VEEDER-ROOT

Carbon Canister Regulator Training

Course Agenda

- **Training and TLS Requirements**
  - Contractor Training Requirements, TLS Hardware and Software Requirements.

- **Vapor Polisher Installation and Set-up**

  - Pre-installation Requirements
  - Installing the Vapor Polisher.
  - Smart Sensor Set-up and PMC/ISD Programming

- **Vapor Polisher Maintenance**

  - Vapor Polisher Valve Filter Replacement
  - Vapor Polisher Valve Replacement
  - Vapor Polisher Thermal Temperature Probe Replacement
  - Vapor Polisher Ambient Temperature Sensor Replacement

Course Agenda- Continued

- **Vapor Polisher Operation and PMC/ISD Reports (Printed and RS-232)**
  - Vapor Polisher Operation- How Does it Work?
  - ISD Daily, Monthly and Status Reports and PMC Status Reports
  - RS-232 & Console Reports

- **PMC/ISD Warnings and Alarms and Vapor Polisher Troubleshooting**
  - Troubleshooting PMC Warnings and Alarms
  - ISD Warnings and Alarms-New Warnings and Failures
  - Troubleshooting ISD Warnings and Alarms

- **Operability Testing**
  - Vapor Polisher exhibits 11 & 12

PMC/ISD Contractor Training Course

- **Prerequisite** = Valid Veeder-Root Technician & VR ISD/PMC Certification
- **Course includes:**
  - Pressure Management Control (PMC)
  - Vapor Polisher…
    - Installation
    - Checkout
    - Startup
    - Programming
    - Operations training
  - Troubleshooting and service techniques for VR ISD
- **Completion** = Carbon Canister Vapor Polisher with ISD & ISD/PMC Certification (& card)

Contractor Certification Requirements

- **Veeder-Root <u>Installer</u> (Level 1)** - wiring and conduit routing, equipment installation only

- **Veeder-Root <u>Technician</u> (Level *2/3 or 4*)** - Approved to perform installation checkout, startup, programming and operations training, troubleshooting and servicing for TLS-3XX systems, including Line Leak Detection and associated accessories

- **Veeder-Root <u>ISD/PMC-CCVP Technician</u>** - In-Station Diagnostics/ Pressure Management Control (ISD/PMC) installation checkout, startup, programming, and operations training.

The VST EVR Balance System

VST
Balance
Fuel Nozzles

Dispenser

VR Vapor Polisher

EO- 203 & 204 Hanging Hardware Requirements

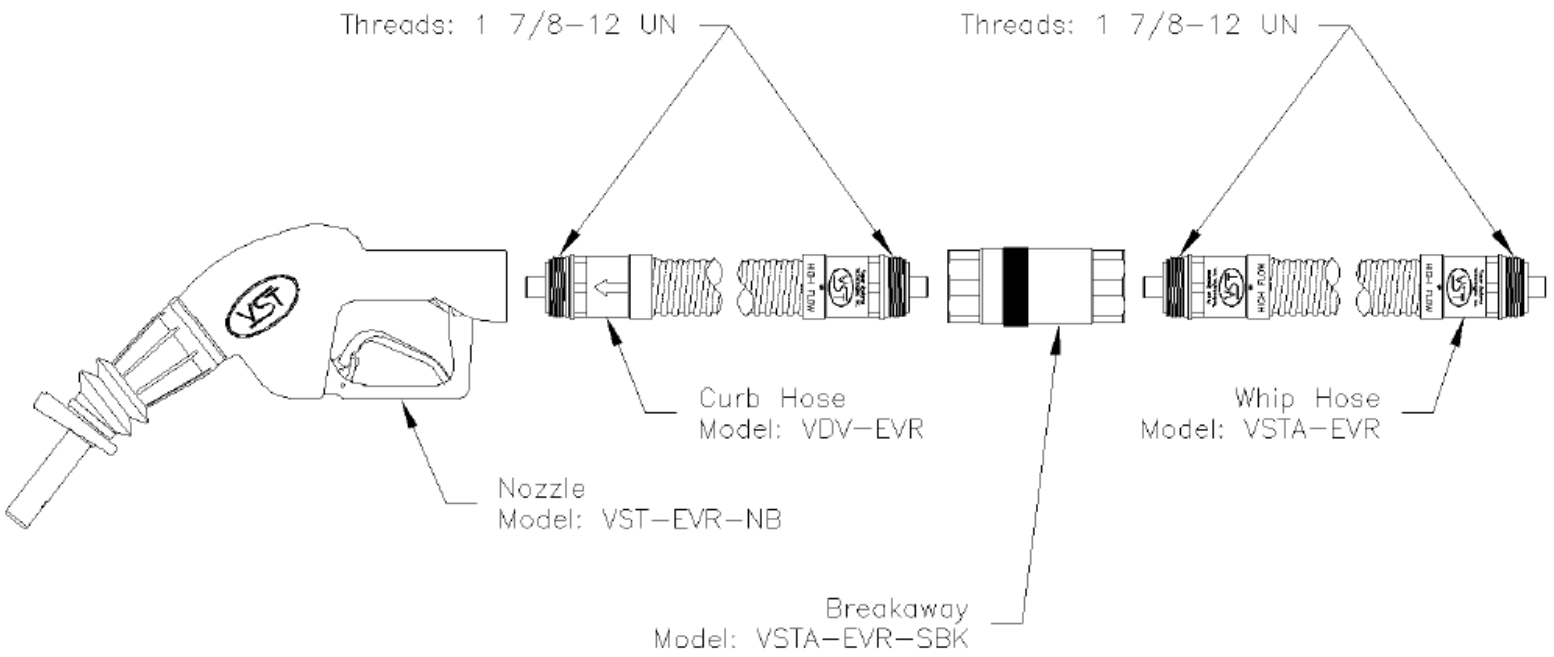

Figure 1: VST Hanging Hardware
(Nozzle, Coaxial Curb Hose, Breakaway, and Coaxial Whip Hose)

Site Requirements for VR Vapor Polisher PMC only Install

- V-R TLS-350R/EMC w/BIR, TLS-350 Plus/EMC Enhanced, TLS-350/EMC and ProMax consoles with ECPU2 with v.329 software or higher/ PMC version 1.02
- A flash memory board (NVMEM203) for PMC software storage - installed on the ECPU2 board in place of the console's 1/2 Meg RAM board- No Set-up Required
- Seven Channel Smart Sensor Module and Vapor Pressure Sensor.
- One VR Mag Probe in each of the Gasoline Tanks being monitored
- An IS conduit to the Vent Stack or the availability of direct bury.
- An RS-232 Port will be available for use by contractor or government inspectors

**Integral Printer Required*

Site Requirements for VR Vapor Polisher ISD Install

- V-R TLS-350R/EMC w/BIR, TLS-350 Plus/EMC Enhanced, TLS-350/EMC and ProMax consoles with ECPU2 with V.329 or higher/ ISD version 1.02 Software
- A flash memory board (NVMEM203) for PMC/ISD software storage - installed on the ECPU2 board in place of the console's 1/2 Meg RAM board
- An IS Conduit or the availability to direct bury
- A seven channel Smart Sensor Module, Dispenser Interface Module, Output Relay Module, Balance Vapor Flow Meter per Dispenser and Vapor Pressure Sensor
- One VR Mag Probe in each of the Gasoline Tanks being monitored
- An RS-232 port will be available for use by contractor or government inspectors.

