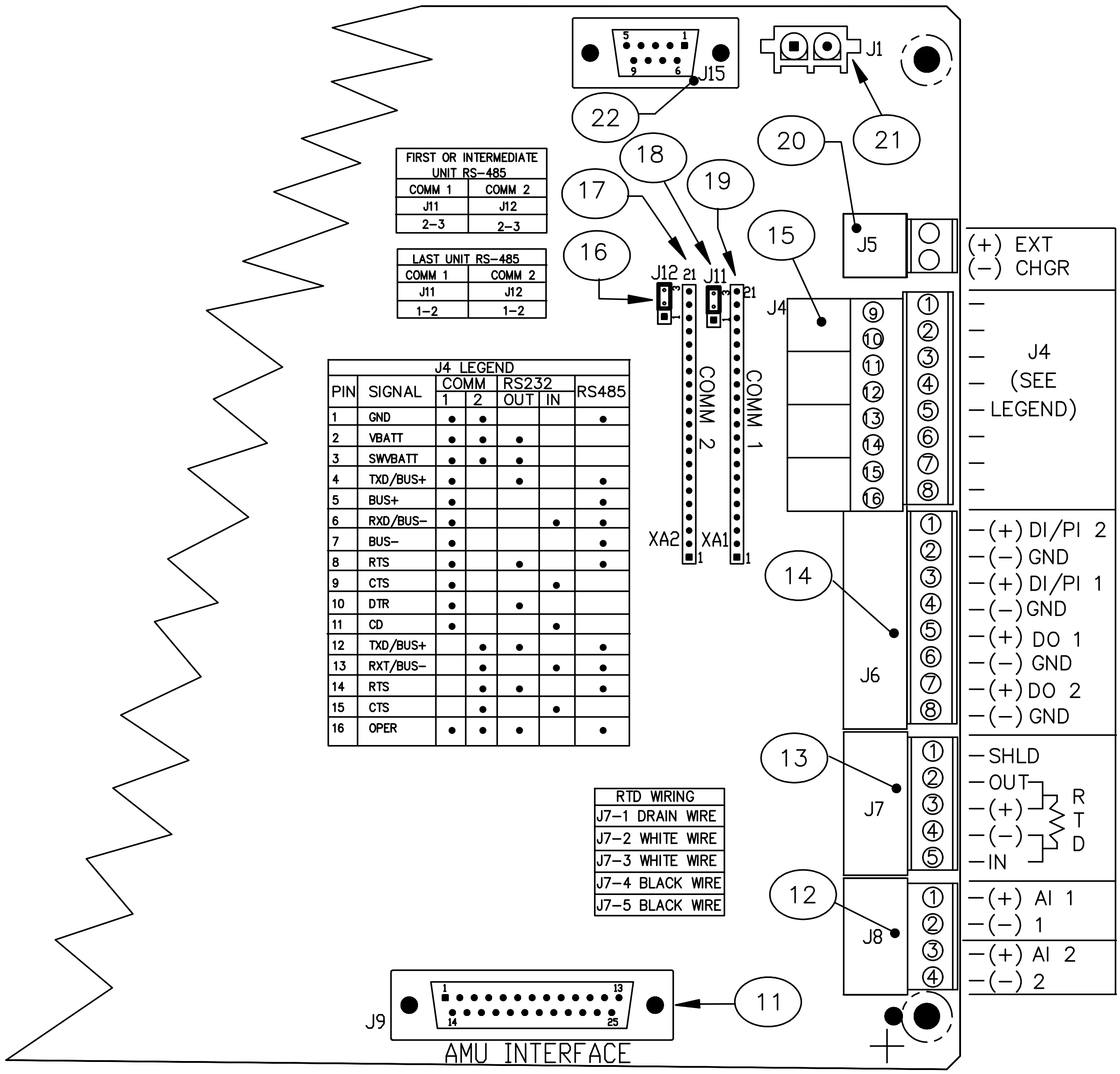


FYI

To prevent moisture from entering XFC after installing RTD cord connector, be certain associated connector, at XFC, has a metal backed sealing “O” ring and metal locking nut attached.

Power should be removed from XFC before performing any field wiring.

Step	Procedure
2.	Using snap ring pliers, adjust probe length so that it is spring loaded against bottom of thermowell.
3.	Remove nut from water tight cord connector. On XFC, remove hole plug from unit and insert wires through the hole. Allow enough RTD cable to extend into XFC for connecting wires to RTD termination Block J7 (Figure 2–32 Item 13).
4.	Secure RTD Probe cable using supplied sealing ring and nut.
5.	Connect RTD probe to XFC RTD connector as follows. Before making connections to terminal block, remove spade lugs if attached and trim wire ends back 1/4” and remove associated terminal block from XFC-195 Board. See overlay on battery plate. Loosen terminal block securing screws, insert wire then retighten. Reinstall terminal block with wires attached. See 2–31 .
6.	Following connection of RTD thermowell, secure cable to meter run pipe with plastic tie wraps. Do Not wrap cable around meter run pipe.



FIRST OR INTERMEDIATE UNIT RS-485	
COMM 1	COMM 2
J11	J12
2–3	2–3

LAST UNIT RS-485	
COMM 1	COMM 2
J11	J12
1–2	1–2

J4 LEGEND						
PIN	SIGNAL	COMM 1	COMM 2	RS232 OUT	RS232 IN	RS485
1	GND	•	•			•
2	VBATT	•	•	•		
3	SWVBATT	•	•	•		
4	TXD/BUS+	•		•		•
5	BUS+	•				•
6	RXD/BUS−	•			•	•
7	BUS−	•				•
8	RTS	•		•		•
9	CTS	•			•	
10	DTR	•		•		
11	CD	•			•	
12	TXD/BUS+		•	•		•
13	RXT/BUS−		•		•	•
14	RTS		•	•		•
15	CTS		•		•	
16	OPER	•	•	•		•

RTD WIRING
J7–1 DRAIN WIRE
J7–2 WHITE WIRE
J7–3 WHITE WIRE
J7–4 BLACK WIRE
J7–5 BLACK WIRE

Figure 2–32 XFC-195 Board Cutout-Installation

Table 2–1 XFC-195 Board Identifications-Installation

ID Number	Description
11	AMU Interface
12	Analog Input Connectors
13	RTD Connectors
14	Pulse Input and Digital Output Connectors
15	Remote Communications Connectors
16	Remote Comm 2: RS-485 Termination Jumper
17	Remote Comm 2: Module Plug-in
18	Remote Comm 1: RS-485 Termination Jumper
19	Remote Comm 1: Module Plug-in
20	External Charger
21	Battery Connection
22	I/O Module Interface

Battery Pack Installation

A battery pack provides the XFC with it's operating power. The battery is packed and shipped separately. The battery is not installed in XFC when shipped. Before installation, inspect power cables, where they terminate on battery pack, and connector for breakage.

Installation

Battery pack is mounted behind the removable metal battery plate cover. The plate is adjustable for various size batteries.

Instructions

Step	Description
1.	Remove XFC battery cover plate and insert battery pack into compartment. Insert battery pack with its long dimension facing outward. When cover plate is reinstalled, it should fit snugly against the battery pack. The screws can be loosened to accommodate larger battery.
2.	Connect battery pack connector to XFC-195 Board BATTERY CONN J1 (Figure 2–32 , Item 21) connector, located in upper right corner of Board.
3.	Observe LCD, the display should be on and scrolling through the startup diagnostics sequence.

Solar Panel Installation

The Solar Panel is designed for outdoor mounting on a 2” extension pipe installed on upper end of XFC 40” mounting pipe. Solar panel must be mounted within 12 feet of XFC (other lengths available). For wall mounted XFC it can be mounted on top or side of meter house.

CAUTION Do not connect solar panel power cable to the XFC unless main battery pack has been connected to J1 (Figure 2–32 , Item 21). Refer to previous section on Battery Pack Installation.

FYI If installation procedures are required for mounting Solar Panel on top or side of meter house, customer should contact Totalflow's Service Department; see page x, Getting Help.

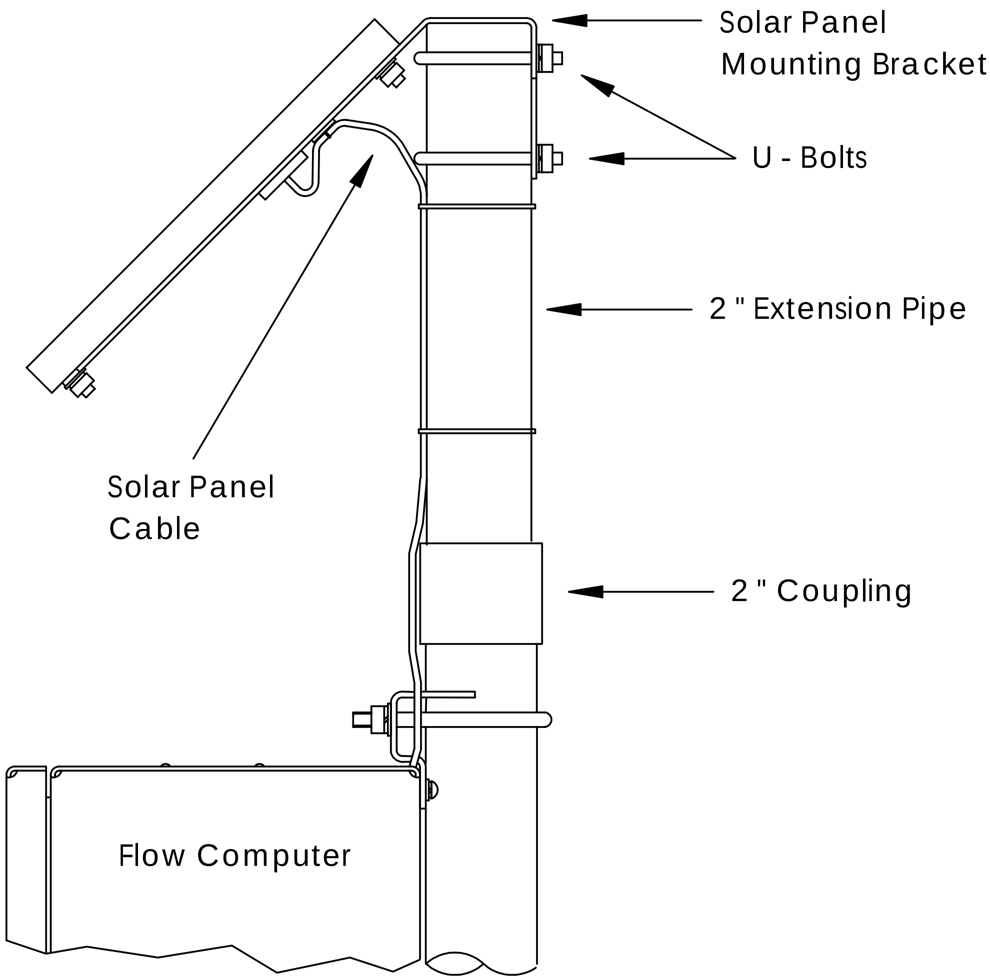


Figure 2–33 Typical Solar Panel Installation

Procedure

Our standard solar panel must be mounted within 12 feet of XFC. For Solar Panel mounting, the following materials are required. See Figure 2–33 .

Materials Supplied

- One Solar Panel
- Two U-Bolts and fastening hardware
- Solar panel cable (if not already attached)
- Solar Panel Mounting Bracket (if not already attached to Solar Panel)

Material not Supplied

- Cable ties
- One 9-inch extension of 2-inch pipe or other suitable length of pipe, threaded on one end.
- One 2-inch Coupling.

FYI

Exercise caution when installing Solar Panel, so as not to damage it. When mounted, Solar Panel will face up from horizon at 50° angle.

Instructions

Step	Procedure
1.	Attach 2" pipe Coupling to top end of XFC 40" mounting pipe. Securely tighten.
2.	Install 2" pipe extension into Coupling and securely tighten.
3.	Check solar panel using digital voltmeter to verify polarity and output voltage. Voltage will vary depending on amount of sun, angle to sun, etc
4.	Install Solar Panel on mounting bracket, if required, with provided hardware. Install Solar Panel Cable if required.
5.	Attach Solar Panel mounting plate to top end of 2" extension pipe with U-bolts and associated mounting hardware. Do not tighten U-bolts until Solar Panel has been correctly orientated.
6.	For northern hemispheres, position Solar Panel facing south. For southern hemispheres, position Solar Panel facing north. For optimum charging, solar panel should not be in shadows for the majority of the day. Panel should be kept clean for maximum charging.
7.	DO NOT connect other end of cable to XFC until instructed to do so.
8.	Insert Solar Panel power cable through an access hole on side of case. Allow enough power cable to extend into XFC for cable connection to EXT CHGR +/- termination's on J5 (Figure 2–32 Item 20); see overlay on battery plate.

Continued on Next Page

Solar Panel Installation, Continued

Step	**Procedure,** Cont.
9.	Before making connections to terminal block, trim wire ends back 1/4" and remove associated terminal block from XFC-195 Board. Loosen terminal block securing screws, insert wire then retighten. Connect Solar Panel (+) lead to + terminal and (-) wire to - terminal. Verify main battery pack is connected and then reinstall terminal block with wires attached.
10.	Following connection of Solar Panel power cable, secure cable to 2" extension and mounting pipe cable with plastic tie-wraps provided.

AC Charging Unit Installation

The AC Power Charging Unit maintains a constant voltage charge on installed battery pack. See Figure 2–34 .

Installation

The following hardware is required to mount the AC power charging unit to XFC.

Materials Supplied

- AC Charging Unit
- Coupling nipple

Materials Not Supplied

- Plastic cable ties
- AC wiring, conduit (rigid or flexible)

FYI

To maintain system certification, all wiring must comply with NEC 501 code and applicable ABB certification drawings.

CAUTION

To prevent injury only a licensed electrician should install AC power wiring to customer supplied primary AC power source.

Instructions

Step	Procedure
1.	The AC Charging Unit is shipped separately. When unit is received, unpack and inspect all components for evidence of damage. Report damage to shipping carrier and to Totalflow's Service Department.
2.	Remove one of the plugs from the side of XFC so that AC charging unit can be mounted without obstruction; see Figure 2–34 .
3.	Feed AC Charger DC power lines into XFC. Allow enough cable to extend into unit for connection to EXT CHGR +/- terminals.

Continued on Next Page

Instructions (Continued)

Step	**Procedure,** Cont.
4.	Connect AC Battery Pack Charger unit to XFC using supplied sealing ring and nut. To prevent moisture from entering XFC after installing AC Battery Pack Charger unit, be certain associated connector, at Charger unit has a metal backed sealing “O” ring and metal locking nut attached.
5.	Before connecting Charger wiring, trim wire ends back 1/4” and remove associated EXT CHGR terminal block J5 (Figure 2–32 Item 20) from XFC-195 Board. Loosen terminal block securing screws, insert red wire into plus (+) terminal (top) and black wire in negative (-) terminal (bottom). Retighten screws and reinstall terminal block with wires attached.
6.	Plumb the conduit and associated AC wiring into the AC Charger conduit box. The AC Charger is rated at either 120 VAC 60 Hz or 240 VAC 50 Hz. Connect the 120 V hot and neutral or the two hot wires for 240 V to TB1 of the AC Charger. Connect the ground wire to the green screw T1.
7.	Verify that the DC power wires are terminated properly inside the flow computer cabinet and verify that the main battery pack is plugged into J1 (Figure 2–32 Item 21). Apply AC power to the AC Charger.
8.	Monitor DC charging voltage by observing the XFC display. LCD should indicate CHARGER 13.0 - 13.5 VOLTS.

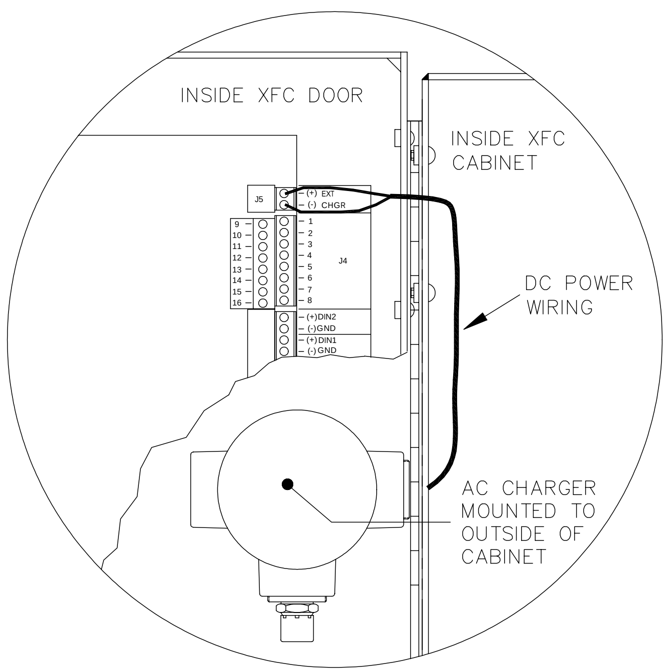


Figure 2–34 Mounting AC Charger

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Chapter 3
XFC Startup

This Chapter generally describes the steps required get a newly installed XFC system up and running. Specific information required to complete each step (depending on your equipment choice) is discussed in the PCCU32 help files, or the Operations manual for the FS/2 Portable Calibration and Collection Unit.

Highlights In this Chapter you will learn about:

Continued on Next Page

Overview, Continued

FYI

Before you begin you should complete the tasks outlined in the Chapter 2.0, Installation.

All references in older materials to AP, absolute pressure, have been converted to SP, Static Pressure. This reflects the difference of including barometric pressure during calibration.

Options

The two equipment options for programming the XFC are the Windows based PCCU32 Software and the DOS based FS/2 device, these are discussed in more detail below.

Laptop Computer running PCCU32

PCCU32 Software running in a laptop Windows environment offers you the most capabilities for programming the XFC. Many of the new features designed into the XFC cannot be accessed by the FS/2 due to it’s limited capabilities. The Windows environment features user friendly help files and easy to follow menus. Having help files readily accessible to the user is comparable to having a virtual teacher on location. Easy to follow menus and icons, step the user through many required choices.

The laptop computer connects via the cable directly to the connector on the side of the XFC.

Once this physical connection has been made, you may begin the communicating through the software.

FS/2 Handheld PCCU

The FS/2 Portable Calibration & Collection Unit (PCCU) is a hand held devices running the DOS version of PCCU. This equipment allows the user to perform only the most basic of operations and program the minimal features of the XFC. Because the device functions in the DOS environment, help files, icons and drop down menus are not available. Therefore this device is more limited.

The FS/2 PCCU connects via the cable directly to the connector on the side of the XFC.

Once this physical connection has been made, you may begin communication with the XFC through the program.

Prior to making the physical connection, you must instantiate the FS/2 application for the unit to recognize the connection. This requires a laptop computer. Once instantiated and the physical connection has been made, you may begin communication with the XFC through the program.

Setting up the XFC

Overview

Once physically connected to the XFC, you must then instruct the software of the programming device to connect. At this time, the software will actually read the device default values programmed at the factory. These preset values are based on the type of product you ordered and programmed for the most widely used configuration.

Depending on the programming device you are using, the following are the minimum required entries. Specific information required to complete each step (depending on your equipment choice) is discussed in the PCCU32 help files, or the Operations manual for the FS/2 Portable Calibration and Collection Unit.

Station ID

The station identifier code should uniquely identify one station from that of others. If running a multiple tube station, the station ID is the same for all tubes on that XFC. If left blank on a single tube device, it will be the same as the device ID.

Description	Format	Note
Station ID	XXXXXXXXXX	10 digit alphanumeric

Device ID / Application ID

The device identifier should uniquely identify each tube/application on a multi-tube device. On a single tube installation, the identifier code should uniquely identify one XFC from that of others and will be the same as the Station ID.

Description	**Format**	**Note**
Device/Application ID	XXXXXXXXXX	10 digit alphanumeric

Location

In WINCCU, the host software, the location field can hold up to 24 alphanumeric characters to describe its location. An example would be the county name or road number.

Description	**Format**	**Note**
Location	xxxxxxxxxxxxxxxxxxxxxxxx	24 digit alphanumeric

FYI

There are additional fields stored in WINCCU for uniquely identifying the meter including fields for entering the lease holder, producer, operator and buyer. These fields reside on the host computer in the ID Manager, not in the XFC.

Setting up the XFC, continued

Date/Time

The XFC date and time must be set correctly and should agree with the Collection Equipment.

Description	Format	Note
Date	MM/DD/YY	Must enter 2 digits each
Time	HH:MM:SS	24 hour clock

Security System

The XFC-195 Board has a bi-level security system built in. For the purpose of this manual, we will refer to this as the Hardware Security. When the XFC is accessed through PCCU32 or WINCCU Host software packages, this will have a third level of security included. We will refer to this as the Software Security.

The Software Security System is designed to have a Password Administrator who sets up the accounts and privileges for himself as well as the other PCCU users. This privilege includes being able to instantiate applications and make changes to the functionality of the XFC. See the help files in the host software package for more information.

The Hardware Security System is designed to have two levels of user access, Application Editing and Downloading Files to a device. User access by default is restricted from modifying and downloading the Application Table or from downloading files to the device's R: and S: drives, but has all other user type privileges. These default privileges can be edited by the Administrator.

In order to program a user code into the XFC the Security Switch S1 on the XFC-195 Board must be OFF.

Also note that XFC does not send an error message when you have breeched the security level, it simply does not accept value changes.

CAUTION If the Security Switch S1 located on the XFC-195 Board is in the OFF position, no security code has to be entered to access the operating parameters even if there is one programmed into the device.

Description	Format	Note
Security Code	XXXX	4 digit numeric

Configuring the XFC

Contract Hour

You can program the XFC to begin the contract day based on your contract or company standards. When a XFC first powers up the contract is preset to begin at midnight.

FYI Midnight is 00 o'clock. If any value entered is greater than 23, you will record an error message and the XFC forces the value to 00 (midnight).

Log Period

Log period is the specified length of time between writing the calculated accumulated volume to record. You may record volumes as often as every minute and as seldom as every hour. The default is 60 minutes. The XFC can normally store 960 log periods (40 days x 24 logs). A 5 minute log period will consume available memory in 8 days.

Description	Options
Log Period	1,2,5,10,20,30,60

Volume Calculation Period

Volume Calculation Period is the specified length of time between volume calculations. The Volume Calculation Period must be equally divisible into the Log Period. The default is 60 minutes.

Description	Options
Volume Calculation Period	1,2,5,10,20,30,60

Calculation Method

When the XFC is powered up Initaially, the calculation method must be set. You have the option of setting the calculation method to AGA-3 1985, AGA-3 1992, AGA-7 or liquid. Once you have determined the calculation type, you may toggle specific factors on or off depending upon their availability.

TIP Calculation type, and many of the factors involved with setting up the calculations, are usually dictated by your sales contract or by company policy.

Continued on Next Page

Table 3–1 Configurable Calculation Factors

Calculation Parameter	Configurable	
	AGA-3 1985	**AGA-3 1992**
Fpb (Pressure Base Factor)	Yes	N/A
Ftb (Temperature Base Factor)	Yes	N/A
Fg (Specific Gravity Factor)	Yes	N/A
Fb (Orifice Factor)	Yes	N/A
Ftf (Flowing Temperature Factor)	Yes	N/A
Y (Expansion Factor)	Yes	Yes
Fr (Reynolds Number)	Yes	N/A
Fa (Orifice Thermal Expansion Factor)	Yes	N/A
**Fpv (Supercompressibility Factor)	Yes	Yes
*Fw (Water Vapor Factor)	Yes	Yes
*Faux (Full Well Stream Factor)	Yes	Yes
Cd (Coefficient of Discharge)	N/A	Yes
Fp (for Fpv method = NX19 Fixed)	Yes	Yes
Ft (for Fpv method = NX19 Fixed)	Yes	Yes

A complete description can be found in the AGA Report No. 3.

* NOTE: Faux and Fw are not AGA factors.

1. Faux is a user set multiplier to compensate for liquids in the gas stream, defaults to 1.
2. Fw is a factor which compensates for water vapor in the gas stream and its affect on volume measurements.

** NX19 GCN, NX19 GCNM, AGA-8 1992 Gross and AGA-8 1992 Detail

Super Compressibility Calculation (Fpv)

When the XFC is powered up Initaially, the calculation method must be set. You have the option of changing the formula method to any of several other choices, see Table 3–2. Once you have determined the calculation to use, you may toggle specific parameters on or off depending upon whether you would like to use fixed or live analysis data.

TIP Many decisions involved with setting up the Fpv are dictated by your sales contract or based on company policy.

Continued on Next Page

Table 3–2 Fpv Analysis Data

			Configurable		
Parameter	Default Value	Units	*All Others	NX19 Fixed FtFp	AGA-8 1992 Detail
Fp (for Fpv method NX19 Fixed)	1.000		No	Yes	No
Ft (for Fpv method NX19 Fixed)	1.000		No	Yes	No
**Heating value	1000.0000	BTU/SCF	Yes	Yes	Yes
Argon	0.0000	mol %	No	No	Yes
Carbon dioxide CO2	0.0000	mol %	Yes	Yes	Yes
Carbon Monoxide	0.0000	mol %	No	No	Yes
Ethane	0.0000	mol %	No	No	Yes
H2S	0.0000	mol %	No	No	Yes
Helium	0.0000	mol %	No	No	Yes
Hydrogen	0.0000	mol %	No	No	Yes
iButane	0.0000	mol %	No	No	Yes
iPentane	0.0000	mol %	No	No	Yes
Methane	100.000	mol %	Yes	No	Yes
nButane	0.0000	mol %	No	No	Yes
nDecane	0.0000	mol %	No	No	Yes
nHeptane	0.0000	mol %	No	No	Yes
nHexane	0.0000	mol %	No	No	Yes
nitrogen N2	0.0000	mol %	Yes	Yes	Yes
nNonane	0.0000	mol %	No	No	Yes
nOctane	0.0000	mol %	No	No	Yes
nPentane	0.0000	mol %	No	No	Yes
Oxygen	0.0000	mol %	No	No	Yes
Propane	0.0000	mol %	No	No	Yes
Water H2O	0.0000	mol %	No	No	Yes
Specific Gravity	0.6000	N/A	Yes	Yes	Yes

* NX19 GCN, NX19 GCNM, AGA-8 1992 Gross

** Enter the Heating Value in Btu per SCF. Not used in volume calculations. Only used for calculating MMBTU for reports.

Constants

On a single tube gas orifice meter, there are certain constants or parameters that may need to be entered or changed from the default values. Please see Table 3–3 for the list of constants.

Table 3–3 Gas Orifice Constants

			Configurable	
Parameter	**Default Value**	**Units**	**AGA-3 1985**	**AGA-3 1992**
Auxiliary Factor (Faux)	1.0		Yes	Yes
Barometric Pressure		PSIA	Yes	Yes
DP zero cutoff	0.0000	inches H2O	Yes	Yes
Meter Factor (Fb Basic Orifice Factor)	210.2300		Yes	N/A
Orifice Coefficient of Expansion	9.2500	Inches per Deg. F	No	Yes
Orifice diameter	1.0000		Yes	Yes
Orifice Material	Stainless		Yes	No
Pipe Coefficient of Expansion	6.2000	Inches per Deg. F	N/A	Yes
Pipe diameter	2.0670		Yes	Yes
Pressure Base (Contract)	14.7300	PSIA	Yes	Yes
Specific Heat Ratio	1.3000		Yes	Yes
Tap Location	Downstream		Yes	Yes
Tap Type	Flange Taps		Yes	No
Temperature Base (Tb)	60.0000	Degrees F	Yes	Yes
Viscosity	0.0103	Centipoise	Yes	Yes
Z of air at base condition	0.9996		N/A	Yes
Fixed Cd	.6		N/A	Yes

Configuring the XFC, continued

Alarm Limits

You have the ability to set XFC Alarm Limits for the parameters listed in Table 3–4. There are many purposes for setting these limits. ie. Controlling well output, or sending digital signals.

Table 3–4 Alarm Limits

			Configurable	
Parameter	**Default Value**	**Units**	**AGA-3 1985**	**AGA-3 1992**
DP High Limit	2047.9688	In H2O	Yes	Yes
DP Low Limit	0	In H2O	Yes	Yes
Flow Rate High Limit	1,000,000	SCF/Hr	Yes	Yes
Flow Rate Low Limit	0	SCF/Hr	Yes	Yes
RTD High Limit	420	Degrees F	Yes	Yes
RTD Low Limit	0	Degrees F	Yes	Yes
SP High Limit	2047.9688	PSIA	Yes	Yes
SP Low Limit	0	PSIA	Yes	Yes

Reset Volume

When you Reset the volume accumulator the XFC will:

- Store time, date and previous accumulated partial calc periods volume into the historical record file
- Zero the remaining partial calc periods accumulations.
- Complete all computations for the present flow file daily record.
- Begin a new flow file daily record.
- Zero total volume accumulator and log the event with an accumulator value before zeroing out accumulator.

TIP

Since the XFC volume calculations are made each vol calc period, any changes you make during the period would affect the volume calculations (such as changing the orifice plate size) and be introduced into the calculations. To avoid introduced errors, it is recommended that Reset Volume command be used. This command forces the XFC to perform volume calculations for the elapsed time since a previous volume calculation was made. A new partial period volume is added to the volume accumulator, which is logged as an event before it is reset to zero (0).

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Startup XFC

Put XFC On Line

CAUTION To avoid a calibration shift, carefully follow these instructions.

Instructions Open both bypass valves and close the vent to atmosphere valve, this stabilizes the pressure on both sides of the cell. Then begin to SLOWLY open the high side orifice tap valve from the meter run. Then SLOWLY open the low side valve. Once both the high and low sides are completely open, you may close both bypass valves.

Calibrating the XFC

Following installation and configuration of the XFC, the technician should perform calibration checks and possibly a calibration to ensure that measurements are accurate. The calibration technique used is usually determined by company policy and/or a contract.

Detailed instructions for performing calibration checks and calibrations may be found in Chapter 5, Maintenance.

Setup RTD

Although the RTD (Resistive Temperature Detector) temperature is accurately self-calibrating, you can match it to another reference source. This is accomplished by entering temperature bias, which shifts the RTD probe curve either positive or negative.

Setting XFC Temperature Calculation

The XFC temperature calculations can be set to the following conditions:

- Selection of "Fixed Temperature" Used in Calculations—causes fixed temperature to be used in flow calculations.
- Selection of "Fixed Temperature" and RTD Installed—will record RTD temperature while using fixed temperature in calculations.
- Selection of "RTD Installed" and not use "Fixed Temperature—measures and uses RTD temperature in calculations. However, if a temperature error occurs such as an A/D error, the “Fixed Temperature” will be used for calculations.

TIP Selecting “RTD Installed” only, does not force the unit to use the flowing temperature in its calculations. You must turn off the “Fixed Temperature” selection.

Volume Reset

Since the XFC volume calculations are made each vol calc period, any changes you make during the period would affect the volume calculations (such as changing the orifice plate size) and be introduced into the calculations. To avoid introduced errors, it is recommended that Reset Volume command be used. This command forces the XFC to perform volume calculations for the elapsed time since a previous volume calculation was made. A new partial period volume is added to the volume accumulator, which is logged as an event before it is reset to zero (0).

Description

When you reset the volume accumulator the XFC will:

- Store time, date and previous accumulated partial calc period volume into the historical record file.
- Zero the remaining partial calc period accumulation.
- Complete all computations for the present flow file daily record.
- Begin a new flow file daily record.
- Zero total volume accumulator and log the event with an accumulator value before zeroing out accumulator.

XFC Standard Displays

Program Display

The single tube XFC comes from the factory with a set default displays as shown below. By default, each display item remains on the display for 5 seconds. You have the ability to change this default to zero (item not displayed) or any value from 1 to 255 seconds. You are also able to change the engineering units, and data format for display purposes. Further instructions on programming the display system can be found in the PCCU32 Help Files. All display items and item groups are programmable and may be displayed by user defined parameters.

Table 3–5 XFC Displayed Items

Description	Format	Note
DATE/TIME	MM/DD/YY HH:MM:SS	24 hour clock
YEST DP LO	NN PERCENT	Yesterday’s Percent DP Low Limit Percent time below DP Low Set Point
YEST DP HI	NN PERCENT	Yesterday’s Percent DP High Limit Percent time below DP High Set Point
FLOWRATE	NNNNNN.N SCF/HR	Current Flow Rate Programmable SCF or MCF or MMCF
ACCUM VOL	NNNNNN.NN MCF	Total Accumulated Volume Programmable SCF or MCF or MMCF
BATTERY	NN.N VOLTS	Battery Voltage Volts
DIFF PRESS	NNN.N IN. H2O	Differential Pressure Inches H2O
STATIC PRESSURE	NNN.N PSIA	Static Pressure Static PSIA
FLOW TEMP	NN.N DEG. F	Flowing Temperature°F
YEST VOL	NNNN.N MCF	Yesterday’s Volume Programmable MCF or MMCF
PERIOD VOL	NNNN.N SCF	Previous Period Volume Last volume calculation period volume
CHARGER	NN.N VOLTS	Charger Voltage
STATION ID	XXXXXXXXXX	10 Character alphanumeric identifier
DEVICE ID	XXXXXXXXXX	10 Character alphanumeric application or tube identifier

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Optional Equipment

Key Pad

The X Series models may be configured to include the optional Keypad located on the front cover of the unit. Keypad entry allows the user to monitor programmed display items without using additional equipment. See Figures 3–2 and 3–3.

FYI For you to be able to view various display items, those items must be pre-programmed for keypad entry. You may either program all the display items for an application or individual display items within the application using PCCU32.

Log On Press the ENT button in the lower right hand corner of the keypad. See Figure 3–4.

Security When ask, enter the 4-digit security code.

Viewing Use the up and down arrow keys located in the upper right hand corner to scroll through the various instantiated applications (Multiple Tube Device).

Selectin When you have located the item you wish to change/display, press the ENT button.

Changing After viewing the item for change, press the = key located in the lower right corner of the keypad. If entering a negative figure, press the +/- key to toggle the minus sign on or off. Enter the new figure. Press Enter.

FYI You may change only those values that are not live from this screen.

Validate When setting up the XFC Display items, you may also set Data Limits so that when you change a programmed value, it must be valid between the High and Low Limit, otherwise it will return and “invalid” code. This is called Validate Keypad Entry, and must be set to “yes” to be active.

Time Out Based on how you have programmed the display setup, you may set the “Scroll Lock Timeout”. After the programmed time has elapsed, it will return to regular operation. This includes exiting the security system. To re-enter the keypad program, you will need to re-enter your security code.

SPACE Pressing this button will have the effect of leaving a blank space(s) between characters during data entry.

MENU Pressing the MENU button and then the group number and item number will take you directly to the specified screen.

REG Pressing the REG button and then entering the “application.array.index” of the register you would like displayed will take you directly to the specified register.

ESC To exit the program, press the ESC key in the lower left corner once for each level you are viewing. When the screen begins to scroll again, you have exited the program completely.

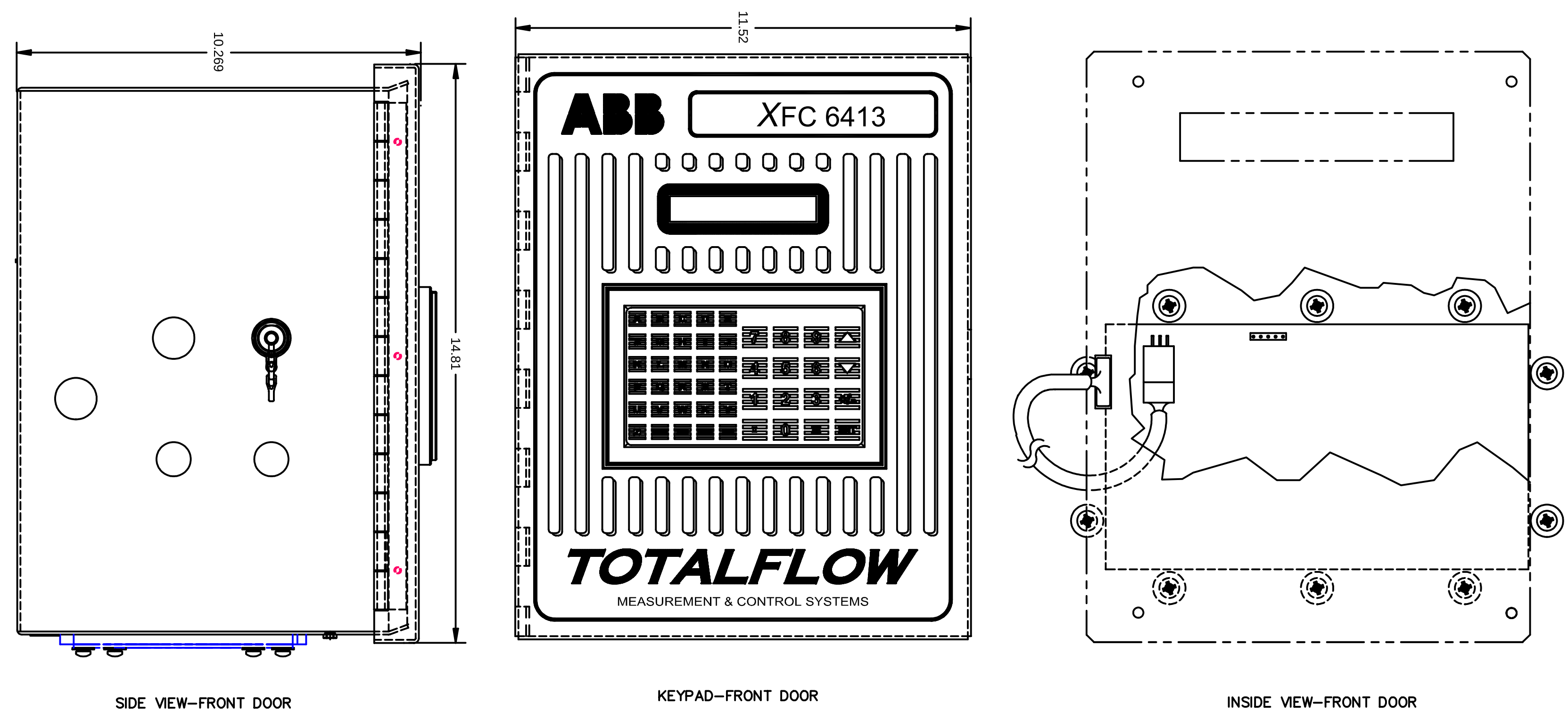

Figure 3–1 XFC 6413 with Optional Key Pad

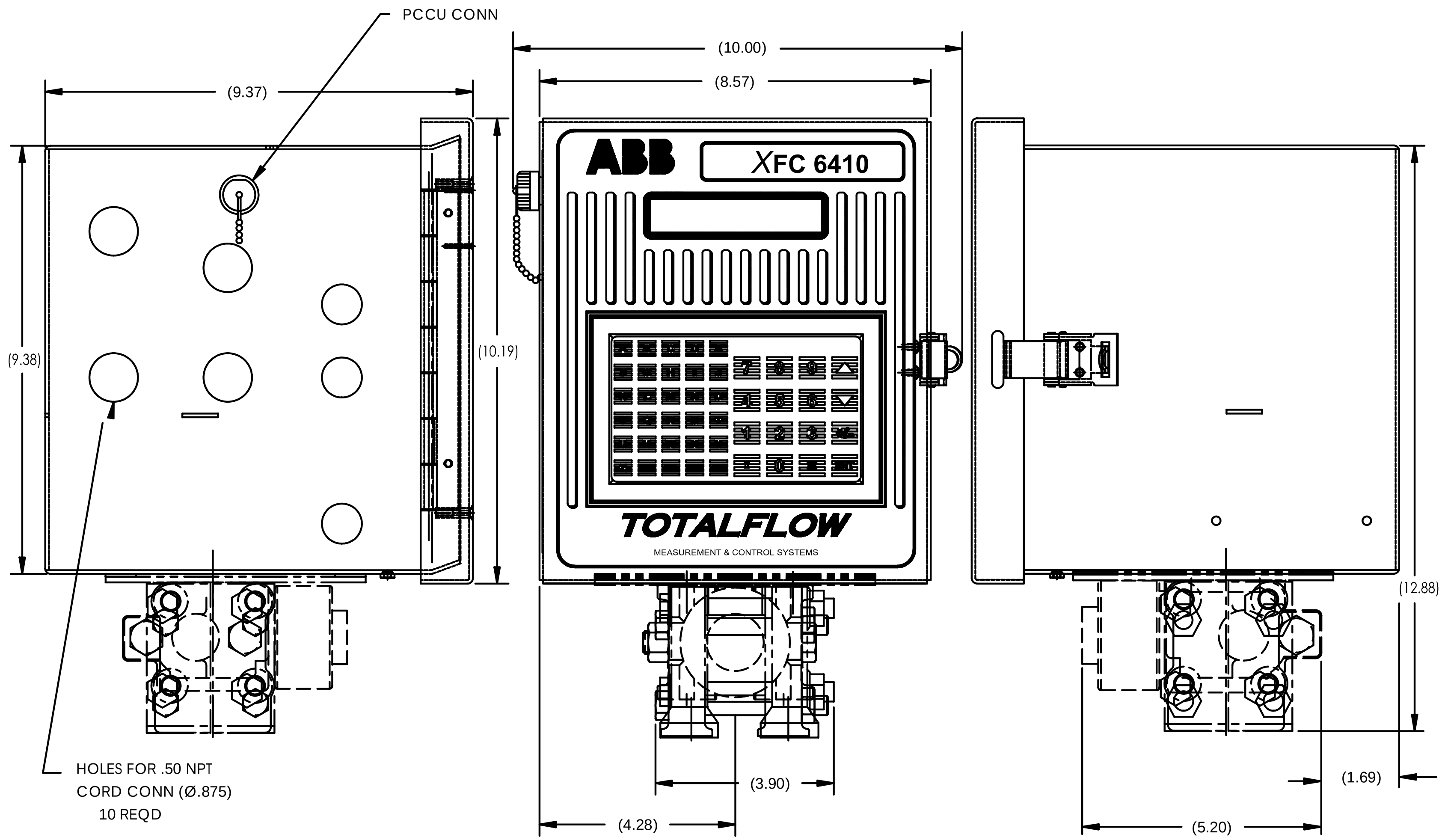

Figure 3–2 XFC 6410 with Optional Key Pad

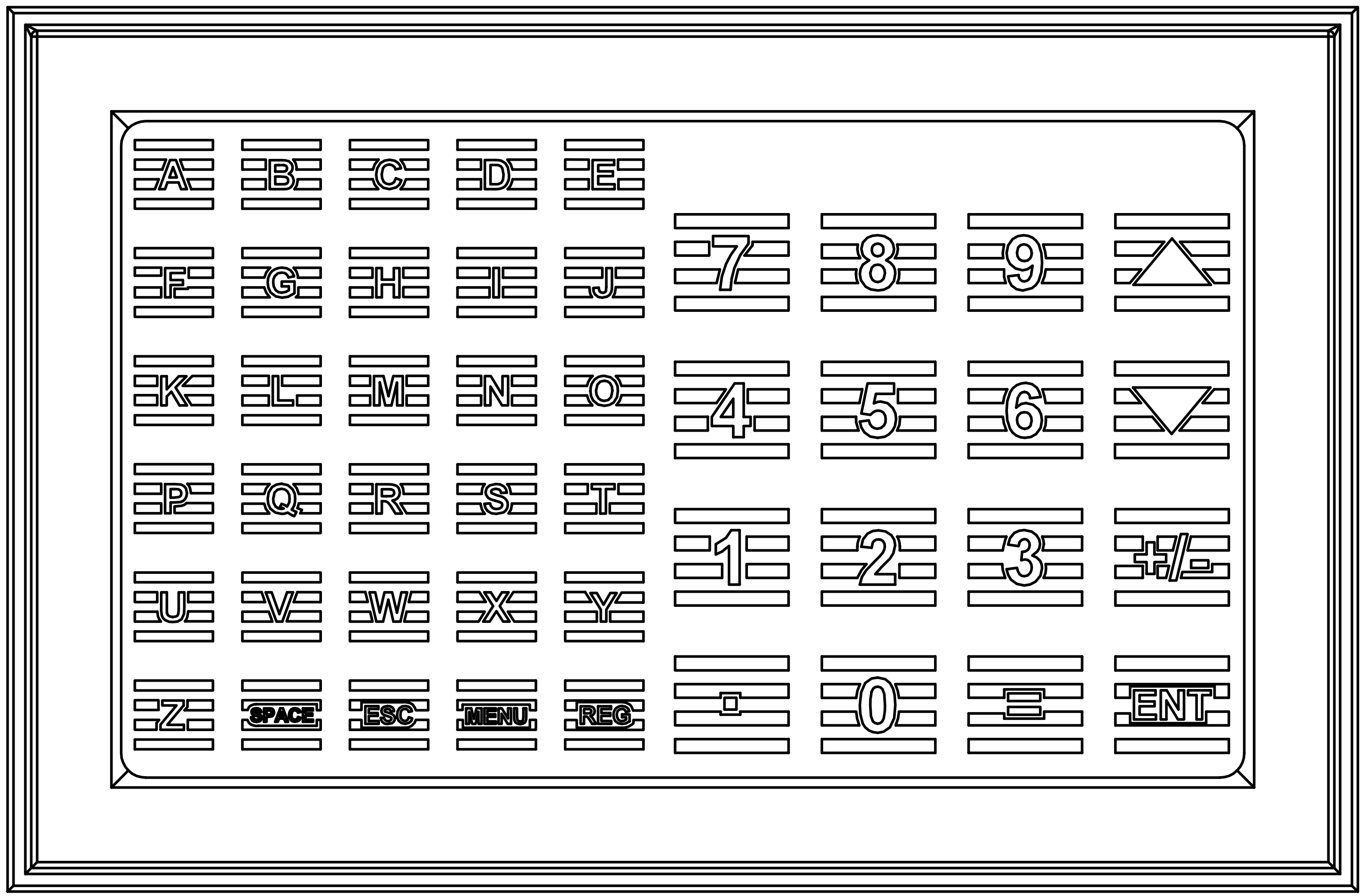

Figure 3–3 Optional Keypad

Totalflow Input/Output Modules Overview

In addition to Totalflow's enhanced on-board input/output capabilities, the hardware functionality of XFC Series can be extended in a flexible and friendly way by adding modular I/O as needed (see Figure3–4). Totalflow I/O (TFIO) modules are designed to accommodate low power, harsh environment and economical cost requirements. The system automatically recognizes the module types and configures the I/O Scanner subsystem accordingly.

The modules are interfaced to the XFC-195 Board by an I^2C bus. On top of this bus, Totalflow has implemented an efficient I/O protocol to exchange information between the modules and the XFC-195 Board. The bus operates in a master/slave mode, with the Main Board acting as master.

The XFC 6413 and XFC 6414 (as shown in Figure3–5) systems support up to 3 modules. For example, 3 analog input modules can be connected to the I^2C bus. Since each module supports 8 analog inputs, then a total of 24 analog inputs can be added to the I^2C bus. Each module has capacity for up to 16 field terminations. Thus, for many modules 8 points are supported, since 2 terminations are generally required for each point. The XFC 6713 and XFC 6714 (as shown in Figure3–6) systems support up to 6 modules.

The I/O module hardware is packaged in DIN mount enclosures that employ Phoenix contact technology for field wiring. The modules also interconnect with each other to provide the necessary power and interface signals along their bus. Installation consists of snapping the Phoenix connector onto the DIN rail and moving the module into position directly beside and snapped to the next module. Likewise, in removing a module, it must first be separated from the module on either side, then removed from the DIN rail.

For additional information, please refer to the TFIO Module User's Manual (Part No.2101226-001).

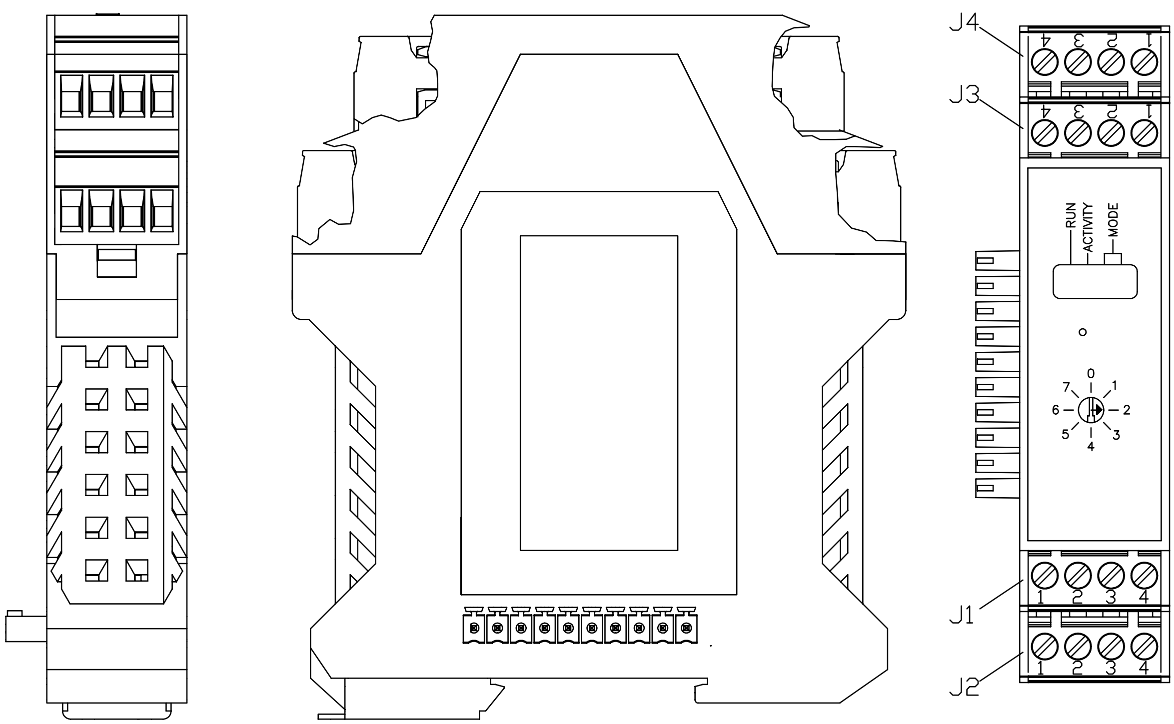

Figure 3–4 TFIO Module Housing

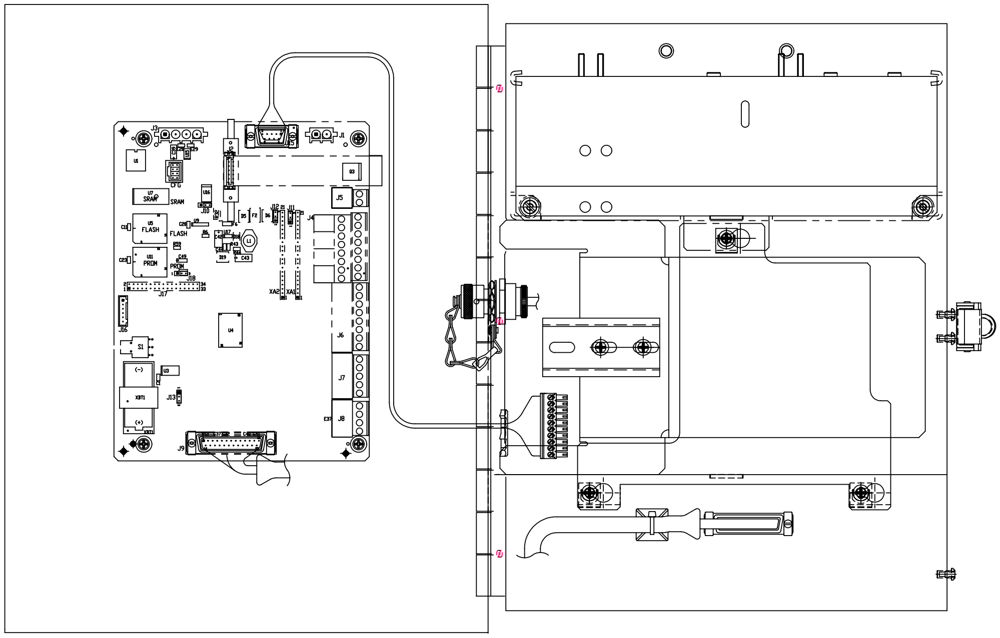

Figure 3–5 XFC 6413/6414 Inside View

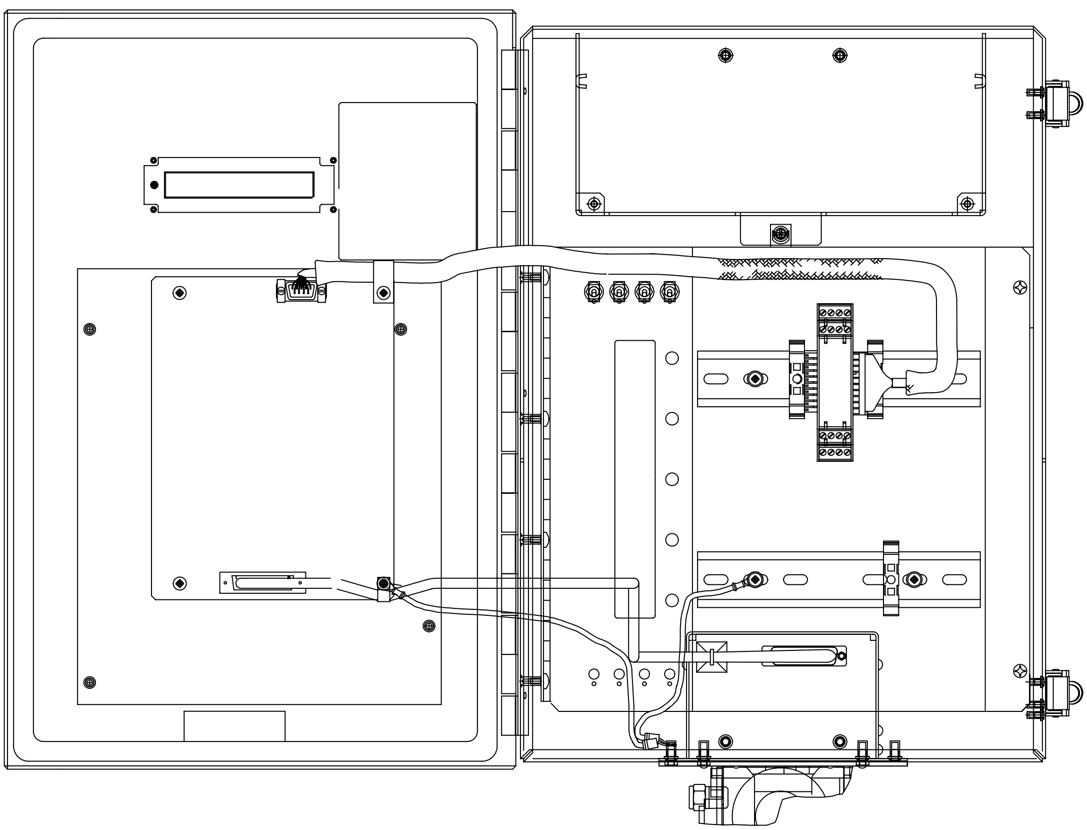

Figure 3–6 XFC 6713/6714 Inside View

Chapter 4
Maintenance

Overview

This Chapter provides you with standard Maintenance information and instructions on how to remove and install components of the XFC.