PMC/ISD & Vapor Polisher Reference Manuals

- **577013-937/ IOM 16** (ISD Install, Setup and Operation Manual for Veeder-Root Vapor Polisher & VST ECS Membrane Processor)*
- **577013-948/ IOM 19** (PMC Install, Setup and Operation Manual for Veeder-Root Vapor Polisher)*
- **577013-920/ IOM 18** (Carbon Canister Vapor Polisher Installation Manual)*
- **576013-879** (TLS –350) Site Prep and Installation)

* Manuals controlled by CARB part of the Executive Order

Course Agenda

- **Vapor Polisher Installation and Set-up**
  - Pre-installation requirements
  - Installing the Vapor Polisher.
  - Smart Sensor Set-up and PMC/ISD Programming
- **Vapor Polisher Maintenance**
  - Vapor Polisher Valve Filter Replacement
  - Vapor Polisher Valve Replacement
  - Thermal Temperature Probe Replacement
  - Ambient Temperature Sensor Replacement
- **Carbon Canister Operation and PMC/ISD Reports (Printed and RS-232)**
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  - Troubleshooting PMC Warnings and Alarms
  - ISD Warnings and Alarms-New Warnings and Failures
  - Troubleshooting ISD Warnings and Alarms
- **Operability Testing**
  - Vapor Polisher exhibits 11 & 12

Carbon Canister Installation - Site Prep Requirements

- Certified VR Installer (Level 1) required for this type of installation
- Comply with OSHA and your employer's safety practices
- Intrinsically safe circuits must be segregated in accordance with Article 504 of the NEC when installed in the same raceway.
- Review and comply with all the safety warnings in installation manuals and any other National, State or Local requirements.
- If being wired directly to a TLS console, a 2-conductor, 18 AWG shielded cable must be installed in intrinsically safe conduit
  - Intrinsically safe wiring compartment in console to the Carbon Canister.
  - If direct burial cable is used, it must comply with all requirements of the local authority having jurisdiction
- Only UL-certified Gas/TFE yellow Teflon tape on all fittings.

Preparing the Installation - Vapor Polisher Parts Required

Veeder-Root Parts

- Veeder-Root Carbon Canister Vapor Polisher, Form No. 861290-002.

Table 1. CCVP 2" Installation Kit

Item	Qty.	Description	P/N
1	1	Carbon Canister	332761-002
2	1	Inlet Piping Kit	330020-638
3	1	Mounting Bracket Group	332861-002
4	1	CCVP Installation Instructions	577013-920

- Veeder-Root Carbon Canister Vapor Polisher, Form No. 861290-003.

Table 2. CCVP 3" Installation Kit

Item	Qty.	Description	P/N
1	1	Carbon Canister	332761-002
2	1	Inlet Piping Kit	330020-638
3	1	Mounting Bracket Group	332861-003
4	1	CCVP Installation Instructions	577013-920

- Veeder-Root CCVP piping group kits.

Table 3. CCVP Piping Group Kits

Item	Qty.	Description	P/N
1	1	2" Piping Group Kit	332954-002
2	1	3" Piping Group Kit	332954-003

Installing the Vapor Polisher

1. Figure 4 of the TLS-3XX Site Prep Manual, P/N 576013-879, must be consulted for proper installation of the Carbon Canister into hazardous locations with direct wiring.
2. During the installation, all required National, State and local safety codes must be followed.
3. The CCVP contains an integral vapor valve that operates in parallel with the site pressure/vacuum (P/V) vent. Location of the vapor valve outlet must conform to Article 514 of the National Electrical Code (NEC) and NFPA 30/30A.
4. Do not install the CCVP on unsupported vent pipes. If the vents are not attached to a support structure or a wall, a support structure must be installed prior to mounting the CCVP.
5. A straight coupling or union is required at the base of the vent pipe installation. For new or rebuilt sites, it is recommended that the installation design specify a threaded fitting for joining the vent pipes to the underground piping system.
6. **IMPORTANT! To assure that the canister outlet is 12 feet (minimum above grade, the CCVP mounting bracket must be located as shown in Figure 1 and the U-bolts tightly clamped to the vent pipe before mounting the canister.**

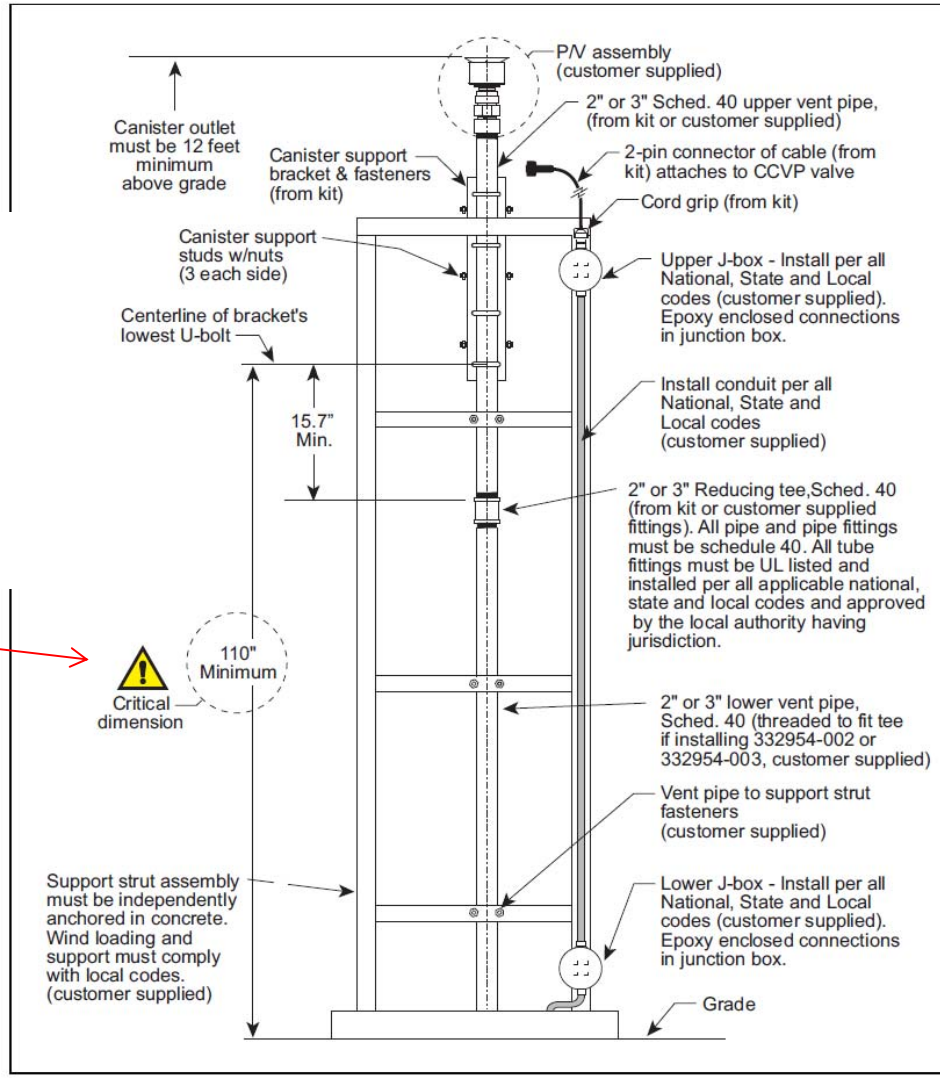


Figure 1. Typical direct wired installation example

Installing the Vapor Polisher

7. Following all required national, state, local and site safety precautions, carefully hang the CCVP's notched support tabs onto the top two side studs of its mounting bracket (Step 1 in Figure 2), swing the canister down until all of the slots in the canister's side mounting tabs seat against the studs in the bracket (Step 2 in Figure 2), then tighten the six side nuts to secure the canister onto its bracket (Step 3 in Figure 2).
8. Figure 3 shows important reference dimensions and required clearances of the installed canister.
9. Install weather tight junction boxes (2 required) and conduit per all NEC, State and local codes (see example installation in Figure 1).
10. Connect the two-pin connector of the 6-foot cable provided in the installation kit to the CCVP vapor valve, observing plug polarities (see Figure 4). The other end of this cable is passed through a kit supplied cord grip in the upper junction box.
11. Connect the white wire of the two conductor cable from the vapor valve to the positive sensor wire from the TLS Console Smart Sensor Interface module (see Figure 5). Connect the black wire on the two conductor cable to the negative sensor wire from the TLS Console Smart Sensor Interface module.
12. Following the instructions in Figure 6, seal the wire nuts of each of the two cable connections in the epoxy pack provided.
13. Attach CCVP vapor valve field wiring to the Smart Sensor Interface Module in the TLS console as shown in Figure 7.
14. Connect all lower fittings, valve and tubing between the vent pipe and the lower manifold on the CCVP.
15. Confirm ball valve is in the open, canister to vent stack position (per Figure 3), then insert the clevis pin and secure with the hitch pin.
16. A passing pressure decay test, in accordance with CARB TP-201.3, must be completed after the CCVP is installed (see Exhibit 4 of VR 203 / VR 204).
17. A passing operability test must be completed in accordance with the procedures defined in VR 203 / VR 204 Exhibit 11 & 12.