Highlights

In this Chapter you will learn how to:

Maintenance Support

If installation, calibration and maintenance assistance is required, user can contact the Totalflow Service Department.

USA: (800) 442-3097 International: 001-918-338-4888

Continued on Next Page

How to Use This Chapter

We recommend that you develop a regularly scheduled maintenance program. By establishing a maintenance program, XFC downtime can be minimized.

Record all items within this Chapter, in the maintenance practice procedures. Practical experience permits updating this schedule over a period of time. This results in many maintenance items being handled on a routine basis before potential problem(s) result in a failure.

Cleanliness

Because an XFC installation is primarily exposed to external environmental conditions, it is important that it be regularly inspected for cleanliness, both externally and internally. Foreign contaminants can cause damage to interior mounted components rendering XFC inoperable.

Front Mounted LCD

The user is informed of operational problems and operational limit violations by observing the alarm codes on the right side of the LCD display. XFC alarm troubleshooting procedures are presented in the Troubleshooting Chapter.

Returning Part(s) for Repair

If a TOTALFLOW component is to be returned to Totalflow for repair, securely wrap it in protective anti-static packaging. Before returning a component, call us for a Return for Authorization Number (RA). Affix this number to the outside of return package.

Parts shipments must be prepaid by customer. Any part, not covered by original SYSTEM WARRANTY, will be shipped to customer, F.O.B.

Backing up Configuration Files

Before you begin any maintenance on your XFC, you should collect the data and back up all configuration files to your laptop's hard drive or a floppy disk. This “Upload” safeguards your data and allows you to re-start the unit without the hassle of re-configuring the XFC should any problem arise.

Although there are “Save” buttons in the Entry Mode screens which allows the user to backup “Entry” mode data items, a complete system backup is only accomplished by using the “Save and Restore Utility”. When using this utility to backup files, the user should also “download” the files to the S: drive in case of a “Cold” start.

- While in PCCU, use the Save and Restore Utility found under File Utilities in the Operate drop down menu.

Changing XFC Clock

When any measurement applications are instantiated on the XFC, changing the clock could affect the time when log period entries are made. To protect integrity of accounting audit trails, the XFC handles these types of clock changes as follows:

Clock Change Not Crossing an Hour Boundary:

When next log period entry is made, clock is not altered.

Example: If present time is 4:15 p.m. and clock is changed to 4:05 p.m. of the same day, the daily flow record is the same. Entry reflects averages accumulated over a 70 minute time period (15 minutes plus 55 minutes).

Forward Clock Change Crossing an Hourly Boundary:

Forces an log period entry for part of hour that has accumulated since last hourly entry. XFC then advances to newly defined data flow record boundary and begins maintaining balance of days' data in newly defined boundary.

Example: If present time is 4:55 p.m. and clock is changed to 5:05 p.m. of the same day, the entry reflects only a 55 minute average accumulation. Then a new flow record is written and this period is also based on a 55 minute accumulation.

Backward Clock Change Crossing an Hourly Boundary:

Hourly entry is made for part of hour that has accumulated since making last hourly entry. This is same as for a Forward Clock Change Crossing an Hourly Boundary. XFC advances to a new day’s data flow record and maintains balance of day’s data in new record.

Example: If present time is 5:05 p.m. and clock is changed to 4:55 p.m. of the same day, the log period record entry reflects only a 5 minute average accumulation. Then a new flow record is written and this log period is based on a 60 minute accumulation.

FYI

A backward clock change uses two (2) records to maintain data integrity. This assures that previously recorded data is not overwritten.

If it is necessary to make small backward time changes, less than one (1) hour, user should wait until current hour has progressed far enough to make change that does not cross an hour boundary.

Replacing XFC Battery Pack

This Chapter presents the procedures for removal and installation of XFC battery pack. To access the battery pack, open XFC door. Battery pack is located behind a front mounted keeper plate. On the XFC 6713/6714 models, the Battery is located directly behind a hinged plate on which the I/O module DIN rails are mounted. You will need to remove the two screws located on upper and lower right side on these models.

CAUTION When removing battery pack, DO NOT remove Lithium battery from XFC-195 Board. This prevents any data stored in Board RAM, from being lost.

TIP To extend the life of the battery pack, fully charge the battery prior to installation. A system using solar panels may not fully charge the battery. Also a fast charge, which the solar panel can't provide, improves the life of the battery.

To recharge a battery, a quick charge will remove the buildup in the battery much more effectively than a "trickle charge". A battery slowly drained by low light conditions on a solar charged system or setting in storage for instance, will be less likely to recover than a battery pack that was quickly discharged from a short for instance. Store batteries in a cool environment for less drainage.

Procedure

In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.

Step	Procedure
1.	Make sure the J13 (Figure 4–1, Item 10) memory backup jumper covers the top two pins. This enables the memory backup.
2.	Either make sure "L_L" battery alarm is not being displayed on XFC or measure lithium battery and make sure it is > 3.0V.
3.	Disconnect the battery charger from XFC-195 Board terminals EXT CHGR +/- J5 (Figure 4–1, Item 20).
4.	Before removing battery pack, disconnect the Battery Cable from the XFC-195 Board connector J1 (Figure 4–1, Item 21).
5.	Remove battery compartment cover (Figure 4–2 or 4–3, Item 18), which secures battery pack in its mounting location, by slightly loosening the three mounting screws. It is not necessary to remove screws.
6.	Remove battery pack from battery compartment.
7.	Insert new battery pack into battery compartment. Battery pack must be positioned so its longest dimension fits snugly against keeper plate when plate is installed. Reinstall keeper plate (Figure 4–2 or 4–3, Item 18) and tighten the three keeper plate mounting screws. Or close hinged plate and insert and tighten the upper and lower plate keeper.
8.	Reconnect battery pack cable to XFC-195 Board connector J1 (Figure 4–1, Item 21).
9.	Reconnect battery charger to XFC-195 Board terminals EXT CHGR +/- terminals J5 (Figure 4–1, Item 20).
10.	After closing XFC door, check door mounted LCD for normal operational readings.

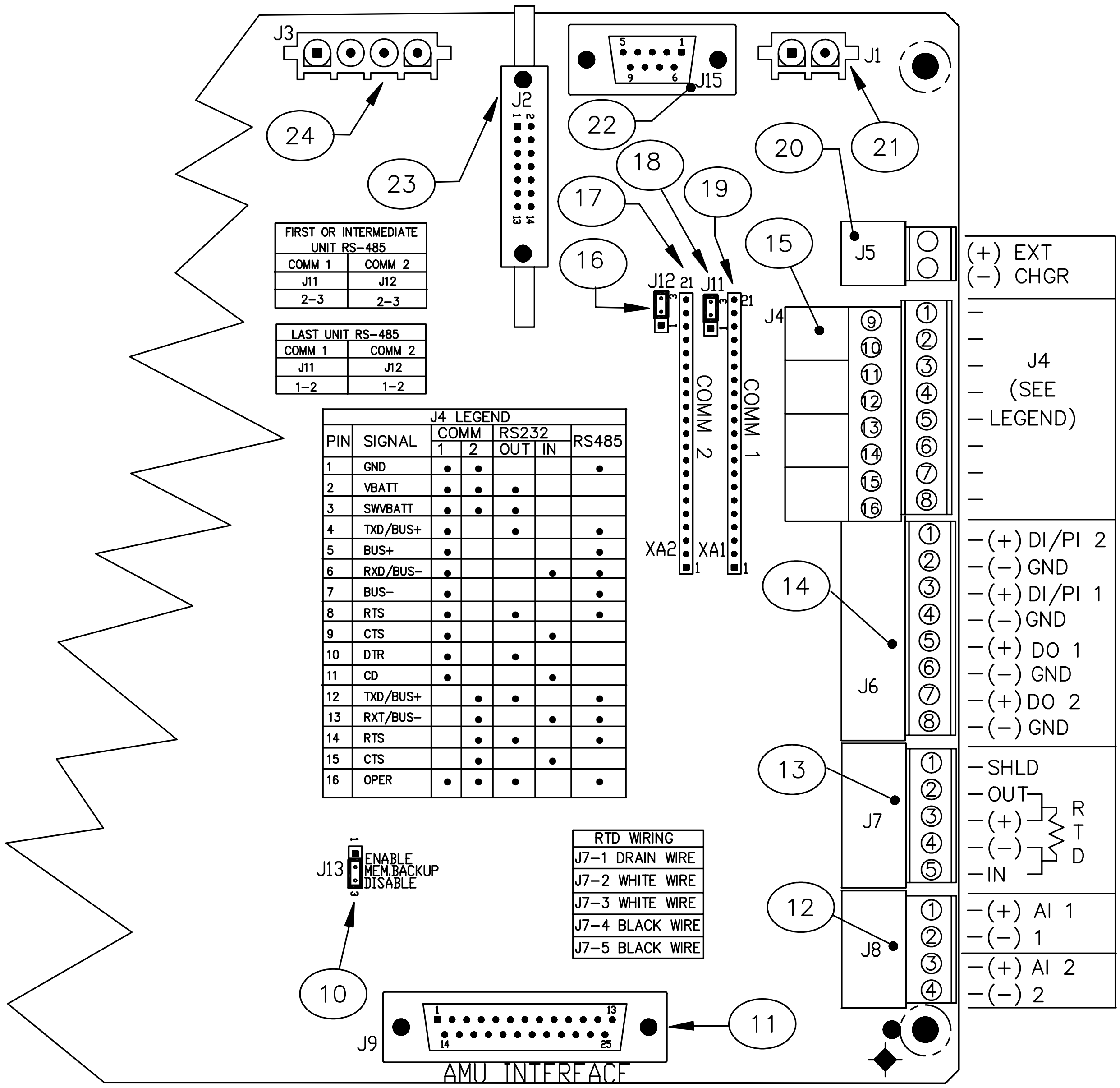

Figure 4–1 XFC-195 Board Cutout-Maintenance

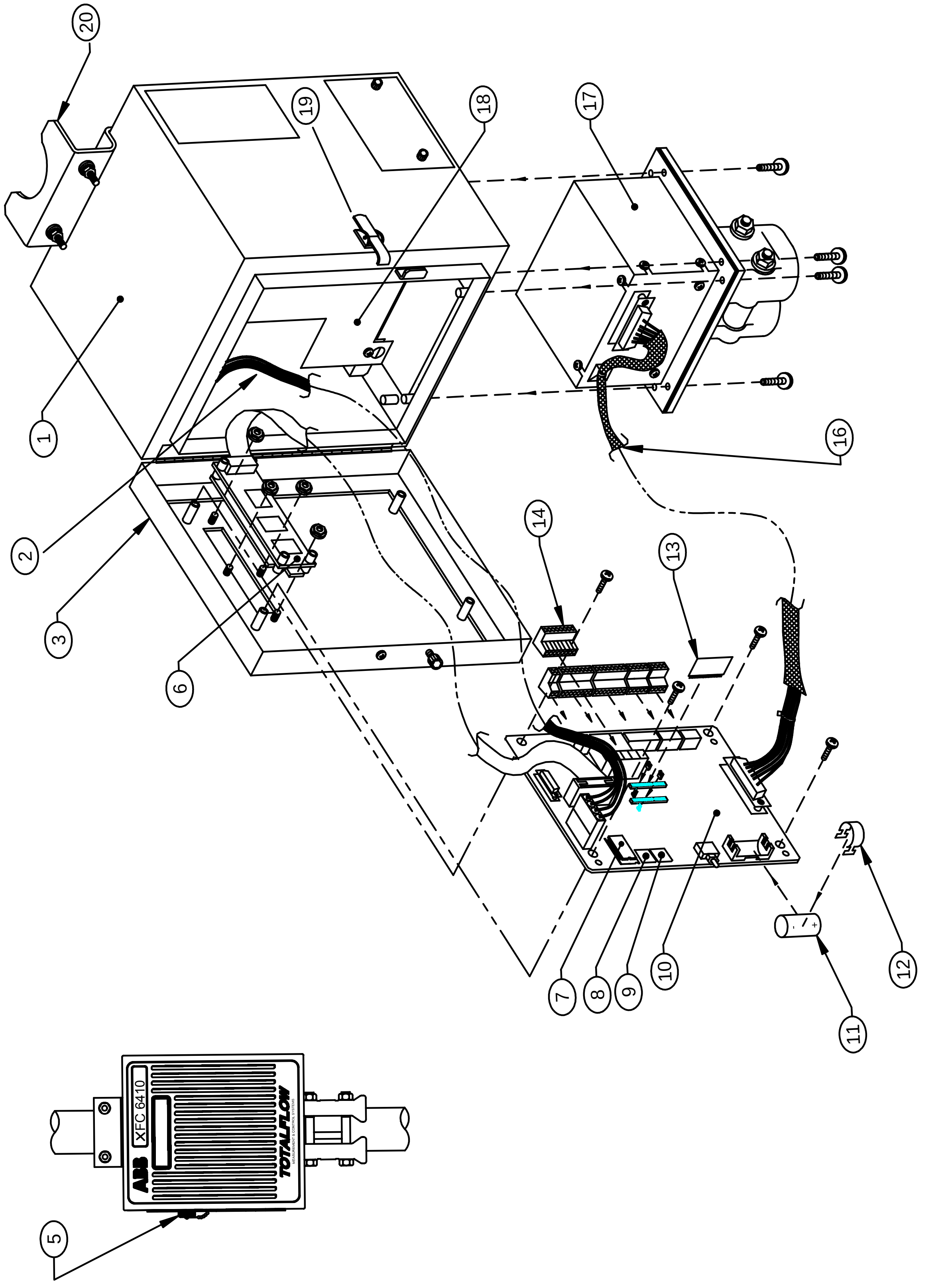

Figure 4–2 XFC 6410 Component/Cable Locations

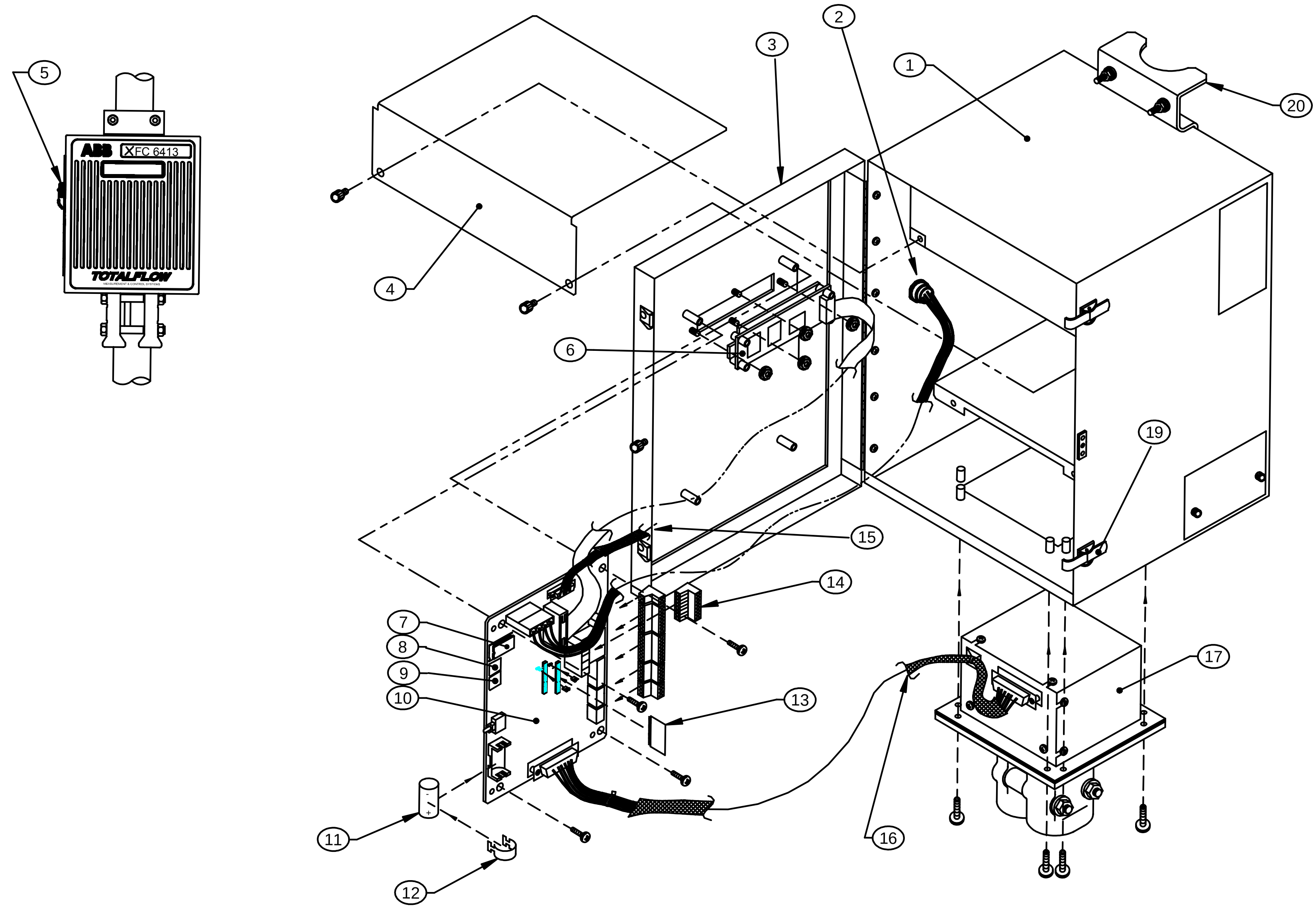

Figure 4–3 XFC 6413 Component/Cable Locations

Table 4–1 XFC-195 Board Identifications, Maintenance

ID Number	Description
10	Memory Backup Enable/Disable
11	AMU Interface
12	Analog Input Connectors
13	RTD Connectors
14	Pulse Input and Digital Output Connectors
15	Remote Communications Connectors
16	Remote Comm 2: RS-485 Termination Jumper
17	Remote Comm 2: Module Plug-in
18	Remote Comm 1: RS-485 Termination Jumper
19	Remote Comm 1: Module Plug-in
20	External Charger
21	Battery Connection
22	I/O Module Interface
23	LCD Display Interface
24	PCCU Interface

Table 4–2 XFC 6410 and 6413 Component Identifications

ID Number	Description
1	Enclosure
2	PCCU Internal Cable
3	Door
4	Radio Compartment Cover (6413/6414 only)
5	External PCCU Connector
6	LCD Display
7	Sram
8	Flash
9	Prom
10	XFC-195 Board
11	Lithium Battery
12	Battery Cover
13	Communication Module
14	Phoenix Connector Plug Module
15	TFIO Module Interface Cable (6413/6414 only)
16	AMU Interface Cable (Not on Pulse Models)
17	AMU (Not on Pulse Models)
18	Battery/Compartment Cover
19	Door Latch
20	Pipe Mounting Bracket

Replacing the Main Electronic Board (XFC-195)

The X Series Main Electronic Board (XFC-195 Board) is mounted to the backside of XFC access door. It is mounted, to the door, on standoffs. Refer to Figure 4–2 or 4–3. On Models XFC 6713 and XFC 6714, the XFC-195 Board is mounted below the LCD Screen

CAUTION

The XFC-195 Board, as with any electronic board, is susceptible to damage by static electricity or improper handling. To prevent this from occurring, user should wear a grounding strap.

A grounding strap is a conductive device used to make connection between the person handling the board, and a high quality ground point. Before handling the board you must install ground strap on your body then connect it to a grounded point. This discharges electrical static buildup from the body to ground, preventing static from discharging to the board.

Before removal of XFC-195 Board, be certain any historical flow data has been saved to an external storage medium. Failure to do so could result in data loss when XFC-195 Board is removed.

Procedure

In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.

Step	Procedure
1.	Back up configuration files following the instructions listed previously in this chapter titled: Backing Up Configuration Files.
2.	Before XFC-195 Board removal, disconnect the following associated connectors in this order. • If used, disconnect external charging source J5(Figure 4–1, Item 20). • Disconnect battery pack connector J1(Figure 4–1, Item 21). • Slide, to the right; green terminal strips J4, J6, J7 and J8 (Figure 4–1, Item 12–15) from their associated XFC-195 Board connector. DO NOT lift connectors upward. Tape an identifier to each connector so it will be correctly reinserted into the same Board mounting connector during reinstallation of XFC-195 Board. • Disconnect PCCU Port connector J3 (Figure 4–1, Item 24). • AMU Port connector J9 (Figure 4–1, Item 11). • XFC LCD port connector J2 (Figure 4–1, Item 23). • Remove cable from J15 (Figure 4–1, Item 22) if External I/O Modules are installed.
3.	Remove four mounting screws and lock washers securing XFC-195 Board (Figure 4–2 or 4–3, Item 10) to door mounted standoffs.

FYI

When removing the XFC-195 Board, grasp its outer edges. This prevents damage to circuitry and components.

Continued on Next Page

Replacing the Main Electronic Board (XFC-195), Continued

Step	**Procedure,** Cont.
4.	Replace and secure XFC-195 Board on four standoffs and secure in place using four screws and lock washers. DO NOT over tighten screws. Doing so could cause damage to Board or associated circuitry.
5.	Reinstall connectors, removed in Step 1, to their associated Board mounted connectors in the following order. • AMU Connector J9 (Figure 4–1, Item 11) • LCD Connector (Figure 4–1, Item 23) • PCCU Connector J3 (Figure 4–1, Item 24) • RTD J7 (Figure 4–1, Item 13) • I/O Module Cable J15 (Figure 4–1, Item 22) • Battery Pack J1 (Figure 4–1, Item 21) • Communications J4 (Figure 4–1, Item 15) • On-Board I/O J6 and J8 (Figure 4–1, Item 12 & 14) • Charger Last (Figure 4–1, Item 20)
6.	If you desire to restore the Configuration Files follow the instructions found in the PCCU32 Help Files.

Replacing Liquid Crystal Display (LCD) Board

The LCD Board is mounted on the backside of hinged doors behind the XFC-195 Board. To access and remove Display Board, perform the following procedures.

Procedure

In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.

CAUTION

DO NOT remove the XFC-195 Board mounted Lithium battery since it provides power to RAM. It is recommended that historical flow data be downloaded before accessing and removing LCD Board to prevent potential loss of stored data.

Step	Procedure
1.	Make sure the J13 (Figure 4–1, Item 10) memory backup jumper covers the top two pins. This enables the memory backup.
2.	Back up configuration files following the instructions listed previously in this chapter titled: Backing Up Configuration Files.
3.	To access the LCD Board, open the TOTALFLOW unit door. Board is located behind XFC-195 Board on all Models except the XFC 6713 and XFC 6714.
4.	Disconnect the external charging unit J5 (Figure 4–1, Item 20) from the XFC-195 Board.
5.	Disconnect the Battery Pack connector J1 (Figure 4–1, Item 21) from the board mounted connector.

Continued on Next Page

Step	**Procedure,** Cont.
6.	Disconnect LCD Board cable connector from XFC-195 Board Display Port connector J2 (Figure 4–1, Item 23). If you are replacing the LCD Board on either the XFC 6713 or XFC 6714, proceed to step 9.
7.	Remove four XFC-195 Board mounting screws and lock washers. DO NOT let screws and lock washer fall onto Board circuitry.
8.	Move Board away from door then support it so its circuitry does not come in contact with any metal surface.
9.	Using a 3/16" nut driver, remove four Display Board hexagonal mounting standoffs. Lift Board from door mounted standoffs. If Board is being returned to Totalflow for service, it is recommended that attached ribbon cable be left connected and returned with Display Board.
10.	To reinstall Display Board, perform procedures 1 to 9 in reverse order. DO NOT over tighten screws. Once Display Board is reinstalled, apply power to XFC and verify information displayed on LCD is correct. Adjust contrast potentiometer (R32) for optimum display.

TIP To adjust display contrast, use an extra small screw driver to turn potentiometer R32 completely clockwise, then move screw back counter clockwise until screen is readable.

Replacing AMU

CAUTION Under no circumstances shall the XFC AMU cover be removed. Removal of this cover, and entry into interior of AMU, **voids AMU warranty**. If the AMU requires servicing, the entire assembly, including cable, must be removed from XFC, securely packaged for shipping and returned to Totalflow.

Procedure

In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.

Step	Procedure
1.	Make sure the J13 (Figure 4–1, Item 10) memory backup jumper covers the top two pins. This enables the memory backup.
2.	Using meter run installed Manifold high/low control valves, equalize pressure to AMU. See Figure 4–4.
3.	Using XFC high/low tap valves, close off both lines. These two valves connect Meter Run high/low output lines to XFC.

Continued on Next Page

Step	**Procedure,** Cont.
4.	Vent manifold to atmosphere using vent valve.
5.	Completely disconnect high/low Manifold lines from AMU.
6.	If used, disconnect external battery charger connected to J5 (Figure 4–1, Item 20).
7.	Disconnect battery pack from J1 (Figure 4–1, Item 21).
8.	**Do not disconnect AMU cable with power connected.** Disconnect XFC AMU cable J9 (Figure 4–1, Item 11) from XFC-195 Board. Cable is secured to XFC-195 Board with a Board mounting screws which must be removed. See Figure 4–2 or 4–3.
9.	Loosen XFC 2” mounting post clamps and rotate XFC a sufficient distance to allow removal of AMU. Clearance of approximately 7” is required for removal. After rotation, tighten clamps to hold XFC in place before removing AMU.

CAUTION When rotating XFC, be careful not to place twisting stress on attached cables.

10.	Using a Phillips screwdriver, remove eight mounting screws, washers and lock washers securing AMU to XFC cabinet. Access mounting hardware from underside of XFC.
11.	Tilt AMU slightly upwards, then remove unit. A weather sealing gasket is affixed to top side of AMU mounting flange.

FYI During reinstallation of AMU, weather sealing gasket must be reinstalled between the AMU and bottom of XFC to keep out moisture and dust.

12.	To install AMU, perform steps 2 to 11 in reverse order. When installing AMU, the eight mounting screws should be securely tightened to keep our external environmental elements.

TIP Before placing AMU back into operation, the XFC MUST be calibrated. Refer to Calibration Procedure; Chapter 3 for detailed procedures.

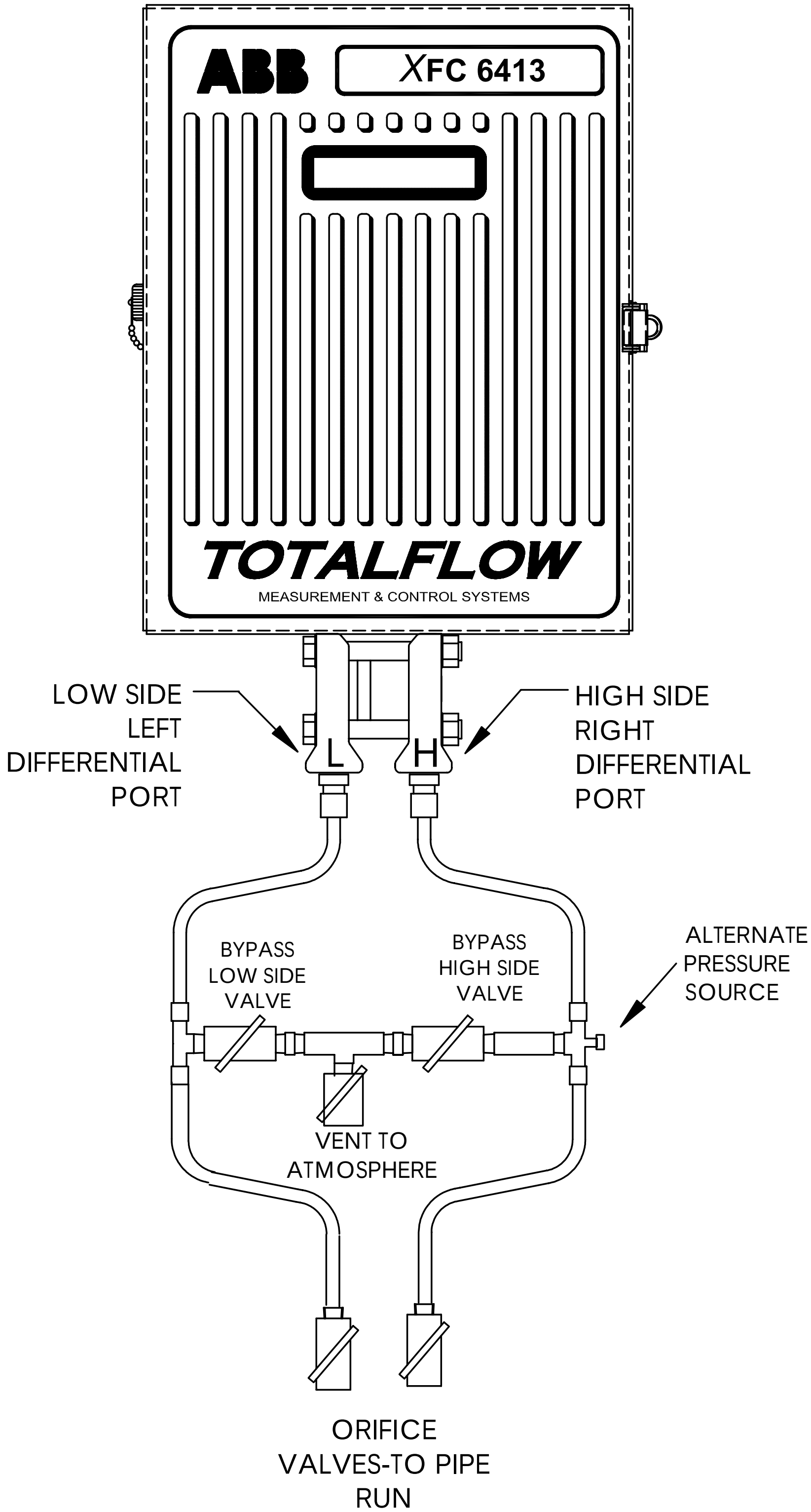

Figure 4–4 Flow Computer with Discrete Manifold

Calibration Overview

The calibration mode allows you to calibrate, check and zero the static and differential pressure. In addition, this mode allows you to set the (bias) for the Resistance Temperature Detector (RTD). During the initial calibration, the parameters shown in Table 4–3 will need to be configured.

Table 4–3 Calibration Configurable Parameters

Parameter	Default Value	Units
Fixed Temperature	60.0000	Degrees F
RTD installed	No	
Temperature Base (Tb)	60.0000	Degrees F

Required Test Equipment

The following test equipment is required to calibrate the XFC AMU/IMV :

- PCCU (either laptop with PCCU32 software or FS/2
- Deadweight tester or equivalent calibration standard
- Test Gauge capable of dual range measurement (PSIG and Inches)
- Barometer or another means which can determine barometric pressure
- Nitrogen or compressed air source

FYI

If a method other than the 'compressed nitrogen / deadweight tester' method is used to calibrate Static Pressure cell, you must ensure that the prescribed Flange Tap valves are blocked to prevent false differential pressure from being applied to DP cell. Also ensure that both high and low sides are pressured up during SP calibration.

Hold Mode

When calibrating the AMU or setting up a fixed temperature, the PCCU will instruct the XFC to ignore live values for the flow calculations for the period of time the XFC is being calibrated. This prevents real time XFC flow calculations from being affected during the calibration. During this time the XFC uses SP, DP and temperature captured at the time calibration mode was entered. (This is called the “HOLD” mode.)

To exit the Hold mode:

1. Exit Calibration mode
2. Unplug DATA cable at XFC connector

TIP

Totalflow recommends performing a five point check before and after calibration. During normal operation, either cell could be knocked out of calibration (typically due to a slug of liquid). WinCCU, the host software, is capable of recalculating the volume based on the differences between the previous five point check and the current five point check.

After a secure audit trail is archived, WinCCU recalculates the flow volumes based on the previous and current markers, this allows more accurate results of the flow volume.

Checking Static Pressure (SP)

The XFC allows you to check the Static Pressure Calibration and log the pressure marker check points. You should perform this check prior to and directly following the calibration.

During normal operation of the XFC, the display provides continuous SP readouts. However during this procedure the XFC is placed in a temporary hold mode.

You can enter as many SP pressure markers as you desire. Recording too many markers could cause the XFC to overwrite existing older events. Only the last five checks are used by the WINCCU editor for calibration adjustment. Enter a low, mid-low, mid, mid-high and high value.

FYI

During this procedure, you will pressure both sides of the cell by closing both the high and low side orifice valves, open the vent to atmosphere, then closing the atmosphere vent and opening both high and low bypass valves.

CAUTION

The resulting comparison pressure must not be greater than the static pressure cell's maximum pressure.

Calibrating Static Pressure (SP)

A three or five point pressure method is used to calibrate the XFC Static Pressure cell. These different pressures are applied to the cell from a known traceable source with resultant pressure values entered into the XFC using PCCU software.

When doing the following procedures wait for the XFC display to stabilize. If the XFC is not in the calibration mode the display will not necessarily match applied cell pressures.

FYI

The XFC uses an absolute Static Pressure (SP) Cell. Absolute pressure measures the pressure referenced to a vacuum or sealed chamber. This is different than a guage cell which measures the pressure referenced to the atmosphere.

It is recommended that the initial calibration point be at vented conditions and when doing so that the barometric pressure reading (in psi) be used as the initial point.

Since the static pressure cell is an absolute device, it always measures the true pressure relative to a vaccum or sealed chamber. Thus when vented, it measures true barometric pressure.

For other points of calibration, add reading of PSI and barometric pressure to arrive at psia, then enter this reading.

To convert barometric pressure measured from inches of mercury to Barometric Pressure (psi), perform the following calculation:

Barometric pressure, in inches of mercury x .4912 or (÷ 2.036) equals Barometric Pressure in psi.

Checking Differential Pressure (DP)

As discussed above under “Checking Static Pressure (SP) Calibration”, it is recommended that checks of the Differential Pressure (DP) be done prior to and directly following calibration.

You can enter as many DP pressure markers as you desire. Recording too many markers may cause the XFC to overwrite existing older events. Only the last five checks are used by the WINCCU editor for calibration adjustment. Enter a low, mid-low, mid, mid-high and high value.

FYI During this procedure, you will pressure the high side of the cell by closing both the high and low side orifice valves, open the vent to atmosphere and the low side bypass valve, and closing the high side bypass valve.

Calibrating Differential Pressure (DP)

A three or five point pressure method is used to calibrate the XFC Differential Pressure cell. These different pressures are applied to the cell from a known traceable source with resultant pressure values entered into the XFC using PCCU software.

During factory calibration, the Differential Pressure (DP) is set to zero to compensate for any leaks that may be detected. After field calibration of the unit, the correction made at the factory remains as is. This ensures that the readings received in the field are accurate. The user may not change the factory set shift. If readings appear incorrect, you may need to check for leaks and then re-calibrate the DP.

When calibrating, wait for the readings to stabilize before entering the new values.

On-Board I/O Calibration Overview

The calibration mode enables the calibration of the Analog Inputs, Analog Outputs (TFIO Module) and Pulse Inputs.

Hold Mode When calibrating, PCCU will instruct the XFC to ignore live values for the period of time the XFC is being calibrated. This prevents real time XFC calculations from being affected during the calibration. During this time the XFC uses the last know value at the time calibration mode was entered. (This is called the “HOLD” mode.)

To exit the Hold mode:

1. Exit Calibration mode
2. Unplug DATA cable at XFC connector

Calibrating On-Board Analog Input

Overview

The Totalflow XFC comes standard with 2 analog inputs on the XFC-195 Board. As you enter calibration, the XFC enters the Hold Mode and displays the current values.

The Current Values section will display the current values continuously by checking the "Update" box. When different analog inputs are selected, their assigned register numbers are displayed on the top of the screen.

Follow the instructions in the PCCU32 Help files for specific software steps. Generally you need to complete the following procedures.

Calibration

Step	Procedure
1.	Connect an accurate power source capable of 1 - 5 volts to the AI terminals to be calibrated.
2.	In Calibration Control for the AI you are calibrating, select either 3 Point or 5 Point for number of calibration points. 3 Point for low, 50% and 100% values and 5 Point for low, 25%, 50%, 75% and 100% values.
3.	In the Current Value box, check the Update button. This causes the AI to look for it's source at the terminals instead of a Test Value.
4.	Begin the calibration starting with the first selection, Low Calculation Point.
5.	Apply 1 volt to the AI terminals.
6.	Enter a value (typically zero) representing the Low Cal Point and representing the desired engineering units. Click the OK button.

Note: The Current Reading value on the pop up entry screens will be placed in the Reading column and represent values from the previous calibration. User entered values will be displayed in the Entry column.

7.	Move to the 100% Calibration Value.
8.	Apply 5 volts to the AI terminals.
9.	Enter a value representing full range and representing the desired engineering units. Click the OK button.
10.	If 3 Point calibration was selected, move to the 50% Calibration Value.
11.	Apply 3 volts to the AI terminals.
12.	Enter a value representing 50% and representing the desired engineering units.

Note: If Preforming a 5 point calibration, you will need to add additional steps for the 25% and 75% Calculation points.

Calibrating On-Board Pulse and Digital Inputs

Overview

Totalflow XFC comes standard with 2 high speed Pulse Inputs on board. These may also be used as Digital Inputs. The following procedure is for calibrating Pulse Inputs. As you enter the calibration screen and have selected the P/I that you would like to calibrate, the XFC enters the Hold Mode and displays the current values and their register number.

The Current Values section will display the current values continuously by checking the "Update" box. When different analog inputs are selected, their assigned register numbers are displayed on the top of the screen.

Follow the instructions in the PCCU32 Help files for specific software steps. Generally you need to complete the following procedure.

Calibration

Step	Procedure
1.	Click on the K-Factor button, enter a value and click the OK button. Input pulses are multiplied by the K-Factor. To have a one to one pulse count, use a factor of 1.

CAUTION

Please take into consideration that these inputs may have the debounce enabled or disabled. This feature is discussed in the PCCU32 Help files and is also turned on or off within PCCU32.

Calibrating TFIO Module Analog Outputs

Overview

The following procedure is for calibrating Analog Outputs contained on the XFC TFIO Analog Output Modules. As you enter the calibration screen and have selected the A/O that you would like to calibrate, the XFC enters the Hold Mode and displays the current values and their register number.

The Current Values section will display the current values continuously by checking the "Update" box. When different analog inputs are selected, their assigned register numbers are displayed on the top of the screen. Follow the instructions in the PCCU32 Help files for specific software steps. Generally you need to complete the following procedures.

Calibration

Step	Procedure
1.	Connect a meter capable of reading 4 - 20 ma signal to the analog output terminals to be calibrated.
2.	Click on the Low Cal button and verify that the meter's reading has stabilized at approximately 4 ma.
3.	Enter the meter's reading in the Enter Measured Value window and click the OK button.
4.	Click on the High Cal button and verify that the meter's reading has stabilized at approximately 20 ma.
5.	Enter the meter's reading in the Enter Measured Value window and click the OK button.
6.	To test the calibration, click on the appropriate AO button in the Current Values section and enter a value 0 - 100% and note the reading on the meter. (25% = 8 ma, 50% = 12ma, 75% = 16 ma, 100% = 20 ma)

How to Change Orifice Plate

Use one of the following procedures when changing an orifice plate.

Taking Run Out-of-Service Procedure (Simplex Fitting)

Step	Procedure
1.	Take meter run out of service.
2.	Replace the orifice plate.
3.	If you would like to record a Volume Calculation, go to the Entry screen, select the measurement tube, and move to the Commands tab. Change the value for the Reset Log Period to Yes. This forces a new record to be written based on the old orifice plate size. If you would also like to simultaneously zero the accumulated volume, you may use the Reset Volume command instead. While seemingly unnecessary, if the Volume Calculation Period is set to anything less than 60 minutes, TotalFlow recommends performing either the Reset Log Period or the Reset Volume command to enhance the audit trail created by the event.
4.	In PCCU, enter the new orifice plate diameter.
5.	Return meter to service.

Leaving Run In-Service Procedure (Senior Fitting)

Step	Procedure
1.	Place XFC in HOLD, by entering the calibration mode, so constant SP, DP and Temperature values are used, while the orifice plate is being changed.
2.	Replace the orifice plate.
3.	Exit the Calibration mode, releasing the Hold of the SP, DP and Temperature.
4.	If you would like to record a Volume Calculation, go to the Entry screen, select the measurement tube, and move to the Commands tab. Change the value for the Reset Log Period to Yes. This forces a new record to be written based on the old orifice plate size. If you would also like to simultaneously zero the accumulated volume, you may use the Reset Volume command instead. While seemingly unnecessary, if the Volume Calculation Period is set to anything less than 60 minutes, TotalFlow recommends performing either the Reset Log Period or the Reset Volume command to enhance the audit trail created by the event.
5.	In PCCU, enter the new orifice plate diameter.

FYI At top of next Volume Calculation Period, the XFC will do calculations based on new orifice plate diameter for the part of the period after the log was reset.

Zero Transducer

During the process of setting pressure markers to determine the need for a calibration of either the Static Pressure (SP) or the Differential Pressure (DP), you may conclude that the SP or the DP pressures are out of alignment exactly the same amount at each pressure marker (linear shift). When this occurs, you may either re-calibrate the XFC or you may set the Transducer to zero. The preferred method is to re-calibrate the XFC. This maintains the XFC records in a manner that is assures accountability and continuity when other measurement issues arise. By using the Zero Transducer command, all references to previous pressure markers are non-existent, eliminating the ability to adjust volumes based on previous markers.

CAUTION

Using the Zero Transducer capability assumes that the shift is Linear, meaning that at different levels of pressure that the AMU is off by exactly the same amount. If this is not the case, you need to re-calibrate the AMU instead.

Static Pressure

The SP can be zeroed without re-calibrating. If the SP shifts, user can enter a new barometric pressure value. This shifts the SP AMU curve. After the HOLD state begins, select Zero Transducer.

Differential Pressure

The DP can be zeroed without re-calibrating. If DP shifts, user can enter a new zero (0). This shifts the DP curve. After the HOLD state begins, select Zero.

Replacing Static Pressure Transducer

CAUTION

Under no circumstances shall the XFC Static Pressure Transducer cover be removed. Removal of this cover, and entry into interior of Static Pressure Transducer, **voids the warranty**. If the Static Pressure Transducer requires servicing, the entire assembly, including cable, must be removed from XFC, securely packaged for shipping and returned to Totalflow.

Procedure

In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.

Step	Procedure
1.	Make sure the J13 (Figure 4–1, Item 10) memory backup jumper covers the top two pins. This enables the memory backup.
2.	Using user installed static pressure transducer impulse line isolation valve, close and isolate static pressure to transducer. See Figure 4–5.
3.	Using user installed static pressure transducer calibration three way valve, close and isolate pressure to transducer and open test port to vent static pressure from transducer.
4.	Remove static pressure impulse line connections from transducer.
5.	If used, disconnect external battery charger connected to J5 (Figure 4–1, Item 20).
6.	Disconnect battery pack from J1 (Figure 4–1, Item 21).

Continued on Next Page

Step	**Procedure,** Cont.
7.	**Do not disconnect cable with power connected.** Disconnect XFC Transducer cable from XFC-195 Board (Figure 4–1, Item 11). Cable is secured to XFC-195 Board with a Board mounting screw which must be removed.
8.	Remove cable from Static Pressure Transducer connector.
9.	Loosen FCU 2” mounting post clamps and rotate XFC a sufficient distance to allow removal of Static Pressure Transducer. Clearance of approximately 7” is required for removal. After rotation, tighten clamps to hold XFC in place before removing Static Pressure Transducer.

CAUTION When rotating XFC, be careful not to place twisting stress on attached cables.

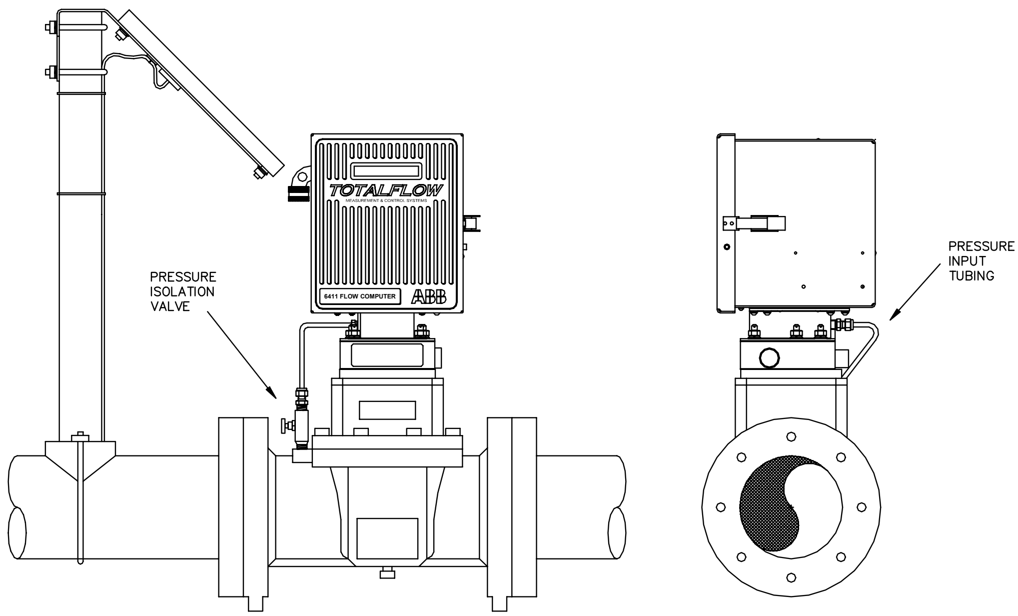

Figure 4–5 Flow Computer with Pulse Meter

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Replacing Static Pressure Transducer, Continued

Step	**Procedure,** Cont.
10.	Using a Phillips screwdriver, remove eight mounting screws, washers and lock washers securing Static Pressure Transducer to XFC cabinet. Access mounting hardware from underside of XFC.
11.	Tilt Static Pressure Transducer slightly upwards then remove unit. A weather sealing gasket is affixed to top side of Static Pressure Transducer mounting flange.

FYI

During reinstallation of Transducer, weather sealing gasket must be reinstalled between the Transducer and bottom of XFC to keep out moisture and dust.

12.	To install Static Pressure Transducer, perform steps 2 to 11 in reverse order. When installing the Transducer, the eight mounting screws should be securely tightened to keep external environmental elements from entering FCU interior.

TIP

Before placing Static Pressure Transducer back into operation, the XFC MUST be calibrated. Refer to Calibration Procedure, in this chapter for detailed procedures.

Chapter 5
Troubleshooting

Overview

This Chapter contains troubleshooting tables to correct most XFC alarm code condition(s). The alarm codes flag you that an operational problem exists, and are visible on the front door LCD.

The Troubleshooting Tables are designed to match an alarm code with its probable cause(s) and the corrective procedure(s). Besides these tables, this Chapter contains procedures for setup and troubleshooting with an installed radio communication unit.

See Table 5–1 and Figure 5–1 for XFC-195 Board Troubleshooting Component locations.

Highlights

This Chapter covers the following topics:

Table 5–1 XFC-195 Board Identifiers, Troubleshooting

ID Number	Description
10	Memory Backup Enable/Disable
11	AMU Interface
12	Analog Input Connectors
13	RTD Connectors
14	Pulse Input and Digital Output Connectors
15	Remote Communications Connectors
16	Remote Comm 2: RS-485 Termination Jumper
17	Remote Comm 2: Module Plug-in
18	Remote Comm 1: RS-485 Termination Jumper
19	Remote Comm 1: Module Plug-in
20	External Charger
21	Battery Connection
22	I/O Module Interface

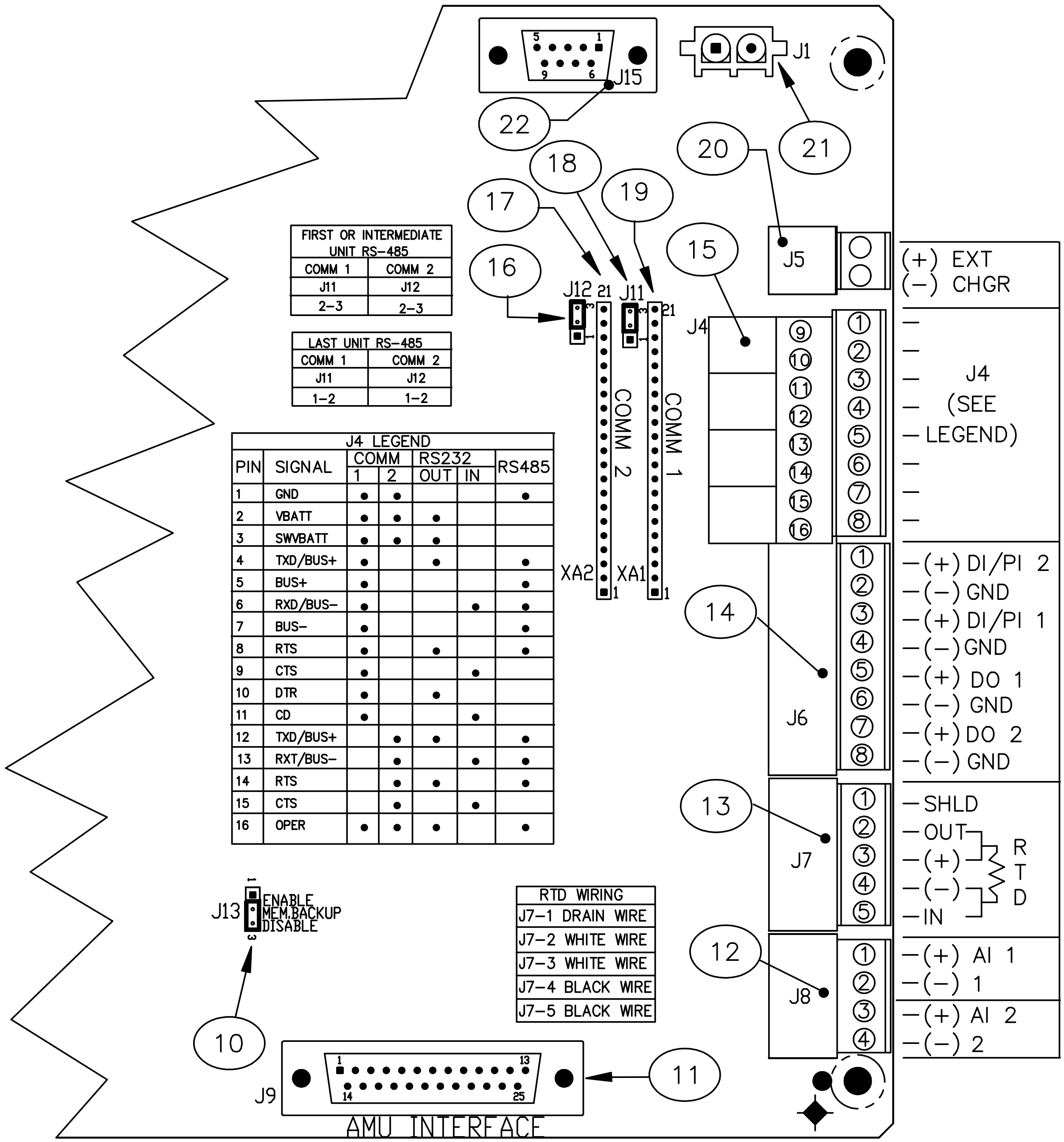

Figure 5–1 XFC-195 Board Cutout-Troubleshooting

Reset Procedures

The XFC operating system can be reset through either a cold or warm start procedure. The decision to use these procedures should only be made by an experienced technician.

Cold Start

A cold start clears all the data that is stored in RAM as well as resetting all entered variables to their factory default values. A cold start should be used for new XFC installations. This will ensure that all memory is clear and the operating program is at its default settings. Discretionary use of this procedure is advised.

Cold Start Procedures (Hardware)

In the following procedure, the common name for a component or it’s jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.

Step	Procedure
1.	If an external charging source is connected, it must be disconnected. Slide external charger terminal block J5 (Figure 5–1, Item 20) from the XFC-195 Board.
2.	Disconnect battery pack connector from XFC-195 Board BAT CONN connector J1 (Figure 5–1, Item 21).
3.	Disable Memory Backup J13 (Figure 5–1, Item 10), by moving the pin jumper to pins 2 and 3.
4.	To return to service reconnect 12 Vdc battery pack connector to XFC-195 Board BAT CONN connector J1 (Figure 5–1, Item 21) and observe LCD .
5.	If removed, reconnect external charging source to EXT CHGR connector J5 (Figure 5–1, Item 20).
6.	Enter all necessary parameters or send a saved setup file and calibrate XFC. See chapter 3.0, XFC Startup.
7.	When XFC has been cold started, the 24 hour clock will be reset to 00:00:00.
8.	Enable Memory Backup J13 (Figure 5–1, Item 10), by moving the pin jumper to pins 1 and 2.

Cold Start Procedures (Software)

Step	Procedure
1.	Using PCCU, in the terminal mode, type this command exactly as shown: boot=COLD

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Warm Start

A warm start occurs when the charging source and main power is removed, then re-applied while memory backup is enabled. This does not clear the data stored in RAM. The warm start will only reset the XFC microprocessor and not disturb any data that has been stored in RAM. A warm start should be used when taking an XFC out service to perform maintenance or troubleshooting. A warm start can be used when a power or communication interruption caused the XFC microprocessor to lock-up.

Warm Start Procedures

In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.

Step	Procedure
1.	If an external charging source is connected, it must be disconnected. Slide external charger terminal block J5 (Figure 5–1, Item 20) from the XFC-195 Board.
2.	Enable Memory Backup J13 (Figure 5–1, Item 10), by moving the pin jumper to pins 1 and 2.
3.	Disconnect battery pack connector from XFC-195 Board BAT CONN connector J1 (Figure 5–1, Item 21). The XFC is now out of service.
4.	To place XFC in service, connect battery pack connector J1 (Figure 5–1, Item 21).
5.	Connect the EXT CHGR terminal block J5 (Figure 5–1, Item 20).

Visual Alarm Codes

After the XFC completes recording hourly flow and operational records the LCD will show any alarm conditions that have occurred. Also, the date, hour and type of alarm conditions are stored in the XFC memory. An alarm can be a word, character, letter or symbol. The entire list of Status and Alarm codes may be found in Chapter 1, Table 1–2. For the purpose of troubleshooting, only those codes considered to be as alarms are discussed here. A description of each XFC alarm code, is described in Table 5–2.

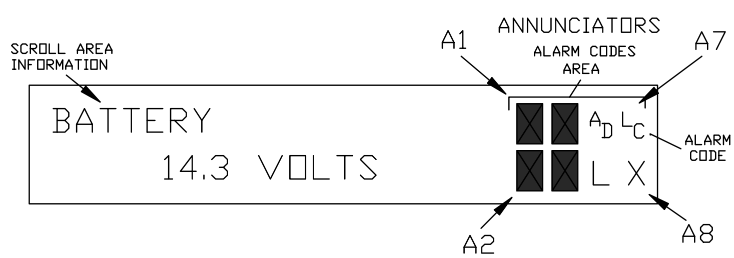

Figure 5–2 Liquid Crystal Display and Indicators

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Visual Alarm Codes, continued

Table 5–2 Visual Alarm Codes

Annunciator	Description
$^{L}{}_{L}$	*Low Lithium Battery Alarm*: When $^{L}{}_{L}$ (low lithium) is displayed, lithium battery voltage is below 2.5 Vdc. A new lithium battery measures approximately 3.6 Vdc.
$^{L}{}_{C}$	*Low Charger.* Displayed if XFC battery charging voltage is less than 0.4 Vdc above the battery voltage.
$^{A}{}_{D}$	*A to D Failure.* Displayed if A to D Converter Absolute Differential Pressure, Absolute Static Pressure or temperature readings exceed maximum counts or are less than minimum counts.

System Troubleshooting

System indicated alarm conditions and their probable cause, including SLEEP mode, and procedure(s) for correcting the problem, are presented below in Table 5–3.

Table 5–3 Troubleshooting

Indicator	Probable Cause	Procedure
In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.		
SLEEP	Battery Voltage Below 10.9 VDC	Make a local connection with the XFC. This wakes up the unit so that you may check all alarm conditions and determine the problem. 1. Check battery pack cable. It must make a good secure electrical connection with the main board BAT CONN connector J1(Figure 5–1, Item 21). 2. Check battery pack cable is securely connected to battery. 3. If battery pack cable is securely connected on both ends, check battery pack voltage. If voltage is low, replace with another battery pack.
L_C	Charging Source Below 0.4 Vdc Plus Battery Pack Voltage	Check battery pack charging source with PCCU Monitor Mode. This is for either Solar or externally connected charging sources.

Table Continued on Next Page

Table 5–3 Troubleshooting, Continued

Indicator	Probable Cause	Procedure
L C	Solar Power Charging Unit	In low sun light conditions, the display normally shows LC. 1. Check solar panel angle and direction. In northern hemisphere, panel should face due south and in southern hemisphere, due north. 2. Check solar panel for any physical damage or obstructions to sunlight. Sunlight obstruction prevents solar panel from receiving enough sunlight to charge installed battery pack. 3. Solar panel should be positioned so it receives the most sunlight. Do not place it in a shaded area. 4. Check solar panel wiring to be certain it is correctly connected to associated XFC-195 Board termination block J5 (Figure 5–1, Item 20). 5. Solar panel should be checked under load, using a diagnostic test kit. 6. If solar panel wiring is correct, sunlight is not obstructed and voltage does not increase above 0.4 VDC under bright sunlight, replace Solar Panel.
L C	AC Power Unit	1. Check AC charger wiring to XFC termination block connector J5 (Figure 5–1, Item 20). Be certain wiring is correct. 2. Check input AC voltage to external AC charging unit. Be certain primary AC voltage is correct. 3. If input primary AC voltage level is correct, wiring to XFC XFC-195 Board terminal is correct and there is no DC output from the charger, replace charger fuse. 4. If fuse is not faulty or there is no charger DC output voltage after replacing fuse, replace AC charging unit.
A D	A/D Converter is Over or Under Range	This alarm condition can be caused by differential pressure, static pressure or the temperature being out of measurement range. 1. Check SP, DP and temperature to determine which measurement channel is causing the alarm. In the PCCU Entry screen, enter the Monitor mode by clicking on the I/O subsystem.

Table Continued on Next Page

Table 5–3 Troubleshooting, Continued

Indicator	Probable Cause	Procedure
AD	Temperature Measurement Causing Alarm	A faulty RTD Probe, or loose wiring connection(s), can cause an AD alarm code. 1. Check RTD wiring on XFC-195 Board terminal connector J7 (Figure 5–1, Item 13). 2. To determine if problem is with the RTD Probe or main board, disconnect RTD wiring connector from main board connector J7 (Figure 5–1, Item 13) and perform either of the following two procedures: A) Substituting RTD Probe with Resistor: These procedures are performed on the main board. 1. Connect a 100-ohm resistor across connector J7 (Figure 5–1, Item 13) RTD OUT terminals 3 and 4. 2. Connect a jumper wire from J7 (Figure 5–1, Item 13) terminals 2 and 3. 3. Connect a jumper wire from J7 (Figure 5–1, Item 13) terminals 4 and 5. 4. The XFC LCD should read approximately 32°F with the 100 ohm resistor connected. 5. If temperature is approximately 32°F and AD error goes away, RTD probe is faulty and should be replaced. If temperature is not 32°F, XFC-195 Board or AMU is faulty and should be replaced. B) RTD Probe Resistive Impedance Check: 1. Immerse RTD Probe in ice bath. 2. Perform a continuity check between any two similar colored wires. Measured resistance should be 1-ohm or less. 3. Perform a continuity check between any two dissimilarity colored wires. Measured resistance should be approximately 100 ohms. 4. Perform a continuity between RTD shield and any other wire. Measured resistance should be in the megohm range.

Communications Troubleshooting

These troubleshooting procedures are applicable only to a XFC with an installed radio communication unit. The two basic types of radio communications that can be used between the XFC and a radio receiver, are:

RS-232 Communications: Communication is accomplished using an RS-232 Module, installed in the XFC-195 Board.

RS-485 Communications: Communication is accomplished using an RS-485 Module, installed in the XFC-195 Board.

CAUTION

Before removal or installation of either the above communication interface modules, it is important that you disconnect XFC external battery charger and main XFC battery pack cable connectors from XFC-195 Board. Refer to Figure 5–1.

Setting Up Communication

After installation of communication equipment and before placing the communication system into operation, the user should note the following:

1. Verify RS-232 or RS485 Interface Modules, cables, associated XFC-195 Board MODULE RS-485 or RS-232 connector and radio are correctly installed.
2. Check XFC identifier (ID). Log the ID for future reference.
3. Log XFC access security code, baud rate, listen cycle, protocol and interface for future reference.

FYI

The following helpful hints aid the user after communication equipment has been installed and setup:

1. When communication equipment is powered on, XFC displays the → after it recognizes the XFC ID and is responding.
2. Check baud rate of XFC transmission and LISTEN time settings. The baud rate and time settings can be changed when PCCU is in ENTRY mode. Default settings are 1200 baud and listening time is 4 seconds and communications interface is turned off.

TIP

To check for wiring shorts or opens with two or more wire connections, use a multimeter set on continuity (resistance). Check two wires at a time from one device to another and back. If black and white wires are to be tested, disconnect both wires at both ends, set one probe on black, and the other on white. The meter should read OL or OFL (over range) if no shorts. Jumper the two wires at the other end. The meter should read allow resistance if no opens. This method requires only one end of the wiring to be tested, no matter how far the devices are apart.

Troubleshooting RS-232 Serial Communications

The following RS-232 Serial Communication troubleshooting procedures will assist the user in what may be the possible cause for indicated error message. Refer to Table 5–4.

FYI

Voltage may be difficult to see using a digital voltmeter. It can be seen using an oscilloscope.

Verify voltage by continuously polling XFC from CCU.

Table 5–4 Troubleshooting RS-232 Serial Communications

Error Condition	Check	Procedure
In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.		
Not Responding	Battery Voltage	Verify battery pack voltage is greater than 11.5 Vdc.
	ID Number /Security Code	Verify ID number and security code are correct.
	Wiring	Verify XFC-195 Board wiring to radio transceiver is correct.
	SWVBATT Supply Voltage	Using a digital voltmeter, measure transceiver SWVBATT DC supply voltage between the following XFC-195 Board J4 (Figure 5–1, Item 15) connector terminals. Voltage should be greater than 11.5 Vdc. J4–1 (GND [BLK]) and J4–3 (SWVBATT [WHT]) The SWVBATT voltage should pulse once every four (4) seconds for a time duration of approximately 350 milliseconds (Baud rate dependent 350 ms @ 1200 Baud). Voltage must be at least 11.5 Vdc.
	Receiving Data (RXD+) Voltage	Using an oscilloscope or digital voltmeter, connect it to XFC-195 Board J4 (Figure 5–1, Item 15) connector across the following terminals. J4–1 (GND [BLK]) and J4–6 (RXD+ [BRN]) When communication data is being transmitted from CCU to XFC, voltage should vary between +5 Vdc and -5 Vdc.
	Request To Send (RTS) Voltage	Using an oscilloscope or digital voltmeter, connect measuring device to XFC-195 Board J4 (Figure 5–1, Item 15) green connector across the following terminals. When XFC is sending communication data to CCU, voltage should be +5 Vdc. J4–1 (GND) and J4–8 (RTS) COM1 J4–1 (GND) and J4–14 (RTS) COM2

Table Continued on Next Page

Table 5–4 Troubleshooting RS-232 Serial Communications, Continued

Error Condition	Check	Procedure
Not Responding, Continued	Transmitting Data (TXD+) Voltage	Using an oscilloscope or digital voltmeter, connect measuring device to XFC-195 Board J4 (Figure 5–1, Item 15) green connector across the following terminals. When communication data is being transmitted from the XFC, voltage should vary between +5 Vdc and -5 Vdc. J4–1 (GND) and J4–4 (TXD+) COM 1 J4–1 (GND) and J4–12 (TXD+) COM2
	Problem(s) Still Exists	1. Using two (2) hand-held transceivers, check communication path between Master and Remote sites. If available, voice activated interface can be used. 3. Using a wattmeter, check transceiver output power. Refer to manufacturer's documentation for measuring instructions. 4. Verify that transceiver is on correct frequency. Refer to manufacturer's documentation for checking frequency instructions. 5. Verify orientation of antenna if directional.

Troubleshooting RS-485 Communications

The following RS-485 Communications troubleshooting procedures will assist the user in what may be the possible cause for indicated error message. Refer to Table 5–5. In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. Refer to Figure 5–1 for location of XFC-195 Board connections.

FYI Voltage may be difficult to see using a digital voltmeter. It can be seen using an oscilloscope.

Verify voltage by continuously polling XFC from CCU.

Table 5–5 Troubleshooting RS-485 Communications

Error Condition	Check	Procedure
In the following procedure, the common name for a component or it's jumper number if available (abbreviated J) or part is followed by a number in parentheses. This refers to the call out item number referenced on each drawing.		
Not Responding	Battery Voltage	Verify battery pack voltage is at least 11.5 Vdc.
	Board to Radio TXD+ Wiring	Verify wiring from UCI Board to Radio Transceiver Assembly is correct. Verify UCI Board jumper settings are correct.
	Board to UCI Wiring	Verify that XFC-195 Board wiring, to optional UCI (Universal Communications Interface) Board or Radio Modem Assembly, is correct.
	ID Number /Security Code	Verify that ID number and security code are correct.
	Modem to Radio TXD+ Wiring	Verify wiring from Radio Modem Assembly to Radio Transceiver Assembly is correct.

FYI Power to transceiver can be provided from an external power supply. This allows XFC to switch external power to transceiver. Switching is accomplished using a 12VDC switch line connected to J4–3 (WHT). Refer to Measuring SWVBATT Transceiver Supply Switch Voltage. If this option is used, J4–2 (V-BATT) is not used.

	V-BATT Supply Voltage	Using a digital voltmeter, measure transceiver V-BATT power supply voltage between the following XFC-195 Board J4 (Figure 5–1, Item 15) connector terminals. Switched voltage should be greater than 11.5 Vdc. J4–1 (GND [BLK]) and J4–2 (V-BATT)
	Line Driver voltage	Using an oscilloscope or digital voltmeter, connect it to XFC-195 Board J4 (Figure 5–1, Item 15) connector between the following terminals. Voltage should vary between +5 Vdc and 0 Vdc when communication data is being transmitted from CCU to XFC. J4–4 (BUS+) and J4–6 (BUS-) COM1 J4–12 (BUS+) and J4–13 (BUS-) COM2

Table Continued on Next Page

Table 5–5 Troubleshooting RS-485 Communications, Continued

Error Condition	Check	Procedure
Not Responding, Continued	Request to Send (RTS) Voltage	Using an oscilloscope or digital voltmeter, connect it to XFC-195 Board J4 (Figure 5–1, Item 15) connector between the following terminals. Voltage should be +5 Vdc when sending data to CCU. 0V when not transmitting. J4–1 (GRD) and J4–8 (RTS) COM1 J4–1 (GRD) and J4–14 (RTS) COM2 When RTS is high, transmitter must be keyed and transmitting data.
	Problem(s) Still Exist	2. Using two hand-held transceivers, check communication path between Master and Remote sites. If available, voice activated interface can be used. 6. Using a wattmeter, check transceiver output power. Refer to wattmeter manufacturers documentation for operating instructions. 7. Verify that transceiver is on correct frequency. Refer to transceiver manufacturer’s documentation for procedures to check frequency. 8. Verify transceiver settings.

Chapter 6
Totalflow® Definitions and Acronyms

TERM	DEFINITION
μ	Greek letter for “mu”. Often used in math and engineering as the symbol for “micro”. Pronounced as a long u.
μ FLO	Totalflow’s Micro Flow Computer is a low power, microprocessor based units designed to meet a wide range of measurement, monitor and alarming applications for remote gas systems, while being a cost effective alternative.
μ FLO IMV	μFLO’s measurement and operational features are housed in this single unit assembly. The main electronic board (μFLO-195 Board), communication connection, power, SP, DP and Temperature readings are all housed in this unit.
μ FLO-2100767 Board	Main Electronic Board used in the μFLO Computers. It is housed on the IMV and operates at 195 MHz while drawing minimal power.
μ Sec	Micro Second.
*.CSV file	See Comma Separated Values.
*.INI file	See Initialization File.
A/D	Analog-to-digital.
ABB Inc.	Asea, Brown & Boveri, parent company of Totalflow
Absolute Pressure	Gauge pressure plus barometric pressure. Absolute pressure is used by most Totalflow devices for flow calculations.
Absolute Zero	The zero point on the absolute temperature scale. It is equal to -273.16 degrees C, or 0 degrees K (Kelvin), or -459.69 degrees F, or 0 degrees R (Rankine).
AC	See Alternating Current.
ACK	See Acknowledgment
Acknowledgment	This refers to a response over a remote communication device to a request such as a PING. Basically, saying, "I'm here, and I saw your request!"
ACM	See Analyzer Control Module.
Active Analog Output	Analog Output to a host providing power to the host.
Active Mode	An operational mode used by the LevelMaster for measuring dual float levels by applying a signal to the primary windings, reading the voltage level on the secondary windings and using an algorithm to determine the oil and water levels.
ADC	See Analog-to-Digital Converter.
Address	A unique memory designation for location of data or the identity of a peripheral device; allows each device on a single communications line to respond to its own message.
Aerial	A length of wire designed to transmit or receive radio waves. (See also Antenna)
Aerosol Liquids	Minute liquid paraticles suspended in gas. Aerosols will behave like a fluid and can be transported by pipes and pumping. When aerosols contact each other they coalesce into droplets. Aerosols may be present in gas, or may be generated by glow shearing off the skim inside of a pipeline.
AGA	American Gas Association. Trade group representing natural gas distributors and pipelines.
AGA-3	American Gas Association Report No. 3, method of calculating gas volume across an Orifice Plate.
AGA-5	American Gas Association Report No. 5, methods (Volume, Mass or Energy) for calculating BTUs without knowing the composition of the gas.

TERM	DEFINITION
AGA-7	American Gas Association Report No. 7, method of calculating gas volume using a Pulse Meter.
AGA-8	American Gas Association Report No. 8, method of calculating the Super Compressibility Factor, Fpv.
AGC	Automatic Gain Control
AH	See Ampere-Hour.
AI	Analog Input
Alkane	The simplest homologous series of saturated aliphatic hydrocarbons, consisting of methane, ethane, propane, butane; also know as olefins.
Alternating Current	An electric current whose direction changes with a frequency independent of circuit components.
Aluminum Powder Coating	Totalflow aluminum enclosures have a baked-on Powder Coating designed to our specifications to ensure paint adhesion, weather resistance and durability.
Amp	See Ampere.
Ampere	The unit of electrical current. Also milliamp (one thousandth of an amp) and microamp (one millionth of an amp). One amp corresponds to the flow of about 6 x 10^{18} electrons per second.
Ampere-Hour	The quantity of electricity measured in ampere-hours (Ah) which may be delivered by a cell or battery under specified conditions. A current of one ampere flowing for one hour.
Ampere-Hour Efficiency	The ratio of the output of a secondary cell or battery, measured in ampere-hours, to the input required to restore the initial state of charge, under specified conditions.
Amplitude	The highest value reached by voltage, current or power during a complete cycle.
Amplitude Modulation	Where audio signals increase and decrease the amplitude of the "carrier wave".
AMU	See Analog Measurement Unit.
AMU/IMV	Generic reference to the Measurement unit. See (Integral) Multivariable Transducer for more definition.
Analog	A system in which data is represented as a continuously varying voltage/current.
Analog Input	Data received as varying voltage/current.
Analog Measurement Unit	A device for converting energy from one form to another. (e.g. Static and Differential pressure to electrical signals)
Analog Output	Data is transmitted as varying voltage/current.
Analog Trigger	A trigger that occurs at a user-selected point on an incoming analog signal. Triggering can be set to occur at a specific level on either an increasing or a decreasing signal (positive or negative slope).
Analog-to-Digital Converter	An electronic device, often an integrated circuit, that converts an analog voltage to a number.
Analyzer Control Module	Consists of various electronic components used for analysis.
Annunciator	Display of a status on a screen.
ANSI	American National Standards Institute.
Antenna	A length of wire or similar that radiates (such as a transmitting antenna) or absorbs (such as a radio antenna) radio waves. The two basic types are: Yagi (directional) or Omni (bi-directional).
AO	Analog Output
AP	See Absolute Pressure.
API 14.3	American Petroleum Institute Report No. 14.3 addresses the 1992 equation regarding the AGA-3 method for calculating gas volume across an Orifice Plate.

TERM	DEFINITION
API 21.1	American Petroleum Institute Report No. 21.1 addresses the equation regarding AGA-8 Fpv or Supercompressibility Factor and the energy content of the gas.
Archive	A file containing historical records in a compressed format for more efficient long term storage and transfer. Totalflow archive records are non-editable, meaning that when they are stored they may not be changed. These records are used during an audit of data.
ASCII	American Standard Code for Information Interchange. A very popular standard method of encoding alphanumeric characters into 7 or 8 binary bits.
Asynchronous	A communications protocol where information can be transmitted at an arbitrary, unsynchronized point in time, without synchronization to a reference time or "clock".
ATEX	Certification Directive for Explosive Atmospheres.
Atmospheric Pressure	The pressure due to the weight of the atmosphere (air and water vapor) on the earth's surface. The average atmospheric pressure at sea level (for scientific purposes) has been defined at 14.696 pounds per square inch absolute.
Audio Frequency	Generally in the range 20 Hz to 20 KHz.
Audit	To examine or verify data for accuracy. Totalflow's DB1 and DB2 records may be edited to generate a more accurate representation of data information.
Audit Trail	Using the Long Term Archive files to justify changes made to records that more accurately reflects the correct data. Peripheral information used to edit data is recorded without exception, to justify the accuracy of the edited data records.
Automatic Frequency Control	Similar to Automatic Fine Tune (AFT). A circuit that keeps a receiver in tune with the wanted transmission.
Back Pressure	Pressure against which a fluid is flowing. May be composed of friction in pipes, restrictions in pipes, valves, pressure in vessels to which fluid is flowing, hydrostatic head, or other resistance to fluid flow.
Backflush	
Background Acquisition	Data is acquired by a DAQ system while another program or processing routine is running without apparent interruption.
Bandwidth	The range of frequencies available for signaling; the difference between the highest and lowest frequencies of a band expressed in Hertz.
Barometer	An instrument which measures atmospheric pressure.
Barrel	The unit of volume measurement used for petroleum and it's products; 1 barrel = 42 US gallons.
Base Pressure	The pressure used as a standard in determining gas volume. Volumes are measured at operating pressures and then corrected to base pressure volume. Base pressure is normally defined in any gas measurement contract. The standard value for natural gas in the United States is 14.73 psia, established by the American National Standards Institute as standard Z-132.1 in 1969.
Battery	Two or more electrochemical cells electrically interconnected in an appropriate series/parallel arrangement to provide the required operating voltage and current levels.
Baud	Unit of signaling speed. The speed in baud is the number of discrete conditions or events per second. If each event represents only one bit condition, baud rate equals bits per second (bps).
Baud Rate	Serial communications data transmission rate expressed in bits per second (b/s).
Bias	Term used when calibrating. Amounts to offset the actual measurement taken. On a LevelMaster, it refers to adjusting the measurement of the float level to agree with a calibrated measurement. On an RTD (Resistant Thermal Detector), it refers to adjusting the measurement of the temperature to agree with a calibrated temperature. This figure maybe either a positive or negative figure.

TERM	DEFINITION
BIAS Current	A very low-level DC current generated by the panel meter and superimposed on the signal. This current may introduce a measurable offset across a very high source impedance.
Binary Number	System based on the number 2. The binary digits are 0 and 1.
Binary-Coded Decimal	A code for representing decimal digits in a binary format.
BIOS	Basic Input/Output System. A program, usually stored in ROM, which provides the fundamental services required for the operation of the computer. These services range from peripheral control to updating the time of day.
Bipolar	A signal range that includes both positive and negative values.
Bipolar Transistor	The most common form of transistor.
Bit	Binary Digit - the smallest unit of binary data. One binary digit, either 0 or 1. See also byte.
Bits Per Second	Unit of data transmission rate.
Blue Dot Technology	Technological changes to the DC and ACM Modules, decreasing noise by changing ground. Allows amplification of the results, gains resolution.
Board	Common name used to identify the Main Electronic Board. Also called Motherboard, Engine Card and Circuit Board.
Bottom Solids and Water	Refers to materials that settle to the bottom of an oil tank, including the heavy water.
Bounce	Bouncing is the tendency of any two metal contacts in an electronic device to generate multiple signals as the contacts close or open. When you press a key on your computer keyboard, you expect a single contact to be recorded by your computer. In fact, however, there is an initial contact, a slight bounce or lightening up of the contact, then another contact as the bounce ends, yet another bounce back, and so forth. A similar effect takes place when a switch made using a metal contact is opened.
BPS	See Bits Per Second.
Bridge	Generally a short-circuit on a PC board caused by solder joining two adjacent tracks.
British Thermal Unit	Energy required to raise one pound of water one degree Fahrenheit. One pound of water at 32 F° requires the transfer of 144 BTUs to freeze into solid ice.
Browser	Software which formats Web pages for viewing; the Web client
BS&W	See Bottom Solids (or sediment) and Water.
BTU	See British Thermal Unit.
Btu Method	A method of allocating costs between different operations or between different products based upon the heat content of products produced in the various operations or of the various produced products.
Btu per Cubic Foot	A measure of the heat available or released when one cubic foot of gas is burned.
Btu, Dry	Heating value contained in cubic foot of natural gas measured and calculated free of moisture content. Contractually, dry may be defined as less than or equal to seven pounds of water per Mcf.
Btu, Saturated	The number of Btu's contained in a cubic foot of natural gas fully saturated with water under actual delivery pressure, temperature and gravity conditions. See BTU, DRY.
Btu/CV	Used to express the heating content of gas. See British Thermal Units or Calorific Value.
BtuMMI	Refers to the interface program or software that operates the Btu Analyzer.

TERM	DEFINITION
Buffer	(1) A temporary storage device used to compensate for a difference in data rate and data flow between two devices (typically a computer and a printer); also called a spooler; (2) An amplifier to increase the drive capability, current or distance, of an analog or digital signal.
BUS	A data path shared by many devices (e.g., multipoint line) with one or more conductors for transmitting signals, data, or power.
Bus Master	A type of controller with the ability to read and write to devices on the computer bus.
Busbar	A heavy, rigid conductor used for high voltage feeders.
Butane (C4H10)	A saturated hydrocarbon (alkane) with four carbon atoms in it's molecule (C_4H_{10}). A gas at atmospheric pressure and normal temperature, but easily liquefied by pressure. Generally stored and delivered in liquefied form and used as a fuel in gaseous form, obtained by processing natural gas as produced and also from a process in petroleum refining. Contains approximately 3,260 Btu per cubic foot.
Byte	A group of binary digits that combine to make a word. Generally 8 bits. Half byte is called a nibble. Large computers use 16 bits and 32 bits. Also used to denote the amount of memory required to store one byte of data.
Cache Memory	Fast memory used to improve the performance of a CPU. Instructions that will soon be executed are placed in cache memory shortly before they are needed. This process speeds up the operation of the CPU.
Calibrate	To ascertain, usually by comparison with a standard, the locations at which scale or chart graduations should be placed to correspond to a series of values of the quantity which the instrument is to measure, receive or transmit. Also, to adjust the output of a device, to bring it to a desired value, within a specified tolerance for a particular value of the input. Also, to ascertain the error in the output of a device by checking it against a standard.
Capacitor	An electronic component that stores electrical charge.
Capacity	The total number of ampere-hours (or watt-hours) that can be withdrawn from a cell/battery under specified conditions of discharge.
Carbon	Base of all hydrocarbons and is capable of combining with hydrogen in many proportions, resulting in numberless hydrocarbon compounds.
Carbon Dioxide	Colorless, odorless and slightly acid-tasting gas, consisting of one atom of carbon joined to two atoms of oxygen. C02. Produced by combustion or oxidation of materials containing carbon.
Carrier Gas	
Catalytic	The process of altering, accelerating or instigating a chemical reaction.
Cathode	An electrode through which current leaves any nonmetallic conductor. An electrolytic cathode is an electrode at which positive ions are discharged, or negative ions are formed, or at which other reducing reactions occur. The negative electrode of a galvanic cell; of an electrolytic capacitor.
C-Code	C language (IEC supported programming language)
CCU	See Dos CCU, WINCCU or PCCU.
CCV	See Closed Circuit Voltage.
Cd	Coefficient of Discharge factor.
CE	European Community Certification Bureau.
Cell	The basic electrochemical unit used to generate or store electrical energy.
Cenelec	European Committee for Electro-technical Standardization. Also known as the European Standards Organization.
Central Processing Unit	The central part of a computer system that performs operations on data. In a personal computer the CPU is typically a single microprocessor integrated circuit.

TERM	DEFINITION
Certification	The process of submitting equipment to specific tests to determine that the equipment meets the specifications or safety standards.
CFG	Configuration File. When saving new configuration files, the file is saved as a *.cfg file.
Characteristics	Detailed information pertaining to it's description. The XFC stores this information in the PROM chip. A feature or quality that makes somebody or something recognizable.
Charge	The conversion of electrical energy, provided in the form of a current from an external source, into chemical energy within a cell or battery.
Chip	Another name for integrated circuit or the piece of silicon on which semiconductors are created.
Chromatograph	An instrument used in chemical analysis, to determine the make-up of various substances, and often used to determine the Btu content of natural gas. Chromatography- A method of separating gas compounds by allowing it to seep through an adsorbent so that each compound is adsorbed in a separate layer.
CIM	Communication Interface Module. Totalflow's version is called TFIO Communication Interface Module.
Circuit	1. The complete path between two terminals over which one-way or two-way communications may be provided. 2. An electronic path between two or more points, capable of providing a number of channels. 3. A number of conductors connected together for the purpose of carrying an electrical current. 4. An electronic closed-loop path among two or more points used for signal transfer. 5. A number of electrical components, such as resistors, inductances, capacitors, transistors, and power sources connected together in one or more closed loops.
Circuit board	Sometimes abbreviated PCB. Printed circuit boards are also called cards. A thin plate on which chips and other electronic components are placed. They fall into the following categories: Motherboard: Typically, the mother board contains the CPU, memory and basic controllers for the system. Sometimes call the system board or main board. Expansion board: Any board that plugs into one of the computer's expansion slots, including controller boards, LAN cards, and video adapters. Daughter Card: Any board that attaches directly to another board. Controller board: A special type of expansion board that contains a controller for a peripheral device. Network Interface Card (NIC): An expansion board that enables a PC to be connected to a local-area network (LAN). Video Adapter: An expansion board that contains a controller for a graphics monitor.
Class 1, Division 1	Class 1 refers to the presence of hazardous gas. Division 1 refers to the conditions at the location: meaning that there is not sufficient airflow around the equipment to dissipate any gases that are accumulating in the vicinity. i.e. An enclosed space.
Class 1, Division 2	Class 1 refers to the presence of hazardous gas. Division 2 refers to the conditions at the location: meaning that there is sufficient airflow around the equipment to dissipate any gases that are accumulating in the vicinity.
Clock	The source(s) of timing signals for sequencing electronic events (e.g. synchronous data transfer).
Closed Circuit Voltage	The difference in potential between the terminals of a cell/battery when it is discharging (on- load condition).
CMOS	See Complimentary Metal-Oxide-Semiconductor.
CNG	See Compressed Natural Gas
Coil	A conductor wound in a series of turns.

TERM	DEFINITION
Cold Start	A rebooting technique which will clear all operational errors, loose all data files, but will not damage configuration files if stored on the SDRIVE.
Collector	The semiconductor region in a bipolar junction transistor through which a flow of charge carriers leaves the base region.
Comma Separated Values	These file types are importable records used by spreadsheet programs to display and manipulate data.
Communication Port	Comm. Port (abbreviation) refers to the host computer's physical communication's port being used to communicate with the equipment. Used by Totalflow when discussing local or remote communication with various equipment including the XFC, FCU, XRC, RTU and LevelMaster etc.
Complimentary Metal-Oxide-Semiconductor	Family of logic devices that uses p-type and n-type channel devices on the same integrated circuit. It has the advantage of offering medium speed and very low power requirements.
Component	(1) A small object or program that performs a specific function and is designed in such a way to easily operate with other components and applications. Increasingly, the term is being used interchangeably with applet. (2) A part of a device.
Compressed Natural Gas	Natural gas in high-pressure surface containers that is highly compressed (though not to the point of liquefaction). CNG is used extensively as a transportation fuel for automobiles, trucks and buses in some parts of the world. Small amounts of natural gas are also transported overland in high-pressure containers.
Compressibility	The property of a material which permits it to decrease in volume when subjected to an increase in pressure. In gas-measurement usage, the compressibility factor "Z" is the deviation from the ideal Boyle and Charles' law behavior. See SUPERCOMPRESSIBILITY FACTOR.
Compressibility Factor	See Supercompressibility Factor.
Concurrent	Performing more than one task at a time.
Configuration No.	The Configuration number is a 10 digit suffix of the serial number which defines the characteristics of the unit.
Console Mode	A local user interface typically used with custom applications that are not supported through any other mechanism. Also referred to as Printer Console Mode.
Contact	Current carrying part of a switch, relay or connector.
Conversion Time	The time required, in an analog input or output system, from the moment a channel is interrogated (such as with a read instruction) to the moment that accurate data is available. This could include switching time, settling time, acquisition time, A/D conversion time, etc.
Coprocessor	Another computer processor unit that operates in conjunction with the standard CPU. Can be used to enhance execution speed. For example, the 8087 is designed to perform floating point arithmetic.
Cosine	The sine of the complement of an arc or angle.
CPU	See Central Processing Unit.
CPUC	California Public Utilities Commission
CRC	See Cyclic Redundancy Check.
CRC	Cycling Redundancy Character
CSA	Canadian Standards Association. Canadian certification agency.
CTS	Communication abbreviation for Clear To Send.
Cubic Foot	The most common unit of measurement of gas volume in the US. It is the amount of gas required to fill a volume of one cubic foot under stated conditions of temperature, pressure, and water vapor.
Cubic Foot Metered	The quantity of gas that occupies one cubic foot under pressure and temperature conditions in the meter.

TERM	DEFINITION
Cubic Foot, Standard	That quantity of gas which under a pressure of 14.73 psia and at a temperature of 60 degrees occupies a volume of one cubic foot without adjustment for water vapor content.
Cumulative Capacity	The total number of ampere-hours (or watt hours) that can be withdrawn from a cell/battery under specified conditions of discharge over a predetermined number of cycles or the cycle life.
Current	Current is measured in amps (milliamps and microamps). It is the passage of electrons. Conventional current flows from positive to negative. Electrons flow from negative to positive - called "electron flow".
Cursor	Dots used to indicate the location of the next character or symbol to be entered.
Custody Transfer	The legal and commercial transfer of a commodity such as natural gas, LNG, etc. from one party to another.
Custody Transfer Transaction	The Custody Transfer Transaction is the hand-off of the physical commodity from one operator to another.
Cut-Off Voltage	The cell/battery voltage at which the discharge is terminated.
CV	Calorific Value. European value of heating content.
Cycle	One complete sequence of events. One complete alteration of an AC current or Volt. The discharge and subsequent charge of a rechargeable cell/battery is called a cycle.
Cycle Life	The number of cycles under specified conditions which were available from a rechargeable cell/battery before it fails to meet specified criteria as to performance.
Cyclic Redundancy Check	An ongoing verification of the validity of transmitted and received data providing assurance that the message conforms to a pre-agreed upon convention of communications.
D/A	See Digital-to-analog.
D/I	See Digital Input.
D/O	See Digital Output.
DAC	See Digital to Analog Converter.
Data Acquisition	Gathering information from sources such as sensors and AMUs in an accurate, timely and organized manner. Modern systems convert this information to digital data, which can be stored and processed by a computer.
Data Collect	Physically, locally or remotely, retrieving data stored with a Totalflow unit. This data is typically stored in records located in a data base format.
DB1	Acronym for Data Base 1. This refers to the previous data base structure used to store data in Totalflow products.
DB2	Acronym for Data Base 2. This refers to the current data base structure used to store data in Totalflow products.
DC	See Direct Current
DCD	Communication abbreviation for Data Carrier Detect
DCS/PLC	Distribution Control System/Programmable Logic Controller
DDE	See Digital Data Exchange. Also called Dynamic Data Exchange. May refer to Totalflow’s DDE Server TDS32.
Dead Weight Tester	Portable pressure tester used to check calibration and to calibrate AMU’s utilizing a system of calibrated weights.

TERM	DEFINITION
De-bounce	De-bouncing is any kind of hardware device or software that ensures that only a single signal will be acted upon for a single opening or closing of a contact. When you press a key on your computer keyboard, you expect a single contact to be recorded by your computer. In fact, however, there is an initial contact, a slight bounce or lightening up of the contact, then another contact as the bounce ends, yet another bounce back, and so forth. A similar effect takes place when a switch made using a metal contact is opened. The usual solution is a de-bouncing device or software that ensures that only one digital signal can be registered within the space of a given time (usually milliseconds)
Decibel	A logarithmic measure of the ratio of two signal levels. A practical unit of gain.
Decimal	A numbering system based on 10.
Default	A value assigned or an action taken automatically unless another is specified.
Delivery Point	Point at which gas leaves a transporter's system completing a sale or transportation service transaction between the pipeline company and a sale or transportation service customer.
Demand Day	That 24-hour period specified by a supplier-user contract for purposes of determining the purchaser's daily quantity of gas used (e.g., 8 AM to 8 AM, etc.). This term is primarily used in pipeline-distribution company agreements. It is similar to, and usually coincides with, the distribution company "Contract Day".
Demand Load	The rate of flow of gas required by a consumer or a group of consumers, often an average over a specified short time interval (cf/hr or Mcf/hr). Demand is the cause; load is the effect.
Demand Meters	A device which indicates or records the instantaneous, maximum or integrated (over a specified period) demand.
Demand, Average	The demand on a system or any of its parts over an interval of time, determined by dividing the total volume in therms by the number of units of time in the interval.
Desaturization	Doesn't cause the composition of the gas to change, enabling a more representative sample of gas.
Detector Bead	
DG	Display Group. When display group files are created
Diaphragm	A bellows inside a displacement type gas meter. Also, a membrane separating two different pressure areas within a control valve or regulator.
Differential Pressure	The pressure difference between two points in a system. For example, the difference in pressure between the upstream and downstream taps of an orifice plate, used to measure volume passing through the orifice.
Digital	A signal which has distinct states, either on or off (0 or 1). Digital computers process data as binary information having either true of false states.
Digital Data	Information transmitted in a coded form (from a computer), represented by discrete signal elements.
Digital Data Exchange or Dynamic Data Exchange	A Microsoft data exchange format generally used to transfer data from one program to another. It is a very simple format to use and Totalflow customers often use TDS to acquire data from Totalflow devices and then transfer the data to an Excel spreadsheet using DDE. The Totalflow Driver, TDS32, supports DDE and its network version, NetDDE.
Digital Electronics	The branch of electronics dealing with information in binary form.
Digital Input	Refers to the signal received in binary format.
Digital Output	Refers to the signal emitted in binary format.
Digital to Analog Conversion	The process of translating discrete data into a continuously varying signal. Common uses are to present the output of a digital computer as a graphic display or as a test stimulus.

TERM	DEFINITION
Digital-to-Analog Converter	An electronic device, often an integrated circuit, that converts a digital number into a corresponding analog voltage or current.
DIN	Deutsches Institut für Normung. German Institute for Standardization.
DIN Rail	Rail on which modules are mounted. Allows modules to snap on and slide right and left.
Diode	A semiconductor that allows current to flow in one direction only.
DIP Switches	A bank of switches typically used in setting the hardware configuration and base address of an option card.
Direct Current	A current that does not change in direction.
Direct Memory Access	A method by which information can be transferred from the computer memory to a device on the bus without using the processor.
Discharge	The conversion of chemical energy of a cell/battery into electrical energy and withdrawal of the electrical energy into a load.
Discharge Rate	The rate, usually expressed in amperes, at which electrical current is taken from the cell/battery.
Discrete Manifold	Also called Tubing Manifold. Used in instances when the XFC is not mounted directly on the Orifice, usually pipe mount or wall mount.
Distribution	The act or process of distributing gas from the city gas or plant that portion of utility plant used for the purpose of delivering gas from the city gate or plant to the consumers, or to expenses relating to the operating and maintenance of distribution plant.
Distribution Company	Gas Company which obtains the major portion of its gas operating revenues from the operation of a retail gas distribution system, and which operates no transmission system other than incidental connections within its own system or to the system of another company. For purposes of A.G.A. statistics, a distribution company obtains at least 90 percent of its gas operating revenues from sales to ultimate customers, and classifies at least 90 percent of mains (other than service pipe) as distribution. Compare INTEGRATED COMPANY; TRANSMISSION COMPANY, GAS.
DN	Inside diameter standard.
DOS	Disk Operating System.
DOS CCU	Refers to the DOS version of the Calibration and Collection Unit. Also known as FS/2, hand held or Dog Bone.
DOT Matrix	A group of dots/pixels forming a character or symbol, usually five dots across and seven dots down.
DOT/Pixel	An active element that forms a character or symbol when combined in a matrix.
Download	This refers to a Totalflow procedure in which any file(s) located on a laptop PC or storage device, may be copied to the on-board memory of a Totalflow Host device for purposes of restoring, configuration or repair.
Downstream	Any point in the direction of flow of a liquid or gas from the reference point. Compare UPSTREAM.
Downstream Pipeline	The pipeline receiving natural gas at a pipeline inter-connect point.
DP	See Differential Pressure.
DRAM	See Dynamic Random Access memory.
Driver (Hardware)	An electronic circuit that provides input to another electronic circuit.
Driver (Software)	A program that exercises a system or system component by simulating the activity of a higher level component.
Drivers	Software that controls a specific hardware device, such as interface boards, PLCs, RTUs, and other I/O devices.

TERM	DEFINITION
Droplet Liquids	Large liquid particles
Dry Contact	Contacts which neither break nor make a circuit. 0 Ohms.
DSP	Digital Signal Processor.
Dual-Access Memory	Memory that can be sequentially accessed by more than one controller or processor but not simultaneously accessed. Also known as shared memory.
Duplex	The ability to both send and receive data simultaneously over the same communications line.
DVI	The Port Manager and communication engine of the iVision SCADA System. This software can multiplex among several communication formats and thus supporting several vendor's equipment over a single radio frequency. It "pushes" new data to the iVision database, saving time and network resources by not transmitting redundant data. The DVI includes the Totalflow WinCPC code and thus supports all Totalflow software and functions – including WinCCU, TDS, PCCU, Report by exception, cryout, etc.
Dynamic Random Access memory	This is the most common form of computer memory It needs to be continually refreshed in order to properly hold data, thus the term "dynamic."
E^2Prom	See Electrically Erasable Programmable Read-Only Memory. Also called EEPROM.
Earth	Can mean a connection to the earth itself or the negative lead to the chassis or any point to zero voltage.
EC	European Community.
Edit	Making changes to information, data or configuration files.
EEPROM	See Electrically Erasable Programmable Read-Only Memory.
EFI	Electromechanical Frequency Interface.
EFM	See Electronic Flow Measurment.
EFR	Enhance Feature Release.
Electrically Erasable Programmable Read-Only Memory	ROM that can be erased with an electrical signal and reprogrammed. Also referred to as the S Drive. It is a persistent drive that will not loose it's memory unless manually reprogrammed. Also called E^2Prom. Totalflow's XFC and XRC have a Serial EEPROM on board, which generally holds registry, application configuration and warranty information (non-volatile).
Electrode	The site, area, or location at which electrochemical processes take place.
Electromagnetic Compatibility	IEEE Standards for Electromagnetic Compatibility.
Electromagnetic Interference	Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like.
Electronic Flow Measurment	Historically, flow measurment was tracked using a chart recording technology. Developments in the field of electronics allowed for electronic measurement devices to overtake the chart recording market. This field continues to develop into peripheral markets, making the "Flow Meter" a valuable asset with multi-tasking "Control" capabilities. Totalflow's answer to this developing market is the XSeries equipment.
EMC	See Electromagnetic Compatibility
EMI	See Electromagnetic Interference.
Emitter	One terminal of a transistor.
EN	Euro Norm (European Standard)
Enagas	Spain's Certification Board

TERM	DEFINITION
Encoder	A device that converts linear or rotary displacement into digital or pulse signals. The most popular type of encoder is the optical encoder, which uses a rotating disk with alternating opaque areas, a light source, and a photodetector.
Environmental Conditions	All conditions in which a transducer may be exposed during shipping, storage, handling, and operation.
EPROM	See Erasable Programmable Read-Only Memory.
Erasable Programmable Read-Only Memory	ROM that can be erased using Ultraviolet Light. The EPROM maybe re-programmed by removing the EPROM from the circuit and using special equipment to write to it.
Ethane (C2H6)	A colorless hydrocarbon gas of slight odor having a gross heating value of 1,773 Btu per cubic foot and a specific gravity of 1.0488. It is a normal constituent of natural gas.
Ethylene (C2H4)	A colorless hydrocarbon gas of slight odor having a gross heating value of 1,604 Btu per cubic foot and a specific gravity of 0.9740. It is usually present in manufactured gas, constituting one of its elements.
EU	European Union. Formerly known as the European Community (EC). Members of this union are replacing individual national regulations of member countries with a series of Directives. These Directives are legislative instruments which oblige member states to introduce them into their existing laws. These directives harmonize a variety of existing practices, preserve the different legal traditions and settle constraints for further developments.
Event	Important incident: an occurrence, especially one that is particularly significant.
Event File	Stored records specifying a notable change. The XFC stores up to 200 records, containing: Time, Day, Description, Old Value, New Value.
Events	Signals or interrupts generated by a device to notify another device of an asynchronous event. The contents of events are device-dependent.
Ex	Potential Explosive.
Exp Enclosure	Explosion Proof Enclosure for Class 1 Division 1 locations
Expansion Board	A plug-in circuit board that adds features or capabilities beyond those basic to a computer, such as a data acquisition system expansion board.
Expansion Slots	The spaces provided in a computer for expansion boards than enhance the basic operation of the computer.
Extended Binary Coded Decimal Interchange Code	EBCDIC. An eight-bit character code used primarily in IBM equipment. The code allows for 256 different bit patterns.
External Multivariable Transducer	Multivariable Transducer located outside of the Flow Computer enclosure. Used in multi-tube configurations and on systems where the actual Flow Computer is located at a distance from the flowing tube.
F.O.B.	Abbreviation of free on board with the cost of delivery to a port and loading onto a ship included.
Fa	Orifice Thermal Expansion factor.
Faux	Full Well Stream Factor.
Fb	Basic Orifice factor.
FBD	Function Block Diagram (IEC supported programming language)
FCC	Federal Communications Commission.
FCU	Flow computer unit
Feed Points	Connections between gas feeder lines and distribution networks.
Feedback	Occurs when some or all of the output of the device (such as an amplifier) is taken back to the input. This may be accidental (such as the acoustic feedback from a speaker to microphone) or intentional , to reduce distortion.

TERM	DEFINITION
Feeder (Main)	A gas main or supply line that delivers gas from a city gate station or other source of supply to the distribution networks.
FET	Field-effect transistor. Transistor with electric field controlling output: a transistor, with three or more electrodes, in which the output current is controlled by a variable electric field.
Fg	Specific Gravity factor.
Field Pressure	The pressure of natural gas as it is found in the underground formations from which it is produced.
Film Liquids	Aerosols liquids who have contacted each other and become adhered to the inside of the pipeline.
Firmware	A computer program or software stored permanently in PROM or ROM or semi-permanently in EPROM.
Firmware Version	This refers to the version of firmware contained in the equipment.
Fixed-Point	A format for processing or storing numbers as digital integers.
Flange	For pipe, a metal collar drilled with bolt holes and attached to the pipe with its flat surface at right angles to the pipe axis so that it can be securely bolted to a mating flange on a valve, another pipe section, etc.
FLASH	Re-programmable memory onboard an XFC/XRC, similar to an EPROM, except that it can be programmed while in circuit using a Boot Loader Program to write to it. Generally used for the operating system and application code space (non-volatile).
Flash ADC	An Analog to Digital Converter whose output code is determined in a single step by a bank of comparators and encoding logic.
Flow Computer, X Series	A device placed on location to measure SP, DP and temperature (to calculate flow) of gases or liquids being transferred, for remote unattended operation.
Flow Formulas	In the gas industry, formulas used to determine gas flow rates or pressure drops in pipelines, regulators, valves, meters, etc.
Font	The style of lettering used to display information.
Footprint	The surface space required for an object.
Fpb	Pressure Base factor.
Fpv	See Supercompressibility Factor.
Fr	Reynolds Number factor.
Frequency	The number of cycles per second for any periodic waveform - measured in cycles per second - now called Hertz.
Frequency Modulation	Modulation where the frequency of the sinewave carrier alters with the amplitude of the modulating signal.
FRP	Fiberglass Reinforced Polyurethane. A non-flexible material used for LevelMaster sensors.
FS/2	Ruggadized handheld computer device for programming and collecting data from an XFC. Also referred to a Husky or Dog Bone.
Ftb	Temperature Base factor.
Ftf	Flowing Temperature factor.
Full Duplex	Simultaneous, two-way (transmit and receive), transmission.
Function	A set of software instructions executed by a single line of code that may have input and/or output parameters and returns a value when executed.
Fuse	A short length of wire that will easily burn out when excessive current flows.
Fw	Water Vapor factor.
G	The symbol used for giga or gigabyte.

TERM	DEFINITION
Gain	The factor by which a signal is amplified, sometimes expressed in dB.
Gain Accuracy	A measure of deviation of the gain of an amplifier from the ideal gain.
Gas	That state of matter which has neither independent shape nor volume. It expands to fill the entire container in which it is held. It is one of the three forms of matter, the other two being solid and liquid.
Gas Chromatograph	An analytical instrument that separates mixtures of gas into identifiable components by means of chromatography.
Gas Chromatograph Module	Software module used in conjunction with PCCU32 and WINCCU to interact with Btu Chromatograph equipment and software.
Gas Chromatograph Module Coefficient	A co-efficient generated by the factory allowing user to start calibration on location without having a calibration gas available.
Gas Field	A district or area from which natural gas is produced.
Gas, Associated	Gas produced in association with oil, or from a gas cap overlying and in contact with the crude oil in the reservoir. In general, most states restrict associated gas production since its indiscriminate production could reduce the ultimate oil recovery. Also, since some wells producing associated gas cannot be shut-in without also shutting-in the oil production, natural gas pipelines are generally required to take associated gas produced from oil wells on a priority basis.
Gas, C1	Methane.
Gas, C2	Ethane.
Gas, C3	Propane.
Gas, C6+	Hexanes Plus (C6, C7, C8, C9, C10, C11, etc.).
Gas, CO2	Carbon Dioxide.
Gas, Dry	Gas whose water content has been reduced by a dehydration process. Gas containing little or no hydrocarbons commercially recoverable as liquid product. Specified small quantities of liquids are permitted by varying statutory definitions in certain states.
Gas, IC4	Iso-Butane.
Gas, IC5	Iso-Pentane.
Gas, Liquefied Petroleum (LPG)	A gas containing certain specific hydrocarbons which are gaseous under normal atmospheric conditions but can be liquefied under moderate pressure at normal temperatures. Propane and butane are the principal examples.
Gas, Low Btu	Gas with a heating value of less than 250 Btu's per cubic foot. Typically heating values fall between 120 and 180 Btu's per cubic foot.
Gas, Manufactured	A gas obtained by destructive distillation of coal, or by the thermal decomposition of oil, or by the reaction of steam passing through a bed of heated coal or coke, or catalyst beds. Examples are coal gases, coke oven gases, producer gas, blast furnace gas, blue (water) gas, and carbureted water gas. Btu content varies widely.
Gas, Natural	A naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in porous geologic formations beneath the earth's surface, often in association with petroleum. The principal constituent is methane.
Gas, NC4	Normal Butane.
Gas, NC5	Normal Pentane.
Gas, NeoC5	Neo-Pentane.
Gas, Non-associated	Free natural gas not in contact with, nor dissolved in, crude oil in the reservoir.
Gas, Oil	A gas resulting from the thermal decomposition of petroleum oils, composed mainly of volatile hydrocarbons and hydrogen. The true heating value of oil gas may vary between 800 and 1600 Btu per cubic foot depending on operating conditions and feedstock properties.

TERM	DEFINITION
Gas, Sour	Gas found in its natural state, containing such amounts of compounds of sulfur as to make it impractical to use, without purifying, because of its corrosive effect on piping and equipment.
Gas, Sweet	Gas found in its natural state, containing such small amounts of compounds of sulfur that it can be used without purifying, with no deleterious effect on piping and equipment.
Gas, Unconventional	Gas that can not be economically produced using current technology.
Gas, Wet	Wet natural gas is unprocessed natural gas or partially processed natural gas produced from strata containing condensable hydrocarbons. The term is subject to varying legal definitions as specified by certain state statutes.
Gate Station	Generally a location at which gas changes ownership, from one party to another, neither of which is the ultimate consumer. It should be noted, however, that the gas may change from one system to another at this point without changing ownership. Also referred to as city gate station, town border station, or delivery point.
Gathering	The act of operating extensive low-pressure gas lines which aggregate the production of several separate gas wells into one larger receipt point into an interstate pipeline.
Gathering Agreement	Agreement between a producer and a gathering system operator specifying the terms and conditions for entry of the producer's gas into the gathering system.
Gathering Line	A pipeline, usually of small diameter, used in gathering gas from the field to a central point.
Gathering Station	A compressor station at which gas is gathered from wells by means of suction because pressure is not sufficient to produce the desired rate of flow into a transmission or distribution system.
Gathering System	The gathering pipelines plus any pumps, tanks, or additional equipment used to move oil or gas from the wellhead to the main pipeline for delivery to a processing facility or consumer.
Gauge, Pressure	Instrument for measuring the relative pressure of a fluid. Types include gauge, absolute, and differential.
Gauging Tape Measurements	This refers to a manual method of measuring the level of a liquid in a tank. These measurements may be used to calibrate float levels.
GC	See Gas Chromatograph.
GCM	See Gas Chromatograph Module
GCMC	See Gas Chromatograph Module Coefficient.
GCN	Gravity, Carbon Dioxide and Nitrogen compounds. Used in NX-19 GCN Supercompressibility Factor.
GCNM	Gravity, Carbon Dioxide, Nitrogen and Methane compounds. Used in NX-19 GCNM Supercompressibility Factor.
GDF	Gasde of France
GND	See Ground.
GOST	Russian Certification
GPA 2145	Gas Processors Association standard for values of gas components.
GPM	Gallons of liquid per million cubic feet.
GPS 2261	See Gas Processors Standard 2261.
GRD	See Ground.
Ground	1) An electronically neutral circuit having the same potential as the surrounding earth. Normally, a non-current carrying circuit intended for the safety purposes. A reference point for an electrical system. 2) A large conducting body (as the earth) used as a common return for an electric circuit and as an arbitrary zero of potential.