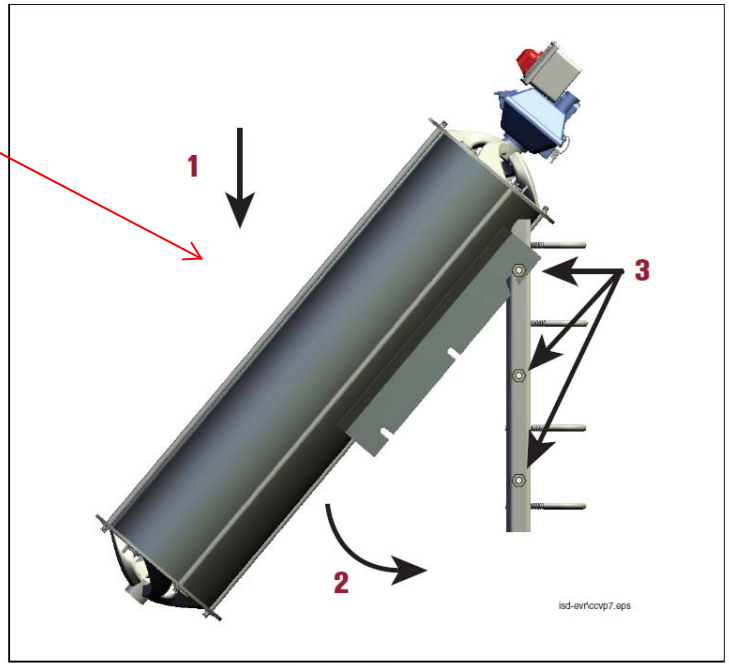


Figure 2. Installing CCVP onto bracket

Vapor Polisher Dimension Requirements

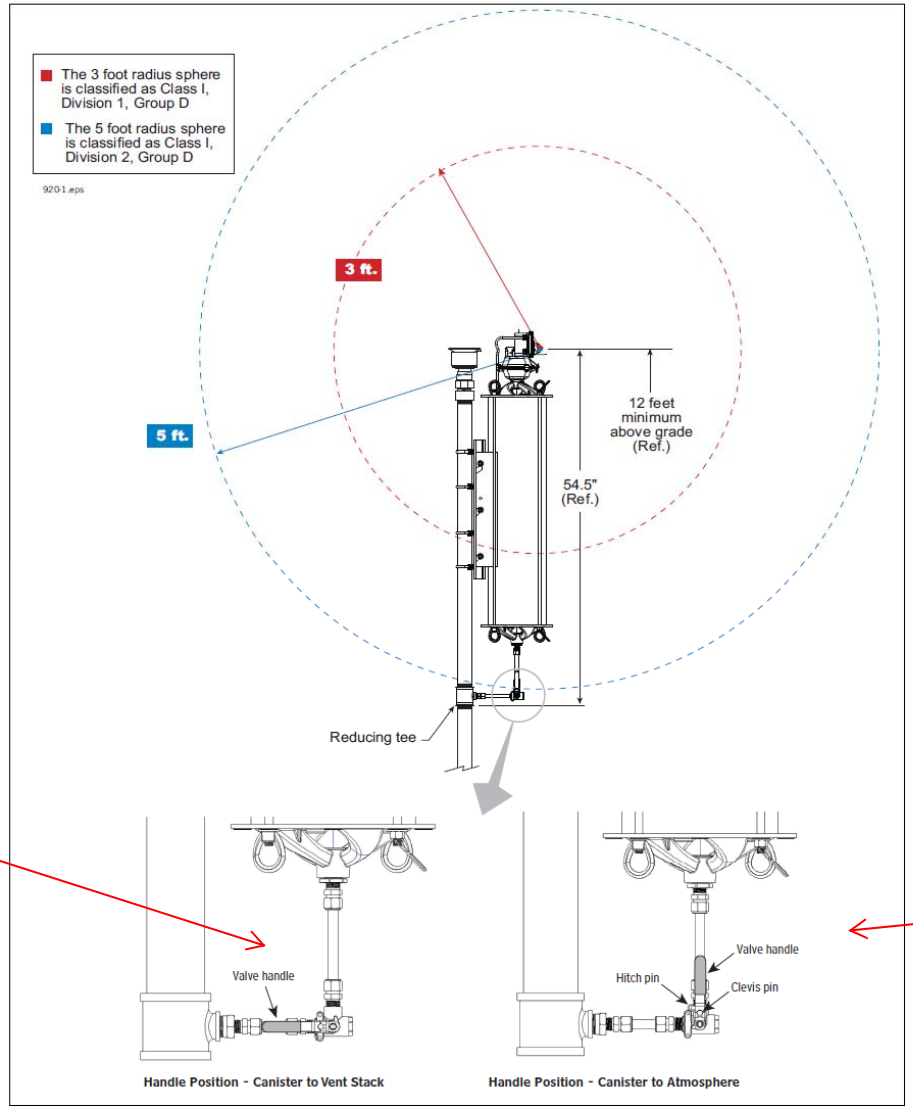


Figure 3. Canister reference dimensions and clearances

Normal Position

Test Position

Wiring the Vapor Polisher

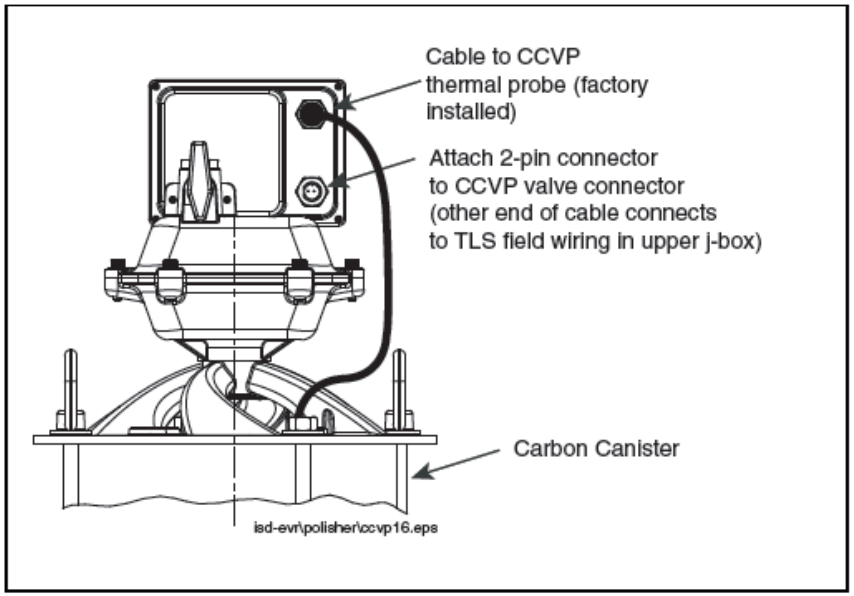
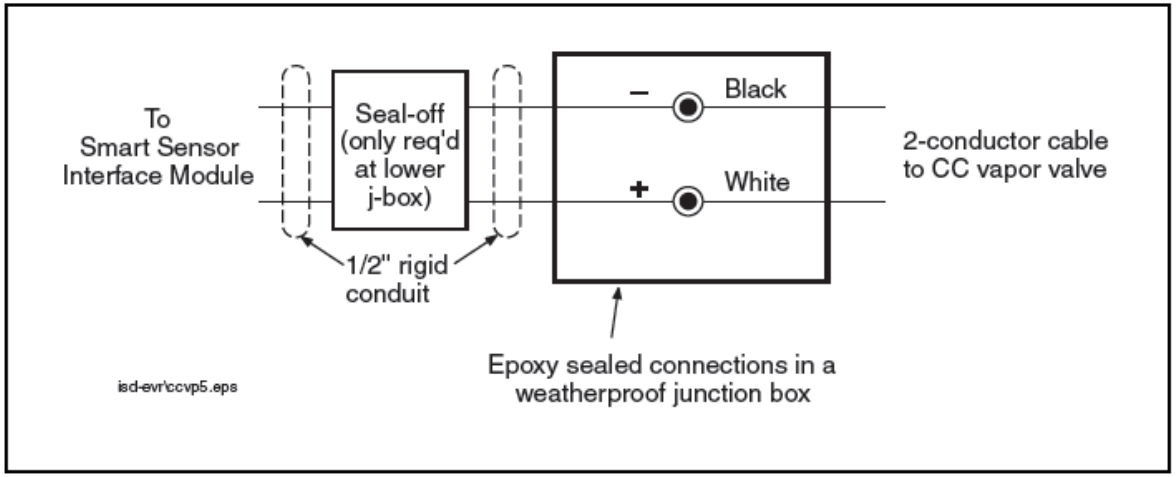


Figure 4. Locating the CCVP vapor valve connector



Seal and Connect Field Wiring – Vapor Polisher

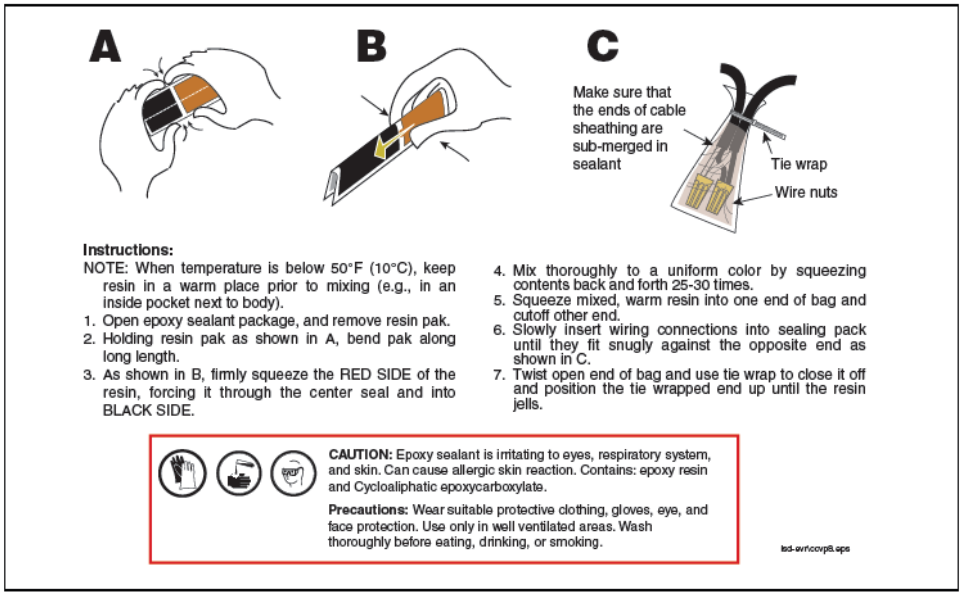
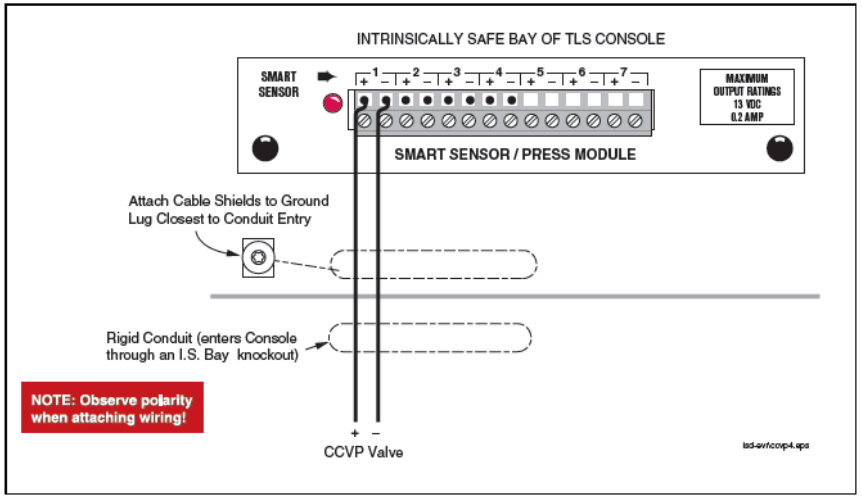
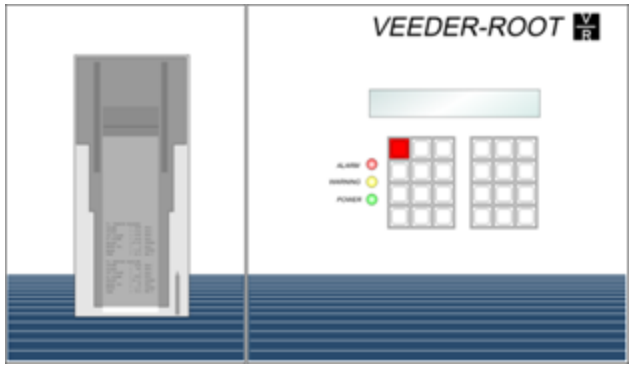