TERM	DEFINITION
Grounding Strap	A grounding strap is a conductive device used to make connection between the person handling the board, and a high quality ground potential.
Half Duplex	Communication transmission in one direction at a time.
Handshaking	Exchange of predetermined signals between two devices establishing a connection. Usually part of a communications protocol.
Hardware	The physical components of a computer system, such as the circuit boards, plug-in boards, chassis, enclosures, peripherals, cables, and so on. It does not include data or computer programs.
Harmonic	A sinusoidal component of a waveform that is a whole multiple of the fundamental frequency. An oscillation that is an integral sub-multiple of the fundamental is called a sub-harmonic.
HART	Communication Interface.
Hazardous Area Classification	Any area likely to have an explosive combination of oxygen and fuel.
Heating Value	The amount of heat developed by the complete combustion of a unit quantity of a material.
Heavy Hydrocarbons	More subseptable to increases in temperature and decreases in pressure, thus causing liquids to form.
Hertz	Cycles per second. A measure of frequency or bandwidth.
Hexadecimal	A numbering system to the base 16, 0 through F.
Hexanes	A saturated hydrocarbon (alkane) with two carbon atoms in it's molecule (C_2H_6). A liquid under normal conditions.
Hierarchical	A method of organizing computer programs with a series of levels, each with further subdivisions, as in a pyramid or tree structure.
High Btu Gas	A term used to designate fuel gases having heating values of pipeline specification, i.e., greater than about 900 Btu's per standard cubic foot.
Host Console	Host Console via Local Port uses the PCCU cable between the computer and the device's Local PCCU port but running Remote Protocol. Host Console via Remote Port uses the remote protocol
Hub	A market or supply area pooling/delivery where gas supply transaction point occur that serve to facilitate the movement of gas between and among interstate pipelines. Transactions can include a change in title, a change in transporter, or other similar items.
HV	See Heating Value.
Hydrocarbon	A chemical compound composed solely of carbon and hydrogen. The compounds having a small number of carbon and hydrogen atoms in their molecules are usually gaseous; those with a larger number of atoms are liquid, and the compounds with the largest number of atoms are solid.
Hyperterm	Terminal emulation program provided with Windows.
Hysteresis	The maximum difference between output readings for the same measured point, one point obtained while increasing from zero and the other while decreasing from full scale. The points are taken on the same continuous cycle. The deviation is expressed as a percent of full scale.
I/O	See Input/Output.
I/O Address	A method that allows the CPU to distinguish between the different boards in a system. All boards must have different addresses.
I^2C	Serial communications channel to I/O modules (developed by Phillips Semiconductor)
IAR	Maker and distributor of the Embedded Workbench, a compiler, assembler, linker development system for the Z80/64180 microprocessor family.

TERM	DEFINITION
IC	See Integrated Circuit
ID	Identification Number. You must assign an ID to the unit. Units are communicated to by this ID number, therefore the ID assigned in the software must agree with the hardware.
IEC	International Electro-technical Commission. Developers of the IEC-61131-3 standard. Programming Language used by Totalflow for user applications in X Series equipment.
IEEE	Institute of Electrical and Electronics Engineers
IL	Instruction List (IEC supported programming language)
IMV	See Integral Multivariable Transducer.
Inch of Mercury	A pressure unit representing the pressure required to support a column of mercury one inch high at a specified temperature; 2.036 inches of mercury (at 32 degrees F and standard gravity of 32.174 ft/sec2) is equal to a gauge pressure of one pound per square inch.
Inch of Water	A pressure unit representing the pressure required to support a column of water one inch high. Usually reported as inches W.C. (water column) at a specified temperature; 27.707 inches of water (at 60o and standard gravity of 32.174 ft/sec2) is equal to a gauge pressure of one pound per square inch.
Industry Canada	Canadian Certification.
Inert	A material not acted upon chemically by the surrounding environment. Nitrogen and carbon dioxide are examples of inert constituents of natural gases; they dilute the gas and do not burn, and thus add no heating value.
Initialization File	Generic file used to support the display of Totalflow application data in PCCU32.
Input	That part of a circuit that accepts a signal for processing.
Input Sense	To examine or determine the status of the input.
Input/Output	The transfer of data to/from a computer system involving communications channels, operator interface devices, and/or data acquisition and control interfaces.
Instantiate	Starting an instance of an object.
Instrument Manifold	Manifold type used when XFC is mounted directly on the Orifice.
Insulator	Any material that resists the flow of electrical current.
Integral Multivariable Transducer	A Multivariable Transducer that is a part of the flow computer enclosure. Also see Multivariable Transducer.
Integrated Circuit	A circuit component consisting of a piece of semiconductor material containing up to thousands of transistor and diodes. A chip.
Integrating ADC	An ADC whose output code represents the average value of the input voltage over a given time interval.
Interface (computer)	Usually refers to the hardware that provides communication between various items of equipment.
Interface (liquid)	The area between two liquids that are not easily mixed, i.e. oil and water.
Interference	A disturbance to the signal in any communications system.
Inverter	A circuit in both analogue and digital systems that provides an output that is inverse to the input.
Inverter, DC to AC	Converts DC to AC at a high frequency.
ioINT	Interrupt signal from the I/O modules.
ioVBB	i/o Battery Voltage- Unregulated 13.8 volts. Host supplies 2.5 amps to the I/O modules.
ioVDD	Unregulated 5.6 volts from the host for I/O modules.
ISO	International Standards Organization.

TERM	DEFINITION
Isobutane (C_4H_{10})	A hydrocarbon of the same chemical formula as butane but different molecular structure, resulting in different physical properties, notably lower boiling point. Gross heating value 3261 Btu/cu. ft. gas.
Isokenetic Sampling	Laboratory technique where gas sample is tested after removing liquids, therefore not allowing the atomized liquid to to return to the gaseous state, changing the sample accuracy.
IVision	SCADA system designed for oil and gas applications
Joule-Thompson Effect	Created by reducing the gas pressure by constriction, causing the gas to cool, creating condensation.
K	Kilo. 1) In referring to computers, a "kilo" is 1024 or 2 to the 10th power (Note that it is actually slightly more than an even 1000.). 2) the standard metric prefix for 1,000, or 10^3, used with units of measure such as volts, hertz, and meters.
kbytes/s	A unit for data transfer that means 1,000 or 10^3 bytes/s.
Kerosene	An oily liquid obtained in the distilling of gasoline in a temperature range from 174-288 degree C. A hydrocarbon of specific gravity of 0.747 to 0.775. Used as fuel for some internal combustion engines, heating equipment, and illuminating purposes. A heavy grade known as range oil is used for cooking and heating.
KHz	Electronic abbreviation for Kilohertz.
Kilobyte	1024 bytes.
Kilowatt-hour kWh	A unit of energy when one kilowatt of power is expended for one hour. Example A radiator bar is usually rated at 1,000 watts and this switched on for one hour consumes one kilowatt-hour of electricity.
KPa	Kilopascal-Measure of Pressure
LACT	Lease Automatic Custody Transfer.
Latent Heat of Vaporization	Represents the amount of heat required to vaporize a liquid. In the instance of natural gas, the equation appears: 1 Btu = heat to change. This is the most likely scenario for causing gas to liquefy.
LCD	Liquid Crystal Display.
LD	Ladder Diagram (IEC supported programming language)
LED	Light Emitting Diodes.
LevelMaster	Intelligent Digital Level Sensor and is designed for custody transfer accuracy in demanding level measurement applications in tanks. LevelMaster is the name of the Totalflow's Tank Gauging System.
Life	For rechargeable batteries, the duration of satisfactory performance, measured in years (float life) or in the number of charge/discharge cycles (cycle life).
Light Hydrocarbons	More volitile.
Linearity	The maximum deviation of the calibration curve from a straight line between zero and full scale, expressed as a percent of full scale output and measured on increasing measurement only.
Liquefied Natural Gas	Natural gas which has been liquefied by reducing its temperature to minus 260 degrees Fahrenheit at atmospheric pressure. It remains a liquid at -116 degrees Fahrenheit and 673 psig. In volume, it occupies 1/600 of that of the vapor at standard conditions.
Liquefied Petroleum Gas	A gas containing certain specific hydrocarbons which are gaseous under normal atmospheric conditions, but can be liquefied under moderate pressure at normal temperatures. Propane and butane are the principal examples.
Liquid Crystal Display	A reflective display that requires very low power for operation.
Liquids, Natural Gas	Those liquid hydrocarbon mixtures which are gaseous at reservoir temperatures and pressures but are recoverable by condensation or absorption. Natural gasoline and liquefied petroleum gases fall in this category.

TERM	DEFINITION
Load (electrical)	A load is an energy consuming device. The device can be an actual device such as a bulb of a flash light, radio, cassette player, motor, etc., a resistor or a constant current load.
Load (units)	The amount of gas delivered or required at any specified point or points on a system; load originates primarily at the gas consuming equipment of the customers. Also, to load a pressure regulator is to set the regulator to maintain a given pressure as the rate of gas flow through the regulator varies. Compare DEMAND.
Location File	This is a file containing the configuration of the Location or site and the LevelMasters assigned to the Location. You may have a file that contains everything or a file for each Location name. The information from the file is displayed on the main MasterLink screen in the form of a tree structure. See the Main Screen topic for more information.
Location Name	Location Name is the top of the hierarchy tree of a Location File. Included in the Location Name is the LevelMaster's name, ID, S/N, Sensor File and Configuration no.
Log Period	In a XFC, the specified length between writing the calculated accumulated volume to record. You may record volumes as often as every minute and as seldom as every hour. More frequent recording reduces the number of days of records possible between collection.
Long Term	For Totalflow's purpose, the application of this term refers to storing data over a period of time that is greater than a minimal time. Such as data collected weekly versus data collected weekly but stored indefinitely.
LSB	Least Significant Byte
M	Mega, the prefix for 1,048,576, or 2^{20}, when used with byte to quantify data or computer memory. Also 1000, as in MCF or 1000 Cubic Ft.
Manifold	The conduit of an appliance which supplies gas to the individual burners. Also, a pipe to which two or more outlet pipes are connected.
Man-Machine Interface	Software program that converts machine instructions and commands into a user interface.
MasterLink	MasterLink is the name of the software program used to communicate with the LevelMaster for purposes of doing setup, calibration, troubleshooting, generating site files, monitoring levels and collecting data.
Mbytes/s	A unit for data transfer that means 1 million or 10^6 bytes/s.
Mcf	The quantity of natural gas occupying a volume of 1000 cubic feet at a temperature of 60° Fahrenheit and at a pressure of 14.73 psia.
Measurement Unit Assembly	µFLO's measurement and operational features are housed in this single unit assembly. The main electronic board (µFLO-195 Board), communication connection, power, SP, DP and Temperature readings are all housed in this unit.
Mega	Multiplier indicating that a quantity should be multiplied by 1,000,000.
Memory	Electronic devices that enable a computer to store and recall information. In its broadest sense, memory refers to any hardware capable of serving that end, e.g., disk, tape, or semiconductor storage.
Menu	The list of available functions for selection by the operator, usually displayed on the computer screen once a program has been entered.
MEPAFLOW	SICK Engineering's Menu-based Measurement and Parameterization Software for the TotalSonic system (MMI).
Meter Manifold	Gas piping between gas service line and meter. Also, gas piping supplying two or more meters.
Meter, Orifice	A meter using the differential pressure across an orifice plate as a basis for determining volume flowing through the meter. Ordinarily, the differential pressure is charted.

TERM	DEFINITION
Meter, PD	See Meter, Positive Displacement.
Meter, Positive Displacement	An instrument which measures volume on the basis of filling and discharging gas in a chamber.
Meter, Turbine	1) Pulse meter. 2)A velocity measuring device in which the flow is parallel to the rotor axis and the speed of rotation is proportional to the rate of flow. The volume of gas measured is determined by the revolutions of the rotor and converting them to a continuously totalized volumetric reading.
Methane (CH4)	A hydrocarbon (alkane)with the lightest molecule. A gas under normal conditions. The first of the paraffin series of hydrocarbons. The chief constituent of natural gas. Pure methane has a heating value of 1012 Btu per cubic foot.
Micro Flow Computer	See μFLO.
Microprocessor	This term is commonly used to describe the CPU. More specifically, it refers to the part of the CPU that actually does the work, since many CPUs now contain L1 and L2 caches on-chip.
Milli	One thousandth e.g. one milli-watt - 1mW. one milli-amp - 1mA. one milli-volt -1mV.
MIPS	Million instructions per second. The unit for expressing the speed of processor machine code instructions.
MMBtu	A thermal unit of energy equal to 1,000,000 Btu’s, that is, the equivalent of 1,000 cubic feet of gas having a heating content of 1,000 BTUs per cubic foot, as provided by contract measurement terms.
MMcf	A million cubic feet. See CUBIC FOOT. (1,000,000 CF)
MMI	See Man-Machine Interface.
Modbus	Messaging structure developed and used to establish master-slave/client-server communication between intelligent devices. Generic protocol supported by most process automation vendors.
Modem	Modulator-Demodulator. A device used to convert serial digital data from a transmitting terminal to a signal suitable for transmission over a common carrier, or to reconvert the transmitted signal to digital data for acceptance by a receiving terminal.
Module	Typically a board assembly and its associated mechanical parts, front panel, optional shields, and so on. A module contains everything required to occupy one or more slots in a mainframe.
Mole Percent	
MRB	Modbus Request Block. When requesting storage space after adding a new Modbus application, the file is saved as a *.mrb file.
MRM	Modbus Register Map. When requesting storage space after adding a new Modbus register, the file is saved as a *.mrm file.
MS	Milliseconds. One-thousandth of a second.
MSB	Most Significant Byte
Multi-tasking	A property of an operating system in which several processes can be run simultaneously.
Multi-tube Sites	Locations where many flow tubes are all within a prescribed distance allowing one flow meter with multitube capabilities, such as the XSeries product line, to monitor and maintain flow records for each tube in one Flow Computer.

TERM	DEFINITION
Multivariable Transducer	Transducer supplying more than 1 variable. Totalflow uses this term to encompass units that read Static Pressure, Differential Pressure and Temperature. Historically these units were coined AMU for Analog Measurement Unit. As a result of advanced technology, the unit no longer functions as only an analog measurement unit. Therefore the newer terminology, Multivariable Transducer, more aptly describes the functionality of this design. The abbreviation MVX, refers to the External version of the multivariable. The abbreviation IMV refers to the Integral version of the multivariable.
MV	Acronym for Molecular Weight.
MV	See Multivariable Transducer.
MVX	See Multivariable Transducer.
N.C.	See Normally Closed.
N.O.	See Normally Open.
N2	Nitrogen
NAK	See Negative Acknowledgement
NAMUR	Normenarbeitsgemeinschaft für Mess- und Regeltechnik in der chemischen Industrie (Standards study group for measurement and process control technology in the chemical industry).
Natural Gas Distillate	Material removed from natural gas at the "heavy end" portion; that is, aliphatic compounds ranging from C4 to C8 (butanes and heavier).
Natural Gas Liquids	The hydrocarbon components: propane, butanes, and pentanes (also referred to as condensate), or a combination of them that are subject to recovery from raw gas liquids by processing in field separators, scrubbers, gas processing and reprocessing plants, or cycling plants. The propane and butane components are often referred to as liquefied petroleum gases or LPG.
Negative Acknowledgment	This refers to a response over a remote communication device, such as a PING. Basically, saying, "I don’t acknowledge your request!" This is the opposite of ACK. NAK is a slang term that means that you disagree or do not acknowledge something.
NEMA	National Electrical Manufacturers Association.
Newton Meter	Torque measurement unit equal to 8.84 Inch Pounds.
Nm	Abbreviation for Newton Meter. Metric Torque measurement.
Noise	An undesirable electrical signal. Noise comes from external sources such as the AC power line, motors, generators, transformers, fluorescent lights, soldering irons, CRT displays, computers, electrical storms, welders, radio transmitters, and internal sources such as semiconductors, resistors, and capacitors. Unwanted disturbances superimposed upon a useful signal that tends to obscure its information content.
Non-Persistent	Refers to data that is no longer available after a Warm Start.
Normally Closed	Designation which states that the contacts of a switch or relay are closed or connected when at rest. When activated, the contacts open or separated.
Normally Open	Designation which states that the contacts of a switch or relay are normally open or not connected. When activated the contacts close or become connected.
Norsok	Norwegian Certification Bureau
NPN	Negative-Positive-Negative (Transisitor).
NPT	National Pipe Thread.
NRTL	Nationally Recognized Testing Laboratory.
NX-19	American Gas Association Report referring to a specific method to calculate the Supercompressibility factor.
OCV	See Open Circuit Voltage.

TERM	DEFINITION
ODBC	See Open Database Connectivity.
OHM	The unit of resistance usually shown as the symbol "R". One thousand ohms is written "k" and one million ohms is written "M". Resistance is measured with a multimeter, set to the "ohms range".
OLE	Object Linking and Embedding. A set of system services that provides a means for applications to interact and interoperate. Based on the underlying Component Object Model, OLE is object-enabling system software. Through OLE Automation, an application can dynamically identify and use the services of other applications, to build powerful solutions using packaged software. OLE also makes it possible to create compound documents consisting of multiple sources of information from different applications.
Ole for Process Control	This is a data interchange format and supporting software. Typically, vendors (such as ABB) write OPC server drivers which can talk to their devices. SCADA system vendors (again like ABB) write OPC clients that can gather data from OPC Servers. The idea is to provide a universal way to collect data into a SCADA system regardless of the equipment vendor. This standard was developed and is maintained by the OPC Foundation. The Totalflow Driver, TDS32, supports OPC.
Ole for Process Control Database	A programming interface to databases. IVision supports the OLEDB interface.
OLEDB	See Ole for Process Control Database.
OOP	Object-Oriented Programming. The XFC/XRC architecture incorporates an object-oriented approach.
OPC	See Ole for Process Control.
Open Circuit	A complete break in a metal conductor path.
Open Circuit Voltage	The difference in potential between the terminals of a cell/battery when the circuit is open (no-load condition).
Open Collector	A single NPN transistor with the base connected to the logic driving circuitry and with the emitter grounded. The collector is the output pin of the gate.
Open Database Connectivity	A widely accepted application-programming interface (API) for database access. It is based on the Call-Level Interface (CLI) specifications from X/Open and ISO/IEC for database APIs and uses Structured Query Language (SQL) as its database access language. Using ODBC, you can create database applications with access to any database for which your end-user has an ODBC driver. This allows access for authorized users to databases over any network, including the Internet. The iVision SCADA system provides an ODBC driver, making the database accessible to authorized users anywhere on a corporate network, or even over the Internet if the network is properly configured.
Operating System	Base-level software that controls a computer, runs programs, interacts with users, and communicates with installed hardware or peripheral devices.
Orifice Meter	Device to record differential pressure measurement which uses a steel plate with a calibrated hole or orifice to generate a drop in pressure between the two sides of the plate. Also the primary element of the meter run.
Orifice Plate	A plate of non-corrosive material which can be fastened between flanges or in a special fitting perpendicular to the axis of flow and having a concentric circular hole. The primary use is for the measurement of gas flow.
ORing	Boolean algebra logical function. Described as the addition or summing of switches or inputs, in the case of boolean elements, the 0 and 1 represent two possible states of a premis or hypothesis: True or False, On or Off. When adding boolean elements not real numbers, you will find these results: 1 or 1 = 1 1 or 0 = 1 0 or 1 = 1 0 or 0 = 0

TERM	DEFINITION
O-Ring	A flat ring made of rubber or plastic, used as a gasket.
Output	That part of a circuit where the processed signal is available.
P/I	See Pulse Input.
Parameter	(1) Characteristic. For example, *specifying parameters* means defining the characteristics of something. In general, parameters are used to customize a program. For example, file names, page lengths, and font specifications could all be considered parameters. (2) In programming, the term *parameter* is synonymous with argument, a value that is passed to a routine.
Passive Analog Output	Analog Output to a host that is powered by an outside source.
PCCU	Portable Collection and Calibration Unit.
PCCU32	Windows version of PCCU communications software to process, archive and collect data from the Totalflow equipment. Generally run from a laptop.
Peak Area	
Peak High	
Pentane (C5H12)	A saturated hydrocarbon (alkane) with five carbon atoms in it's molecule (C_5H_{12}). A liquid under normal conditions.
Peripheral	The input/output and data storage devices attached to a computer such as disk drives, printers, keyboards, displays, data acquisition systems, etc.
Persistent	Refers to data that remains available after a Warm Start.
PEX	A flexible material used for LevelMaster sensors.
PID	See Proportional, Integral, Derivative.
Piezoceramic	A ceramic material that has piezoelectric properties similar to those of some natural crystals.
PLC	See Programmable logic controller
Plunger Lift	A technique used to optimize gas production. A Steel plunger is inserted into the production tubing in the well. The flow is turned off and this shut-in causes plunger to fall allowing fluid to collect above plunger. Different techniques are used to decide how long to shut in and flow the well.
Polling	A snapshot view of the readings taken by the Totalflow equipment.
Porportional, Integral, Derivative	PID Controllers are designed to eliminate the need for continuous operator attention. An example would be the cruise control in a car or a house thermostat. These controllers are used to automatically adjust some variable to hold the measurement (or process variable) at the set-point. The set-point is where you would like the measurement to be. Error is defined as the difference between set-point and measurement.
Port	A communications connection on a computer or a remote controller. A place of access to a device or network, used for input/output of digital and analog signals.
Positive Temperature Co-efficient fuse	Opens circuit when high current condition occurs. Closes when condition no longer exists. Replaces typical fuses, which require replacement when blown.
POU	Program Organization Unit. This is Softing's term for an 'independent programming unit'. Programs, functions, etc.
Pressure Differential	Difference in pressure between any two points in a continuous system.
Pressure Markers	Pressure testing at different levels of pressure. Used for comparison purposes.
Pressure, Absolute	See PSIA.
Pressure, Atmospheric	See Atmospheric Pressure.

TERM	DEFINITION
Pressure, Gas	In the natural gas industry pressure is measured by the force applied to a designated area. PSI and OSI refer to how much pressure (pound or ounce) is applied to one square inch. Inches Water Column (In.W.C.) is also used to express gas pressure and is measured using a manometer for lower pressure readings. 1 PSIG=27.21 Inches Water Column.
Pressure, Gauge	See PSIG.
Primary Cell (or Battery)	A cell or battery which is not intended to be recharged and is discarded when the cell or battery has delivered all its electrical energy.
PRM	Acronym for Pressure Regulator Module.
Process Gas	Gas use for which alternate fuels are not technically feasible, such as in applications requiring precise temperature controls and precise flame characteristics.
Programmable Logic Controller	A highly reliable special-purpose computer used in industrial monitoring and control applications. PLCs typically have proprietary programming and networking protocols, and special-purpose digital and analog I/O ports.
Programmable Read Only Memory	Computer memory in which data can be written to. ROM is used for storing programs (e.g. operating systems) and characteristic files on a permanent basis. (non-volatile)
Programmed I/O	The standard method a CPU uses to access an I/O device-- each byte of data is read or written by the CPU.
PROM	See Programmable Read Only Memory
Propane (C3H8)	A saturated hydrocarbon (alkane) gas, the molecule of which is composed of three carbon and eight hydrogen atoms. Propane is present in most natural gas and is the first product refined from crude petroleum. It has many industrial uses and may be used for heating and lighting. Contains approximately 2,500 Btu per cubic foot.
Protocol	A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.
PSI	Pounds per Square Inch.
PSIA	Pounds per Square Inch Absolute. Absolute pressure uses a perfect vacuum as the zero point. A perfect vacuum is 0 PSIA. PSIA=PSIG + Atmospheric Pressure.
PSIG	Pounds per Square Inch Gauge. Gauge pressure uses the actual atmospheric pressure as the zero point.
PTB	Physikalisch Technische Bundesanstalt (Federal Physical Technical Office) or Technical Institute for Certification.
PTC	See Positive Temperature Co-efficient Fuse.
Pulse Input	Any digital input to a meter (usually a turbine) that is used to measure pulses over a time period. This calculates volume and flow rate for each period of time.
Pulse Mode	An operational mode used by the LevelMaster for measuring single float levels by transmitting a pulse to the primary windings, reading the voltage level on both the primary and secondary windings and using a calculation whereby one is subtracted from another to determine the single fluid level.
Pulse Output	Any digital output that is used to measure pulses over a period of time. Frequency of Pulses in a predetermined time frame represents a value to be used in calculating volume and flow rate.
Radio Frequency	RF for short. That part of the spectrum from approx. 50kHz to gigahertz.
Radio Frequency Interference	Electromagnetic radiation which is emitted by electrical circuits carrying rapidly changing signals, as a by-product of their normal operation, and which causes unwanted signals (interference or noise) to be induced in other circuits.
RAM	See Random Access Memory.

TERM	DEFINITION
RAM Disk	A lithium backed storage chip. Also see Random Access Memory.
Random Access Memory	Onboard read/write volatile memory, generally used for application variables and the file system. Data stored is lost if power is removed (volatile).
Rated Capacity	The number of ampere-hours a cell/battery can deliver under specific conditions (rate of discharge, cut-off voltage, temperature).
RBUS	Communication abbreviation for Results Bus.
RCV	Communication abbreviation for Received.
RD	Acronym for Relative Density.
RDrive	Refers to Totalflow's SRam Drive (solid state memory chip) located on the main board, used to store data and configuration files. The RDrive is a lithium backed, volatile memory chip and is not affected by a warm start.
Read Only Memory	Computer memory in which data can be routinely read but written to only once using special means when the ROM is manufactured. ROM is used for storing data or programs (e.g. operating systems) on a permanent basis.
Real Time	Data acted upon immediately instead of being accumulated and processed at a later time.
Real Time Data Base	The iVision SCADA system has an in-memory RTDB for the data it collects from various devices. Real-time generally means that the data is acquired often enough that the user can make operational changes to the process while it is still useful to do so. On a factory floor, this can be in milliseconds. For remote devices which may require a couple of hours of drive time to reach, real-time can be thought of in tens of minutes or even hours. The iVision data base can meet either of these requirements.
Real Time Operating System	Any operating system where interrupts are guaranteed to be handled within a certain specified maximum time, thereby making it suitable for control of hardware in embedded systems and other time-critical applications. RTOS is not a specific product but a class of operating system.
Recharge/Charge	The conversion of electrical energy, provided in the form of a current from an external source (charger), into chemical energy within a cell/battery.
Recommended Standard 232	This is the standard interface for full-duplex data communication conducted with two way independent channels. It employs unbalanced signaling and refers to point-to-point communications between one driver and one receiver in a 4-wire bus system. The RS-232 (single-ended) transmits at a relatively slow data rate (up to 20K bits per second) and short distances (up to 50 Ft. @ the maximum data rate).
Recommended Standard 422	This is the standard interface for half-duplex communications conducted with a dual-state driver. It employs balanced signaling and refers to multi-drop communications between one driver and up to ten receivers, known as "straight-through" cabling in a 4-wire bus system. The RS-422 (Differential) transmits a much faster data rate (up to 100K bits per second) and longer distances (up to 4000 Ft. @ the maximum data rate).
Recommended Standard 485	This is the standard interface for half-duplex communications conducted in the tri-state or common mode. It employs balanced signaling and refers to true multi-point communications between up to 32 drivers and 32 receivers, in 2-wire bus system. The RS-485 (Differential) transmits a much faster data rate (up to 100K bits per second) and longer distances (up to 4000 Ft. @ the maximum data rate). It also supports more nodes per line because it uses lower impedance drivers and receivers.
Relay	Electromechanical device containing a coil and set of contacts. The contacts close when the coil is activated.
Remote Controller, X Series.	Totalflow's X series Remote Controller is a low power, microprocessor based unit designed to meet a wide range of automation, monitor, control, alarming and measurement applications.

TERM	DEFINITION
Remote Terminal Unit	An industrial data collection device similar to a PLC, designed for location at a remote site, that communicates data to a host system by using telemetry (such as radio, dial-up telephone, or leased lines).
Resistance	The measure of the ability of a material to pass a current.
Resistant Thermal Detector	A metallic probe that measures temperature based upon its coefficient of resistivity.
Resistor	Passive component with a known resistance. The value of resistance is usually shown by a set of colored bands on the body of the component.
Resolution	The smallest significant number to which a measurement can be determined. For example, a converter with 12-bit resolution can resolve 1 part in 4096.
Restore	This refers to a Totalflow procedure in which all the Station or Configuration files are restored to the SDRIVE from the file located on the laptop. This process is very helpful prior to doing a Cold Start when you want to continue using the Configuration and Station files.
RFI	See Radio Frequency Interference.
Ribbon Cable	A flat cable in which the conductors are side by side rather than in a bundle.
ROM	See Read Only Memory
RRTS	Communication abbreviation for Remote Ready To Send.
RS-232	See Recommended Standard 232.
RS-422	See Recommended Standard 422.
RS-485	See Recommended Standard 485.
RTD	See Resistant Thermal Device.
RTDB	See Real Time Data Base.
RTOS	See Real Time Operating System.
RTS	Communication abbreviation for Ready To Send.
RTU	See Remote Terminal Unit
RXD	Communication abbreviation for Receive Data.
S/N	Serial Number. The whole Serial Number is made up of a prefix of 5 digits and the suffix, a 10 digit configuration number.
Saddle	A fitted plate held in place by clamps, straps, heat fusion, or welding over a hole punched or drilled in a gas main to which a branch line or service line connection is made. The saddle also may serve as a reinforcing member for repair.
Sample Loop	
Save	This refers to a Totalflow procedure in which all the Station or Configuration files are copied from the RDRIVE or the SDRIVE, to a file created on a laptop.
Savitsky-Golay Smoothing	Digital Signal Smoothing. A special class of a digital signal processing filter. Specifically determines the coefficients that are used for signal processing.
SCADA	See Supervisory Control and Data Acquisition
Schematic	Another name for a circuit diagram.
SCM	Acronym for Sample Conditioning Module.
SDRIVE	Totalflow's Serial E^2 PROM solid state memory chip, located on the Main Board (volatile memory, affected by a cold start), used to store configuration or station files.
Selectable Units	Selectable measurement units for various international and specialized application needs.
Self-Calibrating	A property of a DAQ board that has an extremely stable onboard reference and calibrates its own A/D and D/A circuits without manual adjustments by the user.

TERM	DEFINITION
Semiconductor	Material that is nether a conductor nor insulator. Its properties can be altered by a control voltage.
Sensor	A device that responds to a physical stimulus (heat, light, sound, pressure, motion, flow, and so on), and produces a corresponding electrical signal.
Sensor File	The Sensor File contains all the setup/calibration information of the unit. The Sensor File is a (.dat) file and by default is named after the base serial number proceeded by an "s", such as s00108.dat. Although the name can be overwritten, it is recommended that the default name be kept.
Serial I/O	A common form of data transmission, in which the bits of each character are sent one at a time over the line.
Serial Port	A communications interface that uses one data line to transfer data bits sequentially. On the IBM PC the serial port refers to a standard asynchronous serial interface which uses the 8250/16450/16550 family of UART's.
Service Life	The period of useful life (usually in hours or minutes) of a primary cell/battery before a predetermined cut-off voltage is reached.
Set-Point	A "level" or control point in a feedback system.
SFC	Sequential Function Chart (IEC supported programming language)
SG	Acronym for Specific Gravity.
Short Circuit	A connection of comparatively low resistance accidentally or intentionally made between points on a circuit between which the resistance is normally much greater. Also called a "bridge" or "short" such as when solder from two tracks touch on a PC board.
SIG	See Signal.
Signal	Any communication between message-based devices consisting of a write to a signal register.
Signal Generator	A circuit that produces a variable and controllable signal.
Signed Integer	Can represent a number half the size of a “unsigned integer”, including a negative number.
Sink	Device such as a load that consumes power or conducts away heat.
Skip Days	Extra Daily records for recording events that require the start of a new day. i.e. Volume Reset, Backward Time change over the hour, and Contract Hour change.
SNAM	Italy’s Certification Board
SNR	Signal to Noise Ratio.
SoftCONTROL	Softing’s IEC compiler environment
Softing	Maker and distributor of the IEC compiler softCONTROL
Software	The non-physical parts of a computer system that include computer programs such as the operating system, high-level languages, applications programs, etc.
Solar cell	A cell that produces current under sunlight.
Solenoid	A coil of wire that is long compared to its diameter, through which a current will flow and produce a magnetic flux to push or pull a rod (called an armature).
SOS	See Speed of Sound.
Source	Device that provides signal power or energy to a load.
SP	See Static Pressure
Specific Gravity	The ratio of the mass of a solid or liquid to the mass of an equal volume of distilled water at 4°C (39°F) or of a gas to an equal volume of air or hydrogen under prescribed conditions of temperature and pressure. Also called *relative density*.
Speed of Sound	Rate at which sound travels through the medium. Used in flow calculations in the TotalSonic Meter.

TERM	DEFINITION
SPU	Signal Processing Unit (measurement transducer).
SQL	See Structured Query Language.
SRAM	See Static Random Access Memory
SSM	Acronym for Stream Selector Module.
ST	Structured Text (IEC supported programming language)
Static Pressure	Equals PSIA or PSIG. Referenced to atmospheric pressure versus absolute pressure in a vacuum. It is defined as the pressure exerted by a non-moving liquid or gas. In the case of a gas well this would be the natural PSI of the gas inside of the well.
Static Random Access Memory	The place in your computer that programs reside when running. You can access any part of the memory, and it can easily be overwritten with new values. SRAM is much more expensive and physically larger than DRAM but much faster.
Status Output	Any digital output that uses “On” or “Off” conditions to determine the status of the assigned description. Changing from one to the other represents a change in the condition.
STP	Standard Temperature and Pressure
Stream	
Structured Query Language	IBM developed this language in the 60’s as a way of accessing data from a relational database. It has a very simple syntax for simple functions but can become complex for sophisticated applications. This language is standardized by international standards bodies, and is almost universal in application. Almost all databases support SQL. The iVision RTDB supports SQL and this makes it extremely flexible within a corporate network. Authorized users throughout the organization can write SQL statements to acquire data from this database that they need for Marketing, Accounting, Engineering, or other functions.
Supercompressibility Factor	A factor used to account for the following effect: Boyle's law for gases states that the specific weight of a gas is directly proportional to the absolute pressure, the temperature remaining constant. All gases deviate from this law by varying amounts, and within the range of conditions ordinarily encountered in the natural gas industry, the actual specific weight under the higher pressure is usually greater than the theoretical. The factor used to reflect this deviation from the ideal gas law in gas measurement with an orifice meter is called the "Supercompressibility factor Fpv". The factor is used to calculate corrected from volumes at standard temperatures and pressures. The factor is of increasing importance at high pressures and low temperatures.
Supervisory Control and Data Acquisition	A common PC function in process control applications, where programmable logic controllers (PLCs) perform control functions but are monitored and supervised by a PC.
Surge	A sudden change (usually an increase) in the voltage on a power line. A surge is similar to a spike, but is of longer duration.
SW VBATT	Switched Battery Voltage. Cycles power to equipment to save power.
Switch	An electrical device for connecting and disconnecting power to a circuit, having two states, on (closed) or off (open). Ideally having zero impedance when closed and infinite impedance when open.
Synchronous	(1) Hardware - A property of an event that is synchronized to a reference clock. (2) Software - A property of a function that begins an operation and returns only when the operation is complete.
Syntax	Comparable to the grammar of a human language, syntax is the set of rules used for forming statements in a particular programming language.
System Noise	A measure of the amount of noise seen by an analog circuit or an ADC when the analog inputs are grounded.

TERM	DEFINITION
TankMaster	Totalflow Control System for LevelMaster Tank Units.
Tap	To cut threads in a round hole so that other fittings or equipment can be screwed into the hole. Also to make an opening in a vessel or pipe.
TBUS	Communication abbreviation for Transmit Bus.
TCP/IP	TCP/IP – This is the basic communication format for the Internet, and for much of what happens on a corporate network. Virtually all networked PCs and other computers have an "IP address" having the format xxx.xxx.xxx.xxx (xxx can range from 0 to 255 in most cases). You can see the ip address of your PC by going to the start menu, selecting run, and entering cmd. A "DOS Box" will be displayed on your screen. Type ipconfig to get the ip address. When you enter a URL (e.g., www.totalflow.com) in a browser, a DNS server (on the network) resolves this into an IP address and directs your request to the machine with that address.
TDS32	Totalflow DDE Server that allows Microsoft Windows applications with DDE capabilities to communicate with Totalflow's equipment. For example data can be retrieved and placed in an Excel spreadsheet.
Temperature Coefficient	An experimental number used to modify the calibration of a device (Totalflow transducer) to account for changes in environmental temperature.
Temperature, Ambient	The temperature of the air, atmosphere or other fluid that completely surrounds the apparatus, equipment or the work piece under consideration. For devices which do not generate heat, this temperature is the same as the temperature of the medium at the point of device location when the device is not present. For devices which do generate heat, this temperature is the temperature of the medium surrounding the device when the device is present and generating heat. Allowable ambient-temperature limits are based on the assumption that the device in question is not exposed to significant radiant-energy sources such as sunlight or heated surfaces.
Temperature, Flowing	Temperature of the flowing fluid. Usually gas and measured by an RTD.
Terminal Mode	Man-Machine interface tool used as and engineering interface with equipment.
Termination	Placement of a connector on a cable.
Termination Panel	A circuit board with screw terminals or other connector system that allows convenient connection of field signals to a data acquisition or communication system.
TF.NET	Totalflow network used to access iVision/web data.
TFIO Module	Totalflow Input/Output module (i.e. quad AO)
Thermocouple	A temperature sensor created by joining two dissimilar metals. The junction produces a small voltage as a function of the temperature.
Thermowell	A closed-end tube designed to protect temperature sensors from harsh environments, high pressure, and flows. They can be installed into a system by pipe thread or welded flange and are usually made of corrosion-resistant metal or ceramic material depending upon the application.
Therms Master	Totalflow application for Gas Analyzer.
Tolerance	The allowable percentage variation of any component from that stated on its body.
Totalflow	Product line of ABB Inc. Maker and distributor of the X Series Flow Computers (XFC) and Remote Controllers (XRC).
TotalSonic MMI	TotalSonic's Man Machine Interface software program. May also be called MEPAFLOW 600.
Transducer	A device for converting energy from one form to another, specifically the measurement of pressure differential in natural gas gate stations. I.e. Pressure to voltage or current.
Transfer Rate	The rate, measured in bytes/s, at which data is moved from source to destination after software initialization and set up operations; the maximum rate at which the hardware can operate.

TERM	DEFINITION
Transient	An abrupt change in voltage, of short duration (e.g. a brief pulse caused by the operation of a switch).
Transistor	A three leaded device (Collector, Base, Emitter) used for amplifying or switching. Also called a bi-polar transistor to distinguish it from Field Effect Transistor etc.
Transmitter	A device that converts audio, video or coded signals into modulated radio frequency signals which can be propagated by electromagnetic waves (radio waves).
Tranzorb	Transient Voltage Suppression device.
TRB	Tank Request Block Editor. When requesting storage space after adding a LevelMaster application, the file is saved as a *.trb file.
Tube	Cylinder for transporting or storing liquids: any long hollow cylinder used to transport or store liquids.
Tuned Radio Frequency	An amplitude modulated (AM) receiver with one or more stages of radio frequency before the detector.
TXD	Communication abbreviation for Transmit Data.
UDINT	Unsigned Double Integer
Unsigned Integer	Can represent a number twice the size of a “signed integer”, but cannot represent a large negative number.
Upload	This refers to a Totalflow procedure in which any file(s) located in the on-board memory of a Totalflow Host is copied to a file created on a laptop PC.
UPS	Un-interruptible power supply. A power conditioning unit placed between the commercial power service and the protected device. The UPS uses line power to charge batteries, which, in the case of a power failure, can drive electronic circuitry to produce the appropriate AC requirements for some time period.
Upstream	From a reference point, any point located nearer the origin of flow, that is, before the reference point is reached.
Upstream Pipeline	The first pipeline to transport natural gas en route to an inter-connect point for delivery to another pipeline. See DOWNSTREAM PIPELINE.
USX	Provider of the RTOS used by the X Series product line
VAC	Volts of alternating current.
Vacuum	A pressure less than atmospheric pressure, measured either from the base of zero pressure or from the base of atmospheric pressure (PSIA).
Valve	A mechanical device for controlling the flow of fluids and gases; types such as gate, ball, globe, needle, and plug valves are used.
Valve Control	This feature provides automatic feedback control of Differential Pressure (DP), Static Pressure (SP), and Flow Rate for the purpose of positioning a flow valve to maintain a desired value of DP, SP, or Flow Rate.
VAS32	Totalflow’s Voice Alarm System. A software program that receives and transmits alarm notifications via cell, telephone or pager systems.
VBATT	Battery Voltage. The voltage output from the battery source.
VDC	Volts of direct current.
VDE	Verband der Elektrotechnik Elektronik Informationstechnik [Association for Electrical, Electronic & Information Technologies]
Vent	A normally sealed mechanism which allows for the controlled escape of gases from within a cell.
Virtual Memory	A method of making disk storage appear like RAM memory to the CPU, thus allowing programs that need more RAM memory than is installed to run in the system. This technique is slow compared to "real" memory.
VOG	Velocity of Gas.

TERM	DEFINITION
Volatile Memory	A storage medium that loses all data when power is removed.
Volt	The unit of voltage or potential difference.. One thousand volts = 1kV.
Voltage	Electrical pressure, the force, which causes current to flow through a conductor. Voltage must be expressed as a difference of potential between two points since it is a relational term. Connecting both voltmeter leads to the same point will show no voltage present although the voltage between that point and ground may be hundred or thousands of volts.
Voltmeter	A meter for reading voltage. It is one of the ranges in a multimeter.
Volume Calculation Period	The specified length between reading and calculating volume data.
VOS	Velocity of Sound.
Warm Start	A rebooting technique which will clear most operational errors, without damaging either the data or configuration files. This causes the equipment to boot from the RDRIVE, which is a solid state memory chip.
Watt	Symbol W. The unit of power. One watt is the product of one volt and one amp. Power (W) = Current (I) X Energy (E). (E = Volts)
Wavelength	The distance between two points of corresponding phase in consecutive cycles
Web Page	All the text, graphics, and sound visible with a single access to a Web site; what you see when you request a particular URL.
Web Server	The hardware and software required to make Web pages available for delivery to others on networks connected with yours.
Web Site	A collection of electronic "pages" of information on a Web server
Well, Development	A well drilled in order to obtain production of gas or oil known to exist.
Well, Disposal	A deep well in which to inject waste chemicals, etc., such as a well to dispose of salt brine from the solution mining of salt dome gas storage caverns.
Well, Exploratory	A well drilled to a previously untested geologic structure to determine the presence of oil or gas.
Well, Gas	A well which produces at surface conditions the contents of a gas reservoir; legal definitions vary among the states.
Well, Marginal	A well which is producing oil or gas at such a low rate that it may not pay for the drilling.
Well, Stripper	Non-associated gas well capable of producing no more than 90 Mcf/day at its maximum rate of flow.
Well, Wildcat	An exploratory well being drilled in unproven territory, that is, in a horizon from which there is no production in the general area.
Wellhead	The assembly of fittings, valves, and controls located at the surface and connected to the flow lines, tubing, and Casing of the well so as to control the flow from the reservoir.
WINCCU	Windows Central Collection Unit. Windows version of software to process, archive and manipulate data collected from the Totalflow products.
Witness	In the field, where hydrocarbons are changing hands and actual cash register transactions being performed, it is not uncommon for one party or the other to request / require a representative or company employee be present during calibrations and or routine maintenance. Often this arrangement is contractually linked.
Wobbe Index	Calculated from the energy content, or a higher heating value of the gas, and the relative density of the gas (Btu/RD$^{1/2}$).
Working Voltage	The highest voltage that should be applied to a product in normal use, normally well under the breakdown voltage for safety margin. See also Breakdown Voltage.

TERM	DEFINITION
World Wide Web	An Internet service facilitating access to electronic information - also known as the Web, WWW, or W3.
X Series	Totalflow's new extendable equipment series featuring technology that is expandable and flexible for ever changing needs.
XFC	See Flow Computer, X Series.
XFC-195 Board	The main electronic board used in X Series flow computers. The XFC-195 Board mounts on the inside of the enclosure's front door.
XIMV	Integral Multivariable Transducer
XMV	External Multivariable Transducer.
XRC	See Remote Controller, X Series.
XRC	X Series Remote Controller. Also see Remote Controller, X Series.
Y	Expansion factor
Zero Gas	Gas at atmospheric pressure.

Chapter 7
Drawing & Diagrams

This Chapter of the manual has been provided as a location for the user to place drawings that accompanies their new Totalflow units.

Totalflow recommends that a complete set of all drawings that accompany a Totalflow units be placed in this Chapter. This would ensure that the user have only drawings applicable to their units and drawings that are at the latest revision level.

SYSTEM INSTRUCTION

I. PURPOSE

Provides requirements for the field inspection and maintenance of orifice plates.

II. GENERAL

A. Inspect orifice plate, as outlined in Section III at the following times:

1. when originally installed.

2. during scheduled inspections or more frequently, if needed. See II.D.

3. whenever removed from the orifice fitting for any reason.

B. When removing and installing orifice plates, see System Instructions:

185.0485, *Remove and Replace Orifice Plate in Commercial Senior Orifice Fitting*

185.0490, *Remove and Replace Orifice Plate in Daniel Senior Orifice Fitting*

185.0495, *Remove and Replace Orifice Plate in Daniel Junior Orifice Fitting*

185.0500, *Remove and Replace Orifice Plate in Robinson Senior Type "E" Orifice Fitting*

185.0505, *Remove and Replace Orifice Plate in Robinson Junior Orifice Fitting*

C. Install beveled plates with the beveled orifice edge downstream. Examine such plates for proper installation prior to removal from the plate carrier. Report on the chart any plates found installed incorrectly and complete Form 4682, Orifice Meter Order.

D. Maintain orifice plates in the cleanest possible condition. Repeated or excessive accumulations of foreign matter on a plate indicate the need for more frequent inspections.

E. Measure orifice plates during each inspection to verify the actual size agrees with the size shown stamped on the plate and with the size shown on Form 4681, Orifice Meter Inspection Card. Office will make any corrections on Form 4681. Field should complete Form 4682.

F. When changing the size of an orifice plate to maintain accurate measurement, determine the correct size of orifice as follows:

1. Verify that the beta ratio is in the following range:

   minimum = 0.20 **maximum = 0.60**

   The beta ratio = orifice diameter / orifice meter tube diameter.

Note: If the beta ratio is outside this range notify **ETS Measurement Instrumentation & Control**.

2. If changing the size of the orifice to either increase or decrease the differential pressure (D.P.), calculate the new orifice size as follows:

   New Orifice Size = Current Orifice Size x Orifice Sizing Factor

   $$\textbf{Orifice Sizing Factor} = \sqrt{\frac{\text{Current D.P.}}{\text{Desired D.P.}}}$$

   $$\textbf{Example Orifice Sizing Factor: } \sqrt{\frac{2.5\text{ in. w.c.}}{9\text{ in. w.c.}}} = 0.53$$

   Example New Orifice Size: 3.000" x 0.53 = 1.590"

Note: Use Orifice Size closest to 1.590" which is 1.625", per AGA-3.

   Consult **ETS Measurement Instrumentation & Control** for assistance.

G. Order orifice plates through the gauge shop. Do not maintain an orifice plate inventory in the region, except for seasonal or curtailment needs. Return all other plates as removed.

H. Report orifice plate inspections, unsatisfactory conditions and any corrective action taken on Forms **4681** and **4682** as appropriate.

III. INSPECT PLATE FOR DEFECTS

A defect is defined as any nick, dent, pit, scratch, blasted or roughened surface, etc. that is readily visible to the eye and can be felt by the tip of a finger. Imperfections that can only be located by the fingernail are not considered defects.

Important Steps	Key Points
A. Clean plate.	A. Use solvent and rags.
B. Verify Size	B. Measure inside diameter.

Important Steps	Key Points
C. Examine both edges of opening in orifice plate.	C. An acceptable edge is sharp, square, and free of defects.
D. Examine both faces within the inner one-third of the plate.	D. An acceptable face is free of defects.
E. Determine acceptability of plate inner edges and faces.	
1. If both inner edges and both faces are acceptable, plate is reusable.	
2. If both inner edges or both faces are unacceptable, or if one inner edge and one face on opposite sides are unacceptable, plate is unusable.	2. Order replacement within one working day. Install within one working day upon receipt of plate.
3. If only one inner edge or one face is acceptable (or one of each on the same side):	
a) Plate without bevel.	a) Plate may be reused if defective inner edge and/or face is positioned downstream.
b) Plate with one inner edge beveled.	b) If face with bevel is defective, plate may be reused (beveled inner edge must be positioned downstream). If inner edge or face opposite bevel is defective, plate is unusable and must be replaced. Order replacement within one working day. Install within one working day upon receipt of plate. **Do not use with bevel upstream.**
F. Examine both faces within one-fourth inch of outer edge of plate.	F. Replace if serious defects are found as they interfere with proper seating of plate in carrier.

IV. INSPECT PLATE FOR FLATNESS

The following flatness inspection need not be performed when plate is not acceptable as a result of defect inspection.

Important Steps	Key points
A. Place straight edge across plate. See Figure 1.	A. Use steel carpenter square, steel ruler, or comparable edge.
B. Check for gap at several points between the straight edge and plate.	B. Straight edge and plate must be at eye level. See Figure 1.
1. If gap appears at edge of orifice opening.	1. See Section V to determine acceptability of plate.
2. If gap appears between the edge and outside edge of plate, turn plate over and check for gap at orifice opening.	2. See Section V to determine acceptability of plate.

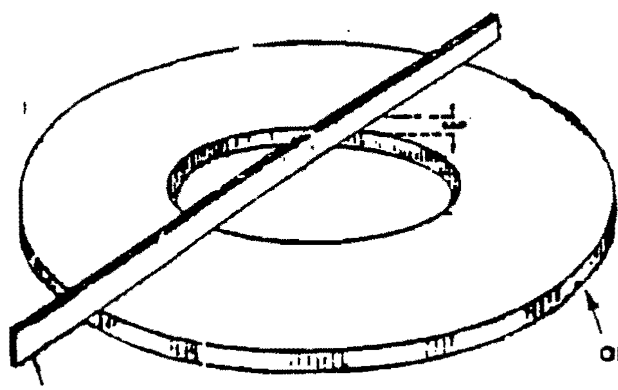


Figure 1

V. DETERMINING ACCEPTABILITY OF BENT OR WARPED PLATES

Important Steps	Key Points
A. Measure bent or warped plate at point of largest gap.	A. Use feeler gauge if available or use one of the following:

Item	Approximate Thickness
Scrap of Paper	.005"
Business Card	.010"
Matchbook Cover	.018"
New Dime	.050"
New Penny	.060"
New Nickel	.075"

Important Steps	Key Points
B. Calculate **Maximum Allowable Gap** Example:	B **0.005(Meter ID - Orifice ID)** 15.00" - 9.00" = 6.00" 0.005 x 6.00" = 0.030" Answer
C. If Maximum Allowable Gap is Less than Measured Gap, then plate is acceptable.	C. In Example, measured gap = 0.018" and max. allowable gap = 0.030".
D. If Maximum Allowable Gap is Greater than Measured Gap, then plate is unacceptable.	D. If unacceptable, order replacement within one working day. Install within one working day upon receipt of plate.

■

PTO #9584-R3

(condition 9.C.16(v)

The Maintenance and Calibration of the measurement devices for calculating the volume of hydrocarbon condensate transferred from the hydrocarbon liquid storage tank into trucks at the loading station.

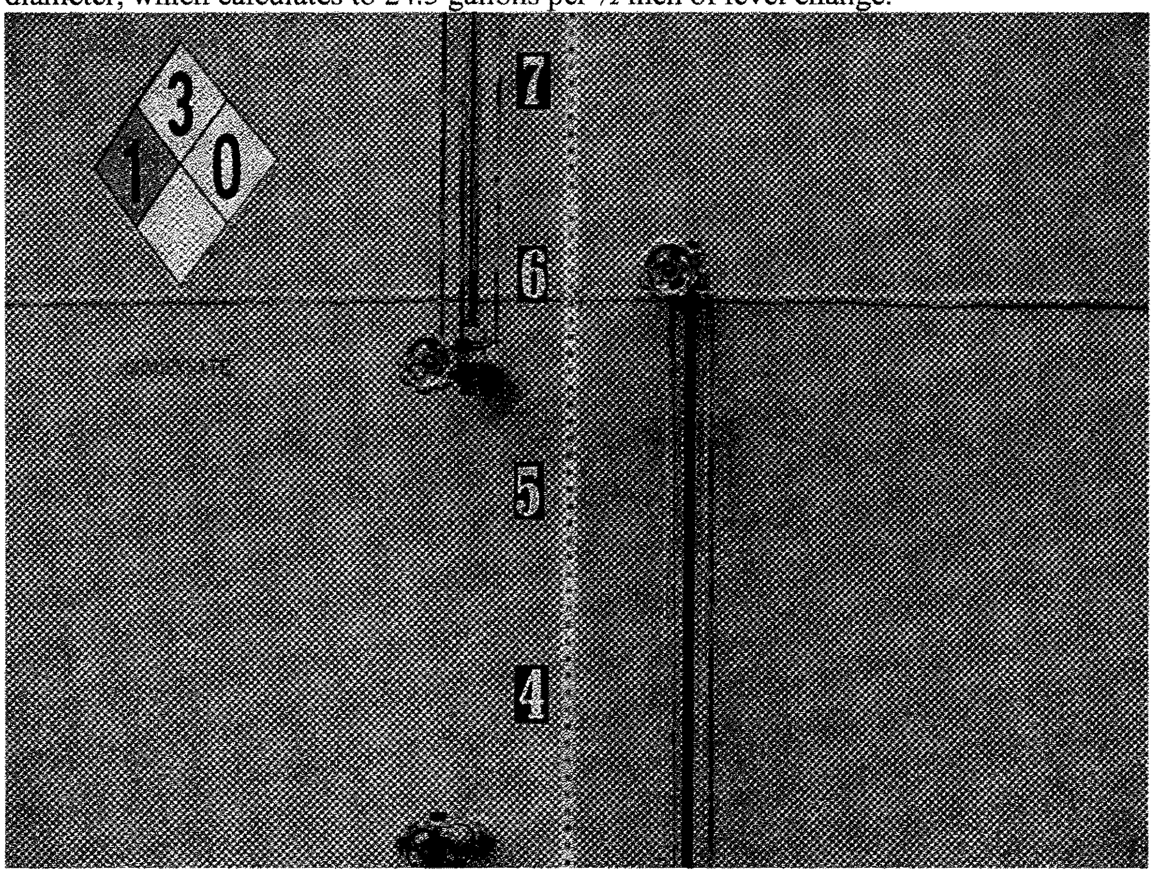
February 8, 2012

Measurement device for calculating the volume of hydrocarbon liquid shipped:

There is no maintenance or calibration for this measurement device as it is a graduated tape attached next to the sight glasses on the side of the tank containing the hydrocarbon condensate liquid.

The volume of hydrocarbon liquid transferred from the storage tank to tanker truck is calculated by taking the difference between the starting level measurement in the storage tank from the ending level measured in the storage tank after the transfer. That measured difference multiplied by 24.5 gallons per ½ inch is equal to the volume transferred to the truck.

The hydrocarbon condensate liquid storage tank is cylindrical, vertical and 10' nominal diameter, which calculates to 24.5 gallons per ½ inch of level change.



PTO #9584- R7
(condition 9.C.16(v)

The Maintenance and Calibration/Proving of the fuel gas meters for the I.C. Engines Main Units 2 – 9 and Micro-turbines (micro-turbines are on common fuel meter).

June 22, 2020

FUEL METER DEVICE LIST

Service	**MFG.**	**Type**	**Model**	**Meter Number**
Engine for Air Compressors #4A and #5A	Roots	Rotary Positive Displacement	3 MSSM	12775115
Hot Water Heater #201A	Roots	Rotary Positive Displacement	3 M175	15915913
Hot Water Heater #201B	Roots	Rotary Positive Displacement	3 M175	15915916
Hot Oil Heater #1	Roots	Rotary Positive Displacement	15 C 175	1937451
Hot Oil Heater #2	Roots	Rotary Positive Displacement	15 C 175	1937460
Microturbines 1 through 4	Roots	Rotary Positive Displacement	1.5 MSSM	10167689
Engine for Main Unit #2	Roots	Rotary Positive Displacement	4.6 M900	5825486
Engine for Main Unit #3	Roots	Rotary Positive Displacement	4.6 M900	7800656
Engine for Main Unit #4	Roots	Rotary Positive Displacement	4.6 M900	2792008
Engine for Main Unit #5	Roots	Rotary Positive Displacement	4.6 M900	10279656
Engine for Main Unit #6	Roots	Rotary Positive Displacement	4.6 M900	2792001
Engine for Main Unit #7	Roots	Rotary Positive Displacement	4.6 M900	2792010
Engine for Main Unit #8	Roots	Rotary Positive Displacement	4.6 M900	4024936
Engine for Main Unit #9	Roots	Rotary Positive Displacement	2 M900	3017246

REQUIREMENT

Field Meter accuracy tests are performed on medium and Large Displacement Meters (500 CFH and over) to ensure measurement accuracy and to comply with California Public utility Commission General Order 58-A/Section 12.

COMPLIANCE REQUIRED

1. Company field personnel perform field meter accuracy tests on specified diaphragm and rotary meters with medium and large capacity (500 CFH and over) at customer's premises.

2. Field personnel are required to maintain accuracy test results within tolerances designated in this System Instruction (SI).

3. Field accuracy tests are performed with natural gas or air while maintaining a hazard-free condition.

4. Field personnel use approved transfer provers for meter accuracy tests.

5. Mechanical pressure correctors and electronic instruments are tested in conjunction with field meter tests.

6. Regions are responsible for conducting on-the-job training, self-audit programs. and review to ensure compliance with this System Instruction.

SYSTEM INSTRUCTION

I. General Requirements

A. Meters

1. Meters in parallel are both field tested on same schedule (low flow meters are not considered parallel meters).

2. Meters are replaced when field testing cannot be completed if unable to install test equipment or maintain a hazard-free condition. Meter must be replaced within established field test or PMC schedules.

B. Critical Temperature Conditions When Testing With Natural Gas

When ambient temperature is greater than 85°F, both meter and proving unit must be shaded (use umbrellas if necessary). The temperature differential should be monitored during the test. Discontinue testing the meter when ambient temperature or radiant heat shows signs of adversely affecting temperature differential. Use an approved thermometer to determine the ambient temperature.

C. Undergear

1. Verify undergear through index ratio. See SI **185.0400.** *Indexes and Undergears - Determine Ratios.*

2. Inspect the undergear and index assemblies for defects. See SI **185.0390,** *Diaphragm Meters - Replacement: of Indexes, Drive Components, Handhole Plates and Installation Security Devices.*

II. Perform Accuracy Test

A. Perform "as found" tests, beginning with the open flow rate, prior to making any adjustments.

1. For test flow rates using natural gas, see SI **185.0360**, *Transfer Provers - Meter Accuracy Test.*

2. When the "as found" test results exceed +/- 10.0%, replace the meter within **twenty** working days.

B. When the meter accuracy (without a pressure corrector) at check proof or combined accuracy of meter and pressure corrector is more than **2.0%** slow (-2.0%), terminate the testing and follow guidelines listed in SI **185.0305**, *MSA Inspection and Maintenance - General.*

NOTE: Combined accuracy is the meter Check accuracy (+) the accuracy of the pressure corrector at all three test pressures.

C. If the combined accuracy is **2.0%** slow, or less, the meter can be adjusted. Make adjustments based on the results of open and check flow rate tests only.

D. Retest meter at open and check flow rates after adjustments are made until meter is within tolerances. If meter cannot be brought within tolerances, establish the "as left" conditions and make arrangements to have meter replaced within **twenty** working days.

NOTE: Inactive meters, off and blanked meters, and meters soon to be removed (not to exceed scheduled inspection) from service and their associated pressure correctors are not required to be field tested.

III. Accuracy Tolerance - Displacement Meters

Diaphragm Meters With Standard Indexes

Accuracy tolerance is +/- 1.0% at both the Open and Check flow rates, with a maximum difference between these two tests of 1.0%. If meter is adjusted it must be left within +/- 0.5%.

A. Meters With Mechanical Pressure Correctors

1. Accuracy tolerance is +/- 2.0% at both the Open and Check flow rates, with a maximum difference between these two tests of 1.0%.

2. If the "as found" Check proof is +/- 2.0% or less and is within 1.0% of the open test, and the combined accuracy at all test pressures with pressure corrector is +/- 1.0% or less, no adjustment is required.

3. If the combined accuracy is more than +/- 1.0%, and adjusting the meter brings the combined accuracy to +/- 1.0%, or less, only the meter requires adjusting. If the meter is adjusted it must be left within +/- 0.5%.

B. Rotary Meters

1. Accuracy tolerance for all rotary meters is +/- 1.0%.

2. Rotary meters with pressure correctors:

If the combined accuracy exceeds +/- 1.0%, but is not more than 2.0% slow, and cleaning the meter impellers brings the combined accuracy to +/- 1.0%, or less, the pressure corrector does not need adjusting. See SI **185.0430**, *Rotary Displacement Meters - Field Inspections and Repairs.*

If the "as found" accuracy exceeds the tolerance:

a) Remove meter and clean impellers of meters smaller than 16M. Use approved cleaning solvent listed in M&S Catalogue (M&S 46-2696/46-2698). Replace 16M and larger meter.

b) Retest meter after cleaning impellers. Replace meter within twenty working days if accuracy exceeds +/- 1.0%.

c) Replace within **ten** working days when meter is D.R.

C. Turbine Meters

All turbine meters are accuracy tested at Pico Rivera prior to shipment to the field. A wire tag with meter number and the Check Proof test result is attached to each meter. Record the turbine meter Check Proof shop test results as indicated on wire tag in field order when ever a new turbine meter is installed or module is replaced. Turbine meter Check Proof stop results are entered into MARS on system screen B71250cc ("Field Order Results, Turbine Meter Test").

IV. Diaphragm Meter Repair

A. Inspect the meter for loose, broken or excessively worn parts and dirty valves.

B. Make approved repairs and replacements. See SI **185.0370**, *Medium and Large Diaphragm Displacement Meters - Inspection and Field Repair.*

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C. When approved repairs cannot be made in the field, replace the meter within **ten** working days.

V. Adjusting Diaphragm Meters

A. When proof adjustments are made to diaphragm meters, adjust the meter to a tolerance of +/- 0.5% on both the Cheek and Open flow rates. Attempt to adjust both the Check and Open proof so that they are equal. See Recommended Method (RM) **185.085**, *Meters - Accuracy Adjustments*, Table 1, Meter Proof Adjustment Guide.

B. Replace meter within **twenty** working days when adjustments do not respond or cannot be made.

VI. "Follow-up" Accuracy Tests

Perform a "follow-up" accuracy test of a diaphragm meter after two weeks, but not more than **thirty** days, if any of the following occur:

A. The "as found" proof at either the Check or the Open tests are found between 5.0% to 10.0% fast or slow, unless the cause is a mechanic failure which has been corrected.

B. Response of the adjustment leaves doubt that the adjustment will hold.

C. Valve covers are replaced or valve seats or covers are cleaned.

D. If the Check or Open test results on a follow-up test differ from the "as left" results by more than +/- 2.0%, replace meter within **twenty** working days. If the tests are within +/- 2.0%, adjust meter if applicable.

NOTE: The pressure corrector does not need to be tested on a follow-up test. For combined accuracy, use the "as left" test of the previous pressure corrector inspection.

VII. Electronic Device - Meter Accuracy

A. Use meter check proof test results to select applicable electronic instrument meter factor, listed in Appendix A, for meter accuracy only.

1. For a displacement meter, use the Check proof test result listed in MARS report, B71600-01, M&R Order-Customer MSA. If unavailable, field test meter and determine appropriate electronic instrument meter factor. See Appendix A for EC (Mercor) or F (AUX) (Totalflow 6611) Factor.

2. For a turbine meter, use Meter Shop check proof test result to determine appropriate electronic instrument meter factor. See Appendix A for correct EC (Mercor EC) or F (AUX) (Totalflow 6611) Factor.

B. Electronic Instrument Meter Factor must entered into appropriate device.

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1. Mercor EC - enter EC factor into EC auxiliary correction code (function 46).

2. Totalflow 6611 - Access AGA-7 constraints menu and enter F (AUX).

VIII. Records - Forms

A. For converted accounts, use MARS report **B71600-01**, *M&R Order-Customer MSA*, to record scheduled inspection results.

B. For unconverted accounts, use report **B71615-01**, *Base Register Order-Customer MSA*, to record scheduled results. Include meter and regulator equipment information on front of page 1. Forward completed documents to M&R section clerk for conversion and data entry into MARS.

C. Use report **B71615-01**, *Base Register Order -Customer MSA*, or **Form 4683**, *Meter and Regulator General Order*, with Field Meter Test Worksheet to record unscheduled inspections.

IX. Periodic Testing of Proving Equipment

Return Transfer Provers to Measurement Standards and Quality for four-month calibration tests as scheduled on *Transfer Prover Calibration and Meter Proof Test Data* Form.

■

APPENDIX A

ELECTRONIC INSTRUMENT METER FACTORS

MTR. CHECK PROOF	E.C. OR F(AUX) FACTOR	MTR. CHECK PROOF	E.C. OR F(AUX)
0.0	1.0000	0.0	1.0000
+0.1	.9990	-0.1	1.0010
+0.2	.9980	-0.2	1.0020
+0.3	.9970	-0.3	1.0030
+0.4	.9960	-0.4	1.0040
+0.5	.9950	-0.5	1.0050
+0.6	.9940	-0.6	1.0060
+0.7	.9930	-0.7	1.0070
+0.8	.9920	-0.8	1.0080
+0.9	.9910	-0.9	1.0090
+1.0	.9900	-1.0	1.0100
+1.1	.9890	-1.1	1.0110
+1.2	.9880	-1.2	1.0120
+1.3	.9870	-1.3	1.0130
+1.4	.9860	-1.4	1.0140
+1.5	.9850	-1.5	1.0150
+1.6	.9840	-1.6	1.0160
+1.7	.9830	-1.7	1.0170
+1.8	.9820	-1.8	1.0180
+1.9	.9810	-1.9	1.0190

Use check proof results to determine correct factor.

1. E. C. Factor — MERCOR EC

2. F(AUX) — Applied Automation Totalflow 6611

Unit Value/Revolution Index Drive	K Factor
10	.200
100	2.000
1000	20.000

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PC DOCS FCD PROFILE SUMMARY	
Document Number:	**185.0345**
Document Title:	Meters - Field Accuracy Testing
Document Category:	System Instruction
Document Status:	Active
If Merged, Merged to:	
Effective Date:	3/19/1992
Current Version Issued:	7/7/2000
Review Date:	7/7/2005
Prior Numbers:	185.55
Company:	Southern California Gas Company
Business Unit:	SCG Energy Transportation Services
Business Organization:	Transmission & Storage Operations
Department:	Engineering & Technical Services
Department Organization:	Measurement Regulation & Control
Organization Team:	Measurement Technology
Contact Person/Writer:	Cal Calleros
Referenced Documents:	185.0400; 185.0390; 185.0360; 185.0305; 185.0430; 185.0370; 185.085; 4683
Related Documents:	
Part of O&M Plan:	No
Compliance Required by:	-
Mandated by:	-
CPUC Review Required:	No
Legal Review Required:	No

Author's Brief/Summary of Changes:

Page 2 – II. Perform Accuracy Test. B., Changed 2.2% to 2.0%

Page 2 – II. Perform Accuracy Test. C., Changed 2.2% to 2.0%

Page 3 – III. Accuracy Tolerance – Displacement Meters. B. 2., Changed 2.2% to 2.0%

Circulation Code	Filing Instructions
MEAS	FILE NUMERICALLY
MR	FILE NUMERICALLY IN VOLUME I, BEHIND TAB 9 METER PROVING

COMPLIANCE REQUIREMENTS

Dresser Model 5 prover falls under the same compliance requirements (California Public Utility Commission General Order 58A) as our current transfer prover.

Refer to SI 185.0345 Meters - Field Accuracy Testing (DIST, MEAS, MR).

A. GENERAL REQUIREMENTS

The Dresser Model 5 provers follow the same general requirement guidelines detailed in SI 185.0345.

B. RECORDS - FORMS

MARS has been modified to accept the final proof result of the 10M, Model 5 provers. Enter <u>% Error</u> result from the Model 5 prover software on the <u>Corr. Accy</u> line of MARS or Base Register order. ***It's very important that the <u>Prover ID</u> is entered on the work order.***

<u>Example</u>:

When the M&R clerk enters prover ID "10M01" into MARS, it will accept the final (corr. Accy) proof result without worksheet computations. When meter prover ID "7M 33" is entered, the order must have all data fields completed.

C. PREPARE MSA FOR FIELD METER TEST

1. Soap test MSA for leaks.
2. By-pass and blow down meter. (Refer to M&R Handbook, Misc. Tab. Pg. 10).

   PERFORM BUILD TEST

   With meter blown down, install an approved inches water column gauge on the meter. Close all MSA valves and observe gauge. If pressure builds this is an indication of an inlet or outlet valve leak.

   The Model 5 prover motors are not intrinsically safe. **If an inlet or outlet valve is leaking, repairs must be made before continuing with the Field Meter Test.** If repairs can not be made test the meter out of line.

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D. PERFORM FIELD METER TEST

1. Insure controller power switch is **OFF.**

2. FIELD DATA BOX

   Plug in military connector to connection labeled "field cable."

3. COMPUTER CONNECTION

   Connect 15 pin computer connector into side of controller box labeled computer cable and 9 pin connector into computer. Plug computer 110 power source into outlet on top of prover controller box.

4. AC POWER

   Plug female end of AC extension cord into prover controller box and male end into the generator or 110 AC outlet.

5. PRESSURE AND TEMPERATURE SENSORS

   Rotary meters:

   Remove existing 1/4-inch nipples and fittings from inlet and outlet meter taps on top of meter.

   Locate 1/4-inch brass adapter fittings provided with kit. Install inlet (yellow) differential hose and temperature sensor probe into inlet (upstream) tap. **Bottom out temperature probe and then pull up 1/4-inch.**

   Connect outlet (black) hose into outlet (downstream) tap. Connect other end of temperature and differential sensor lines into field data box.

   Diaphragm meters :

   Remove 1/4-inch plug from handhold plate. Install 1/4-inch brass adapter fitting with temperature inlet provided with kit. Connect inlet (yellow) differential hose and temperature sensor to adapter fitting. Insert temperature sensor. Leave outlet (black) differential hose open to atmosphere. **Bottom out temperature probe and then pull up 1/4-inch. Verify probe does not interfere with linkage.** Connect other end of temperature and differential sensor lines into field data box.

6. ID PULSER

Align and mount the ID pulser on the meter wriggler (remove Imac pulser if equipped). Plug ID pulser connector into field data box.

OPTICAL SCANNER

If proving an 8C LMMA series counter index rotary meter, see Attachment A for instructions on mounting optical scanner.

If proving a 1.5 through 11M LMMA series counter index rotary meter, see Attachment B for instructions on mounting optical scanner.

7. PROVER HOSE CONNECTION

Connect prover hose to an upstream meter tap and the purge connection of the prover.

8. Remove downstream prover tee plug.

9. Turn on controller power switch.

10. DATE AND TIME

Turn on computer. From Hard Disk menu, select date and time using arrow keys or number selection. If date and time is correct press [enter]. If either are incorrect, enter the correct time and/or date, then press [enter].

11. METER TYPE

Select type of meter being tested (rotary or diaphragm) by highlighting with arrow key and pressing [enter].

12. MATCH SERIAL NUMBERS

Verify master meter and software serial numbers match. (Master meter serial number is located on side of master meter.) If numbers match press [enter]. Do not continue if serial numbers do not match, software must match compatible prover.

13. PURGE METER

1. A purge and leak test must be performed before proving the meter. To purge the meter select, the following items in sequence from the Main Menu, F2, F5, F3 and F7.

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2. At the Meter purge routine screen select prover capacity (10M) and press [Enter]. Enter a value for flow rate high. Enter the maximum flow rate of the meter being tested (5000 cfh maximum) then press [Enter].

3. Enter zero for flow rate medium and flow rate low. Press [Enter] to save and start meter purge. Follow instructions on screen. For help press the F1 key. Verify ID pulser is aligned correctly on meter wriggler during purge. After meter has been fully purged of gas press Y to end purge process and return to Maintenance Menu.

15. LEAK TEST

1. Move prover hose to downstream prover tee. Re-install inlet plug, or close inlet system to atmosphere. Switch prover end of hose from lower (purge) connection to upper (prove) connection.

2. From the Maintenance Menu select F3 "Leak test". Enter the prover capacity (10M), then press [Enter] to save. Press Y to begin leak test. If leak test fails, find source of leak and make repairs. When leak test is complete, press F2 twice to continue. **Re-open inlet side of MSA to atmosphere.**

16. PROVING METER

Install diskette in floppy drive. From Main Menu select F2 (Select and run a pre-configured meter test). Select the type of meter being tested and press [enter]. Follow instructions on the screen.

The software is configured to run two open tests and one check test. Use the second open run for open test results. Refer to SI 185.0345, Meters - Field Accuracy Testing, DIST, MEAS, MR for meter accuracy tolerances and adjustments.

17. ACCURACY RESULTS

The meter accuracy result is at the bottom right hand corner of the [illegible]nputer screen under indicated by percent error. The result is positive unle[illegible] negative sign is in front of the number. (No plus sign if error is positive.)

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SAVE TEST DATA

18. When test is complete. press "S" to save, then press [enter].

Complete the following fields:

CUSTOMER NAME:	*Enter customers name*
LOCATION:	*Enter customer address*
OPERATOR NAME:	*Enter name*
FIELD METER TYPE	*Enter meter type*
FIELD METER SERIAL NUMBER:	*Enter meter number*
TEST SET-UP:	*Enter "as found" or "as left"*
COMMENTS:	*Enter account sec., seg. & acct. number*

20. When all fields are completed, verify "save" is highlighted and press [enter].

21. RE-TESTING METER AFTER ADJUSTMENT OR CLEANING

Diaphragm
Press F2 twice and select "as left" field for type of meter being proved. As left meter tolerance for diaphragm meters is +/- 0.5%.
Rotary
Press F3 and enter test flow rate for type of meter being proved.

23. EXIT PROGRAM

1. Press escape until prompted to exit the program. Remove disk from floppy drive when re-starting the computer at your next job.

2. Remove all components of Dresser prover when test is complete. Store in the protective box provided. Do not leave laptop computer or prover power on while traveling between jobs.

Appendix A

FIELD METER TESTING 8C LMMA SERIES ROTARY METERS

1. Remove the oil reservoir plug on the gear end of the meter (above the sight glass) with an allen wrench.

2. Locate the optical scanner mounting hardware provided with the kit and mount on the gear end of the meter.

3. Locate the optical scanner provided with the kit and connect to the mounting hardware.

   Rotate the meter until the oil slinger becomes visible through the opening. Line up the optical scanner so it's pointing directly at the oil slinger. Set the magnifier lens approximately 1-inch from case of meter.

4. Plug other end of optical scanner into the 8C adapter. Plug the 8C adapter into the field data box.

5. Adjust sensitivity pot (using blue plastic screwdriver) until the optical scanner red light pattern is focused on the oil slinger inside the oil reservoir. (May require several turns).

6. Begin the meter prove. If light on the sensitivity pot is not flashing as the meter is turning, adjust the sensitivity pot until it does. The 8C gear ratio is designed to rotate 2668 turns in 10 cubic feet. The light will flash at a very fast rate.

NOTE: If the sensitivity pot is adjusted incorrectly the test will continue to run past the 10 cubic foot sample. If this occurs the test is invalid. Re-adjust the sensitivity pot and re-run test. The test will not stop exactly at 10 cubic foot unless the meter is 0.0 % accurate, but should stop close to this number depending on the accuracy of the meter.

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Appendix B

FIELD METER TESTING 1.5 THROUGH 11M LMMA COUNTER INDEX ROTARY METERS

1. Locate the optical scanner mounting hardware provided with the kit and mount on the test hand end of the meter.

2. Mount the optical scanner mounting hardware on the end of the meter with the test hand.

3. Locate the optical scanner provided with the kit and connect to the mounting hardware.

4. Point the optical scanner magnifier lens directly at the white or black side of the test hand.

5. Plug the other end of the optical scanner into the ID pulser connection on the field data box.

6. Adjust sensitivity pot (using blue plastic screwdriver) until the optical scanner red light pattern is focused on the test hand. If the focused beam is on the black portion of the target, start with the sensitivity control fully counter-clockwise and slowly turn the control clockwise until the indicator light comes on.

   Note the position of the control.

   Move the white portion of the index into the focused beam and slowly turn the control counter-clockwise until the indicator light goes off. Note this position of the control.

   Midway between these two positions of the control is the optimum adjustment for this particular target set-up.

   NOTE: If the off and on settings are critically close together, aiming the light beam approximately 10 degrees from perpendicular will increase the adjustment range.

7. Begin the meter prove. If light on the sensitivity pot is not flashing as the meter is turning, adjust the sensitivity pot until it does. The light should pulse two pulses per revolution, one pulse for each half of the index.

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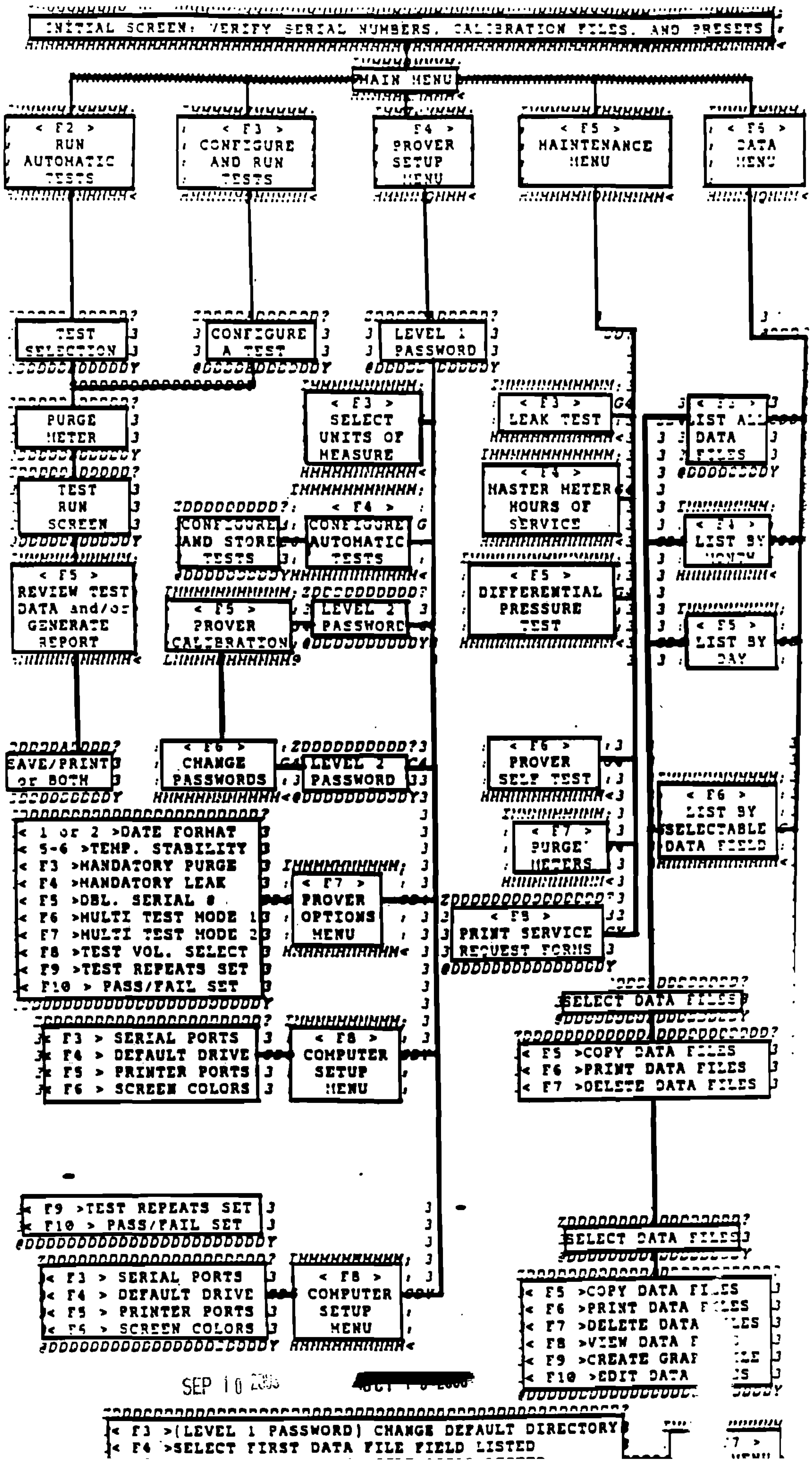

INITIAL SCREEN: VERIFY SERIAL NUMBERS, CALIBRATION FILES, AND PRESETS
MAIN MENU
< F2 > RUN AUTOMATIC TESTS
< F3 > CONFIGURE AND RUN TESTS
F4 > PROVER SETUP MENU
< F5 > MAINTENANCE MENU
< F6 > DATA MENU
TEST SELECTION
CONFIGURE A TEST
LEVEL 1 PASSWORD
PURGE METER
TEST RUN SCREEN
< F5 > REVIEW TEST DATA and/or GENERATE REPORT
SAVE/PRINT or BOTH
< F3 > SELECT UNITS OF MEASURE
< F4 > CONFIGURE AUTOMATIC TESTS
CONFIGURE AND STORE TESTS
< F5 > PROVER CALIBRATION
LEVEL 2 PASSWORD
< F6 > CHANGE PASSWORDS
LEVEL 2 PASSWORD
< F3 > LEAK TEST
MASTER METER HOURS OF SERVICE
< F5 > DIFFERENTIAL PRESSURE TEST
< F6 > PROVER SELF TEST
< F7 > PURGE METERS
< F8 > PRINT SERVICE REQUEST FORMS
LIST ALL DATA FILES
< F4 > LIST BY MONTH
< F5 > LIST BY DAY
< F6 > LIST BY SELECTABLE DATA FIELD
< 1 or 2 >DATE FORMAT
< 5-6 >TEMP. STABILITY
< F3 >MANDATORY PURGE
< F4 >MANDATORY LEAK
< F5 >DBL. SERIAL #
< F6 >MULTI TEST MODE 1
< F7 >MULTI TEST MODE 2
< F8 >TEST VOL. SELECT
< F9 >TEST REPEATS SET
< F10 > PASS/FAIL SET
< F7 > PROVER OPTIONS MENU
< F3 > SERIAL PORTS
< F4 > DEFAULT DRIVE
< F5 > PRINTER PORTS
< F6 > SCREEN COLORS
< F8 > COMPUTER SETUP MENU
SELECT DATA FILES
< F5 >COPY DATA FILES
< F6 >PRINT DATA FILES
< F7 >DELETE DATA FILES
< F9 >TEST REPEATS SET
< F10 > PASS/FAIL SET
< F3 > SERIAL PORTS
< F4 > DEFAULT DRIVE
< F5 > PRINTER PORTS
< F6 > SCREEN COLORS
< F8 > COMPUTER SETUP MENU
SELECT DATA FILES
< F5 >COPY DATA FILES
< F6 >PRINT DATA FILES
< F7 >DELETE DATA
< F8 >VIEW DATA F
< F9 >CREATE GRAP
< F10 >EDIT DATA
< F3 >(LEVEL 1 PASSWORD) CHANGE DEFAULT DIRECTORY
< F4 >SELECT FIRST DATA FILE FIELD LISTED

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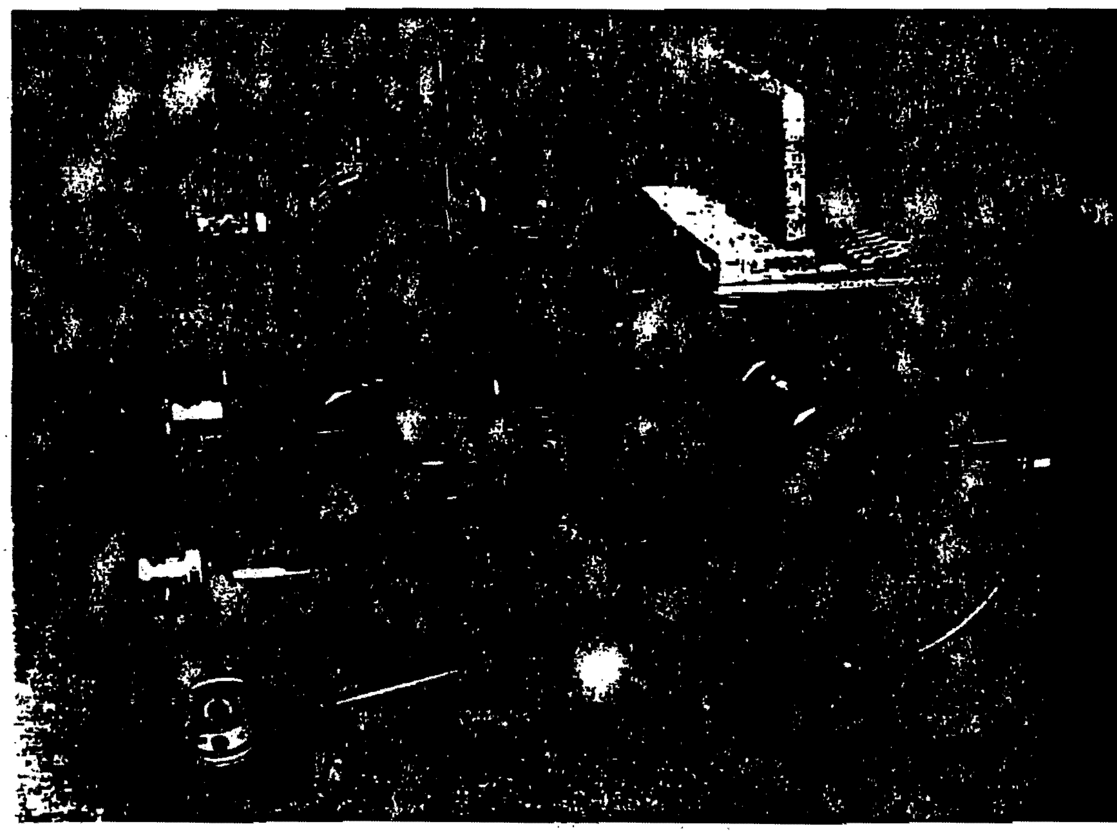
Model 5
ROOTS® Prover



Dresser Measurement

ROOTS DRESSER

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MODEL 5 ROOTS® PROVER

OVERVIEW

The Model 5 Portable Transfer Prover is an integrated, computer controlled system for gas meter verification and testing; with added provisions to test ROOTS meters equipped with the new Volume Correction Computer. The prover system consists of a *Master Meter* for the flow measurement, a *controller* for flow rate control, a *Computer Software Package* for calculations and presentation of the flow test data, and the required *Field Transducers* for the field meter to be tested. A personal computer is needed to run the prover software.

MODEL 5 PROVER INNOVATIONS

- ✔ The Computer software can be used on a laptop for field use or a desktop for shop use. Its user-friendly menu prompts the operator through each step of the Field Meter test procedure.
- ✔ Test air flow rate is automatically controlled by varying blower speed and automatic valve control.
- ✔ Reduced noise level due to lower blower speed requirements.
- ✔ All calibration is accomplished, using pressure and temperature standards, via the Computer software.
- ✔ Protected (password) provisions for factory and/or field recalibration of the system.
- ✔ Stores up to forty predetermined field meter test configurations for a near fully automated test sequence. More test configurations can be stored by copying a new set into the current directory.
- ✔ Includes provisions to store up to 200 test runs and has the ability to print each test run on a standard printer that is equipped with a parallel port.
- ✔ Automatically sets and controls the blower motor(s) speed.
- ✔ Automatically controls the start and stop of the test run.
- ✔ Interfaces directly to the ROOTS Volume Correction Computers, and can be used to test any displacement meter up to the prover's maximum flow capacity.

THE COMPUTER SOFTWARE PERFORMS THE SMART FUNCTIONS OF THE SYSTEM AS FOLLOWS:

- Prompts operator on how to initiate a preconfigured automated test run or to make the manual data entries required to perform the test run.

- Verifies that all temperature transducers are properly connected and yielding reasonable values.

- Automatically zeros the meter pressure readings at the beginning of the first test run.

- Exchanges data and control information with the Controller.

- Performs all calculations during the test run to display test data and verify that the data is reasonable.

- Performs all calculations at the end of each test run to display Field Meter accuracy and build the report file.

- Provides a protected setup screen which permits selection of the engineering units (English and/or Metric) to be used to display and store test data.

- Provides a protected setup screen which allows the entry of preset configuration data for up to forty meter tests.

- Runs sequence of pre-configured meter tests.

- Provides a protected setup screen which guides a technician through the factory or field calibration of the system.

- Has extensive help screens for operator assistance.

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Sample Test Report

ROOTS MODEL 5 PROVER TEST REPORT File Name: 0610140L

Plant Location: DRESSER MEASUREMENT DIV. DRESSER IND. Date: 6/10/199
LOCATION: HOUSTON, TEXAS U.S.A

OPERATOR'S NAME or ID: BILLIE STAGG

MASTER METER TYPE: 10M
MASTER SERIAL #: 4A

FIELD METER TYPE: 5M ROOTS ROTARY
FIELD METER SERIAL #: 8816096

DRIVE RATE or PULSES/TEST: 10 cf
METER OUTPUT: UC

TEST SETUP: IN TEST
SPAN TEST RESULT: PASS þ1.2(

COMMENTS: EXAMPLE TEST REPORT OF THE ROOTS PROVER.

Test Completed: (Hrs:Min:Sec)	13:48: 0	13:49:25	13:51:56	13:53:21	13:55:59	13:57:2
FLOW RATE: (acfh)	4973	4975	2485	2490	500	499
TEST VOLUME: (cf)	100.00	100.00	50.00	50.00	10.00	10.00
Ambient Pressure: (psia)	14.778	14.778	14.778	14.778	14.778	14.77
Master Temperature: (½F)	75.6	75.6	75.6	75.6	75.6	75.6
Master Pressure: (inch)	-2.446	-2.423	-0.651	-0.652	-0.073	-0.073
Master Differential: (inch)	0.718	0.721	0.253	0.251	0.035	0.036
Master Volume: (cf)	100.89	100.93	50.29	50.31	10.05	10.05
Meter Temperature: (½F)	75.0	74.9	75.2	75.0	75.3	75.3
Meter Pressure: (inch)	-0.139	-0.140	-0.034	-0.037	-0.000	-0.000
Meter Differential: (inch)	1.197	1.184	0.339	0.337	0.078	0.081
Test Duration: (Hrs:Min:Sec)	0: 1:12	0: 1:13	0: 1:12	0: 1:12	0: 1:12	0: 1:1
UPPER PASS/FAIL LIMIT:	+0.60	+0.60	+0.60	+0.60	+0.60	+0.60
LOWER PASS/FAIL LIMIT:	-0.60	-0.60	-0.60	-0.60	-0.60	-0.60
% Pressure Correction:	-0.563	-0.558	-0.151	-0.150	-0.018	-0.018
% Temp. Correction:	-0.114	-0.133	-0.082	-0.106	-0.053	-0.057
% Uncorrected Proof:	100.49	100.53	100.24	100.27	100.32	100.[illegible]
% Corrected Proof:	99.81	99.83	100.00	100.02	100.25	10[illegible]
% Accuracy:	100.19	100.17	100.0	99.98	99.75	99.76
% Error:	0.19	0.17	-0.00	-0.02	-0.25	-0.24

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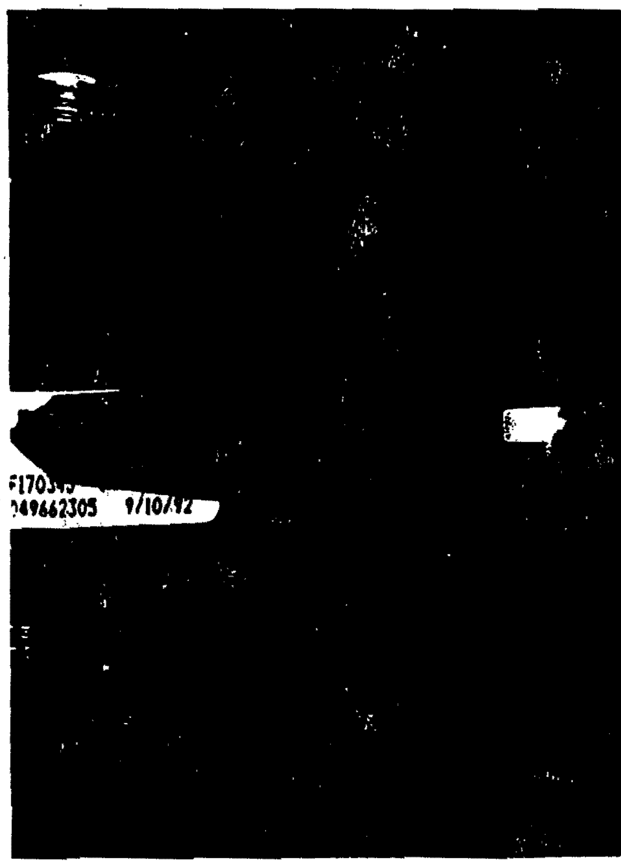
REPORTS

As each test run completes, the computer builds a *report* file for the field meter being tested and stores it on disk memory for print out or display. The report is made up of two parts, the fixed format and the variable data with appropriate decimal points. The report can be custom configured for desired layout.

OPTIONS



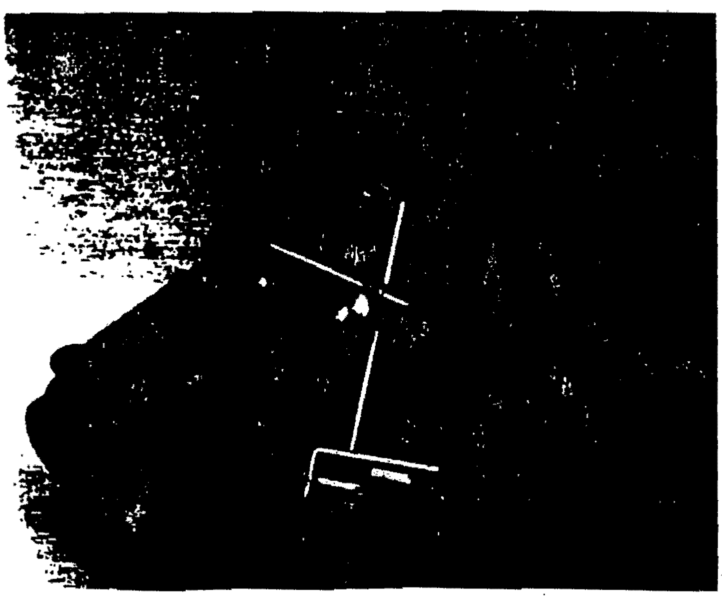
BAR CODE READER

The Bar Code Reader consists of an optical sensor, digitizing electronics, a decode microprocessor and an output line driver. The case is an epoxy coated, textured metal case with O-ring seals at each end, with a bend and strain relief for the cord, and a sapphire tip. The output of the reader is serial ASCII data. The Bar Code Reader requires its own serial port.

The following bar codes can be read: Code 39, Interleaved 2 of 5, UPC/EAN/JAN, Codabar, Code 128, Code 11 and MSI Code.

The Bar Code Reader features a Configuration Display Screen, which allows the user to see the current status of the Reader's functions.

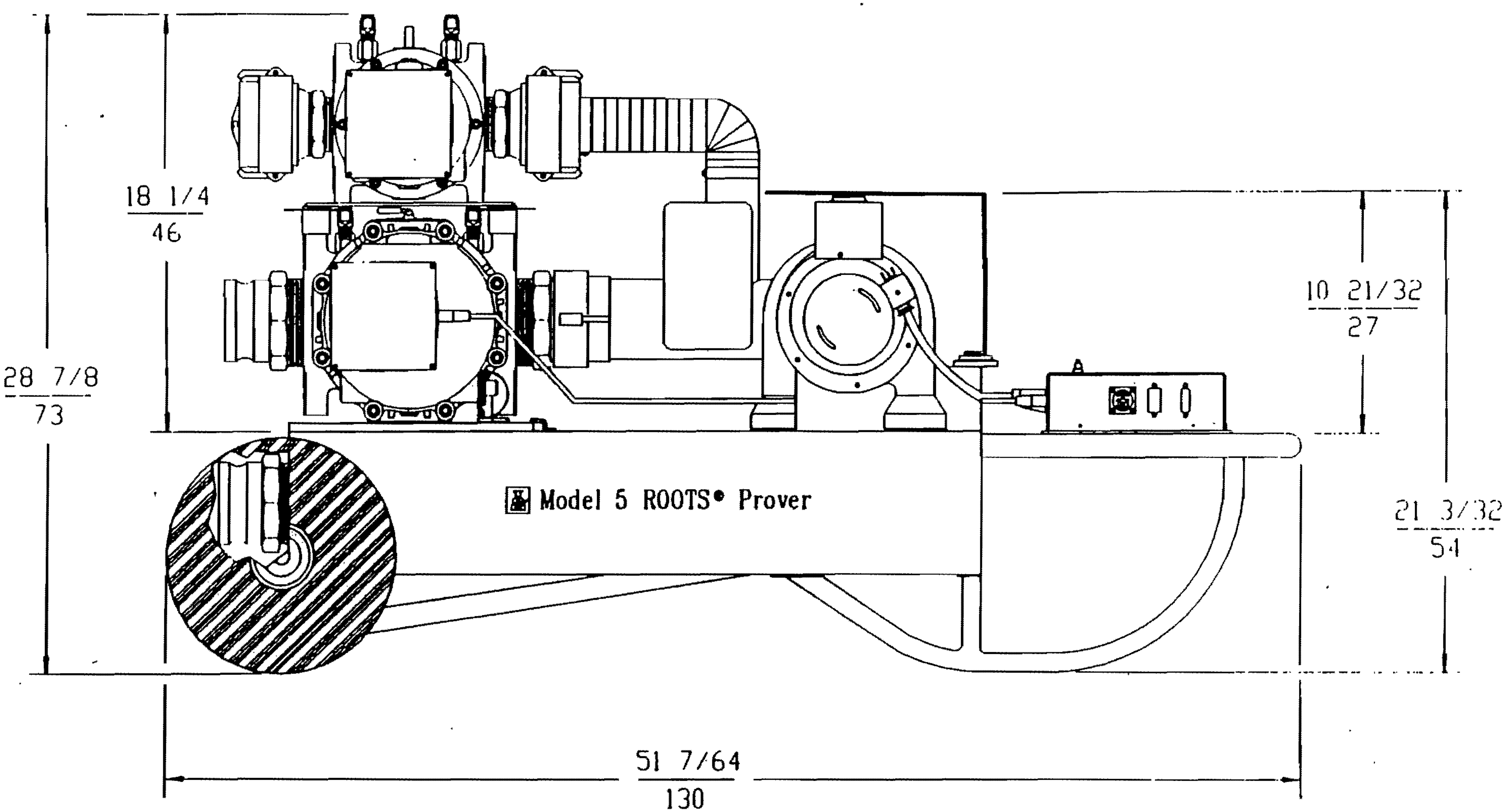
The Bar Code Reader requires no periodic maintenance.



RS-45 SCANNER

The RS-45 Scanner can be used with both the Model 4 and Model 5 Provers. The fiber optic sensor responds to both low and high frequency signals. It replaces the pulser in the automatic mode and starts and stops a test at the beginning and end of a known test volume.

The sensor can be focused on a sweep dial pointer or on a black-and-white dial that represents a known volume.



NOTES:
UPPER DIM. ARE ENGLISH inches
LOWER DIM. ARE METRIC cm

2/92 | D052293 01

SPECIFICATIONS (excluding Computer)

Accuracy:	+/- 0.55%
Repeatability:	+/- 0.10%
Ambient Operating Temperature:	Master Meter: +32° to +140° F
	0° to +60° C
	Controller, etc.: -4° to +140° F
	-20° to 60° C
Ambient Storage Temperature:	Master Meter: -40° to +140° F
	-40° to 60° C
	Controller, etc.: -40° to +185° F
	-40° to 85° C
Humidity:	up to 95 percent non-condensing
AC Power:	
Blower :	120 or 240 volts +/-15%, 48 to 62 hertz
Electronics:	120 or 240 volts = +/-15%, 48 to 62 hertz
Blower Capacity:	
Single:	0 to 7,200 ACFH at 10 inch differential
	0 - 200 m^3/h at 25 millibar differential
Dual:	0 to 14,400 ACFH at 10 inch differential
	0-400 m^3/h at 25 millibar differential
Compliance:	Meets FCC Part-15 requirements
Test Medium:	Air
Test Flow Rate:	
10M Master Meter	100 - 10,000 ACFH
	11 - 283 m^3/h
2M Master Meter	35 - 2,000 ACFH
	1 - 57 m^3/h
Safety Rating:	Complies with Underwriters Laboratory Requirements

Contact factory for alternate power source requirements.

Minimum Computer System Required

- MS-DOS (IBM Compatible) - version 3.2 or greater
- 8088 Processor, 286 or higher recommended
- 640K Ram
- 1.44 MB floppy disk or hard drive, hard drive recommended
- 1 parallel port for printer operation
- 1 RS-232 serial port (2 if bar code option is selected)

Software Supports:

- Color selection
- 2 serial ports - COM1 & COM2
- 2 parallel ports - LPT1 & LPT2
- IBM Extended Graphics Character Set
- Drive A - F through DOS

SEP 10 2003

Dresser U. K. Ltd.
Ruffort Court, Hardwick Grange
Warrington, Cheshire, WA1 4RF, England
925-814545

Dresser Measurement
P.O. Box 42176
Houston, TX 77242
713/972-5000

Dresser Europe, S.
Industrieterrein
5980 AD Panningen, N ands
Phone: 4760-7

IOM:PRVR—MOD5
May 1995

Model 5 ROOTS® PROVER

Installation & Operation Manual

DMD DRESSER

DMD Dresser
Measurement Operation
Houston, Texas USA 713-972-5000

Model 5 ROOTS® PROVER

Installation & Operation Manual

SPECIFICATIONS (excluding Computer)

Accuracy:	+/- 0.50%
Repeatability:	+/- 0.15%
Ambient Operating Temperature:	Master Meter: +32° to +140° F
	0° to +60° C
	Controller, etc.: -4° to +140° F
	-20° to 60° C
Ambient Storage Temperature:	Master Meter: -40° to +140° F
	-40° to 60° C
	Controller, etc.: -40° to +185° F
	-40° to 85° C
Humidity:	up to 95 percent non-condensing
AC Power:	
Blower :	120 or 240 volts +/-15%, 48 to 62 hertz
Electronics:	120 or 240 volts = +/-15%, 48 to 62 hertz
Blower Capacity:	
Single:	0 to 7,200 ACFH at 10 inch differential
	0 - 200 m^3/h at 25 millibar differential
Dual:	0 to 14,400 ACFH at 10 inch differential
	0-400 m^3/h at 25 millibar differential
Compliance:	Meets FCC Part-15 requirements
Test Medium:	Air
Test Flow Rate:	
10M Master Meter	100 - 10,000 ACFH
	11 - 283 m^3/h
2M Master Meter	35 - 2,300 ACFH
	1 - 57 m^3/h
Safety Rating:	Complies with Underwriters Laboratory Requirements
Generator Capacity Required:	3 KVA

Minimum Computer System Requirements

- MS-DOS (IBM Compatible) - version 3.2 or greater
- 640K Ram
- 1.44 MB floppy disk or hard drive
- 1 RS-232 serial port (2 if bar code option is selected)

DMD Dresser Measurement Operation
Houston. Texas • 713-972-5000

Model 5 ROOTS® PROVER
Installation & Operation Manual

Preface: These instructions were written for a person that is familiar with:

- basic operations of a computer
- basic MS-DOS commands

There are a number of computer brands, models, features, and configurations that will operate the Model 5 ROOTS® Prover software. Each computer has unique requirements, making it difficult to give specific installation instructions. The computer dealer or computer manufacturer is the best source for information concerning how to set up your computer for normal operation.

NOTE: Your computer may have memory-resident programs loaded into the internal RAM. These programs may interfere with the operation of the prover software. You may remove the memory-resident programs or boot the computer from the A:\ drive by using a DOS System Disk to alleviate the problem.

Make a backup copy of your prover software before you run the installation program.

The MODEL 5 ROOTS® PROVER system works using an MS-DOS 100% IBM compatible computer with DOS version 3.2 or higher and at least 640k of internal RAM. The software runs the fastest and stores the most information on a computer equipped with a hard disk.

Installing the Software
The INSTALL.EXE program allows the operator to easily accomplish a hard disk installation into the C:\MODEL5 subdirectory from either the A:\ or B:\ drive.
DOS should be in the path statement.

Hard Disk Installations: Change to A: or B: drive and type "install". Read and follow instructions for installation software. Do not swap disks until prompted to do so.

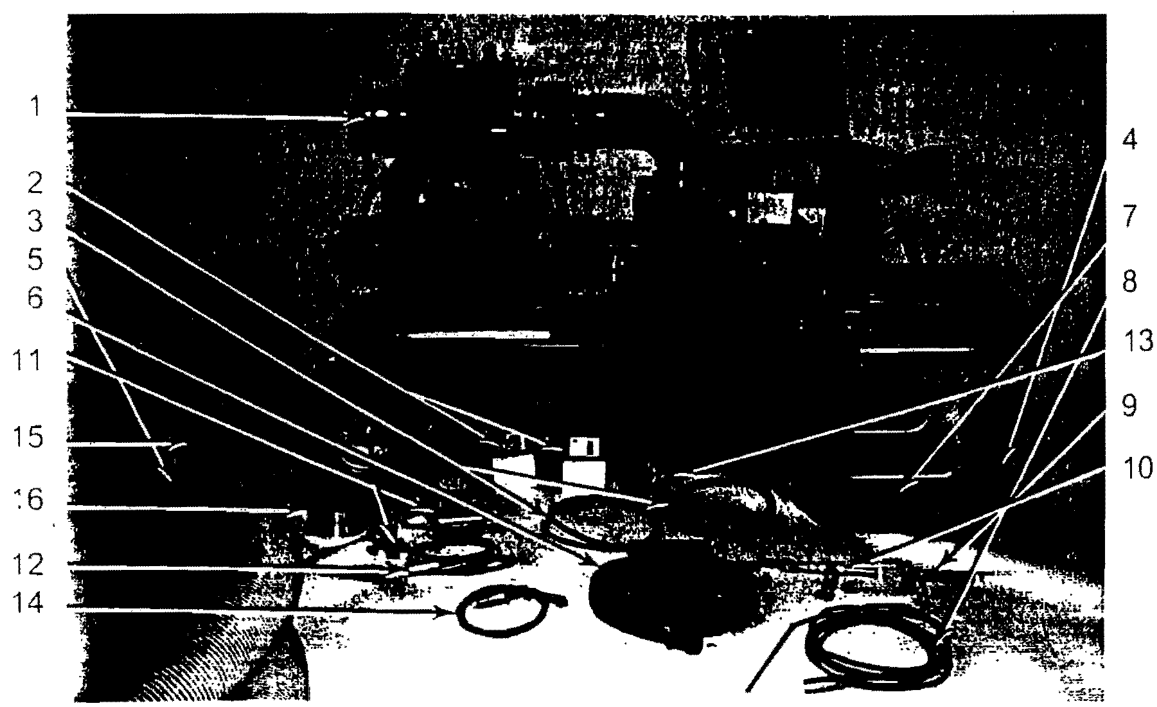
When the software is installed, the install program will automatically change the current drive to the C:\MODEL5 subdirectory. A message, "Type PROVER1.EXE to start the MODEL 5 Prover Program" will then be displayed. At the DOS prompt "C:\MODEL5" type "PROVER1" then press the < ENTER > key to start the prover software. The initial prover screen will appear.

Read the entire computer screen and follow the instructions for verifying the master meter serial numbers. If the serial numbers on the computer screen do not match the serial numbers stamped on the master meters, contact DMD Measurement's Customer Service Department at 1-800-521-1114 or 713-972-5000 before continuing. If the serial numbers do match, exit the software now by pressing the < ESC > key on the computer keyboard and turn the computer off.

Uncrating the ROOTS® PROVER and Accessories

Inventory the PROVER as delivered. Check for damage and compare the items in the crate with those listed below. You should find:

Prover Assembly
1: prover cart with master meter(s), blowers and controller
Accessories
2: two 3-1/2" disks - (prover software) located in the lid of the black accessory case behind the foam padding
3: two 1/4-inch pressure line connections with fittings to connect field meter junction box and the meter to be tested
4: 25-foot power extension cord
5: 25-foot flexible prover hose
6: 30-foot field meter cable attached to a field meter junction box assembly
7: 25-foot computer data cable
8: field meter temperature probe
9: field meter pressure adapter
10: field meter pressure and temperature adapter with plug fitting
11: instrument drive pulser with two mounting ears
12: field pulser cable (4 feet)
13: expandable hole plug
14: manual start/stop cable and switch
15: tool box
16: dust plug for leak test



Prover Connections

When you're ready to test a field meter, press < F1 > twice to access the Help Directory and highlight the *Connecting the Prover* selection.