Figure 6. Epoxy sealing CCVP vapor valve field wiring connections



TLS Console Requirements

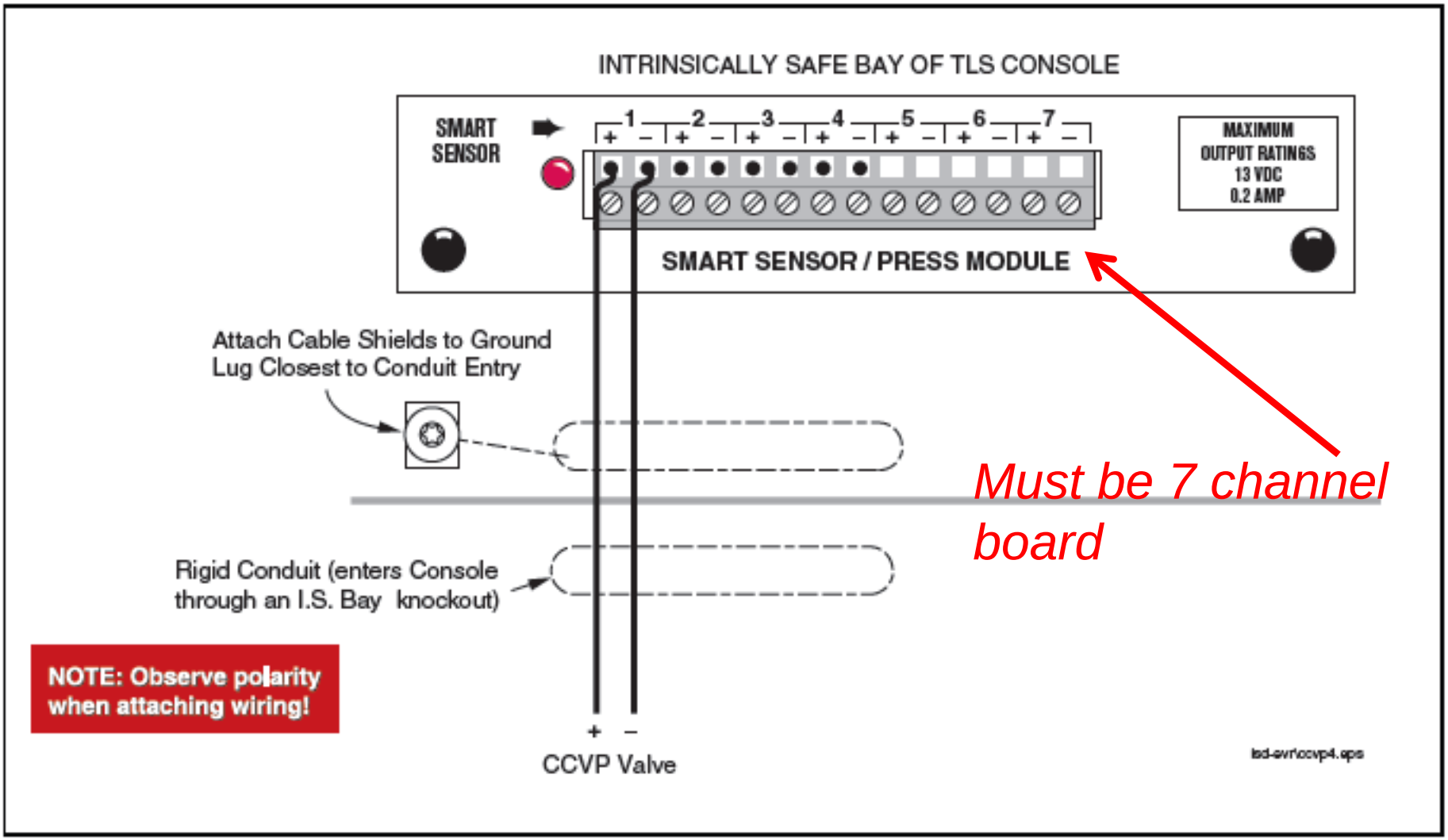
- Upgradeable Consoles*
  - TLS-350 / EMC
  - TLS-350 Plus / EMC Enhanced
  - TLS-350R / EMC w/BIR
  - TLS-350J
  - RedJacket ProMax



- Console Requirements (Modules)
  - ECPU II w/TLS Software **v29** (or higher)
  - ISD SEM & NVMEM 2
  - Submersible Turbine Pump (STP) shutdown control hardware
  - RS-232 Interface Module
  - Dispenser Interface Module (DIM)
  - Sensor interface modules

**Integral Printer Required*

Smart Sensor Module- Vapor Polisher



Smart Sensor Setup- Vapor Polisher

Smart Sensor Setup - Vapor Polisher

The Smart Sensor Interface Module is installed in the Intrinsically-Safe bay of the TLS console. This module monitors the Vapor Polisher. Figure 3 diagrams the Smart Sensor setup procedure.

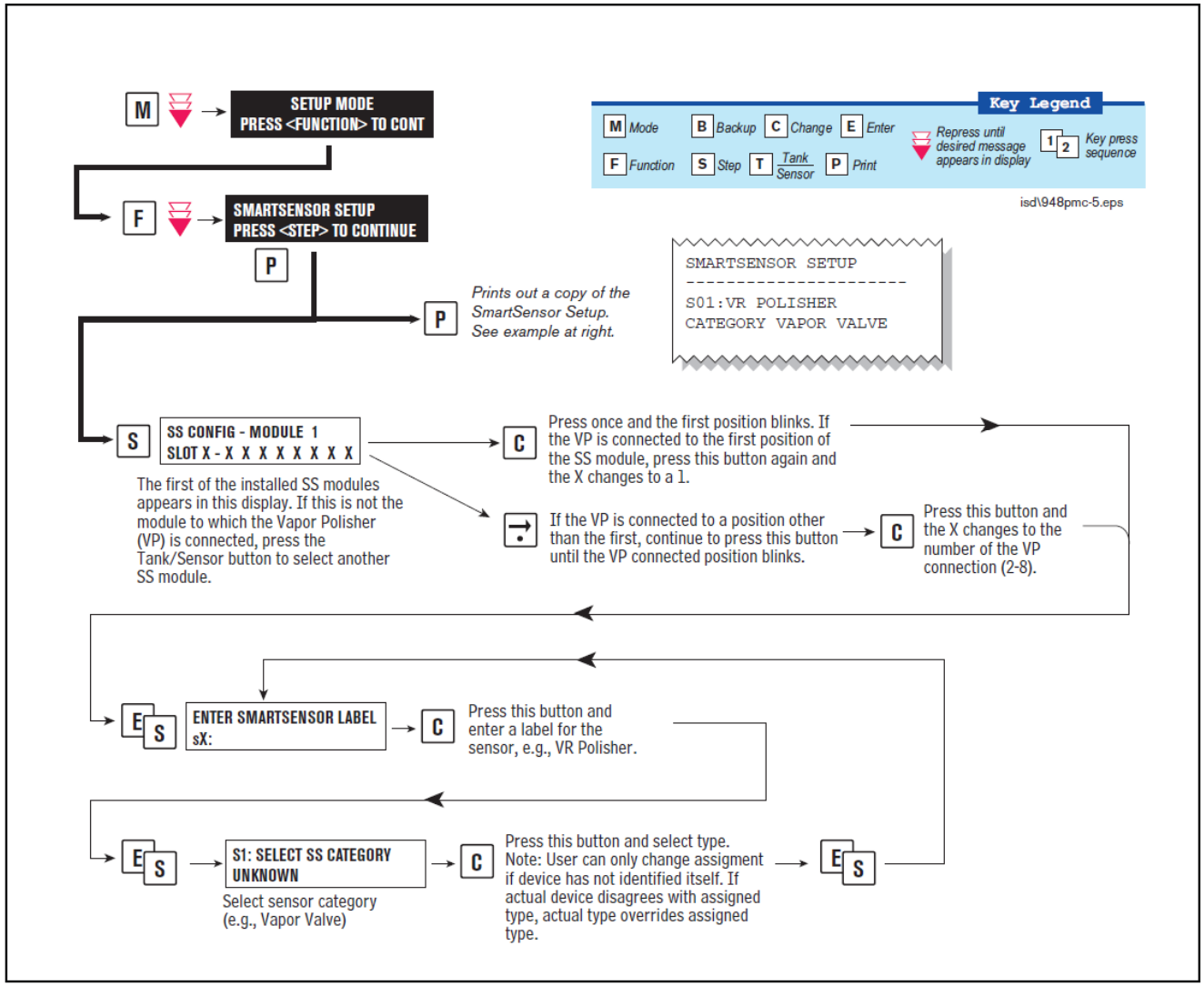


Figure 3. Smart Sensor Setup - Vapor Polisher

Smart Sensor Set-up- Vapor Pressure Sensor

Smart Sensor Setup - Vapor Pressure Sensor

The Smart Sensor Interface Module is installed in the Intrinsically-Safe bay of the TLS console. This module monitors the Vapor Pressure Sensor. Figure 2 diagrams the Smart Sensor setup procedure.