STEP 1: Make sure your computer and controller are off before you begin making connections. Remove the shipping covers from the 25-foot flexible hose quick disconnect nipples located on the master meter(s) and on the blower exhaust nipple located by the cart's axle.

STEP 2: Make certain the master meter pressure line fittings are attached to the controller.

STEP 3: Verify that the 1/4-inch pressure line, labeled outlet on the controller, is routed to the master meter's outlet pressure tap. The prover draws air into the blowers via a connection to the outlet side of the meter.

STEP 4: Verify that the 1/4-inch pressure line, connected to the controller at the inlet pressure fitting, is routed to the inlet pressure tap of the appropriate master meter.

STEP 5: Connect the master meter cable between the controller and the appropriate master meter junction box.

STEP 6: Test all four pressure line fittings by grasping the pressure line between the thumb and forefinger and attempting to rotate the pressure line in the fitting. Do not bend or crimp the pressure line. A small adjustable wrench may be required to tighten the fitting. Do not over-tighten the fittings.

STEP 7: Unpack the field meter junction box. It has two 1/4-inch pressure line fittings, and two electrical receptacles labeled "volume" and "temperature", that will be used to connect to the field meter to be tested.

STEP 8: Connect the 30 ft field meter cable by inserting the 12-pin circular AN connector to its mating connector on the controller labeled meter cable by aligning the slots of the two circular mating connector housings and rotating the metal sleeve of the cable connector end clockwise until the connectors are mated.

STEP 9: Attach the two remaining 1/4-inch pressure lines to the field meter junction box fittings.

STEP 10: Attach the field meter temperature probe to the field junction box labled "Temperature".

STEP 11: Connect the field meter 'ID' pulser to the field junction box labled "Volume". <u>NOTE</u>: The manual Start/Stop cable & the optional optical scanner also attach at the "Volume" input.

STEP 12: Unwind the 25-foot computer cable.

STEP 13: The 15-pin connector attaches to the controller at the connector labeled computer cable. It is advisable to fasten the connector by turning the connector hood fastening screws a few turns. Connect the other end of the computer cable to the COM1 serial port of your computer.

STEP 14: Unwind the 25-foot power extension cord. Plug the male end into a 110 Volt, 60 Hz power source (220 Volt, 50 Hz if the prover has this option). With the controller power off, plug the female end of the power extension cord into the recessed male electrical socket in the side of the controller (closest to the end of the carts handle).

STEP 15: Turn on the controller power switch.

Testing a Field Meter

The procedure below outlines the basic steps to run a prover test. All selections are made from the main menu of the Model 5 Prover Software. Use the help files to guide you through your prover test. The software was designed to be self-explanatory. If you have any questions that are not answered in the help files, contact our Customer Service Department at 713-972-5000 or 1-800-521-1114.

When you are ready to test a field meter, press <F1> twice to access the help directory and highlight the "Configuring Tests" selection. Run the field meter test as follows:

STEP 1: Select <F3> "Configure and Run a Meter Test" from the Main Menu

STEP 2: "Prover Capacity" determines the proper master meter used for the specified field meter test. **CAUTION: Do not select a field meter flow rate that exceeds the maximum flow rate capacity for the master meter or an over speed condition may occur.**

STEP 3: Select the "Test Control Mode" which determines the proper hardware that will initiate the start & stop sequence of a specified test. Options are: "ID" for the instrument drive pulser supplied with the system; "OPTO" for the optional optical scanner; "MANUAL" for the manual start/stop switch supplied with the system.

STEP 4: Determine the proper "METER OUTPUT." Options are "UC" for testing the uncorrected meter output; "TC" for testing the temperature compensated meter output; "PC" & "PCTC" for meter outputs offering pressure and pressure/temperature compensation.

STEP 5: Select the correct "DRIVE RATE" used with the instrument drive pulser. The instrument drive rate for ROOTS® rotary gas maters is 10 cubic feet per revolution for 8C through 11M and 100 cubic feet per revolution for the 16M. For the optical scanner mode, select the number of pulses per test volume.

[redacted]

STEP 7: Select the open and check flow rates for the test sequence. The maximum test set-up allows two tests at three different flow rates.

NOTE: In order to have more flexibility with the test parameters, access the <F4> "Prover Setup Menu" from the "Main Menu." Enter the correct password (default is "ROOTS"). Select <F7> "Prover Options Menu." Select the appropriate options to satisfy test requirements.

STEP 8: Select "Save" to start the test procedure. The system will pass a three second test of the controller operation. The system will warn of any physical electrical configuration errors at this time. (e.g. "Controller Power Off").

STEP 9: Verify that the meter under test has been purged of any volatile gases prior to starting the test. Answer "Y" to start the blowers and run the specified test sequence.

Printing Help Files

To print help files:

- From C:\ prompt go into Model5 subdirectory (cd\MODEL5)
- Type HLP_PRNT.BAT (Press keys slowly to avoid skipping any files)

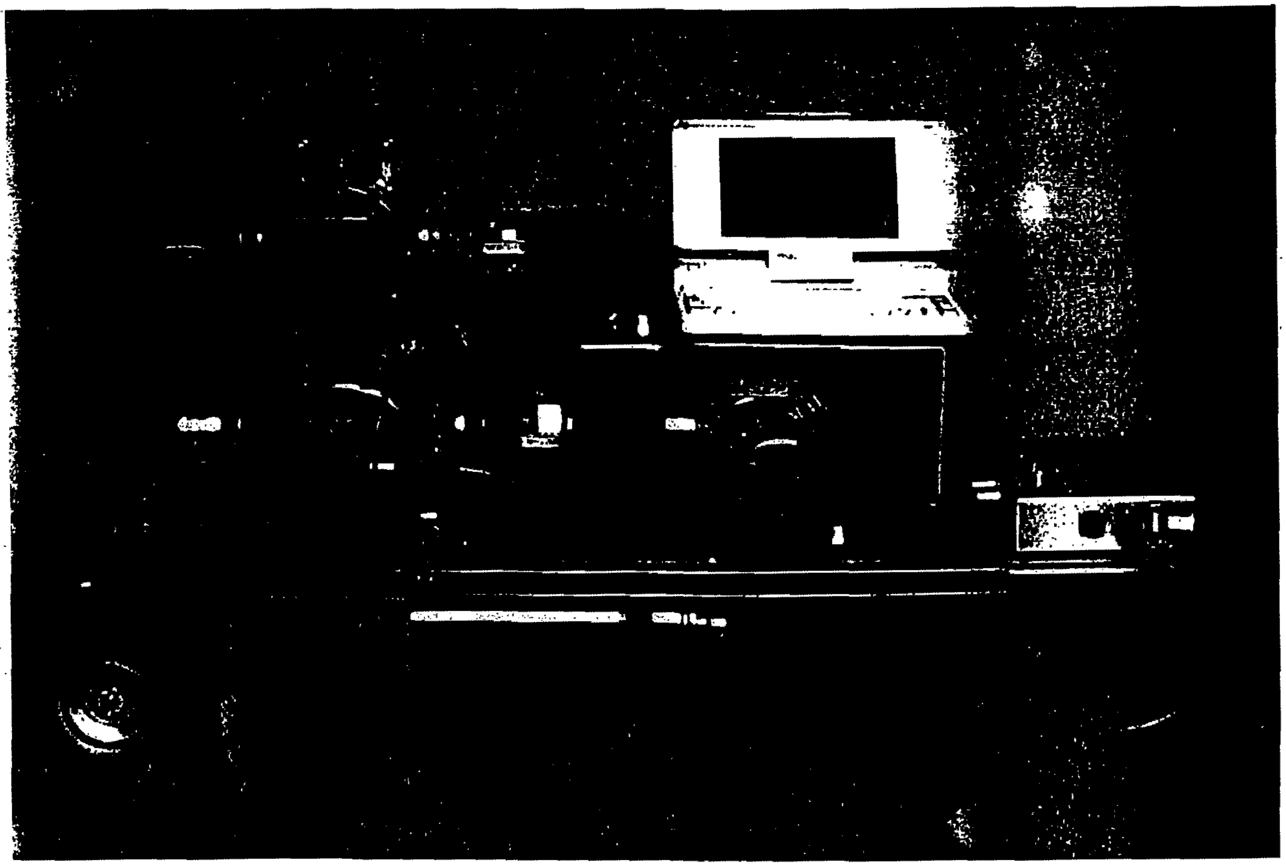
Passwords

Ist level password:	ROOTS (all caps)
2nd level password:	DRESSER (all caps)

Passwords can be changed through the Prover Setup Menu.

DMD Dresser recommends a minimum test duration of 30 seconds
Use these equations to determine the minutes required to run a prover test:

$$\frac{\text{CFH}}{60\ (\text{Min./Hr.})} = \text{Vol./Min.} \qquad \frac{\text{ID Drive Rate}}{\text{Vol./ Min.}} = \text{Test Time (Min.)/Vol.}$$



For additional information, please contact our general offices:

DMD DRESSER

MEASUREMENT OPERATION

Post Office Box 42176
Houston, Texas, USA 77242
Phone: 713/972-5000 Fax: 713/972-5003

DRESSER UK LTD.

Warrington Operations
Rufford Court, Hardwick Grange
Warrington, Cheshire WA1 4RF
Phone: 01925-814545 Fax 01925-816128

DRESSER INDUSTRIAL PRODUCTS B.V.

Industrieterrein 4 - NL 5981 NK
P.O. Box 7163 - NL 5980 AD
Panningen, The Netherlands
Phone: +31 4760-77122 Fax: +31 4760-76494

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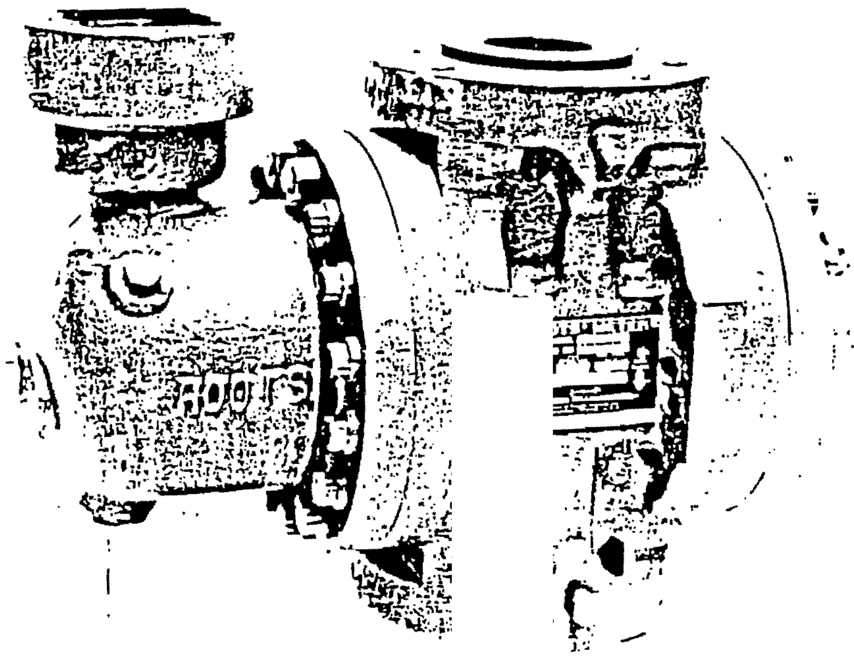
IRM-HP-LM
Planetary
REVISION 2 9/79

Rotary Positive Displacement

ROOTS® METERS

INSTALLATION OPERATION MAINTENANCE



2M90

LINE-MOUNTED MODELS 2 .6M900/3M & 7M1440
With Planetary (leduction

TABLE OF CONTENTS

WARRANTY

Dresser Measurement Division, Dresser Industries, Inc. (herein referred to as the Company) agrees to supply equipment of good design and of first class material and workmanship. In the event of any defect of material or workmanship, the Company will repair F.O.B. place of manufacture, or furnish without charge place of manufacture, similar part or parts which, within one year after their shipment, are proven to have been so defective at the time of shipment, provided the Purchaser gives the Company immediate written notice of such alleged defects. Except as herein provided, there are no other warranties, either expressed or implied (including without limitation, the implied warranties of merchantability and fitness for particular purpose), and any such warranties are hereby expressly disclaimed. The Company, except in case of gross or willful negligence, shall not be liable for any damages for cause or reason whatsoever, either direct, indirect, special or consequential, arising out of any contract or from the operation or failure properly to operate of any apparatus or equipment sold. No allowance will be made for repairs or alterations unless

3 YEAR WARRANTY

Notwithstanding the preceding, warranty claims involving new Rotary Positive Displacement Gas Meters shipped after January 1, 1980, and used only to measure gas volumes in a permanent installation may be made within three (3) years from shipment, with the one exception of newly designed products first sold after January 1, 1980. These new products will be considered for inclusion from time to time. A complete list of products covered by this extended warranty is available by writing our general offices.

NOTE: Information in this manual is correct as of the date of publication. The manufacturer reserves the right to make design or material changes without notice, and without obligation to make similar changes on equipment of prior manufacture.

ROOTS DRESSER

General Offices
DRESSER MEASUREMENT DIVISION
DRESSER INDUSTRIES, INC.
Post Office Box 42176
Houston, Texas 77042
Phone: (713) 972-5000

In Canada
INDUSTRIAL PRODUCTS DIVISION
DRESSER INDUSTRIES CANADA, LTD.
6688 Kilimat Road
Mississauga, Ontario, L5N 1P8, Canada
Phone: (416) 826-8411

In United Kingdom
INDUSTRIAL SPECIALTY PRODUCTS DIVISION
DRESSER EUROPE, S.A.
29-31 Hardwick Grange
Warrington, Cheshire, WA1 4RF, England
Phone: Padgate (0925) 814545

In Europe
DRESSER MANUFACTURING DIVISION
DRESSER EUROPE, S.A.
Post Office Box 7036
Helden-Panningen, Netherlands
Phone: 04760-2929

GENERAL INSTRUCTIONS

Series HP-LM rotary gas meters are precision type measuring instruments, operating on a simple principle as described in this manual. Although of very rugged construction, they should be given reasonable care in handling and storage. It is highly important that a meter not be dropped, or have heavy objects fall on it. Therefore, to realize the maximum service and accuracy built into these meters, it is recommended that the general policies outlined here be followed.

1. Do not accept a shipment that shows evidence of mishandling in transit without making an immediate inspection for damage to the meter. File a claim with the Carrier if damage is indicated, and notify the nearest District Sales Office.

2. Since damage to internal working parts can exist without obvious external evidence, it is advisable to check *all* new meters for free rotation soon after arrival. This simple procedure is described under INSTALLATION.

3. When a meter is not to be tested or installed immediately, store in a dry location and protect against damage. Use the original shipping container, keeping it horizontal with the arrow pointing up. Do not put oil in the two end cover sumps. Do not remove tape covers from meter openings. The tape over the gas inlet connection has a "Demoist" wafer attached inside, intended to provide a reasonable protection for internal surfaces against atmospheric moisture for about one year.

4. Although oil is drained from these meters at the Factory, a small quantity will remain on various surfaces and collect in the two sumps. When the meters are not kept horizontal during shipment or general handling, this oil can pass along the shafts and enter the metering chamber. It is recommended that, prior to performance testing or installation, each meter be properly filled with oil and windmilled for about two minutes at a speed near the maximum rating. The flow can be achieved by injecting controlled compressed air from a nozzle into the open meter inlet connection. During this operation flush about 2 ounces of solvent through the meter. Note: The above speeds correspond to approximately 3.3 rpm (2M900 and 3M1440) and 7.7 rpm (4.6M900 and 7M1440) respectively, taken at the instrument drive shaft.

   After the above run conduct a Starting Differential Test. Connect an inclined water gauge to the two meter pressure taps, and pipe a controlled supply of low pressure air to the meter inlet. Observe the differential pressures required to start the meter rotating, making tests with the impellers starting from six different positions. Any reading above 0.1" W.C. indicates there is either a bind from dirt or the meter needs to be windmilled further.

   Following these operations, drain the oil if meter is to go into installation or storage. The oil may remain if a proof test is to follow, but make sure meter is not tipped during handling.

5. Should any serious trouble appear during installation or initial operation of a new unit, notify the nearest District Office. Do not attempt repairs or adjustments, since doing so will be a basis for voiding the Warranty.

6. When contacting a Sales Office with a problem, give meter Model and Serial Number, location, and a brief outline of the problems. Include gas type, pressure and flow characteristics if involved.

DESCRIPTION AND CHARACTERISTICS

The Series HP-LM meter is a positive displacement rotary type device for continuously measuring and indicating the volume flow of a dry gas in a pipe line. It is not suitable for handling liquids, and its operation can be affected by excessive dirt or other foreign materials in the gas stream. Actual volume measurement—displaced volume—is completely independent of gas specific gravity, temperature or pressure. Correction of displaced volume indication to volume at standard conditions of temperature and pressure is easily accomplished by application of the Basic Gas Laws. Volumetric accuracy of any rotary positive type meter is permanent and non-adjustable, because its measuring characteristics are established by the dimensions and machined contours of non-wearing fixed and rotating parts.

A rotary type meter consists principally of two contra-rotating impellers of two lobe or "Figure 8" contour, operating within a rigid casing having inlet and outlet gas connections on opposite sides. Impeller contours are mathematically developed and accurately produced, and are of such form that a continuous seal without contact can be obtained between the two impellers at all positions during rotation. To accomplish this the correct relative impeller positions are established and maintained by precision grade timing gears. Similar line seals also exist between the impeller lobe tips and the two semicircular parts of the meter casing and minimum clearances are provided between the ends of the impellers and the headplates. Thus, the inlet side of the meter is always effectively isolated from the outlet by the impellers.

Maximum static working pressure of the meters is indicated on the meter nameplate. They should not be installed where line pressures can exceed this figure. However, line pressure has no significant effect on accuracy of measurement, and the meters may be used satisfactorily on pressures down to a few ounces.

Maximum operating pressure is determined by the dynamic loads on the mechanical parts of the meter at its rated speed. For Series 900 LM meters this pressure is 1200 PSIG for 0 to 50% of rated flow, 900 PSIG for 50 to 66.5% of rated flow, and 300 PSIG for 66.5 to 100% of rated flow. The Series 1440 LM meters may be used at 100% of rated flow up to 1440 PSIG. Meter capacity ratings are listed in Table 1 on page 2.

CONSTRUCTION

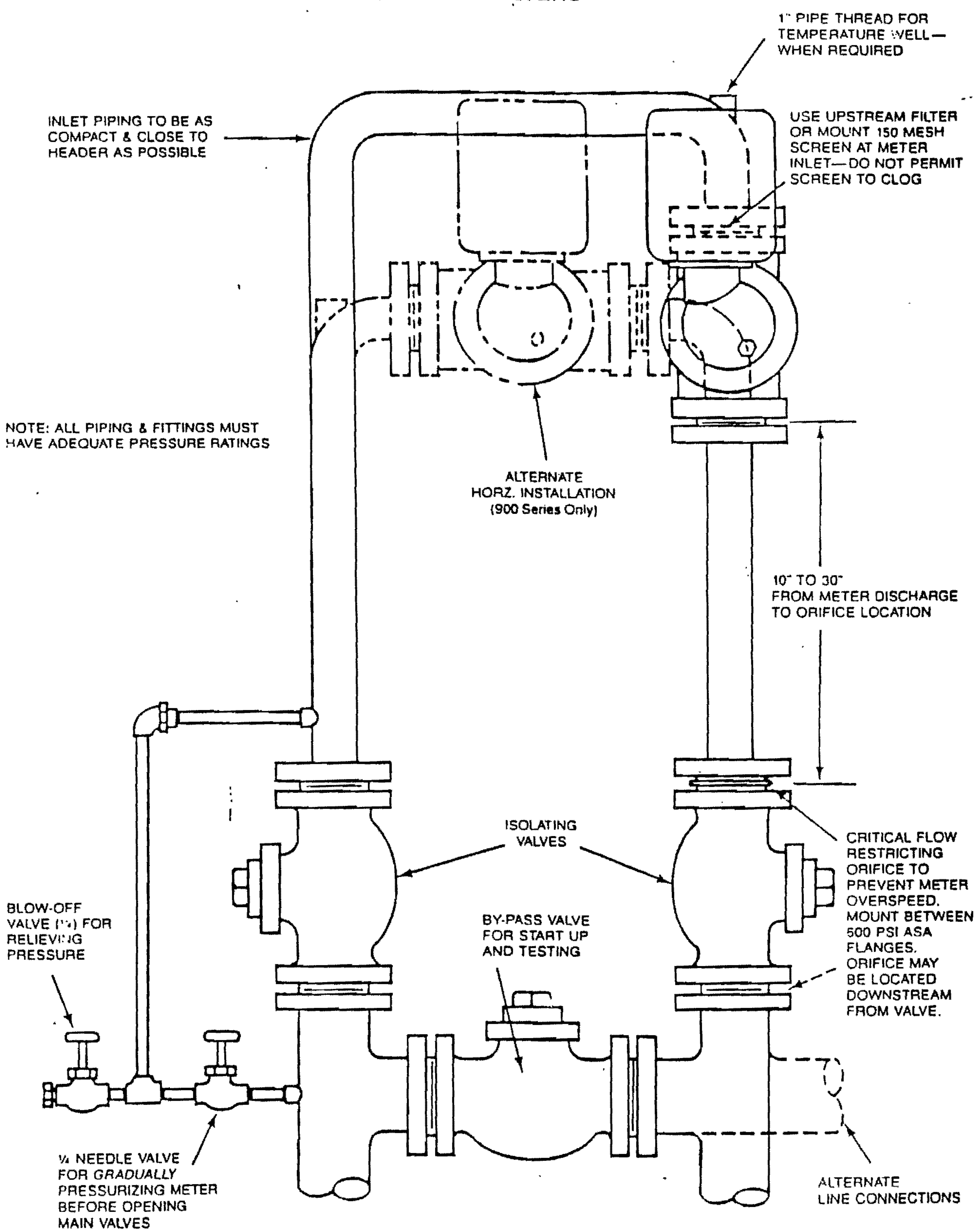
The Series HP-LM gas meters are manufactured with 2" and 3" ANSI 600 lbs., ¼" raised face flanges, and are intended for handling air or clean, dry common gases at flows within the listed ratings. Their construction is standardized as to arrangement and materials, as described hereafter. They are *not suitable* for service in metering acetylene or oxygen because some of the construction materials used are not compatible with these gases.

The meter cylinder, is a one-piece steel casting. Inlet and outlet gas connections are cast integral with the cylinder, and its flanges match ANSI 600 lb. standard steel pipe flanges.

The metering chamber is closed at the ends by headplates and domed gas tight cast steel end covers. This assembly is bolted and sealed with O-rings.

All rotating parts are carried by the two headplates. The 2M900 and 3M1440 precision machined impellers and shafts are cast integrally of ductile iron. The 4.6M900 and 7M1440 impellers are precision machined of [illegible]

INSTALLATION ARRANGEMENT FOR LINE-MOUNTED HIGH PRESSURE METERS



vatively rated ball bearings at each end. Necessary small operating clearances between impellers are maintained by a pair of precision steel timing gears, pinned to the shafts at one end. Shaft bearings at this end are located outboard of the gears, and are clamped securely to the headplate to maintain axial placement of the impellers and control end clearances.

LUBRICATION

Gears and bearings at each end of the meter are continuously lubricated with oil by dip and splash, the oil being supplied from independent primary sumps formed by the two end covers. Each sump is provided with a bull's eye type sight glass and with plugged filling and draining holes. From the primary sump oil is metered through a small orifice into secondary sump, and all excess splash returns to the primary sump.

At the instrument end of the meter, the planetary gearing dips into the secondary oil supply and delivers a portion of it by splash to the adjacent main shaft bearing. Delivery of oil to the other bearings is assisted by a hollow splash pin in the planetary counterweight, and by an oil leader dam located at the bearing. Timing gears at the opposite end of the meter likewise are oiled from a secondary sump, and a main bearing oil leader is provided at both shaft bearings. All four main bearings have oil dams to insure that oil flows through their races. To guard against entrance of lubricating oil into the gas metering chamber, slingers are provided where the shafts pass through the headplates, and rejected oil is re-urned to the sumps. In addition, the timing gear end head-ate has a sheet metal oil shield to keep excess timing gear splash away from the oil slinger area.

Oil levels at both ends of the meter must be maintained within the ⅛" gauging holes in the center of the bullseye sight glass reflector. *Initial filling* of the two sumps should be done with the meter not operating. Under this condition the final oil levels should be just above the bottom edge of the gauging holes and never below. During operation the oil may rise slightly, but it should not go above the top edge of the ⅛" gauging hole at either end.

Succesful operation of this lubricating system depends not only on maintaining the specified oil levels in the sumps, but also on using the *correct grade* of oil. The total quantity of oil provided for is relatively small, as shown in Table 2. Because of this small supply and the requirement for distribution to bearings by splash, plus the necessity to eliminate drag in rotating parts, use of an instrument grade oil will give satisfactory operation.

Lubricating oils of proper quality can be obtained in convenient small quantities through District Offices. Specify Grade Number 50, or indicate the meter Model Number. This oil is a general purpose instrument grade having an approximate viscosity of 50 to 60 SSU at 100°F. All meters are shipped without lubrication in order to prevent contamination of the gas metering chamber during shipment, storage or installation. Do not fill the oil sumps until installation has been completed.

MOUNTING

In order to provide the correct drive rotation and mounting facilities for the various commercial instruments available, it is necessary that the meter be assembled for the specific oriented, so that the face of the instrument mounting flange is *horizontal.*

INSTALLATION

Series HP-LM gas meters are designed for direct in-line mounting, using the flanged pipe connections on either side of the case. The recommended installation and piping arrangement is shown on Sketch K-15987. The meters require no additional means of direct support. Installation is simple and easily accomplished, but certain limitations must be considered to insure completely satisfactory operation.

Correct direction of gas flow is shown clearly by a large arrow on the meter nameplate. This meter position indication must be followed without exception, so that the lubrication system will function and oil will not enter the gas metering chamber.

It is recommended that the meter be placed in a side loop with the by-pass adjacent to the main line. The piping must be properly aligned, and supported on each side of the meter if possible. This results in a solid pipe line, and at the same time removes piping strains from the meter if sufficient flexibility is provided in the meter loop. When installing the piping, make sure it is plumb or level. For most satisfactory operation it is recommended that the meter out-of-level shall not exceed $1/16$" per foot in any direction. Level can be checked in two directions at one of the pipe flanges or at the machined instrument mounting surface.

Also be certain that the inlet pipe run is free of excess dope, dirt, scale, cuttings or weld splatters. If installation is in a vertical pipe run, do not locate the gas inlet valve directly over the meter. Any valve lubricant or other foreign material falling into the meter can stop its operation. Where condensation may be a problem, install adequate drip traps to prevent the fluids reaching the meter.

Before mounting the meter, check it for free rotation after removing the covers from connection flanges. Remove the socket head plug in the gear end cover, near the oil level glass, and insert a screw driver in the exposed slotted shaft end. Turn the shaft several times to make sure the impellers do not bind and that no dirt is in the casing. If satisfactory, replace plug temporarily and proceed with installation.

After gas connections are tightened, check again for free rotation as described above, then leak test the meter and piping in accordance with standard practices. Always add or change the lubricating oil prior to pressurization or after de-pressurization. Lubricating oil must be added to both end covers, using the approximate quantity shown in Table 2 and the proper grade specified in "LUBRICATION."

To prevent pressurization of the meter and piping at an extremely high rate, resulting in damage to the internal parts of the meter, pressurization can be accomplished by a small needle valve which by-passes the main shut-off valves. The main shut-off valves should remain closed until the meter is pressurized. Reference the diagram on page 4.

A differential pressure manometer is not a standard meter accessory, but is useful in providing an indication of meter's operating condition at any time after installation. Pressure taps (¼" pipe thread) are provided near meter inlet and outlet flanges for connecting a manometer, which may be supported by adjacent piping if permanently installed. A suitable instrument for this purpose should have an indicating scale range of about 45 inches water column, should be provided with inlet, outlet and bypass valving, and must be pressure

TABLE 1—METER CAPACITIES AT ELEVATED PRESSURES

Model Base Rating	2M900 3000	3M1440 3000	4.6M900 7000	7M1440 7000
PSIG	**Corrected Capacity at Metering Pressure—MSCFH**			
125	28	28	66	66
150	33	33	78	78
175	39	39	90	90
200	44	44	102	102
250	54	54	126	126
300	64	64	149	149
350	74	74	173	173
400	84	84	197	197
450	63	95	145	221
500	70	105	161	244
550	77	115	176	268
600	83	125	192	292
650	90	135	207	316
700	97	145	223	339
750	104	156	239	363
800	111	166	254	387
850	117	176	270	411
900	124	186	286	435
950	98	196	229	458
1000	103	207	241	482
1050	108	217	253	506
1100	113	227	265	530
1150	119	237	277	553
1200	124	247	289	577
1250		258		601
1300		268		625
1350		278		648
1400		288		672
1440		296		691

Note: Above capacities are based on the following standard conditions:
Average Atmospheric Pressure = 14.40 PSIA
Base Pressure = 14.73 PSIA
Base Temperature = 60°F
Supercompressibility effects have not been included.

TABLE 2-METER OIL CAPACITIES

Meter Size	Approximate Oil Capacity in Fluid Ounces			
	In Vertical Pipe Line		In Horizontal Pipe Line	
	Timing End	Instrument End	Timing End	Instrument End
2M900	7	12½	1½	2½
3M1440	7	12½	N/A	N/A
4.6M900	17½	37	4	10
7M1440	17½	37	N/A	N/A

PLACING IN SERVICE

After rechecking the installation on all points mentioned, and in particular making sure that the impellers rotate freely without drag or bumping at any points, the meter is ready to be tried under line conditions. Open the bypass and outlet gas valves first, and then open the inlet gas valve until the meter starts operating at a low speed. It may be necessary to throttle the bypass to do this, but the meter should not be subjected to a sudden high flow of gas. Let it operate at low speed for several minutes, while listening closely for scraping or knocking sounds. If satisfactory, gradually increase the speed until full line flow is going through the meter, then shut the meter off by closing all three valves.

Allow a few minutes for oil in the two end covers to stabilize, then check the level of each of the sight glasses. If oil must be added or removed to correct the levels, remember that the end covers are now pressurized. Remove all gas pressure from the meter before taking out either fill or drain plugs.

When adding oil, or filling, recognize that it will run directly into the primary sump and give a temporary false high reading. Some time will then elapse before the true level is shown, since the oil must flow through a small orifice in equalizing between the primary and secondary sumps.

If a differential pressure manometer is permanently installed at the meter, or is available for temporary connection, a few initial operating tests should now be made. Data from these tests—if recorded and retained—will furnish the simplest and most accurate basis for checking meter condition in the future by comparison with the original "standard" of operation. In addition to the differential manometer, only a stop watch is required for the tests. See page 7 for sample data sheet.

A DIFFERENTIAL-RATE TEST under line operating conditions will provide data for the most reliable future checks on general mechanical condition of a meter. This test is based on the principle that, as the rotating resistance of a meter increases more energy is absorbed from the flowing gas in turning the impellers, and the gas will then show an increased pressure drop—or differential—in passing through the meter. It is advisable to establish original differential pressure readings for 3 or more gas flow rates at from about 25% to 100% of meter capacity, along with gas pressure and temperature conditions during the test.

To make the Differential-Rate Test, first pressurize the meter. With the differential manometer connected for reading, place the meter on the line gradually so that it is not overspeeded. By suitable adjustment of the gas inlet and bypass valves, establish a steady gas flow at a rate corresponding to approximately 25% of the meter's maximum rating. The cubic feet per hour at line conditions (ACFH), or dial rate can be determined by the following formula:

$$CFH = \frac{36000 \times N}{T}$$

Where: N equals the number of revolutions of the output shaft of a 10 cu. ft. test hand. And, T equals the time in seconds for N revolutions.

With the desired flow rate established, time the passage of a convenient volume of gas, as registered on the counter or instrument dial, and also record the differential pressure reading. Repeat the test twice to insure accuracy, then collect similar data for higher flow rates of about 60% and 100%. Also obtain the line pressure and temperature of the gas for future comparisons. From the register volumes and times, convert the flows to CFH and plot a useful curve of differential pressure vs. flow rate. Also, record the operating pressure at which the Differential-Rate test data was observed. See page 7 for sample data sheet.

As soon as the test data is completed the meter may be placed in full service. Check its operation closely during the first hour, with particular references to oil levels, casing temperature, and increase in differential pressure. If possible, make several additional checks during the first day of operation. Thereafter, the meter will be able to operate unattended for long periods.

If a differential manometer is permanently connected to a meter, its valve should be set so as to protect it during periods when it is not in use. Close only the upstream shut-off valve, while opening the bypass and downstream valves. This will eliminate blowing of the manometer fluid and prevent damage from over-pressure.

INSTRUMENTATION

These Series HP-LM meters may be equipped with various types of instrumentation to provide gas volume readings corrected for the pressure and/or temperature conditions existing at the meter. In addition to the corrected data, such instruments also indicate or record the actual displaced gas volumes. This eliminates the need for a meter counter and permits the reduction gearing to be adapted for driving the instrument. In the meter models of this series the instrument drive take-off shaft turns at a rate of one revolution for each 10 cubic feet of gas measured.

Some instruments require clockwise rotation of the drive take-off shaft, while others require the opposite rotation. When an instrument is furnished as original equipment with a meter, the drive, rotation of the meter will be suited to the instrument, and the instrument's drive rate will be matched to the meter. It is then only necessary that the meter be installed properly with the instrument standing upright, facing the correct direction according to the adapter plate, and with gas flow in the direction indicated by the arrow on the meter. Instruments will not operate correctly with reversed gas flow and may be damaged.

When the instrument requires a pressure pick-up connection to the gas line it should be made at the ¼" pipe tap in the body of the meter near the gas inlet flange. If piping connections have not been supplied with the instrument, use a short pipe nipple, a shut-off cock, and a suitable length of tubing. It is advisable to install a tee in this line also, to permit a differential manometer to be connected more conveniently. If the instrument has a temperature sensing bulb, provision must be made for installing it directly in the gas line near the meter inlet. Usually a 1" pipe tap will be required.

INSPECTION AND MAINTENANCE

Rotary meters are simple in construction and operation. If they are installed properly, are operated within their pressure and capacity limitations, and receive the required minimum of care, they can be expected to operate dependably for many years.

NOTE: If mechanical trouble should develop, do not attempt field or on-site repairs. Install a replacement unit and return the defective meter to your own shop for repair, or contact the nearest District Office for factory service.

Periodic inspection and maintenance servicing should cover the following important points:

1. LUBRICATION—It is very essential to maintain the oil in good condition, and at the proper levels in the two end covers. A complete oil change, including flushing of the oil sumps, is recommended after a 2 to 3 month initial run-in period. Change periods thereafter will depend on the cleanliness of the gas being measured. Under favorable conditions these periods may be from 3 to 5 years. Oil levels should be checked once a month until a practical interval is determined. Add oil as necessary to maintain the level specified under "Lubrication." Remember that the meter must be depressurized slowly before removing filling or drain plugs, and use nothing but instrument grade oil of the specified viscosity.

2. METER LEVEL—Since these meters are supported entirely by the gas pipe line, movement of the piping through accident or other causes can affect the operating freeness of the meter. At each inspection period make sure the meter is not out of level more than 1/16" per foot in any direction. See "Installation."

3. DIFFERENTIAL PRESSURE—Periodically check the operating condition and performance of the meter. This is done by running a Differential-Rate Test (see "Placing in Service") at a single point in the flow range of the meter. If the differential pressure reading thus obtained is 50% higher than the original test value at the same flow rate—with pressure and temperature conditions being approximately the same—remove the meter from service and determine the cause of the increased operating resistance. Possible causes are: Impellers rubbing because of worn bearings or meter being out of level, too heavy or too much oil, and deposits on the cylinder walls. Deposits may usually be removed by flushing or scrubbing the cylinder with a suitable solvent, such as benzol.

4. STUFFING BOX LEAKAGE—When a meter is in operation its casing is completely under line pressure. It is necessary to provide a stuffing box at the point where the instrument drive shaft comes through the casing. A cartridge type stuffing box is used, with spring loaded Teflon V-rings around the shaft. The assembly is self-adjusting, and no maintenance is required or possible. Gas leakage should be checked for at each inspection period, and the cartridge unit replaced if defective.

TROUBLE SHOOTING CHECK LIST

Trouble	Item	Possible Cause	Remedy
No Flow	1	Obstruction in piping or meter.	Check Piping and valves to assure an open flow path. Check meter and remove any obstructions to rotation.
Low Registration	2	Meter Oversized for load.	Increase load or use smaller meter.
	3	Bypass around meter may leak.	Check bypass and valve and see that it is tight.
High Differential	4	Impellers rubbing casing or out of time	Rotate impellers manually to check freeness. Remove obstructions or retime impellers. Check meter leveling.
	5	High oil level or heavy oil.	Check oil level and condition.
	6	Build-up of deposits on impellers, casing or mechanical parts.	Remove build-up by flushing, or replace damaged parts.
	7	Worn bearings.	Replace.
Vibration	8	Misalignment.	Re-level meter.
	9	Impellers rubbing casing.	See Item 4.
	10	Worn bearings or gears.	See Items 4 and 7.
	11	Build-up on impellers.	See Item 6.
	12	High frequency pressure	[illegible]

Replacement parts are grouped into three (3) classifications.

Class A—Parts replacement as an assembly only.
Class B—Parts replacement is beyond the average shop capacity. Care must be taken and a good working knowledge of the meter or the accessory unit would be helpful.
Class C—Parts replacement is within the average shop capacity by individuals with average mechanical and instrument skills.

NOTE: Individual parts ordered that are part of an assembly will be supplied as an assembly only.

TO ORDER PARTS or assemblies, it is necessary to specify the following:

The following parts are for:
Model No. (i.e. 2M900) ________
Type (i.e. Top or Side Inlet) ________
Bill of Material No. ________ or Serial No. ________

If the unit is not of standard materials or construction, specify on order to insure complete material compatibility (i.e., specify "For Oxygen Service, Acetylene Service, Stainless Steel Trim, etc.").

Parts prices are available upon request or can be found in the Dresser Measurement Division price and data book.

REPAIR for any model ROOTS METER is available from the factory. When returning a meter for repair, or estimate to repair, the following should be done:

1. Remove oil from meter.
2. Package meter carefully and seal inlet and outlet connections.
3. At time of shipment, send a note or copy of the shipping order separately with the following information, to the mailing address shown below:
   - —Billing Address
   - —Purchase Order No.
   - —Specify
     - —Repair if less than 50% of new unit.
     - —Inspect and advise cost to repair.
   - —Return Shipping Address
   - —Person to Contact
   - —Phone Number
4. Ship with freight prepaid to shipping address shown below:

Mailing Address
Dresser Measurement Division
P.O. Box 42176
Houston, Texas 77042
Attn: Order Entry Dept.

Shipping Address
Dresser Measurement Division
10201 Westheimer Road—Bldg. #9
Houston, Texas 77042

All of the above must be done before any work can be performed. Incomplete information will delay processing any order and requires that the customer be contacted.

DIFFERENTIAL-RATE TEST DATA

Meter Model ________	Mfg. Serial No. ________	Utility Serial No. ________
Location ________	Date Installed ________	Register Reading ________

Line Press.	Gas Temp.	Sp. Grav.	Volume Measured	Run Time	Rate CFH	Diff. Pressure Ins. W.C.	Diff. Pressure % Chg.	Date	Tester
Initial Tests—New Meter									
Periodic Check Tests									

COMBINED PARTS LIST

SERIES HP-LM ROOTS METERS (Reference Drawing 35879)

Note: All items listed do not apply to all meter sizes of this series.

REPAIR ASSEMBLIES (CLASS C)

Assembly No.	Description	Item No. Qty. in parenthesis
1	Planet Gear Assembly w/Counterweight	21, 30, 36 (2), 39, 58, 60, 84, 89
2	Driven Gear Assembly	9 (2), 11, 12, 14, 20
3	Complete Planetary Gear Assembly	Assembly No. 1 Assembly No. 2 38, 94 (2), 83 (2)
4	Stuffing Box Assembly. (Interchangeable between all line mounted high pressure meters.)	9, 15, 72, 73, 74, 75, 76, 77, 78, 97, 98 (2), 99, 100, 103, 107
5	Instrument Drive Shaft Assembly. (Specify Top or Side Inlet and output rotation desired.)	9 (2), 13, 63, 64, 65 (4), 67 (2), 68 (2), 69, 70, 71, 88 (4)

PARTS LIST

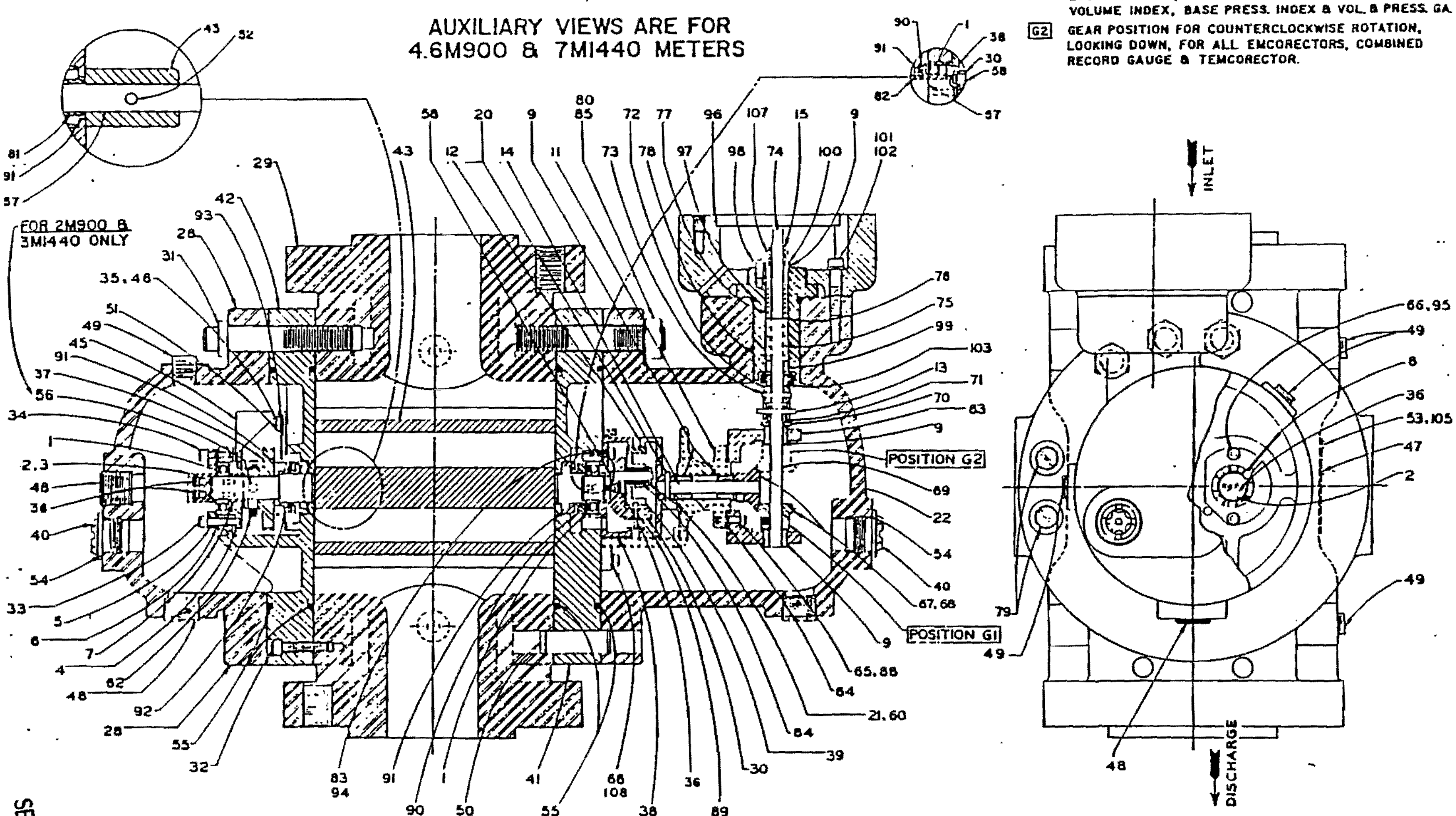
Item No.(1)	Qty. Used	Repair Class	Add. Info. Req'd (1)	Description
1	4	B		Bearing, Main Shaft
2	2	C		Clamp, Bearing—Thrust End, Instrument End
3	1	C		Clamp, Bearing, Slotted—T.E.
4	2	B		Ring, Brg. Placement, Inner—T.E.
5	2	C		Ring, Brg. Placement, Outer—T.E.
6	2	C		Shim, Brg. Placement—T.E. (1 set of various thicknesses)
7	2	B		Sleeve, Brg. Spacing-T.E.
8	1	C		Dam and Leader, Brg. Oil
9	5	B		Bushing—See #11—63—see Assy. #4
11	1	B		Support, Driven Gear w/2 Bushings (#9)—See Assy. #2
12	1	B		Reduction Gear, Driven w/Shaft #14 and Pin #20
13	1	B		Pin, Spring
14	1	A		Shaft, Driven Gear—See #12 & Assy. #3
15	1	B		Sleeve, Stuffing Box—See Assy. #4
20	1	B		Pin, Spring—See #12 & # 69
21	1	C		Pin, Spring (3M1440 & 2M900)—See Assy. #1
21	1	C		Ring, Retaining (7M1440 & 4.6M900)—See Assy. #1
22	1	C		Cover, Instrument End
28	1	C		Cover, Thrust End
29	1	B		Cylinder
30	1	A		Counterweight & Brg. Clamp—See Assy. #1 & 3
31	26-28	C		Screw, Ferry Cap, Countr-Bored
32	4	C		Screw, Cap, Soc, Hd.
33	4	C		Screw, Cap, Soc, Hd. (S.S.)
34	4	C		Screw, Cap, Soc, Hd. (S.S.)
35	2	C		Screw, Cap, Soc,.Hd. (S.S.)
36	8	C		Screw, Cap, Soc, Hd. (S.S.)
37	1 set	B		Gear,Timing (S.S.)—See #56 for 2M & 3M (Priced per Matched set)
38	1	B		Reduction Gear, Stationary—See Assy. # 3
39	1	A		Reduction Gear, Planetary—See Assy. #1 & 3
40	2	C		Gauge, Oil Level—See Item #54
41	1	B		Headplate, Instrument End—with 2 (#90) and 2 (#91)
42	1	B		Headplate, Thrust End—with 2 (#92) and 2 (#91)
43	2	B		Impeller & Shaft Assy. (Includes #81 & #82)
45	2	C		Leader, Oil—T.E.
46	2	C		[illegible]

SEP 10 2003

NOTES:

G1 GEAR POSITION FOR CLOCKWISE ROTATION, LOOKING DOWN, FOR PVTT INSTRUMENT, BASE VOLUME INDEX, BASE PRESS. INDEX & VOL. & PRESS. GA.

G2 GEAR POSITION FOR COUNTERCLOCKWISE ROTATION, LOOKING DOWN, FOR ALL EMCORECTORS, COMBINED RECORD GAUGE & TEMCORECTOR.



SEP 10 2003

SECTIONAL ASSEMBLY
SERIES HP-LM ROOTS® METER
WITH INSTRUMENT DRIVE

CUSTOMER ______
CUST. ORDER NO. ______ OUR ORDER NO. ______
DATE ______ BY ______

DRESSER MEASUREMENT DIVISION
DRESSER INDUSTRIES, INC.
HOUSTON, TEXAS, USA

5/79 D035879-000

MAINTENANCE RECORD

Meter Model ____________________ Serial No. ____________________

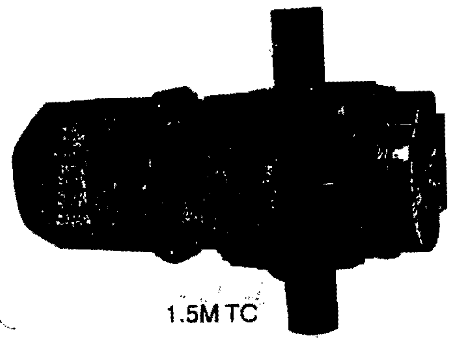
Date	Service

IRM-LM-MA
REVISION 5/85

Rotary Positive Displacement

ROOTS® METERS

INSTALLATION OPERATION MAINTENANCE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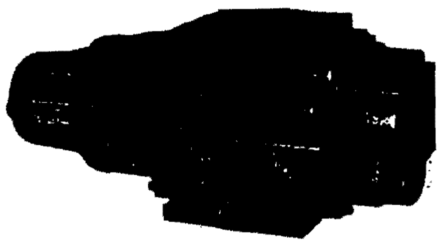
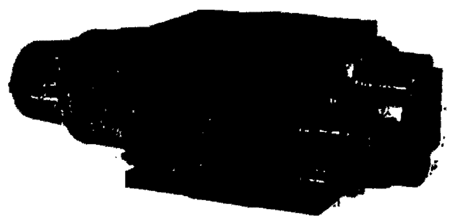
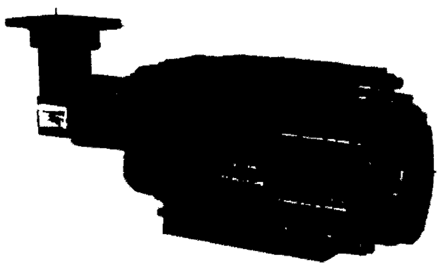
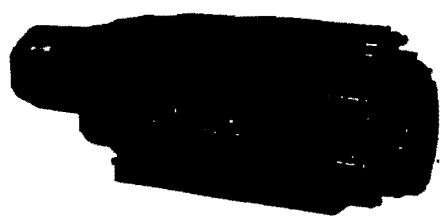

3M CTR


5M CTR


7M CTR


11M CTR/ID


16M TC

LINE-MOUNTED MODELS 1.5M through 16M
Mag-Coupled Gear Reduction
Aluminum Cylinders

SEP 10 2003
[redacted]

DRESSER MEASUREMENT

DRESSER INDUSTRIES, INC.

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3 YEAR WARRANTY

Dresser Measurement (herein referred to as the Company) agrees to supply equipment of good design and of first class material and workmanship. In the event of any defect of material or workmanship, the Company will repair F.O.B. place of manufacture, or furnish without charge place of manufacture, similar part or parts which, within one year after their shipment, are proven to have been so defective at the time of shipment, provided the Purchaser gives the Company immediate written notice of such alleged defects.

Notwithstanding the preceding, warranty claims involving new Rotary Positive Displacement Gas Meters shipped after January 1, 1980, and used only to measure gas volumes in a permanent installation may be made within three (3) years from shipment. The one exception is newly designed products first sold after January 1, 1980. These new products will be considered for inclusion from time to time. A complete list of products covered by this extended warranty is available by writing our general offices.

Except as herein provided, there are no other warranties, either expressed or implied (including without limitation, the implied warranties of merchantability and fitness for particular purpose), and any such warranties are hereby expressly disclaimed. The Company, except in the case of gross or willful negligence, shall not be liable for any damages for cause or reason whatsoever, either direct, indirect, special or consequential, arising out of any contract or from the operation or failure properly to operate of any apparatus or equipment sold. No allowance will be made for repairs or alterations unless made with the written consent first obtained from the Company. Neither shall the Company be held liable or in any way responsible for work done, apparatus furnished, or repairs made by others. Auxiliary equipment supplied hereunder not manufactured by the Company and so identified by the Company is subject to the warranty of the manufacturer thereof and the Purchaser's recourse shall be limited to such other warranty.

NOTE. Information in the manual is correct as of the date of publication. The manufacturer reserves the right to make design or material changes without notice, and without obligation to make similar changes on equipment of prior manufacture.

General Offices
DRESSER MEASUREMENT
DRESSER INDUSTRIES, INC.
Post Office Box 42176
Houston, Texas 77242
Phone: (713) 972-5000

In Europe
DRESSER MANUFACTURING DIVISION
DRESSER EUROPE S.A.
Post Office Box 7036
Helden-Panningen, Netherlands

In United Kingdom
DRESSER MANUFACTURING OPERATIONS
DRESSER U.K. Ltd
29-31 Rufford Court, Hardwick Grange
Warrington, Cheshire, WA1 4RF, England

INTRODUCTION

Use and Limitations

The SERIES LM-MA meter is a positive displacement rotary type device for continuously measuring and indicating the volume flow of gas in a pipe line. It is suitable for handling most types of clean common gases, at either constant or widely varying flow rates. It is not suitable for handling liquids, and its operation can be impeded by excessive deposits of dirt or other foreign materials carried in the gas stream. The meter is not directly suitable for handling acetylene or sewage gas because some of the materials of construction are not compatible with these gases. Specially constructed meters are available for these services.

General Description

As shown pictorially in figure 2 and by diagram in figure 1, the Series LM-MA rotary meter consists basically of two contrarotating impellers of two-lobe or "figure 8" contour operating within a rigid casing. The casing is arranged with inlet and outlet gas connections on opposite sides. Impeller contours are mathematically developed and accurately produced, and are of such form that a continuous seal without contact can be obtained between the impellers at all positions during rotation. To accomplish this, the correct relative impeller positions are established and maintained by precision grade timing gears. Similar seals also exist between the tips of the impeller lobes and the two semicircular parts of the meter casing. Optimal operating clearances are provided between the flat ends of the impellers and the meter headplates.

As a result of this design, the gas at the inlet side of the meter is always effectively isolated from the gas at the outlet side by the impellers. Consequently, the impellers can be caused to rotate by a very small pressure drop across the meter. The rotation is in the direction indicated in figure 1 and as each impeller reaches a vertical position (twice in each revolution) it traps a known specific volume of gas between itself and the adjacent semicircular portion of the meter casing at (A) and (B). Thus, in one complete revolution the meter will measure and pass four similar gas volumes, and this total is the DISPLACEMENT of the meter per revolution. It has been very precisely determined, both by calculation and by test using a known volume of air or other gas.

Actual volume measurement — displaced volume — is completely independent of the gas specific gravity, temperature and pressure. Volumetric accuracy of the ROOTS Meter is permanent and non-adjustable, because its measuring characteristics are established by the dimensions and machined contours of non-wearing fixed and rotating parts.

Definite maximum flow ratings have been established for each meter model, and these flows should not be exceeded in operation. Factors involved are bearing life, shaft deflection, timing gear speed and loading, impeller centrifugal force, and engineering experience. For the SERIES LM-MA meter, the standard maximum flow rate results in a pressure drop of less than 1.5" (38 mm) water column based on air at atmospheric pressure.

Maximum working pressure of a rotary meter is limited by casing design. Refer to meter nameplate for this maximum working pressure. (Note: These meters have been static pressure tested at the factory at twice their maximum working pressure.) They should not be installed where line pressures can exceed their maximum working pressure. However, line pressure has no significant effect on accuracy of measurement, and the meters may be used satisfactorily on pressures down to a few ounces. Meter capacity ratings, listed in Table 1, are expressed in thousands of Standard Cubic Feet per hour at base rating conditions of 60°F. (15°C) and 14.73 PSIA (101.325kPa) pressure. When gas is being metered at a pressure and/or temperature other than Standard, the dial rate — in displaced metered gas at line conditions — is easily converted to standard gas by simple PV relations.

The totalization of the displaced volume of gas is performed by magnetically coupled accessory units which includes a spur gear reduction system. Some of the interchangeable accessory units that can be attached to the basic meter body are shown in Figure 4, and described below.

COUNTER (CTR) UNIT:

The magnetically coupled CTR unit contains a 7—digit counter with the smallest visible increments of 100 displaced cubic feet. Therefore the counter reading must be multiplied by 100 to obtain the total displaced volume measured by the meter. The smallest increment on metric meters is 0.002m³ for the 1.5M thru 5M and 0.02m³ for the 7M thru 16M sizes with all 7 digits exposed. The entire CTR unit is enclosed by a plastic cover. The cover is also an oil sump. The proper quantity and grade instrument oil must be added to this unit. Oil level lines are inscribed on the end of the cover. Test dials are also provided on the end of the cover. Their location and meaning is shown in Figure 3, page 2.

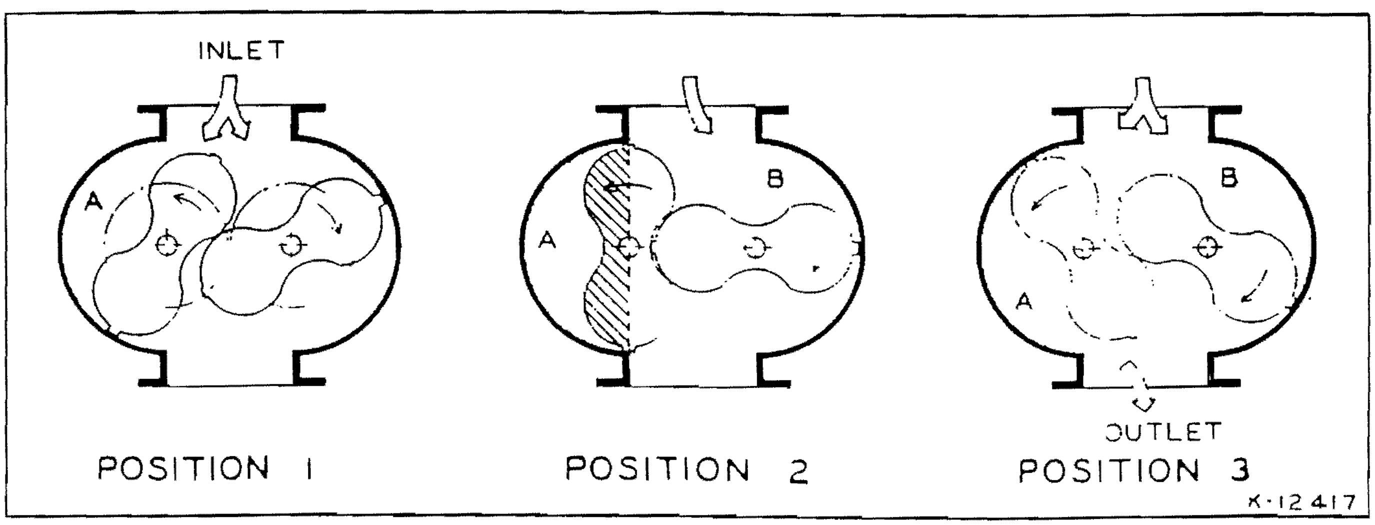

Fig. 1 — Principle of Gas Flow Through the ROOTS Meter

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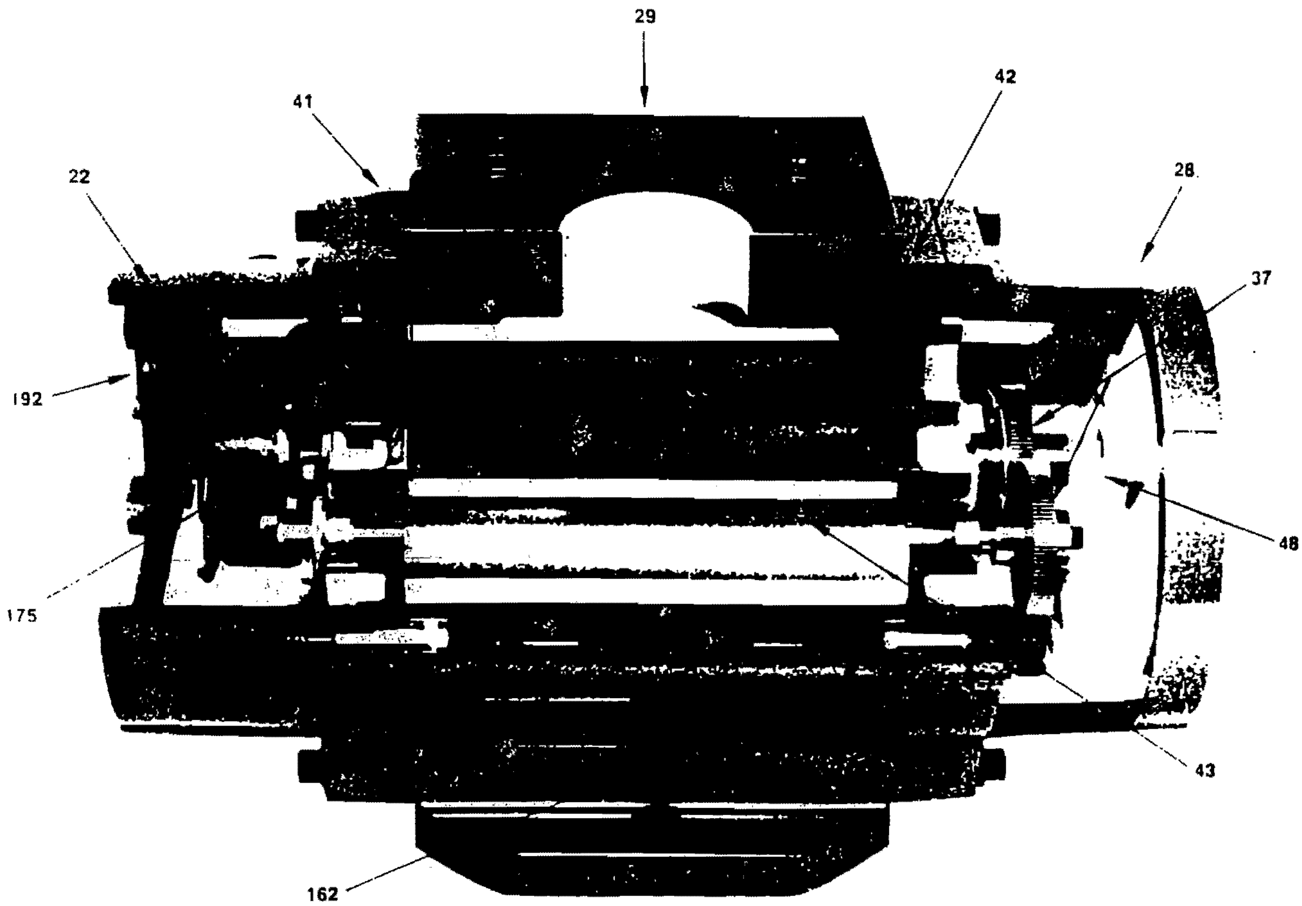


FIGURE 2 — CUTAWAY VIEW OF ROOTS ROTARY METER, SERIES LM-MA

22 End Cover, magnet drive end
28 End cover, gear end
29 Cylinder
37 Timing gears
41 Headplate, magnet drive end
42 Headplate, gear end
43 Impeller & Shaft asm
48. Pipe plug, dry seal
162 Pipe plug, differential tap
175 Magnet wheel asm
192 Temperature Well Asm

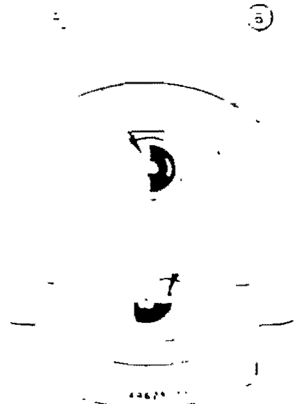
Note: Index numbers also refer to photo list and cross-section view in back of book

CTR UNIT

DIAL INFORMATION

A 1 REV DISPLACEMENT
1.5M-11M ENGLISH [illegible] CU FT
16M ENGLISH [illegible] CU FT
1.5M-5M METRIC [illegible]
7M-16M METRIC [illegible]

B 1 REV 1 IMPELLER SHAFT REV



TC UNIT

DIAL INFORMATION

A 1 REV C.D.
1.5M-11M ENGLISH 10 CU FT
16M ENGLISH 100 CU FT
1.5M-5M METRIC 0.1m³
7M-16M METRIC 1.0m³

B 1 REV 1 IMPELLER SHAFT REV

C 1 REV Corrected Displacement

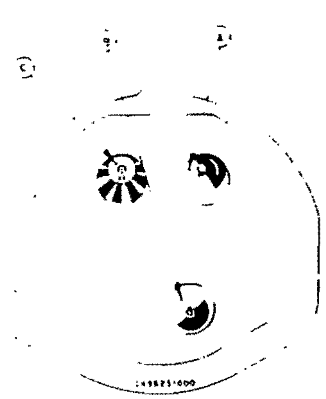


FIGURE 3 — DIAL INFORMATION

TABLE 1—METER CAPACITY RATINGS UP TO 125 PSIG (860kPa)
Corrected Capacity in MSCFH*

Meter Model	Base Rating 14.73 (PSIA)	REFER TO METER NAMEPLATE FOR MAXIMUM WORKING PRESSURE Metering Pressure—PSIG											
		1	5	10	15	20	30.	50	75	100	125.	175	200
1.5M	1.50	1.56	1.98	2.48	3.00	3.50	4.52	6.56	9.10	11.65	14.20	19.29	21.83
3M	3.00	3.13	3.95	4.96	5.98	7.00	9.04	13.11	18.20	23.30	28.40	38.57	43.67
5M	5.00	5.22	6.58	8.28	9.98	11.67	15.07	21.86	30.34	38.83	47.31	64.29	72.78
7M	7.00	7.3	9.2	11.6	14.0	16.3	21.1	30.6	42.5	54.4	66.2	90.0	N/A
11M	11.00	11.5	14.5	18.2	22.0	25.7	33.2	48.1	66.8	85.4	104.1	141.4	N/A
16M	16.00	16.7	21.1	26.5	31.9	37.4	48.2	70.0	97.1	124.3	151.4	205.7	N/A

*Maximum hourly flow rates in thousands of Standard Cubic Feet, corrected for metering pressure and 14.4 PSIA atmosphere to base conditions of 14.73 PSIA and 60°F

Corrected Capacity in Sm^3/h

Meter Model	Base Rating 101.325 kPa Absolute	REFER TO METER NAMEPLATE FOR MAXIMUM WORKING PRESSURE Metering Pressure Gauge											
		50 kPa	100 kPa	200 kPa	300 kPa	400 kPa	500 kPa	600 kPa	700 kPa	800 kPa	860 kPa	1200 kPa	1375 kPa
1.5M	42.5	64	84	126	168	210	252	294	336	378	403	545	619
3M	85	127	169	253	336	420	504	588	672	756	806	1091	1238
5M	140	210	281	421	561	701	840	980	1120	1259	1343	1798	2039
7M	200	298	394	589	785	981	1176	1372	1568	1763	1881	2568	N/A
11M	310	465	619	926	1234	1541	1849	2156	2456	2771	2955	3981	N/A
16M	450	675	900	1347	1795	2242	2689	3136	3583	4030	4299	5779	N/A

Maximum hourly flow rates in cubic meters, corrected for metering pressure and 101.325 kPa absolute atmosphere to base conditions of 101.325 kPa absolute and 15°C.

TEMPERATURE COMPENSATOR (TC) UNIT:

The TC unit is similar to the counter unit with respect to the plastic enclosure, oil requirement, and counter information. In addition the TC unit automatically corrects the displaced volume to standard volume with respect to a specified base temperature (60°F/15°C is the standard base temperature). The TC unit also has another uncorrected volume counter which is covered to prevent misreading. The temperature compensation is accomplished by a mechanical computer with a spiral bi-metallic sensor which is located in a sealed well at the meter inlet. A temperature indicating drum is also provided to indicate the approximate gas temperature. Two test dials are provided on the end of the cover. Their location and function are shown in Figure 3, page 2. A separate operational check procedure for the TC unit itself is described in detail on page 9.

INSTRUMENT DRIVE (ID) UNIT:

Like the CTR and TC units, the instrument drive (ID) unit requires oil and is magnetically coupled to the meter. A spur gear reduction with the proper gear ratio rotates a drive dog. One revolution of the drive dog represents a certain displaced volume measured by the meter. Therefore, pressure and/or temperature compensating or recording instrumentation can be mounted to allow the user to easily determine the total standard volume of gas. A universal instrument mounting plate assembly is supplied with each ID version meter.

INSTRUMENT DRIVE RATES

ENGLISH	1.5M thru 11M 16M	10 CU. FT. REV 100 CU. FT. REV
METRIC	1.5M thru 5M 7M thru 16M	[illegible] m^3 REV [illegible] m^3 REV

As stated before all of the mag-coupled accessory units require that lubrication be added. These units have separate unpressurized sumps to provide lubrication to the spur gear reduction and bearings contained within these units. This will be further discussed under "Lubrication."

The mag-coupled modular design allows for complete interchangeability of the accessory units on meters of the same size. Standard mag-coupled meter bodies are manufactured with the temperature probe well to allow for this modular interchangeability. In addition, the instrument drive unit can easily be rotated 90 degrees for changing the mounting from top to side inlet, or vice versa. Also, a cover plate is provided on the ID unit for changing the direction of rotation of the drive dog. See page 4 for detailed instructions.

RECEIVING, HANDLING & STORAGE

Series LM-MA ROOTS Meters are precision type measuring instruments, operating as described in this manual. Although of very rugged construction, they should be given care in handling and storage. It is highly important that a meter not be dropped, or have heavy objects fall on it. Therefore, to realize the maximum service and accuracy built into these meters, it is recommended that the general policies outlined here be followed.

1. Do not accept a shipment that shows evidence of mishandling in transit without making an immediate inspection for damage to the meter. File a claim with the carrier if damage is indicated and notify the nearest District Sales Office.
2. Since damage to internal working parts can exist without obvious external evidence, it is advisable to check all new meters for free rotation soon after arrival. This simple procedure is described under INSTALLATION.

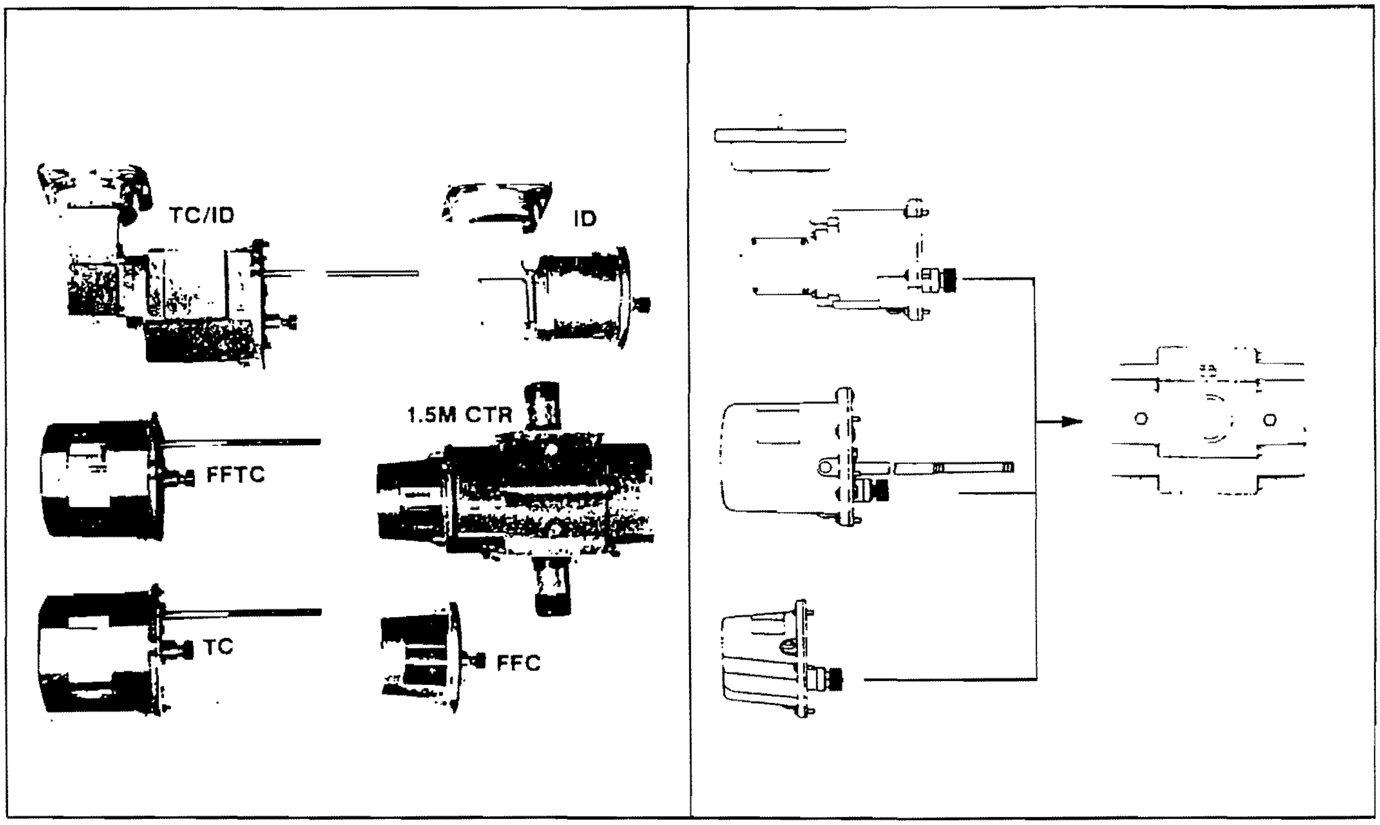


FIGURE 4 — MODULAR DESIGN

3 When a meter is not to be tested or installed immediately, store in a dry location and protect against damage. Use the original shipping container, keeping it horizontal with the arrow pointing up. Do not put oil in the two end cover sumps nor in the accessory unit. Do not remove covers from meter openings. The cover over the gas inlet connection has a "Demoist" wafer attached inside. This is intended to provide a reasonable protection for internal surfaces against atmospheric moisture for about one year. Prior to installation or performance testing see "Cleaning," page 6

4 Should any serious trouble appear during installation or initial operation of a new unit, notify the nearest District office. Do not attempt repairs or adjustments, since doing so will be a basis for voiding the Warranty

5 When contacting a Sales Office with a problem give meter Model and Serial Number as well as serial number of TC unit if so equipped, location and brief outline of the problem. Include gas type, pressure and flow characteristics, as applicable. If only an accessory unit is involved, supply the Bill of Material number as shown on the adapter plate (#415), page 18.

CAUTION When returning a TC Unit, it should be packaged as shown in Figure 5, page 5. Shipping containers are available from the factory

MISCELLANEOUS PROCEDURES

Instrument Drive meters are normally shipped from the factory set up for side inlet installations. Because of the modular design, simple conversion for top inlet can be done in the field or meter shop. If not specified when ordering, Side Inlet meters will be supplied.

SIDE INLET TO TOP INLET CONVERSION:

Meters with ID Accessory require that the instrument support housing (Item #734, drawing #CO47793-001, page 21) must be rotated 90° counter-clockwise. This can easily be done by removing the four (4) screws (Item #748 & #750), turning the housing without removing or pulling away, and replacing the screws.

INSTRUMENT DRIVE OUTPUT ROTATION CHANGE:

Meters with the ID accessory unit are shipped from the factory unless otherwise specified with an output drive rotational direction of clockwise (CW-B) when looking down on top of the unit. To change this rotational direction to counter-clockwise (CCW-A), the following should be done:

Refer to drawing #CO47793-001, page 21

1 Remove the four small screws (#744), cover plate (#743) and gasket (#742)

2. Loosen the bevel gear set screw (#741); remove the pin (#224), drive dog (#221), and retaining ring (#739) under the drive dog from the vertical shaft (#736)

3 Drop the vertical shaft (#736) down and remove the other retaining ring (#739) and washer (#738)

4 Push the shaft (#736) up to remove the bevel gear (#740) and turn it over
Clockwise rotation — bevel gear on top
Counter-Clockwise rotation — bevel gear on bottom

5. Reassemble following the above steps in reverse order. Be sure to allow sufficient clearance in the bevel gears to prevent binding

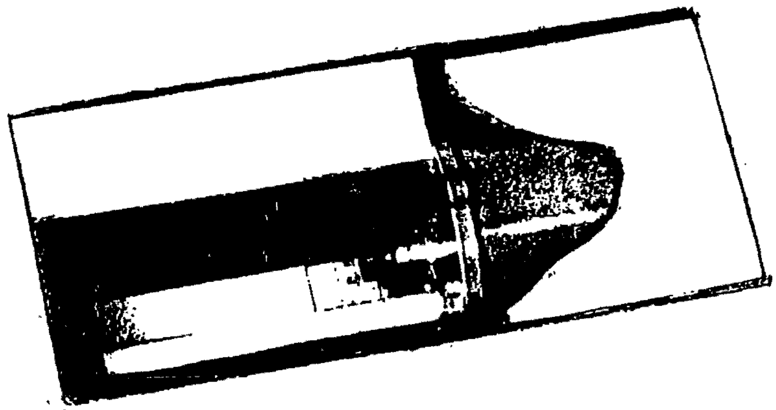


FIGURE 5 — TC UNIT IN SHIPPING CONTAINER

CHANGING COMPLETE ACCESSORY UNITS CTR, TC, OR ID:

The modular design allows for the complete accessory unit to be removed and replaced or converted to any other accessory unit. The procedure for removing and replacing a unit follows:

Refer to drawing #D048138-004, page 13.

1. Drain oil from accessory unit. Both fill and drain plugs are provided for this purpose.

2. Remove screws (Item #404 & #405) and washers (#406).

   NOTE. On TC units it is necessary to remove the plastic cover to gain access to additional mounting screws (#403) which hold the assembly (#400) to the meter body (#267). Also, 1.5M/3M/5M CTR and ID will have one screw (#403) to retain the gear unit.

3. The accessory unit may now be removed by pulling the assembly from the meter body being careful not to damage the male driving magnet.

   NOTE. On TC units the temperature probe must be pulled out being very careful not to distort or apply pressure on the spiral sensing element, or it may be damaged.

4. When replacing the same type of accessory unit or when changing to another type, the above procedure may be followed in reverse order but use caution with respect to the following items:

   (1) Make sure the unit you are installing is of the same gear ratio and model number as the one removed.

   (2) Gasket (#402) should be replaced and care should be taken to insure that it is flat.

   (3) On the ID unit, be careful not to disengage the coupling (#732, drawing #CC47793-001, page 21).

   (4) If a TC unit is being added where one was not being used before, a heat conducting silicone fluid should be carefully brushed on the bimetal element before insertion. The well should be clean before installation. Ref. (IRM-AU Manual supplied w/#400 asm.)

INSTALLATION

General — Basic installation requirements are listed below and followed with more descriptive recommendations.

1. The piping should be clean.
2. Flush the meter.
3. Install the meter level without piping strain.
4. Add oil to the meter sumps and the accessory unit.
5. Check impellers for free rotation.
6. Slowly pressurize and check for leaks.
7. Slowly turn on the gas.

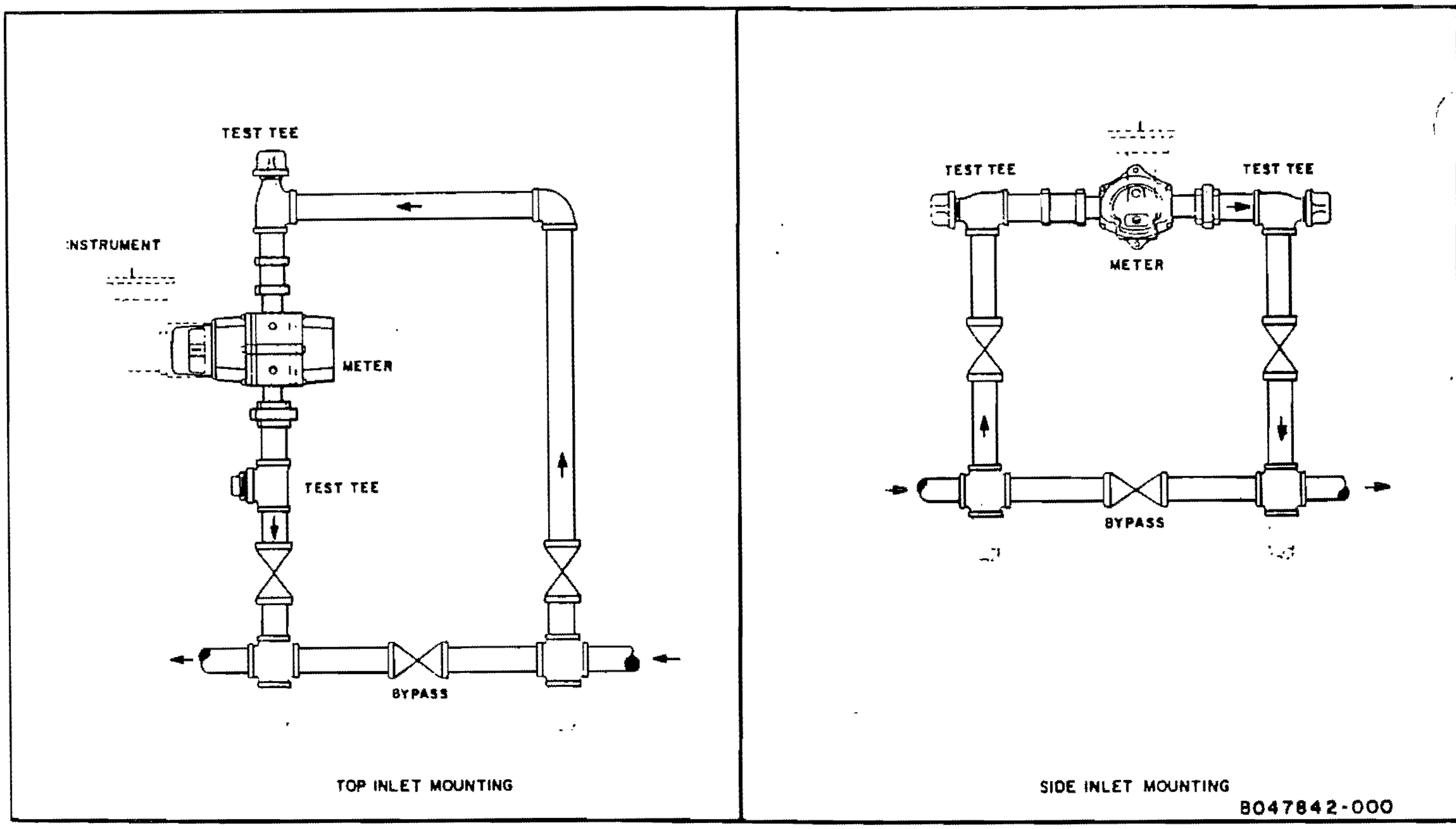


Fig. 6 — Typical Installations of Series LM-MA ROOTS Meters
(1.5M shown, 3M thru 16M have flanged connections)

Piping—The Series LM-MA ROOTS Meters may be mounted in either horizontal or vertical gas lines, if the gas is clean and dry. The preferred installation is top inlet in a vertical pipe line, gas flow being downward as shown in figure 6. Although the design of the impellers tends to make the meter inherently self-cleaning, the top inlet mounting also allows gravity to help pass dirt or scale through the meter.

A horizontal pipe line mounting, also represented in figure 6, is optional in most instances. Other piping layouts based on established practices and experience may be equally satisfactory to those shown.

A further recommendation is that the meter be installed in a side loop with a bypass going straight through. Test tees for transfer proving may be provided. The inlet piping should be completely free of excess dope, dirt, scales, cuttings, and weld spatters. If the top inlet configuration is used, do not locate a lubricated gas inlet valve directly over the meter. Excess valve lubricant or other foreign material falling into the meter may stop its operation.

The piping should be solid and properly aligned. The meter does not require any direct means of support, but the piping on either side should be supported to eliminate any unnecessary piping strains on the meter body. As a final note concerning piping, a meter should never be installed so that it is lower than the discharge pipe runs. Such a condition would cause the meter to become a sump for condensate and foreign material.

Cleaning — Although oil is drained from these meters at the Factory, a small quantity will remain on various surfaces and collect in the sumps. When the meters are not kept horizontal during shipment or general handling, the oil in the meter sumps can pass along the shafts and enter the metering chamber. A slow meter may be the result. It is recommended that, prior to performance testing or installation, each meter be properly filled with oil and windmilled for about two minutes at a speed near the maximum rating (See Table 2). This may be achieved by injecting controlled compressed air from a nozzle into the open meter inlet connection. During this operation flushing about 5 ounces (150ml) of an approved non toxic and non flammable solvent through the meter will remove any lubricating oil or dirt which may have entered the metering chamber. Typical solvents are listed in Table 3.

TABLE 2

Time for One Revolution of Test Dial (CTR & TC Units)
or 1 Revolution of Drive Dog (ID Units)

Meter	Max Dial Rate		Time in Sec. for			
Size	CFH	m^3/h	10 CF	100 CF	0.1 m^3	1.0 m^3
1.5M	1500	42.5	24	240	8.5	85
3M	3000	85	12	120	4.2	42
5M	5000	140	7.2	72	2.6	26
7M	7000	200	5.1	51	18	180
11M	11000	310	3.3	33	12	120
16M	16000	450	N/A	22.5	8	80

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During in-testing or before installation a Starting Differential test may be performed. Connect an inclined water gauge to the two meter pressure taps, and pipe a controlled supply of low pressure air to the meter inlet. Observe the differential pressures required to start the meter rotating, making tests with the impellers starting from six different positions. Any reading above 0.1" (2.5mm) W.C. indicates there is either a bind from dirt or the meter needs to be windmilled further and flushed again with solvent. Also check the temperature of the environment and see if this agrees approximately with the gas temperature indicator located on the TC unit, if equipped.

Following these operations, drain the oil if the meter is to go into storage. The oil may remain if a proof test is to follow, but make sure meter is not tipped during handling.

TABLE 3 — SOLVENTS

Purpose	Solvent
Clean or Flush Meter	Kerosene Benzol
Clean CTR or TC Cover (1)	Hot water & soap Mineral spirits Isopropyl alcohol

(1) Caution: Aromatics, Ketones, and Chlorinated Hydrocarbons will damage the plastic cover. Do not use acetone, carbon tetrachloride, etc.

MOUNTING & LEVELING:

Before mounting the meter, check it for free rotation after removing inlet and outlet covers. Remove the socket head plug (#48, see page 15, 16) in the gear end cover (#28) and insert a screwdriver in the exposed slotted shaft end. Turn the shaft several times to make sure the impellers do not bind and that no dirt is in the casing. If satisfactory, replace plug temporarily and proceed with installation.

Make sure the meter inlet is connected to the gas supply line. The meter should also be level to within 1/16" per foot (5 mm/m) in all directions. As is the case with any rotating piece of equipment, maximum life and efficiency will be enhanced with proper leveling.

After gas connections are tightened, check again for free rotation as described above, re-tighten plug (#48) then leak test the meter and piping in accordance with standard practices. Do not use a test pressure higher than the meter's maximum rated working pressure. (See meter nameplate.)

LUBRICATION

General — Gears on one end and bearings on both ends of the meter body are continuously lubricated with oil by dip and splash. The oil sumps in each end cover are independent of one another and each must be filled to the proper level. Each end cover (gear end and magnet drive end) is provided with visual type oil level gauges and plugged filling and draining holes. CAUTION: THESE TWO END COVERS ARE PRESSURIZED DURING OPERATION. Bleed off the line pressure before removing the plugs.

In addition to the meter body, it is necessary to fill the accessory unit with oil. The CTR and TC units have scribe marks on the end of the plastic cover which indicates the proper oil level. The ID units have visual oil level gauges similar to the meter body. Plugged filling and draining holes are provided on all of the accessory units. It is not necessary to depressurize the meter body to fill or drain oil from the accessory unit. The mag-coupled units are not pressurized like the meter body and end covers.

Oil Type & Grade — Successful operation of this lubricating system depends not only on maintaining the specified oil levels in the sumps, but also on using the correct grade of oil. The total quantity of oil provided for is relatively small, as shown in Table 4, and is considerably less when the meter is mounted in a horizontal pipe line than when it is in the vertical position. Because of this small supply and the requirement for distribution to bearings by splash, plus the necessity to eliminate drag in rotating parts, use of an instrument grade oil is required for satisfactory operation.

Lubricating oils of proper quality can be obtained in convenient small quantities from the company. Specify Grade Number 50, or indicate the meter Model Number. This oil is a general purpose instrument grade having an approximate viscosity of 50 to 60 SSU at 100°F.

Oil Filling — Oil levels at both ends of the meter are to be maintained within 1/16" (1.5 mm) of the center of the oil level gauges and the scribe marks on the plastic covers. Initial filling of the two end cover sumps and the accessory unit sump should be done while the meter is not operating. The oil level may change slightly during operation, but it should not go below the bottom edge of the gauging hole.

TABLE 4 — METER OIL CAPACITIES

Meter Model	Approximate Capacity in Fluid Ounces (ml) Meter W/Accessory Unit					
	In Vertical Pipe Line			In Horizontal Pipe Line		
Designation	CTR	ID	TC	CTR	ID	TC
1.5M, 3M, 5M	11 (320)	12 (350)	15 (420)	4 (120)	5 (140)	6 (170)
7M 11M 16M	24 (700)	25 (720)	27 (800)	6 (160)	7 (210)	6 (180)

CAUTION: Special lubricants are required for meters measuring gaseous oxygen. Do not use standard oils for this service. Refer to Company for proper lubricants.

OPERATION

After rechecking the installation on all points mentioned above, and in particular making sure that the impellers rotate freely without drag or bumping at any points, the meter is ready to be tried under line conditions. Open the bypass and outlet gas valves first, and then open the inlet gas valve until the meter starts operating at low speed. It may be necessary to throttle the bypass to do this, but the meter should not be subjected to a sudden high flow of gas. Let it operate at low speed for several minutes while listening closely for scraping or knocking sounds. If satisfactory, gradually increase the speed until full line flow is going through the meter, then shut the meter off by closing the two meter valves.

CAUTION: Do not pressurize or depressurize these meters at a rate exceeding 5 PSI per second (35 kPa/sec.).

Check the oil level in each of the sight glasses. If oil must be added or removed to correct the levels, remember that the end covers are now pressurized except for the accessory unit. Remove all gas pressure from the meter before taking out either fill or drain plugs in meter end covers.

TESTING

General — A differential pressure manometer is an optional meter accessory useful in providing an indication of a meter's operating condition at any time after installation. Pressure taps (¼" pipe thread) are provided near meter inlet and outlet connections for attaching a manometer, which may be supported by adjacent piping if permanently installed. A suitable instrument for this purpose should have an indicating scale range of about 6" (150mm) water column, should be provided with inlet, outlet and bypass valving, and must be pressure rated for maximum metering pressure. A portable type manometer may be used to check a number of meters periodically.

If a differential pressure manometer is permanently installed at the meter, or is available for temporary connection, a few initial operating tests should now be made. Data from these tests — if recorded and retained — will furnish the simplest and most accurate basis for checking meter condition in the future by comparison with the original standard of operation. In addition to the differential manometer, only a stop watch and pressure gauge are required for the tests.

If a differential manometer is permanently connected to a meter, its valves should be set so as to protect it during periods when it is not in use. Close only the upstream shutoff valve while opening the bypass and downstream valves. This will eliminate blowing of the manometer fluid and prevent damage from over-pressure.

Differential Rate Test under the line operating conditions will provide data for the most reliable future checks on general mechanical condition of a meter. This test is based on the principle that as the rotating resistance of a meter increases, more energy is absorbed from the flowing gas in turning the impellers, and the gas will then show an increased pressure drop — or differential — in passing through the meter. It is advisable to establish original differential pressure readings for 3 or more gas flow rates from about 25% to 100% of meter capacity, along with gas pressure and temperature conditions during the test.

As soon as the test data is completed the meter may be placed in full service. Check its operation closely during the first hour with particular reference to oil levels, casing temperature, and increase in differential pressure. If possible, make several additional checks during the first day of operation. Thereafter the meter will be able to operate unattended for long periods.

TC Unit Test (If Applicable) — The TC unit temperature indicator may be compared to the gas stream temperature. This simple observation will provide an indication that the temperature sensor is functioning. Remember that the temperature indicator gives only an approximate indication.

INSPECTION AND MAINTENANCE

ROOTS Meters are simple in construction and operation. If they are installed properly, operated within their pressure and capacity limitations, and receive the required minimum of care, they can be expected to operate dependably for many years.

Periodic inspection and maintenance servicing should cover the following important points:

1. LUBRICATION — It is very essential to maintain the oil in good condition and at the proper levels in the two end covers and the accessory unit. Oil levels should be checked once a month until a practical interval is determined. Change periods will depend on the cleanliness of the gas being measured. Under favorable conditions these periods may be from 3 to 5 years or more. Add oil as necessary to maintain the level specified under "Lubrication." Remember that the meter must be depressurized slowly before removing fill or drain plugs and use instrument grade oil of the specified viscosity.

   The accessory unit is sealed off from the gas, and it is not necessary to depressurize the meter to change the oil in the sump.

2. METER LEVEL — Since these meters are supported entirely by the gas pipe line, movement of the piping through accident or other causes can affect the operation of the meter. At each inspection period make sure the meter is not out of level more than 1/16" per foot (5 mm/m) in any direction.

3. DIFFERENTIAL RATE TEST — The Differential—Rate Test is an accurate and convenient method of comparing a rotary meter's performance at any time with its original performance. It is accepted by many State Utility Commissions as a means of periodically substantiating that the original accuracy of a meter has remained unchanged.

   A Differential-Rate Test consists of a series of differential pressure readings taken across the meter at several gas flow rates within the meter's range of capacity. It should be performed when the meter is first installed and under the actual conditions of gas line pressure and specific gravity that will exist in service.

   This is particularly important when line pressure will be higher than 15 PSIG (100 kPa Gauge), so that direct comparison with later tests can be made. Below 15 PSIG (100 kPa Gauge) the field tests on gas can, for all practical purposes, be compared directly with Factory test results on air obtained either from an individual Prover Test curve or a Characteristic Accuracy curve. In either case, an increase of up to 50 percent in differential pressure at any flow rate can be tolerated without affecting the meter accuracy more than 1 percent. This has been proven by exhaustive factory and field tests.

To make a Differential Rate Test, pressurize the meter slowly opening the inlet and discharge valves. Adjust the bypass and the inlet valves until the meter is operating at some selected flow rate in the lower range of its capacity. See the nameplate for maximum flow rating of the particular meter. With flow stabilized, time the passage of a predetermined volume of gas as registered on the counter or instrument; and record the differential pressure reading. Repeat the test several times to obtain an accurate average reading. Also record line pressure and temperature readings.

Obtain similar differential readings at as many different flow rates as possible within the meter's range. A least three points are required within the 25 to 100 percent range to establish data for an accurate curve. Now, from the registered volumes and times, convert the gas flow to displaced CFH (m^3/h) and plot a curve of Differential Pressure vs. Flow Rate. A sample data sheet is shown below.

The meter condition and performance can be checked periodically by running a similar differential-rate test at a single selected point. If the differential pressure has increased by 50 percent or more over the original reading at this rate, check the meter for causes of increased resistance. Principal causes are: binding of impellers, worn bearings, and too heavy or too much oil.

NOTE. When checking the differential pressure, make sure the test conditions are in close agreement with original conditions. An increase in line pressure or in specific gravity will cause an increase in the differential.

4 TC UNIT OPERATIONAL CHECK (If Applicable) — Refer to sample data sheet, page 10.

A. Measure stabilized temperature of gas (or air) at meter inlet and record. Compare to temperature drum. Both values should agree within ±4°F. (±2°C.).

B. Raise counter window mask (English only) on the compensated counter with magnet.

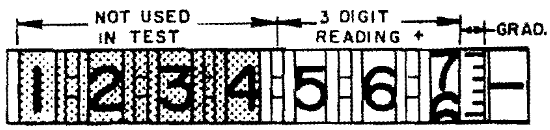
C. After compensated counter stops from a compensating cycle, record the last 3-digit reading (Ci) indicated by the counter. Include the value indicated by the graduated marks on the least significant digit wheel. (See counter below.)

D. After the compensated counter has cycled 10 times, record its reading (Cf) plus the grad.

E. Record the theoretical number of counts from Chart No. 1 (T).

F. Calculate the % Accuracy = $\frac{Cf - Ci}{T} \times 100\%$

SAMPLE COUNTER READING



READ AS 5 6 6 5.

A049629-000

DIFFERENTIAL—RATE TEST DATA

Meter Model ____________ ROOTS Serial No. ____________ Utility Serial No ____________

Location ____________ Date Installed ____________ Register Reading ____________

Line Press.	Gas Temp.	Sp. Grav.	Volume Measured	Run Time	Rate CFH (m^3/h)	Diff Pressure Ins. W.C. (mm W.C.)	Diff Pressure % Chg	Date	Tester
INITIAL TESTS — NEW METER									
PERIODIC CHECK TESTS									

ROOTS METER TC UNIT OPERATIONAL CHECK

CHART NO. 1

THEORETICAL NUMBER OF COUNTS (T) VERSUS TEMPERATURE [1]

°F	°C	Counts	°F	°C	Counts	°F	°C	Counts	°F	°C	Counts
-20	-28.9	1181.8	10	-12.2	1106.4	40	4.4	1040.0	70	21.1	981.1
-18	-27.8	1176.5	12	-11.1	1101.7	42	5.6	1035.9	72	22.2	977.4
-16	-26.7	1171.2	14	-10.0	1097.0	44	6.7	1031.7	74	23.3	973.8
-14	-25.6	1165.9	16	-8.9	1092.4	46	7.8	1027.7	76	24.4	970.1
-12	-24.4	1160.7	18	-7.8	1087.9	48	8.9	1023.6	78	25.6	966.5
-10	-23.3	1155.6	20	-6.7	1083.3	50	10.0	1019.6	80	26.7	963.0
-8	-22.2	1150.4	22	-5.6	1078.8	52	11.1	1015.6	82	27.8	959.4
-6	-21.1	1145.4	24	-4.4	1074.4	54	12.2	1011.7	84	28.9	955.9
-4	-20.0	1140.4	26	-3.3	1070.0	56	13.3	1007.7	86	30.0	952.4
-2	-18.9	1135.4	28	-2.2	1065.6	58	14.4	1003.9	88	31.1	948.9
0	-17.8	1130.4	30	-1.1	1061.2	60	15.6	1000.0	90	32.2	945.5
2	-16.7	1125.5	32	0.0	1056.9	62	16.7	996.2	92	33.3	942.0
4	-15.6	1120.7	34	1.1	1052.6	64	17.8	992.4	94	34.4	938.6
6	-14.4	1115.9	36	2.2	1048.4	66	18.9	988.6	96	35.6	935.3
8	-13.3	1111.1	38	3.3	1044.2	68	20.0	984.8	98	36.7	931.9
									100	37.8	928.6

[1] Chart based upon 60°F (15.56°C) Base Temperature.

NOTE:

The number of theoretical counts (T) can be calculated as follows:

Let Tb = Base Temperature
Ta = Actual Gas Temperature

Therefore:

$$\text{Number of Counts (T)} = \frac{460°F + Tb}{460°F + Ta} \times 1000 \quad \text{or} \quad \frac{273°C + Tb}{273°C + Ta} \times 1000$$

For example, the number of theoretical counts (T) with a gas temperature of 40°F would be calculated as follows:

$$\text{Number of Counts (T)} = \frac{460°F + Tb}{460°F + Ta} \times 1000 = \frac{460°F + 60°F}{460°F + 40°F} \times 1000 = \frac{520}{500} \times 1000 = \underline{\underline{1040.0}}$$

II. SAMPLE DATA SHEET FOR TC UNIT OPERATIONAL CHECK:

1. Stabilized gas (or air) temperature .... _____ °F./°C.

	Digits	Grad		Symbol
2. Final Compensated Counter Reading (Cf)	___ ___ ___	___	=	Cf
3. Initial Compensated Counter Reading (Ci)	___ ___ ___	___	=	Ci
4 Calculated Measured Counts (Cm) = Cf - Ci	___ ___ ___	___	=	Cm
5. Record the theoretical counts (T) from Chart No. 1	___ ___ ___	___	=	T

6. Calculate operational check accuracy as follows:

$$\% \text{ Accuracy} = \frac{\text{Measured Counts}}{\text{Theoretical Counts}} \times 100\%$$

$$\% \text{ Accuracy} = \frac{Cm}{T} \times 100\% = \frac{\_\_\_\ \_\_\_\ \_\_\_\ \_\_\_}{\_\_\_\ \_\_\_\ \_\_\_\ \_\_\_} \times 100\% = \_\_\_\_\%$$

TROUBLE SHOOTING CHECK LIST

Trouble	Item	Possible Cause	Remedy
No Flow Registered	1	Obstruction in piping or meter	Check piping and valves to assure an open flow path. Check meter and remove any obstructions to rotation.
	2	Instrument is binding accessory.	Pin #224 has sheared.
	3	A bind in accessory unit that has caused the magnetic coupling to disengage or a drive pin to shear.	Stop meter and start again. If counter or instrument does not operate, there is accessory unit trouble. Check for sheared drive pin.
Low Registration	4	Meter oversized for load.	Increase load or use smaller meter.
	5	Bypass around meter may leak.	Check bypass and valve and see that it is tight.
High Differential	6	Impellers rubbing casing, or out of time.	Rotate impellers manually to check freeness. Remove obstructions or retime impeller. Check meter leveling
	7	High oil level, or heavy oil.	Check oil level and condition.
	8	Build-up of deposits on impellers, casing or mechanical parts.	Remove build-up by flushing or replace damaged parts. (See Cleaning, page 6.)
	9	Worn bearings.	Replace.
Vibration	10	Misalignment.	Re-level meter.
	11	Impellers rubbing casing.	See Item 6.
	12	Worn bearings or gears.	See Items 6 and 9.
	13	Build-up on impellers.	See Item 8.

Meter Model ____________________ Serial No. ____________________

MAINTENANCE RECORD

Date	Service

PARTS LIST AND DRAWINGS

On the following pages sectional drawings and parts lists covering the Series LM-MA meters can be found. Replacement parts are grouped into three (3) classifications.

Class A — Parts replacement as an assembly only

Class B — Parts replacement is beyond the average shop capacity. Care must be taken and a good working knowledge of the meter or the accessory unit would be helpful.

Class C — Parts replacement is within the average shop capacity by individuals with average mechanical and instrument skills.

NOTE: Individual parts ordered that are part of an assembly will be supplied as an assembly only

TO ORDER PARTS or assemblies, it is necessary to specify the following:

For Meters

The following parts are for:
Model No (i.e. 5M125) ____________________
Bill of Material No. ____________________.
or Serial Number ____________________

For Accessory Units

The following parts are for:
Model No (i.e. 7M) ____________________.
Type of Unit (i.e. CTR, ID, etc.) ____________________.
Bill of Material No ____________________.

Note: The accessory unit B.M # can be located on the magnet side of the adapter plate (#415). If no B.M # exists, specify 'None'.

If the unit is not of standard materials or construction, specify on order to insure complete compatibility (i.e. specify Acetylene Service, Special Service Meters, etc.)

Parts prices are available upon request.

REPAIR for any model ROOTS METER is available from the factory. When returning a meter or Accessory unit for repair, or estimate to repair, the following should be done:

1. Remove oil from meter
2. Package meter carefully and seal inlet and outlet connections. If TC unit only is to be returned, make sure the bimetallic probe is well protected. The plastic cover should be attached for further protection. See figure 5 on page 5 for proper packaging
3. Ship with freight prepaid to:

In USA
Dresser Measurement
10201 Westheimer Road — Bldg. #9
Houston, Texas 77042

In Europe
Dresser Manufacturing Division
Dresser Europe S.A.
Industrieterrein ZZ
5981 NK Panningen
The Netherlands

In United Kingdom
Dresser Manufacturing Operations
Dresser U.K. Ltd.
29–31 Rufford Court, Hardwick Grange
Warrington, Cheshire WA1 4RF England

4. At time of shipment, send a note or copy of the shipping order separately with the following information

- Billing Address
- Purchase Order No
- Specify
  - Repair if less than 50% price of new unit
  - Inspect and advise cost to repair
- Return Shipping Address
- Person to Contact
- Phone Number

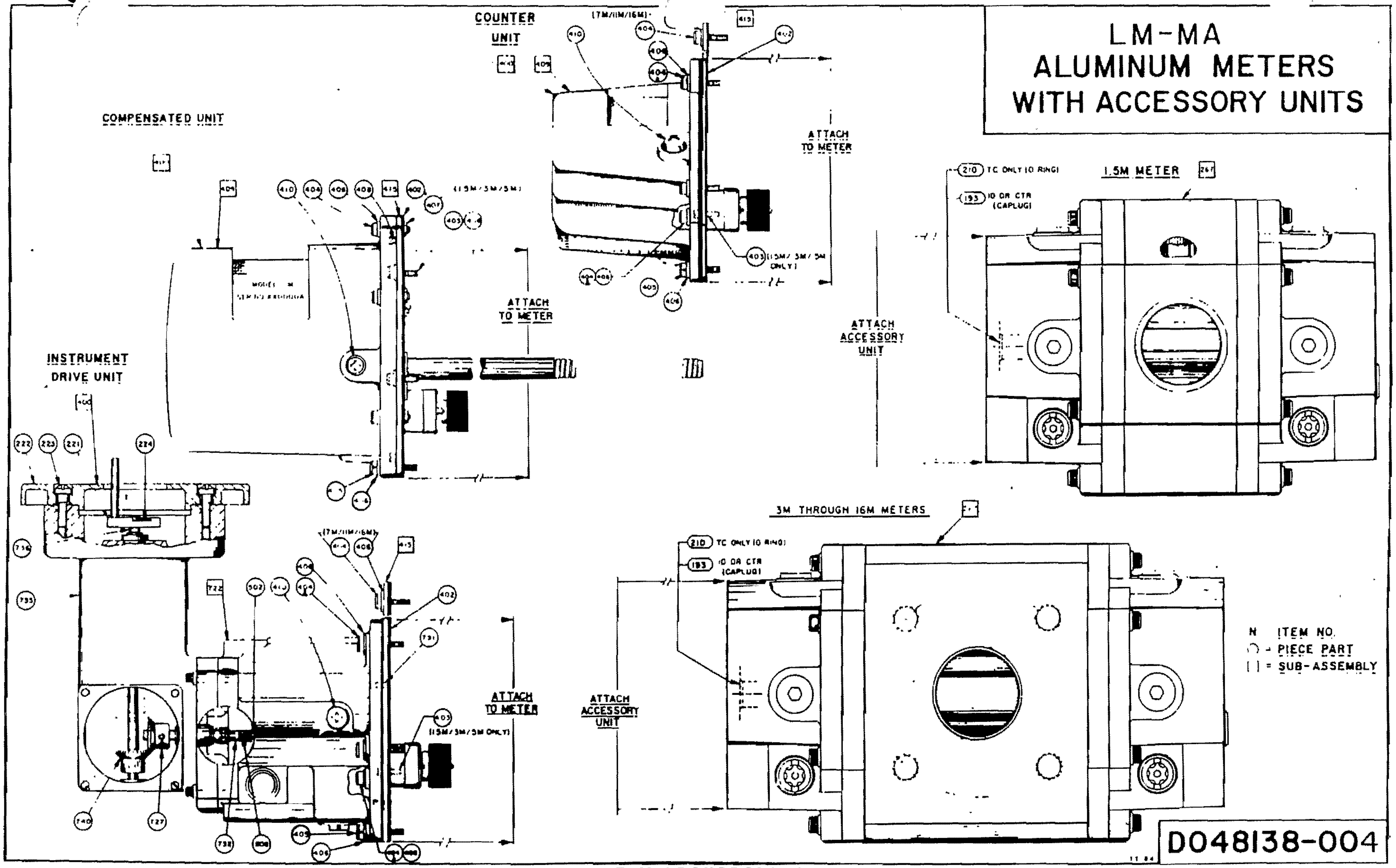
Mail to:

In USA
Dresser Measurement
P.O. Box 42176
Houston, Texas 77242
Attn: Order Entry Dept

In Europe
Dresser Manufacturing Division
Dresser Europe S.A.
Post Office Box 7036
Helden-Panningen
The Netherlands

In United Kingdom
Dresser Manufacturing Operations
Dresser U.K. Ltd.
29–31 Rufford Court, Hardwick Grange
Warrington, Cheshire WA1 4RF England

All of the above must be done before any work can be performed. Incomplete information will delay processing any order and requires that the customer be contacted.