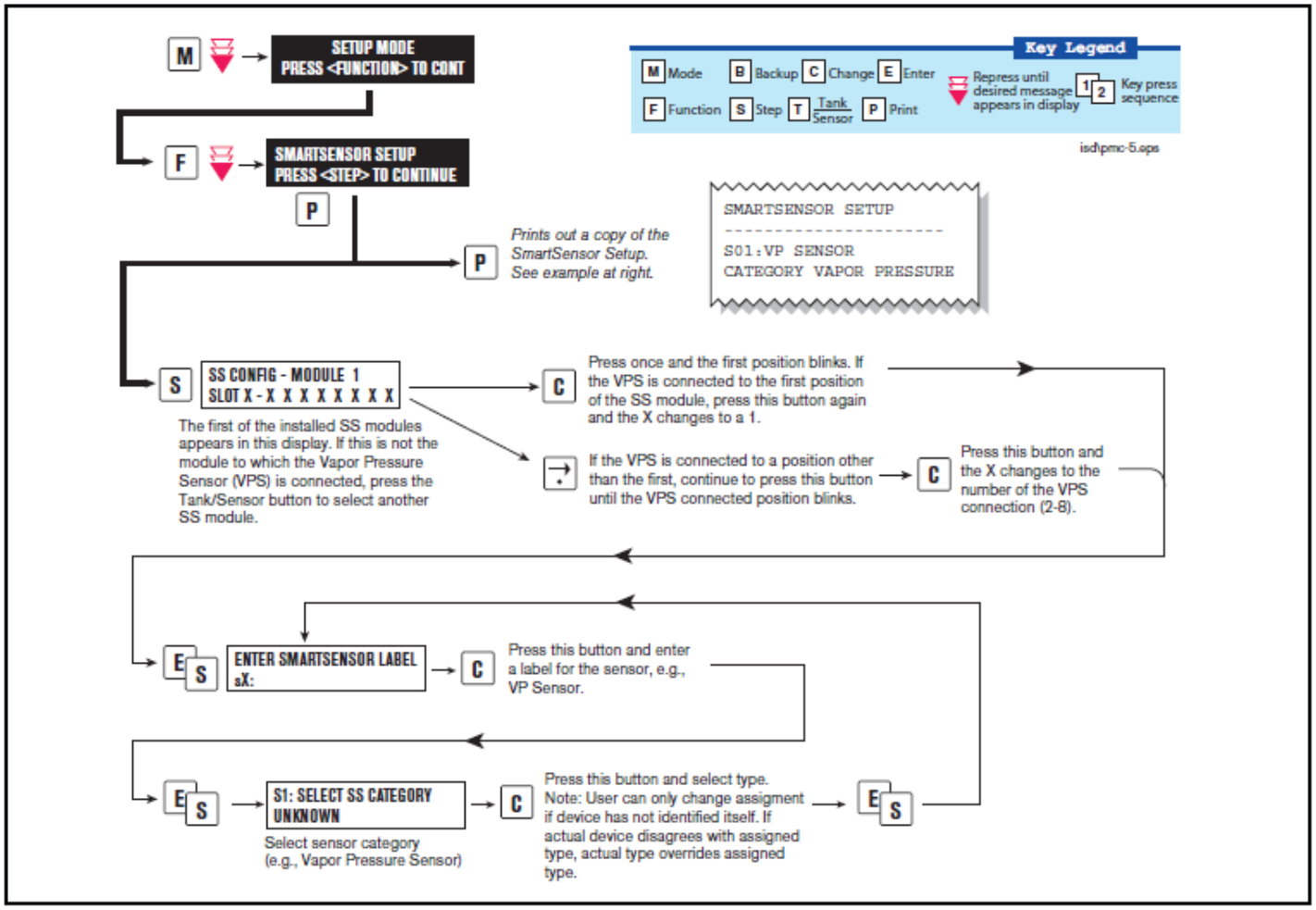


Figure 2. Smart Sensor Setup - Vapor Pressure Sensor

Smart Sensor Set-up- ATMP Sensor

ATM Pressure Sensor Setup

The ATM Pressure Sensor is factory installed in the SmartSensor / Press module and preassigned to channel 8. At least one SmartSensor / Press module, which contains the ATM Pressure Sensor, must be installed in the console. You must configure at least one ATM Pressure Sensor for use by the Vapor Polisher or a PMC Set-up Fail will occur. NOTE: if more than one SmartSensor / Press module is installed, only one ATM Pressure Sensor needs to be configured.

Look in console and note the slot position of the SmartSensor / Press module. Enter the Setup Mode and press the FUNCTION key until you see the message:

```
SMARTSENSOR SETUP
PRESS <STEP> TO CONTINUE
```

Press STEP until you see the message:

```
SS CONFIG - MODULE n
SLOT x - X X X X X X X X
```

Where *x* is the slot number containing the SmartSensor / Press module. Press the → key to move the cursor to the last (8th) X. Press CHANGE and the message below should appear:

```
SLOT x - X X X X X X X 8
PRESS <STEP> TO CONTINUE
```

Press STEP:

```
ENTER SMARTSENSOR LABEL
s 8:
```

NOTE: In the example above, the ATM P sensor position is 8 but it could be16, 32, or 40 depending on the SmartSensor's module number.

Press CHANGE and enter a label:

```
ENTER SMARTSENSOR LABEL
s 8: (ATMP Sensor Label)
```

Press ENTER to accept your label:

```
s 8: (ATMP Sensor Label)
PRESS <STEP> TO CONTINUE
```

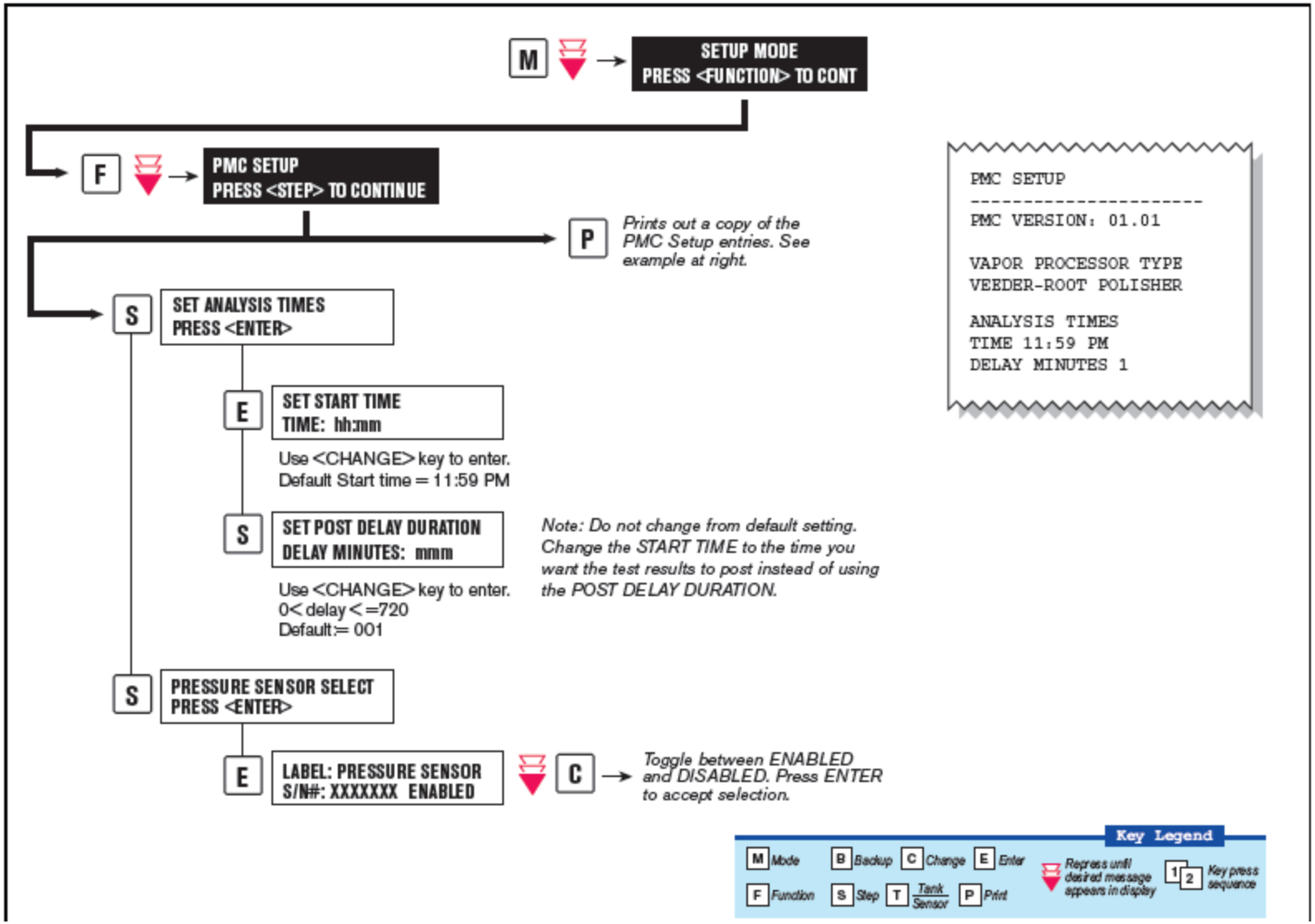
Press STEP:

```
s 8: SELECT SS CATEGORY
UKNOWN
```