METER W/ACCESSORY UNIT

Item [1] #	Description	Max. Qty. Per Meter	Repair Class	Item [1] #	Description	Max. Qty. Per Meter	Repair Class
267	Meter, Complete — Without Accessory	1	C	402.	Gasket, Interface (Accessory to meter)	1	C
	#400			403.	Capscrew	4	C
400	Counter Unit (Complete W/402	1	C	404A.	Capscrew	5	C
	through 410)			405.	Capscrew, Drilled	1	C
400	Temperature Compensated Unit	1	C	406.	Washer, Plain Flat	6	C
	(Complete W/402 through 410)			407.	Nut, Self-Locking	5	C
400	Instrument Drive Unit	1	C	193.	Plug, ID or CTR	1	C
	(Complete W/402 through 410)			210.	Seal-O-Ring, TC	1	C

[1] Refer to drawing D048138-004 for item number reference

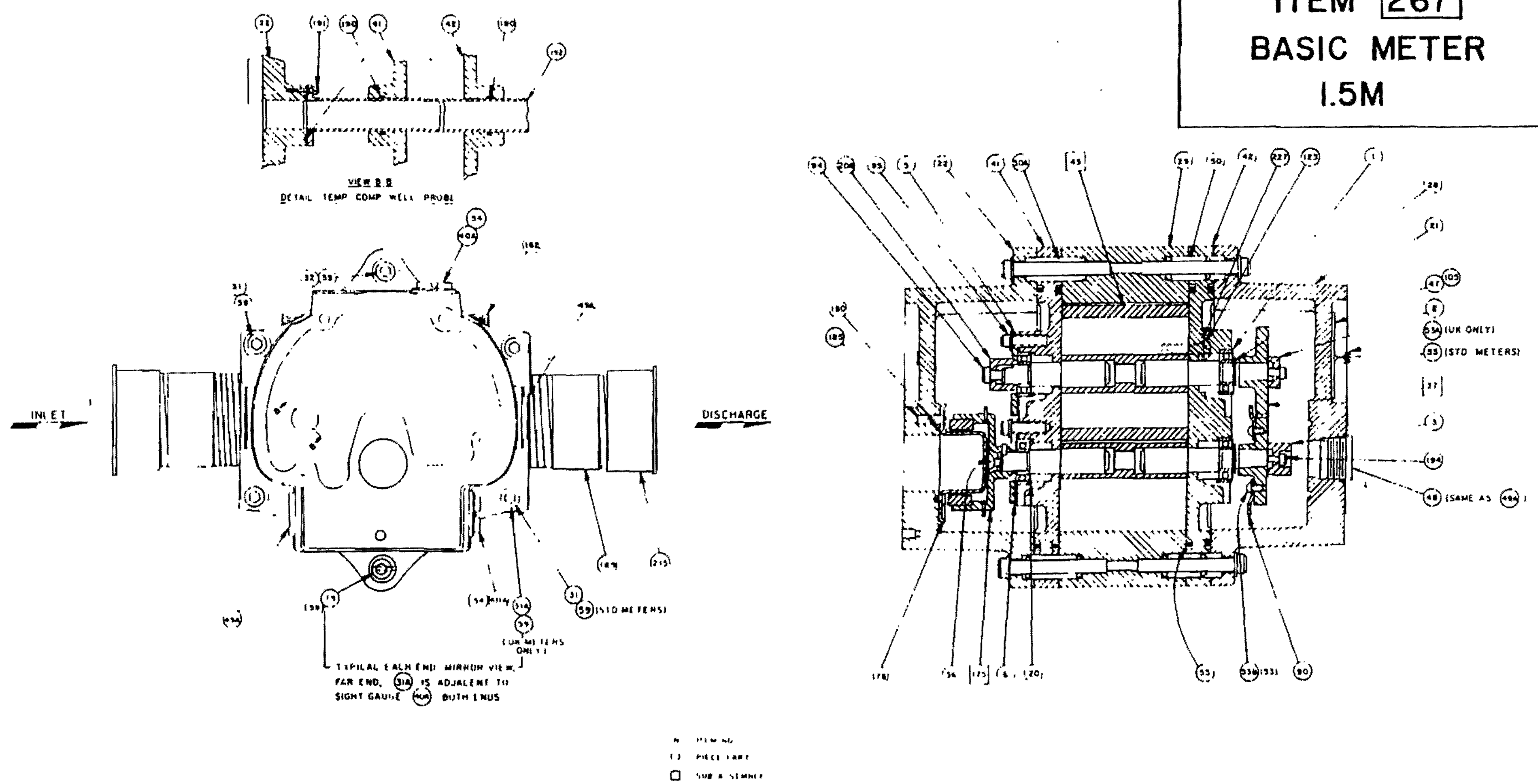
1.5M THROUGH 16M
PARTS LIST
METER BODY W/O ACCESSORY

Item #[1]	Description	Max. Qty Per Meter 1.5 3-5M	Max. Qty. Per Meter 7 11 16M	Repair Class
1	Bearing, Main Shaft	4	4	B
2	Clamp	1	1	C
3	Clamp, Slotted (w/Oil Slinger, 7 to 16M)	1	1	C
5	Plate, Bearing Clamp	2	2	C
6	Shim, Bearing Clamp (1 set of various thickness)	2 sets	2 sets	B
7	Sleeve, Bearing	0	4	B
20	Washer, Wavy Spring	6	4	B
21	Retaining Ring, Bowed	2	2	B
22	Cover, Counter (Magnet Dr[illegible])	1	1	C
28	Cover, Gear End	1	1	C
29 [2]	Cylinder	1	1	B
31	Capscrew	8	15	C
32	Capscrew, Socket Head	3	10	C
36.	Capscrew, Flat, Socket Head (Self-Locking)	1	1	C
37	Timing Gears (priced as matched set)	1	1	B
40A	Sight Gauge, Oil Level (Ref Item 54)	4	4	C
41	Headplate, Magnet Drive End	1	1	B
42	Headplate, Gear End	1	1	B
43 [2]	Impeller & Shaft Assy	2	2	B
47	Nameplate	1	1	C
48	Plug, Pipe Dryseal ½" NPT or same as #49A	1	1	C
49A	Plug w/ "O" Ring Seal ¾ 16 NF2	4	6	C
50	Pin, Dowel Gear End	2	2	B
50A	Pin, Dowel Magnet Drive End	2	2	B
53	Screw Drive	2	4	C
53B	Screw, Drive (Slinger Oil)	2	0	B

Item #[1]	Description	Max. Qty. Per Meter 7 11 16M	Repair Class
54.	O-Ring, Seal Oil Level Gauge (Replacement O-Ring for Item 49A)	4	C
55.	O-Ring, Headplate	4	B
59	Washer Flat, Casing Assy	16	C
60.	Washer, Support	2	B
79.	Capscrew, Drilled	1	C
90.	Slinger, Oil	0	C
94.	Capscrew, Socket Head (Self-Locking)	3	C
95	Capscrew	6	C
105.	Serial Number Plate (specify serial number digits)	1	C
123	Screw, Cap, Button Socket	8	C
162.	Plug, Pipe, Dryseal	2	C
175	Magnet Wheel Assembly	1	C
178.	Magnet Cup	1	C
180	O-Ring, Magnet Cup	1	C
185	Capscrew	3	C
189	Pipe Nipple (1.5M only)	0	C
190	O Ring, Temp. Probe Well Assy	2	C
191.	Capscrew	3	C
192.	Well, Temp Probe	1	C
208.	Clamp, Bearing Magnet End Drive	1	C
215	Cap Plug (1.5M only)	0	C
227	Washer, Seal	8	B
267	Meter Complete W/O Accessory #400	1	C

[1] For Item # reference see Drawing D047843-093, and D048128-093, page 15 and 16.
[2] Bill of Material or Serial Number on the meter nameplate must be specified
IMPORTANT: Individual parts ordered that are part of an assembly will be supplied as an assembly only.

ITEM 267
BASIC METER
1.5M



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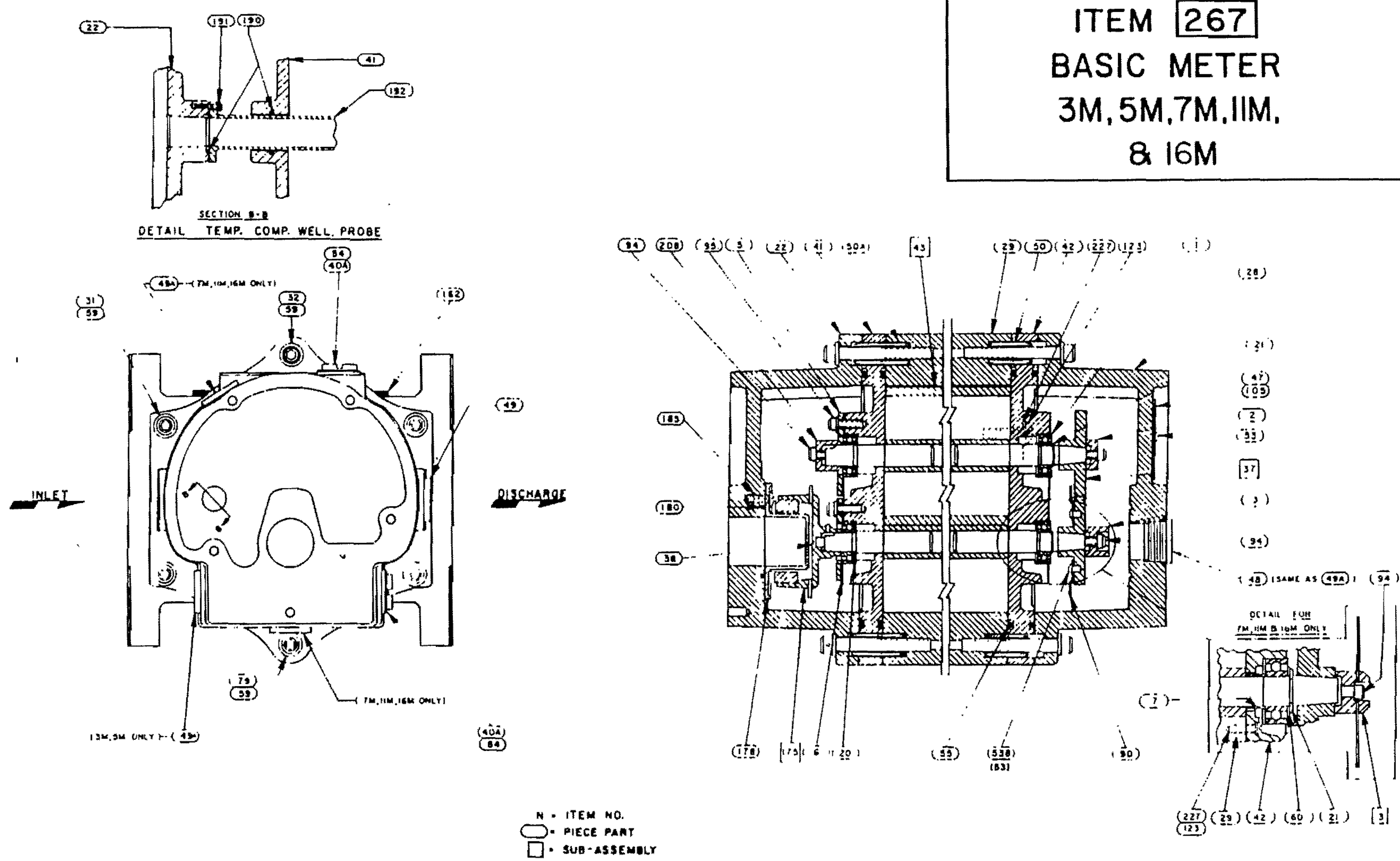
D047843-093

ITEM 267
BASIC METER
3M, 5M, 7M, 11M, & 16M



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D048128-093

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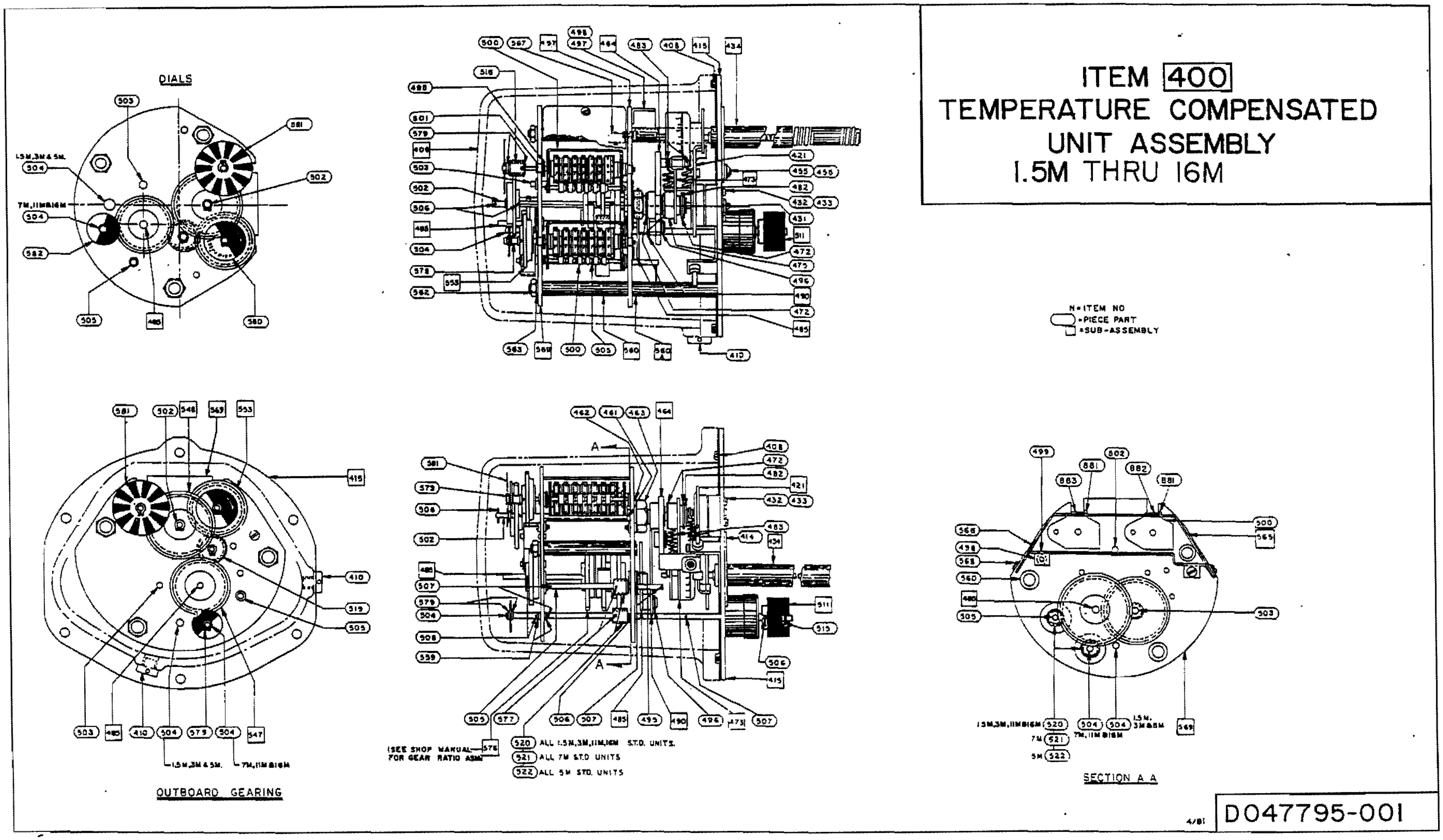


ITEM 400
TEMPERATURE COMPENSATED UNIT ASSEMBLY
1.5M THRU 16M

4/81 D047795-001

OCT 1 6 2003

TC UNITS PARTS LIST

Item #[1]	Description (Major Assemblies)	Max Qty Per Meter	Repair Class
400	Temperature Compensated Units (Complete w/402 through 410)	1	C
408	O-Ring Internal	1	C
409	Cover, Lexan - TC (Includes #402, #408 & #410)	1	C
410	Plug, Self Sealing, Oil	3	C
414 [1]	Decal - Bill of Material	1	C
415	Plate, Adaptor -- Assy	1	B
421 [2]	Computing Arm - Assy.	1	B
431	Pin, Spiral See Asm #421	1	B
432	Capscrew	3	B
433	Lockwasher	3	B
434	Temperature Probe Assy	1	B
455	Clamp, Temperature Probe	3	B
456	Screw, Clamp Probe	3	B
457	Center Plate - Assy.	1	B
461	Shaft, Pivot	1	B
462	Lockwasher	1	B
463	Nut, Hex, Jam	1	B
464	Rocker Arm - Assy	1	B
472	Washer, Flat, Spacer	3	B
473	Brake Arm Assy	1	B
482	Ring, Retaining	1	B
483	Spring	2	C
485	Crank Assy W/Shaft	1	B
490	Connecting Rod -- Assy.	1	B
495	Washer, Flat, Spacer	16	B
496	Ring, Retaining	2	B
497	Bracket, Limit, Temperature Drum	1	C
498	Screw	4	C
499	Bracket, Nameplate	1	C
500	Counter Assy (Includes #495, 518, 553, 557 & 579)	2	C
501	Bushing, Counter (See #457 & 569)	4	B
502	Shaft, Drive Clutch (See Asm #421)	1	B

Item #[1]	Description (Major Assemblies)	Max. Qty. Per Meter	Repair Class
503.	Shaft, Idler	1	B
504.	Shaft, Drive, Magnet	1	B
505.	Shaft, Oil Slinger	1	B
506.	Pin, Spiral	8	C/B
507.	Pin, Spiral	4	C
511.	Magnet & Hub — Assy. (Includes #506 & 515)	1	C
515.	Ring, Retaining	1	C
517A.	Pin, Reinforcing	1	C
518.	Gear, Pinion, Counter Drive (10T)	1	B
519.	Gear, Pinion, Counter Drive (20T)	1	B
547	Gear Assy W/Hub (40T)	1	B
548	Gear Assy W/Hub -- thin (50T)	1	B
553.	Gear Assy W/Hub -- Modif. (40T)	1	B
559.	Washer, Flat, Spacing	Varies	C/B
560.[2]	Spacer, End to Center Plate	3	B
560A.	Spacer, Center to Adapter Plate	3	B
562.	Nut, Hex, Hd.	3	B
563.	Lockwasher	3	B
565.	Nameplate	1	C
566.	Serial No. Plate (Specify Serial No.)	1	C
567.	Tab, Temp. Base (Specify Temperature)	1	C
568	Screw, Self-Tapping	2	C
569.	End Plate — Assy.	1	B
576.[2]	Internal Gearing	*	*
577.	Pin, Spiral	2	B
579.	Ring, Retaining	13	C
580.	Dial, Displaced Volume	1	C
581.	Dial, Test	1	C
582.	Dial, Black and White, RPM	1	C
881.	Pin Hinge	4	C
882.	Mask, Comp.	1	C
883.	Mask, Non-Comp.	1	C

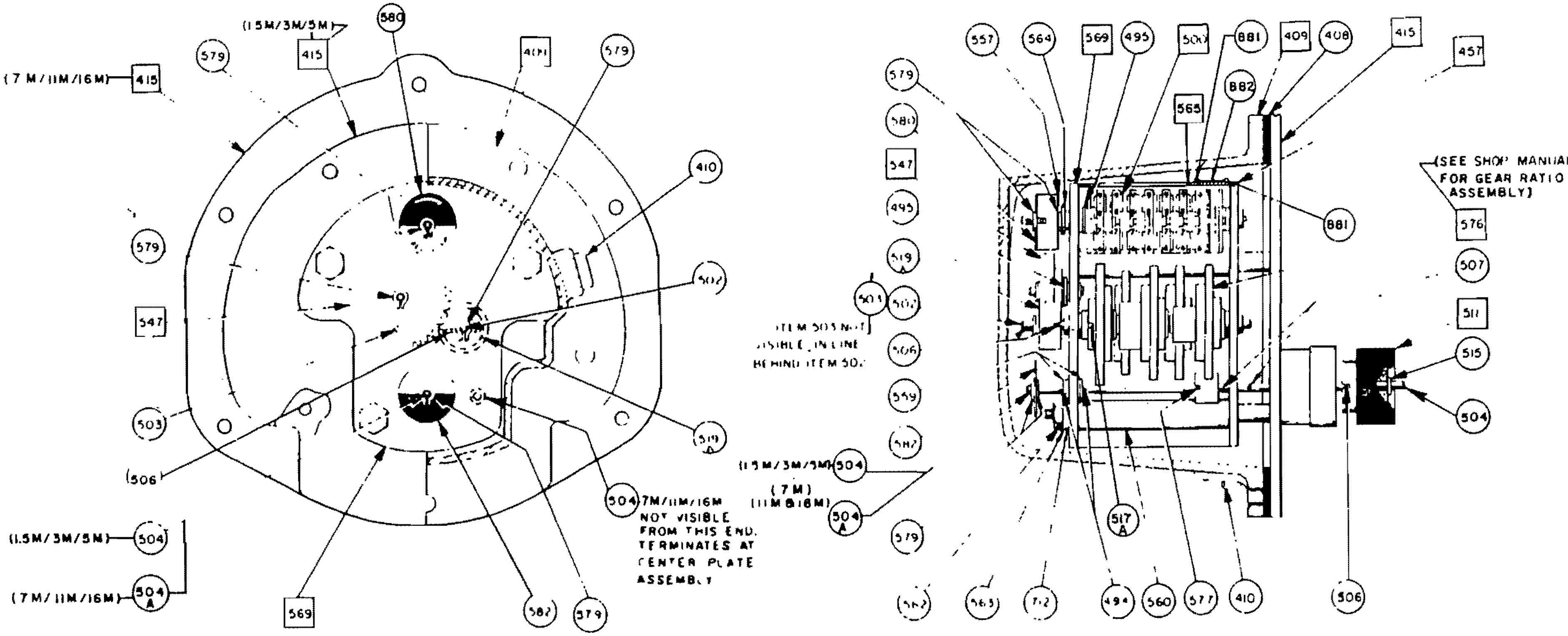
* Refer to Company or see manual SM-AU

(1) For Item # reference drawing D047795-001, Page 17

(2) Provide B/M # (Bill of Material) of Accessory Unit shown on adapter plate (#415).

IMPORTANT. Individual parts ordered that are part of an assembly will be supplied as an assembly only.

ITEM 400 FOR
COUNTER UNIT ASM.
1.5M, 3M, 5M, 7M, 11M & 16M



N = ITEM NO

○ = PIECE PART

□ = SUB ASSEMBLY

9/84

C047791 -001

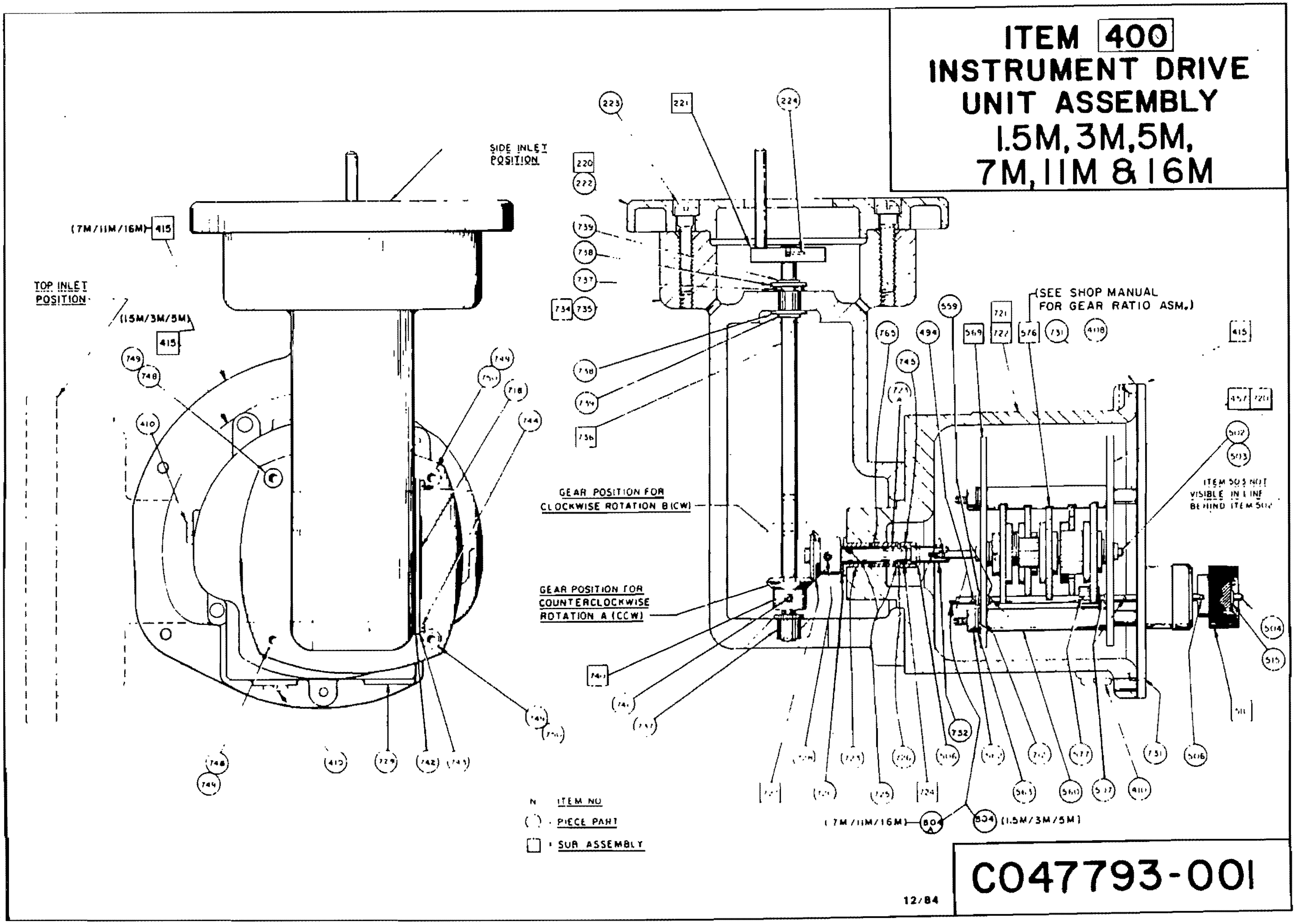
CTR UNIT PARTS LIST

Item #[1]	Description (Major Assemblies)	Max Qty. Per Meter	Repair Class
400	Counter Unit (Complete W/402 through 410)	1	C
408	Gasket Internal	1	C
409	Cover, Lexan - (Includes #402, #408 & #410)	1	C
410	Plug, Self-Sealing, Oil	3	C
415	Plate, Adaptor -- Assy	1	B
457	Center Plate -- Assy.	1	B
495	Washer, Flat, Spacer	2	B
500	Counter, Ctr Unit - Assy (Includes #495, 557, 564, 579)	1	B
502	Shaft, Drive, (10 cu ft /rev)	1	B
503	Shaft, Idler	1	B
504	Shaft, Drive, Magnet	1	B
504A	Shaft, Drive, Idler (7M/11M/16M)	1	B
506	Pin, Spiral	6	C/B
507	Pin, Spiral	6	C
511	Magnet & Hub Assy (Includes) #506 & 515)	1	C
515	Ring, Retaining	1	C
517A	Pin, Reinforcing	1	C

Item #[1]	Description (Major Assemblies)	Max. Qty. Per Meter	Repair Class
519A.	Gear, Pinion, Counter Drive (20T) Modif	1	B
547	Gear Assy W/Hub (40T)	1	B
557	Gear Pinion, Drive—Modif. (20T), See #500	1	B
559.	Washer, Flat, Spacing	Varies	C/B
560.	Spacer	Varies	B
562.	Nut, Hex, Hd	3	B
563.	Lockwasher	3	B
564.	Washer, Flat, Spacer	1	C
565.[2]	Nameplate (Includes #881[2] and 882)	1	C
569	End Plate -- Assy.	1	B
576[2]	Internal Gearing	*	*
577	Pin, Spiral	2	B
579.	Ring, Retaining	12	C
580.	Dial, Counter	1	C
582.	Dial, Black and White	2	C
712.	Washer, Flat	3	B
881.	Pin, Hinge	2	C
882.	Mask	1	C

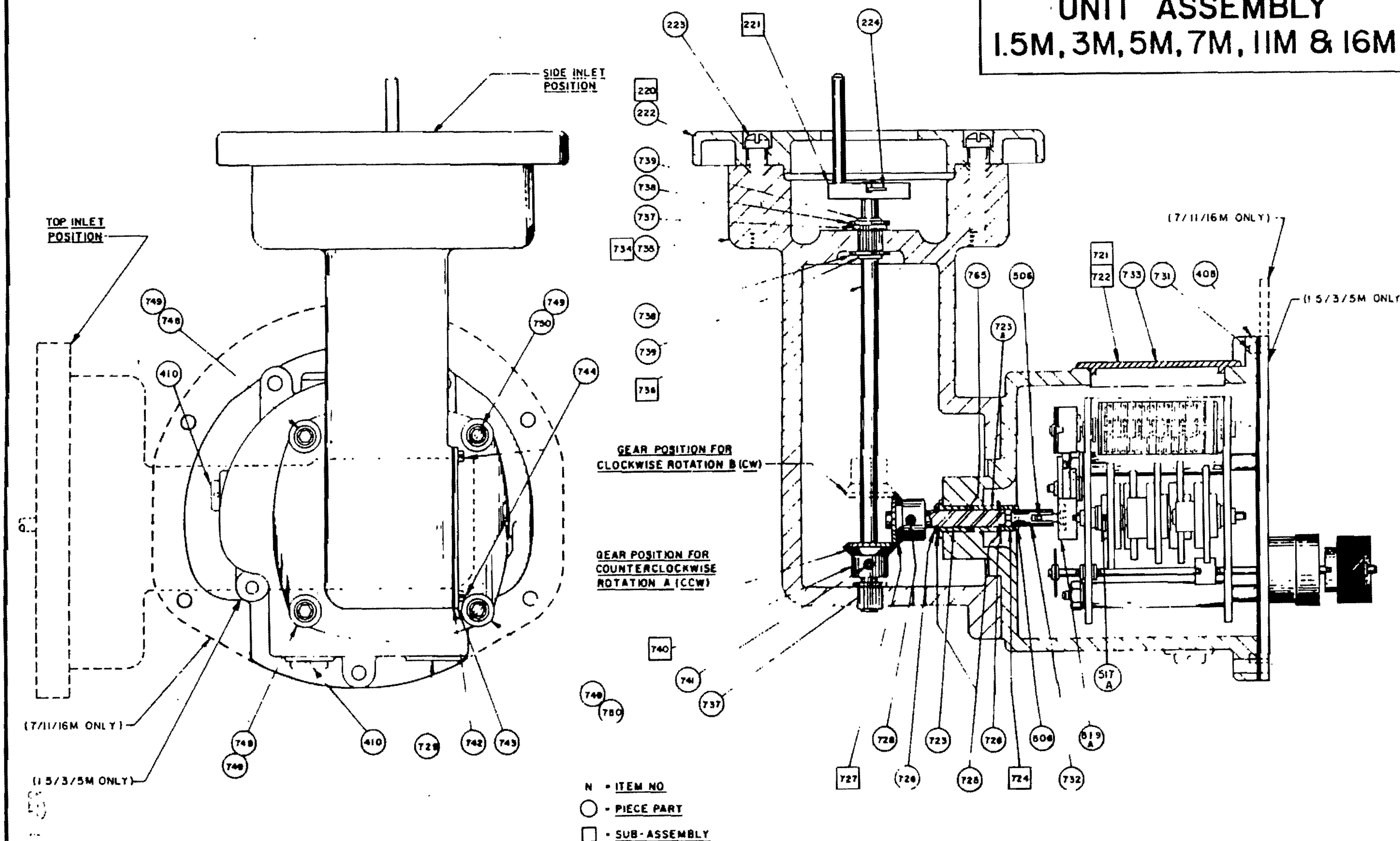
* Refer to Company or see manual SM-AU.
[1] For Item # reference see drawing C047791-001, Page 19.
[2] Provide Bill of Material No. (B/M #) of Accessory Unit if shown on adapter plate (#415).

IMPORTANT: Individual parts ordered that are part of an assembly will be supplied as an assembly only



ITEM 400
INSTRUMENT DRIVE UNIT ASSEMBLY
1.5M, 3M, 5M, 7M, 11M & 16M
SIDE INLET POSITION
TOP INLET POSITION
(7M/11M/16M) 415
(1.5M/3M/5M) 415
(SEE SHOP MANUAL FOR GEAR RATIO ASM.)
GEAR POSITION FOR CLOCKWISE ROTATION B (CW)
GEAR POSITION FOR COUNTERCLOCKWISE ROTATION A (CCW)
ITEM 503 NOT VISIBLE IN LINE BEHIND ITEM 502
(7M/11M/16M) 804
504 (1.5M/3M/5M)
N ITEM NO
( ) PIECE PART
[ ] SUB ASSEMBLY
12/84
C047793-001

ITEM 400
I.D. W/ COUNTER UNIT ASSEMBLY
1.5M, 3M, 5M, 7M, 11M & 16M



7/84 C048660-002

ID UNIT PARTS LIST
(I.D W/Counter**)

Item #[1]	Description	Max Qty Per Meter	Repair Class
220	Instrument Adapter Assy. (Includes #221 to #224)	1	C
221	Drive Dog W/Pin · Assy.	1	C
222	Instrument Adapter Plate	1	C
223	Capscrew	2	C
224	Pin, Shear (one set of five)	1	C
400	Instrument Drive Unit (Complete W/402 through 410)	1	C
408	Gasket, Internal	1	C
410	Plug, Self-Sealing, Oil	3	C
415	Plate, Adapter Assy	1	B
457	Center Plate Assy	1	B
502	Shaft, Drive, (10 cu. ft /rev.) 16M (100 cu ft /rev)	1	B
503	Shaft, Idler	1	B
504	Shaft, Drive, Magnet	1	B
504A	Shaft, Drive, Idler (7M/11M/16M)	1	B
506	Pin, Spiral	8	C/B
507	Pin, Spiral	6	C
511.	Magnet & Hub Assy (Includes #506 & 515)	1	C
515	Ring, Retaining	1	C
517A	Pin, Reinforcing	1	C
559	Washer, Flat, Spacing	Varies	C/B
560	Spacer	3	B
562	Nut, Hex Hd	3	B
563	Lockwasher	3	B
569	End Plate · Assy	1	B
576 [2]	Internal Gearing	*	*
577	Pin, Spiral	2	B
712	Washer, Flat	3	B
718	Decal, Output Drive Rate	1	C
720	Gear Reduction Assy (Includes all gearing mounted on adapter plate w/magnet)	1	C
721	Housing, Gear Assy (Includes #722 to 731)	1	C
722 [2]	Housing, Gear (Includes #402, 408, 410, 723, 729, 731 & 765)	1	C

Item #[1]	Description	Max. Qty Per Meter	Repair Class
723 [2]	Bushing, Flanged (Rulon)	1	B
723A [2]	Bushing, Sleeve (Rulon)	1	C
724 [2]	Shaft, Gear Housing (Includes #506, 725, 726, 732 & 745)	1	C
725.	Washer, Flat	2	C
726.	Ring, Retaining	2	C
727.	Gear, Bevel (same as #740) (Includes #728)	1	C
728	Screw, Set (same as #741)	1	C
729	Plug, Oil Sight Bonded (See #730)	2	B
730	Adhesive, for installing #729 & 733	1	C
731	Pin, Dowel (Included in #721)	2	B
732	Coupling, Gear Reduction	1	C
733.	Counter Window Bonded (See #730 for CD only)	1	C
734	Housing, Instrument Support Assy (includes #735 to 744)	1	C
735.	Housing, Instrument Support (Includes #737)	1	C
736	Shaft, Instrument Support (Includes #738 & 739)	1	C
737	Bushing (Rulon)	2	B
738	Washer, Flat	2	C
739	Ring, Retaining	2	C
740.	Gear, Bevel (same as #727) (Includes #741)	1	C
741	Screw, Set (same as #728)	1	C
742	Gasket, Cover, Plate	1	C
743	Plate, Cover	1	C
744.	Screw, Drilled	4	C
745	Sleeve	1	C
748	Capscrew	2	C
749	Washer, Flat	4	C
750	Capscrew, Drilled	2	C
765	Seal, Spring	1	C

* Refer to Company or see manual SM-AU.
** Ref Parts List for Counter and Instrument Drive
[1] For Item # reference see drawing CO47793-001, Page 21 and 22
[2] Provide Bill of Material No (B/M #) of Accessory Unit if shown on adapter plate (#415).

IMPORTANT: Individual parts ordered that are part of an assembly will be supplied as an assembly only

SEP 10 2003

La Goleta Facility Fuel System
Fuel meters for I.C. Engines: #4A and #5A
Main Units #2 through #8
Main Unit#9

Fuel Meter for Micro-Turbines: MT #1 through #4

Additional fuel meters: Hot Oil Heater #1
Hot Oil Heater #2
Hot Water Heater #201A
Hot Water Heater #201B

So Cal Gas utilizes gas from its pipeline system as fuel for all combustion equipment at the Goleta facility. Primary fuel measurement for the entire facility is through a 4" orifice meter. Fuel is distributed throughout the facility by a system of lines and headers to the individual pieces of equipment or groups of equipment that are on a common meter (see the "Fuel Metering Device List).

All of the fuel meters for the equipment are "positive displacement" rotary meters.

The fuel meters for Main Units 2 through 9, are each equipped with a "Total Flow X-Series" flow computer, which calculates, displays and stores the fuel readings. The Total Flows for Main Units 2 through 9 receive inputs from both pressure and temperature transmitters as well as the pulse generators. The results of the flow calculations are then sent to the facility server computer where they are monitored and recorded by Station operating personnel.

The fuel meter for the Micro - Turbines (MT1-MT4) is equipped with a Total Flow X Series flow computer with inputs for temperature and pressure correction. The results of the flow calculations are transmitted to our facility server. The total fuel used is apportioned between the four micro-turbines by multiplying the total fuel used by all four engines, by the fraction of total operating time each engine operated during the reporting period.

The Roots meters on the Line 1003 Hot Water Heaters are temperature compensated and operated at a fixed pressure constant. Our computer monitors and records values.

The fuel meters for IC engines #4A and #5A and for Hot Oil Heaters #1 and #2 are manually read on the 1st of each month. The volumes consumed are calculated manually using a pressure constant.

Engines MU# 2-9 and Micro-turbine fuel meters are maintained as follows:

- Visual inspection semi-annually:
  a. Check that meter is installed levelly
  b. Check meter oil level and that oil is clean
  c. Check meter for external leaks
  d. Check for smooth operation of meter if equipment is running
  e. Check overall condition of the meter exterior

f. Document inspection results in facility files

- Calibrate Total Flow devices Semi-Annually:
  a. Temperature transmitter (Main Units #2 - 9, and the Micro- Turbines)
  b. Pressure transmitter (Main Units #2 - 9, and the Micro- Turbines}
- Prove accuracy of fuel meters (Main Units 2-8 proven annually; Main Unit #9 proven biennially in conjunction with "Source Tests"):
  a. Accuracy to be within+ or 1 %, using the "Model 5 Roots 1 OM Prover".
  b. If meter is out of tolerance and the lobes cannot be flushed clean to bring the meter back into tolerance) the meter is replaced with a shop proven replacement meter.
  c. Document proving results in facility files
- The Micro-turbines fuel meter is not field provable but is replaced with a shop proven meter at a maximum interval of 120 months.
- The Line 1003 Water Heaters fuel meters are also not field provable and are on the 120 month replacement schedule.

Excerpts of maintenance procedures and the manufacture's literature regarding the Roots Meters, the Model *5* Roots 10M Prover and the Total Flow Computer are included for reference.

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PTO #9584-R3

(condition 9,C.16(v)&(vi)

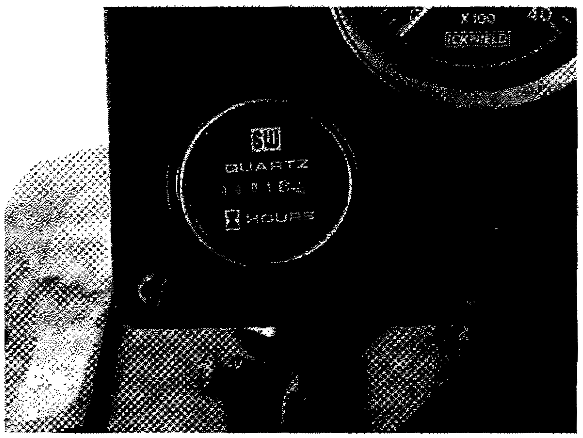
The Maintenance and Calibration of the hour meters used on Restricted use I.C. engines (Fire Pumps #12A & 13A and Office Emergency Generator).

February 8, 2012

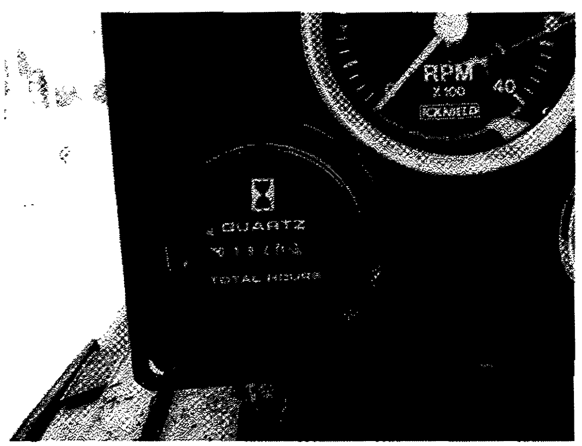
Hour meters:

Auxiliary Units #12A & 13A-Fire Water Pump Engines:

These engines are equipped with "Stewart/Warner" electric driven hour meters mounted into the engine control panel. So Cal Gas does not perform any maintenance or calibration on these instruments.



<= Hour meter for I.C. Engine #12A

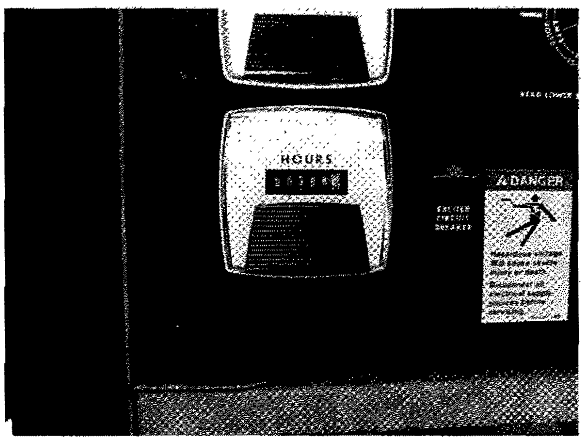


<= Hour meter for I.C. Engine #13A

Emergency Generator Engine:

This engine is equipped with an electric driven hour meter, which we *believe* is manufactured by "General Electric". So Cal Gas does not perform any maintenance or calibration on this instrument.

NOTE: So Cal Gas does not have manufacturer's literature on this hour meter.



<= Hour meter for office emergency generator.

Process Monitor Calibration and Maintenance Plan

PTO #9584- R7

(condition 9.C.16(i) and (v))

The Maintenance and Calibration of the air-fuel ratio controllers for engines subject to CAM Rule ("set point" settings only).

June 22, 2020

Air – Fuel Ratio Controllers ("set point" settings only):
Main Units 2 through 8 (Subject to CAM):

MAINTENANCE

AFRC PERIODIC ADJUSTMENTS

The AFRC system and millivolt ranges and/or optimum set points may be adjusted routinely on a quarterly basis or as necessary on a non-routine basis to keep the engine exhaust downstream of the converter in compliance with the emission limits established by Rule #333 and Part 70/APCD PTO #9584-R7. Adjustments to the millivolt "range" are made while the engine exhaust is being analyzed to assure compliance with emission limits. Adjustments of the "optimum" set point within the millivolt range may be done at the operator's discretion and does not require exhaust analysis.

OXYGEN SENSOR

The oxygen sensors provide a millivolt signal to the AFRC. The maintenance for the sensor is replacement. The sensors will be replaced if either of the following occurs:

1. Sensor is suspected of not functioning properly
2. Sensor attains 2100 operating hours

CATALYST

According to manufacturer's literature, catalysts are efficient with "an inlet temperature as low as 700 F and can be used at a maximum catalyst outlet temperature of 1400 F without degradation". The design configuration of our engine exhaust systems, changes in ambient temperature and changes in developed horsepower can result in inlet temperatures as low as 610 °F, which we consider our minimum temperature requirement. This minimum temperature has been established through on-site validation testing.

Over time, the performance of the catalytic converter will degrade to the level at which the converter needs to be replaced in order to maintain continuous compliance. Determination of when to replace a catalyst will usually be made from the results of the periodic emissions inspections. When catalysts are replaced, the District is notified of the replacement and the exhaust emissions are reinspected in accordance with the requirements of Part 70/APCD PTO 9584-R3,

QUARTERLY NOX MONITORING

Routine quarterly NOx monitoring or additional non-routine "in-house" emissions inspections shall be conducted in accordance with the requirements of Part 70/APCD PTO 9584-R7, and consistent with So Cal source test equipment and procedures set forth in Appendix A of the IC Engine Inspection and Maintenance Plan.

ENGINE MAINTENANCE RECORDS & PROCEDURES

Engines are maintained following facility procedures that were developed from manufacturer's recommendations and our Company's long experience of operating and maintaining I.C. engines. Manufacturer's literature and So Cal's Company Job Instructions are kept on file at the facility.

Note: For a more complete description of the AFRC system refer to the:

"IC Engine Inspection and Maintenance Plan."

Compliance Assurance Monitoring Plan
Southern California Gas Company
La Goleta Storage Field
PART 70/PTO 9584-R4

December 4, 2014

I. Background

A. *Emission Units*

Description:	Internal Combustion Engine / Gas Compressor Units Ingersoll-Rand LVG-82, 650 HP, (Units 2 - 5) Ingersoll-Rand KVG-62, 660 HP, (Units 6 - 8)
Identification:	Compressor Units 2 through 8 (001199 through 001205)
Facility:	Southern California Gas Company Goleta Station 1171 More Road P.O. Box 818 Goleta CA 93116

B. *Applicable Regulation, Emission Limit, and Monitoring Requirements*

Regulations:	40 CFR Part 64
Permit Nos:	Part 70/APCD PTO No. 9584-R4
Monitoring Requirements:	Refer to Summary of Monitoring Requirements Tables on Page 2.
CAM Applicability:	NOx, ROC and CO concentration limits
Control Technology:	Non-Selective Catalytic Reduction (NSCR) system including catalyst and air fuel ratio controller

Summary of Monitoring Requirements from Part 70/APCD PTO 9584-R4

IC Engine Main Units #2 through #8 (001199 thru 001205)

Requirement	**Frequency**	**Parameter/Limit**
Source Test	Annual	NOx: 50 ppmv @ 15% O_2 or 90% reduction CO: 4500 ppmv @ 15% O_2 per Rule 333, but also must be less than approximately 1700 ppmv @ 15% O_2 to meet 27.81 lb/hr permit limit. VOC (ROC): 250 ppmv @ 15% O_2
I&M Plan	Ongoing with minimally Quarterly monitoring of NOx and CO Emissions	Implement monitoring related provisions of the APCD approved Inspection and Maintenance Plan
Fuel Heating Value	Semi-annually	HHV (BTU/scf)
Fuel Sulfur Content	Semi-annually	Total Sulfur and H_2S/ PUC Quality Natural Gas
Operating Hours	Monthly	Document hours of operation for each ICE

Summary of Compliance Assurance Monitoring Requirements

IC Engine Main Units #2 through #8 (001199 thru 001205)

Indicator	**Catalyst Inlet Temperature**	**Catalyst Outlet Temperature**	**Oxygen Sensor Millivolt Output**
Indicator Range (Note 1)	≥ 610°F and < 1250°F	≥ 610°F and ≤ 1400°F.	Within 5% of the set point used in the most recent Rule 333 monitoring
QIP Threshold	1% excursion rate of the valid reads in a calendar quarter per ICE.	1% excursion rate of the valid reads in a calendar quarter per ICE.	1% excursion rate of the valid reads in a calendar quarter per ICE.
Monitoring Frequency	Once every hour	Once every hour	Once every hour

NOTE 1: Indicator range excursions exclude 60 minute start-up periods, 15 minute shut-down periods, calibrations, and periods of sudden and infrequent monitoring malfunctions beyond the operator's reasonable control.

II. Monitoring Approach

A. Indicator	Catalyst Inlet Temperature	Catalyst Outlet Temperature	Oxygen Sensor Millivolt Output
B. Measurement Approach	Thermocouple	Thermocouple	The Air Fuel Ratio (AFR) controller firmware monitors oxygen sensor output mV.
C. Indicator Range	Catalyst inlet temperature ≥ 610°F and < 1250°F	Catalyst outlet temperature ≥ 610°F and ≤ 1400°F	Within 5% of the set point used in the most recent Rule 333 monitoring
D. Quality Improvement Plan (QIP) Threshold	The QIP threshold is a 1% excursion rate of the valid reads in a calendar quarter per ICE.	The QIP threshold is a 1% excursion rate of the valid reads in a calendar quarter per ICE.	The QIP threshold is a 1% excursion rate of the valid reads in a calendar quarter per ICE.
E. Performance Criteria *Data Representativeness*	Proper catalytic reduction occurs when catalyst inlet temperature is at or above 610°F. This minimum temperature was established by on-site validation testing (refer to attached test results). The engine exhaust gas temperature is measured at the inlet to the catalyst.	Proper catalytic reduction can be affected by catalyst degradation or damage, which can occur at catalyst temperatures over 1400 F. The catalyst temperature is measured at the outlet of the catalyst.	The oxygen sensor, also called a lambda (λ) sensor, is used as a feedback signal to keep the engine air fuel ratio at the proper set point for optimum catalytic reduction of NOx, and CO emissions.
QA/QC Practices and Criteria	Annual calibration check. Station control system will indicate thermocouple problems that result in open or over-range conditions.	Annual calibration check. Station control system will indicate thermocouple problems that result in open or over-range conditions.	Periodic emission inspections as required by SBCAPCD Rule 333 to verify compliance with the existing set point and to adjust AFR controller as necessary to optimize set point.
Monitoring Frequency	Once every hour (excludes 60 minute start-up periods, 15 minute shut-down periods, calibrations, maintenance, and periods of sudden and infrequent monitoring malfunctions beyond the operator’s reasonable control).	Once every hour (excludes 60 minute start-up periods, 15 minute shut-down periods, calibrations, maintenance, and periods of sudden and infrequent monitoring malfunctions beyond the operator’s reasonable control).	Once every hour (excludes 60 minute start-up periods, 15 minute shut-down periods, calibrations, maintenance, and periods of sudden and infrequent monitoring malfunctions beyond the operator’s reasonable control).
Data Collection Procedures	Manual log sheet, or automated data logging by station control system.	Manual log sheet, or automated data logging by station control system.	Manual log sheet, or automated data logging by station control system.

III. Justification

A. *Rationale for Selection of Performance Indicators*

Inlet Catalyst Temperature

A minimum inlet temperature is needed for the catalyst to become reactive.

Outlet Catalyst Temperature

If the catalyst temperature gets too high, catalyst degradation or damage can occur. The catalyst outlet, rather than the inlet, is monitored because high temperature caused by an increase in unburned hydrocarbons from the engine would not be detected at the catalyst inlet.

Oxygen Sensor Millivolt Output

Fluctuation of oxygen sensor output around the set point is normal and beneficial; however, if the output permanently strays from the set point, there is a problem with the AFR controller and the actual AFR may not be correct for proper catalyst operation. (Note that the oxygen sensor is also called a lambda sensor because it provides a measure of lambda which is defined as the actual air fuel ratio divided by the stoichiometric air fuel ratio.) Therefore, proper AFR controller operation is verified by assuring that the oxygen sensor output does not deviate more than 5% from the set point.

B. *Rationale for Selection of Indicator Range or Level*

Inlet Catalyst Temperature

On-site verification testing has established the minimum temperature to be 610°F.

Outlet Catalyst Temperature

According to the catalyst manufacturer, the catalyst may be damaged if the exhaust temperature goes over 1400°F.

Oxygen Sensor Millivolt Output

The oxygen sensor output shall be within 5% of the set point used during the most recent Rule 333 monitoring. If the set point is changed, compliance with emission limits for the engine will be confirmed at the new set point. If the AFR controller cannot bring the oxygen sensor output back to values within 5% of the set point, it is assumed that the controller is not working. The ±5% tolerance is arbitrary, but reasonable since the purpose is to detect the most common AFR controller failures that would result in egregious deviations in the oxygen sensor set point.

C. *Data Capture Rate*

The value of the CAM monitored indicators will be recorded ("captured") on an hourly basis per Permit 9584-R4, Condition 9.C.18(d). The acceptable Data Capture Rate is ≥ 90% per calendar quarter per ICE. The formula to calculate the capture rate percentage is as follows:

(total no. of recorded readings ÷ total no. of engine run hours) × 100 = Data Capture Rate %

(excludes 60 minute start-up periods, 15 minute shut-down periods, calibrations and periods of sudden and infrequent monitoring malfunctions beyond the operator's reasonable control).

D. *Rational for Selection of Quality Improvement Plan (QIP) Threshold*

The selected QIP threshold for each IC engine is a 1% excursion rate of the valid reads in a calendar quarter per ICE (per Permit condition).

SoCalGas shall immediately notify the APCD if a QIP has been triggered; and shall develop and submit a QIP to the APCD for approval as expeditiously as practicable. The QIP submitted by SoCalGas shall meet all the requirements specified for it in 40 CFR Section 64.8 (QIP requirements), at a minimum.

E. *Maintenance Requirements*

Thermocouple calibration is checked annually.

The AFR controller manufacturer recommends that the oxygen sensors be replaced every 2000 hours. However, based on experience with these sensors at other facilities and to accommodate operational constraints and long weekends, the sensor will be replaced no later than every 2100 hours. Sensors will also be replaced whenever they are suspected of not functioning properly or if the AFR controller shows sensor health to be below 35%.

AFR controller set point is adjusted when periodic NOx and CO monitoring required by SBCAPCD Rule 333 indicates optimization is necessary. If the set point is changed, compliance with emission limits for the engine will be confirmed at the new set point.

F. *CAM Plan Revisions*

This CAM Plan will be revised, as necessary, to ensure it continues to meet the intent of the CAM Rule. Additionally the CAM Plan will be revised if the need for a QIP is triggered, or there is a change in the type of emissions control hardware installed on the units or there is a change in the method to monitor the emissions control system.

All revisions will be submitted to the SBCAPCD for approval.