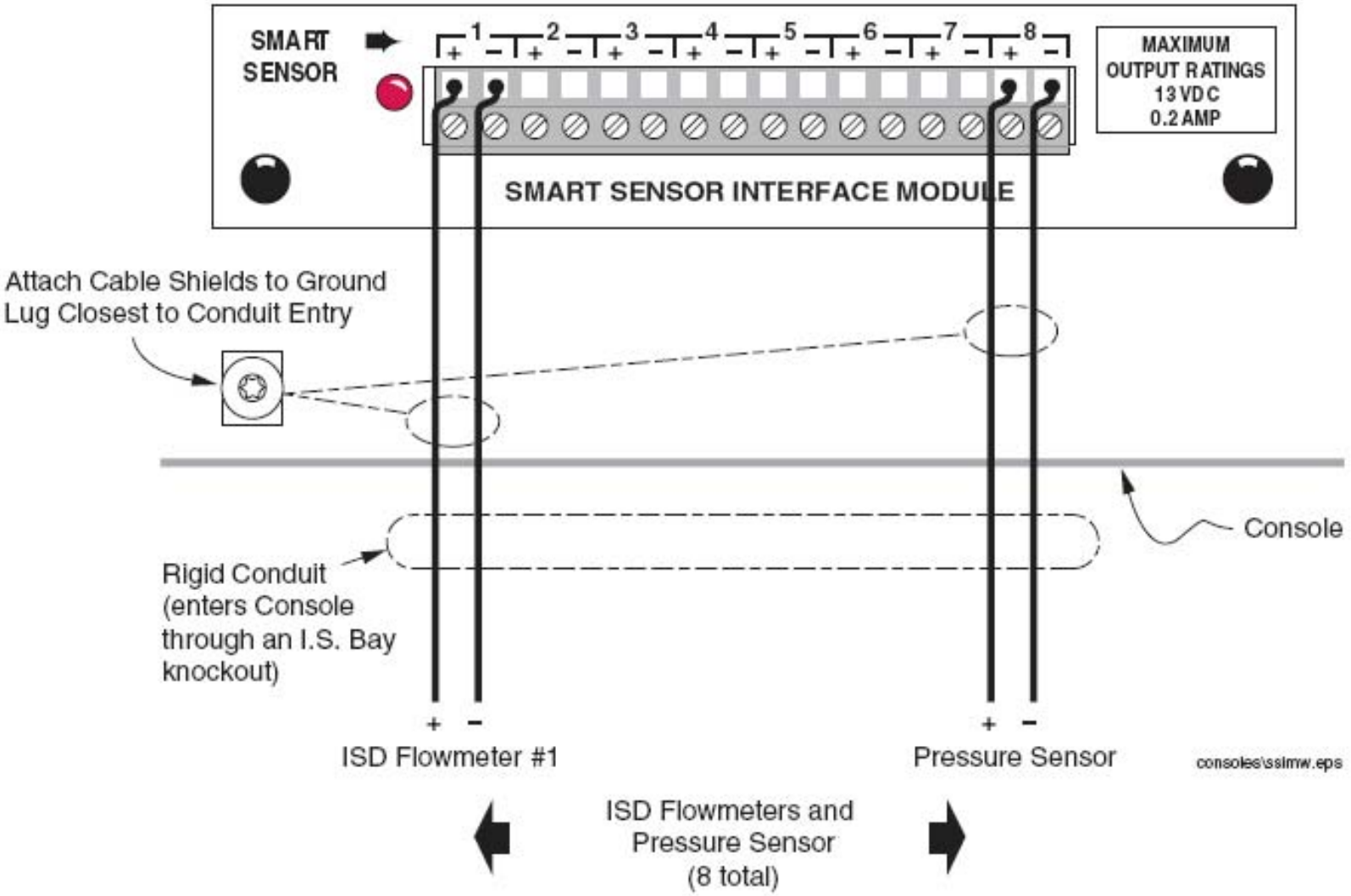
Press CHANGE until you see the message:

```
s 8: SELECT SS CATEGORY
ATM P SENSOR
```

PMC Setup Without ISD- Vapor Polisher

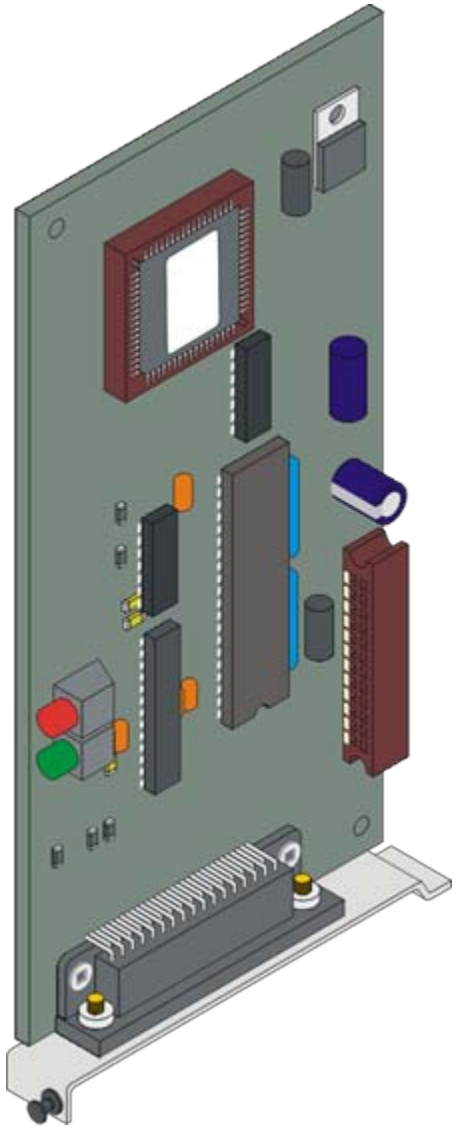


Smart Sensor Module- ISD Sensors



Dispenser Interface Module (DIM)

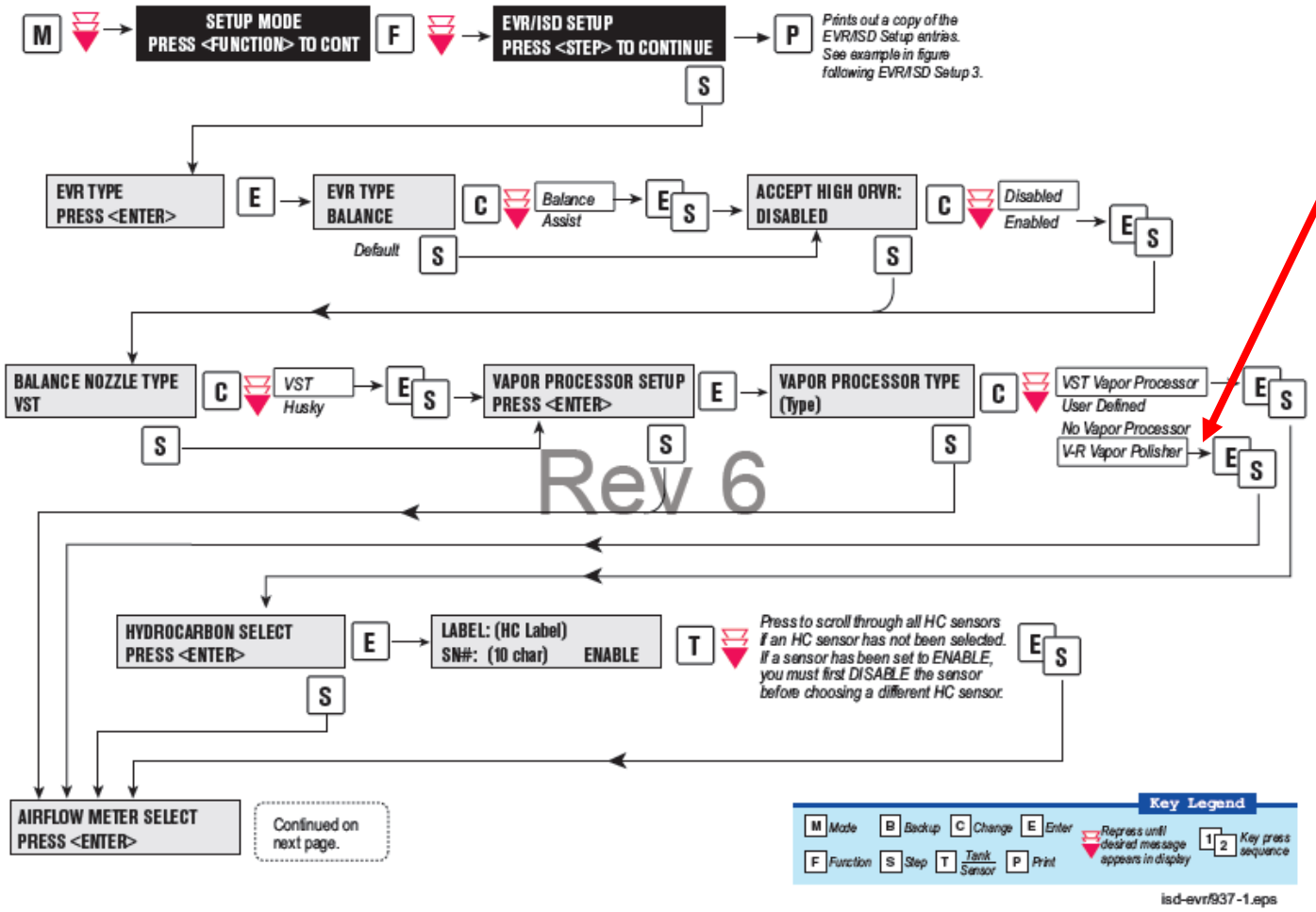
Dispenser Interface Module (DIM) installed in the TLS console communication bay or high power compartment



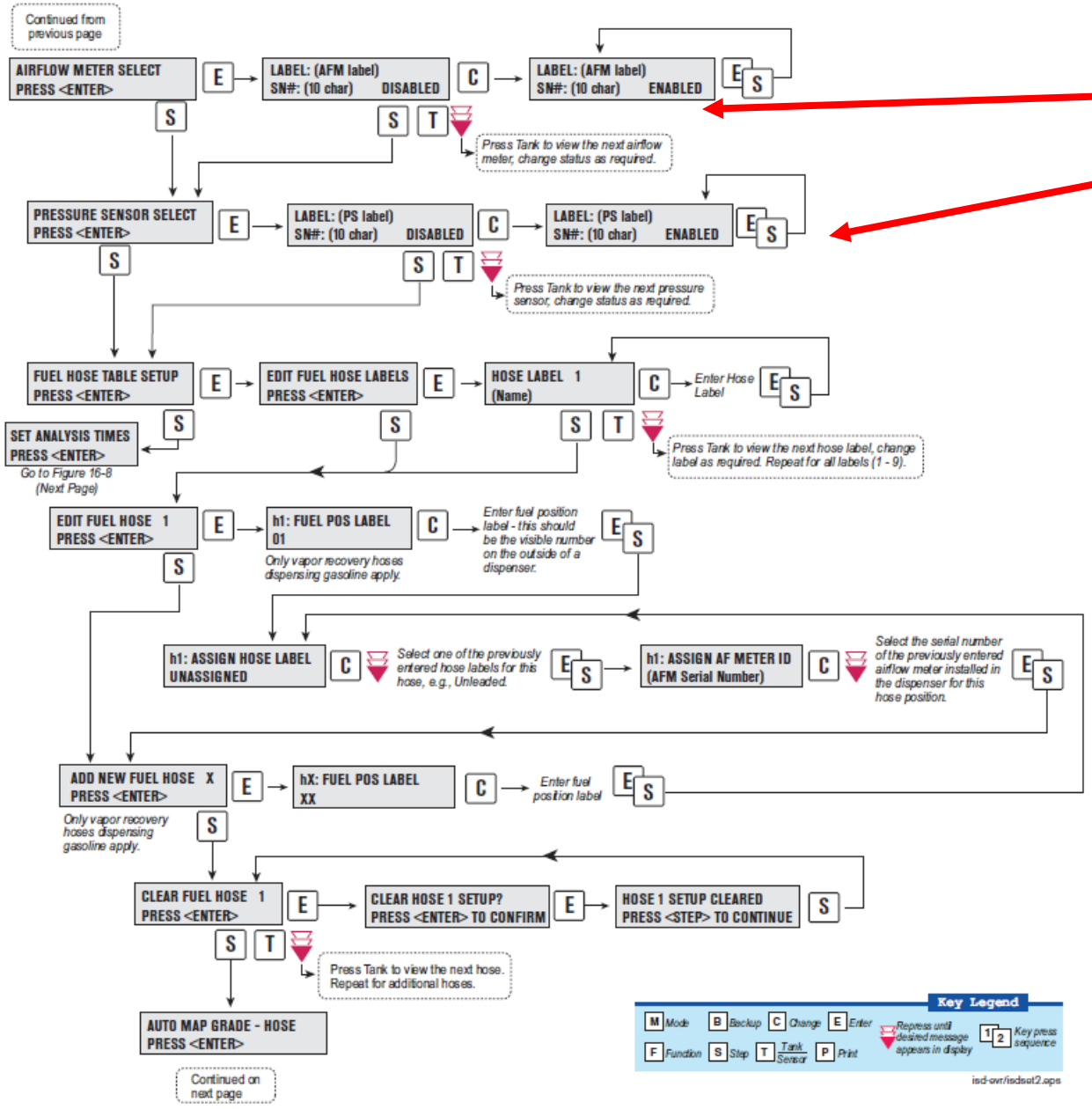
EVR/ISD Set-up (Balance)

New Selection

New Menu

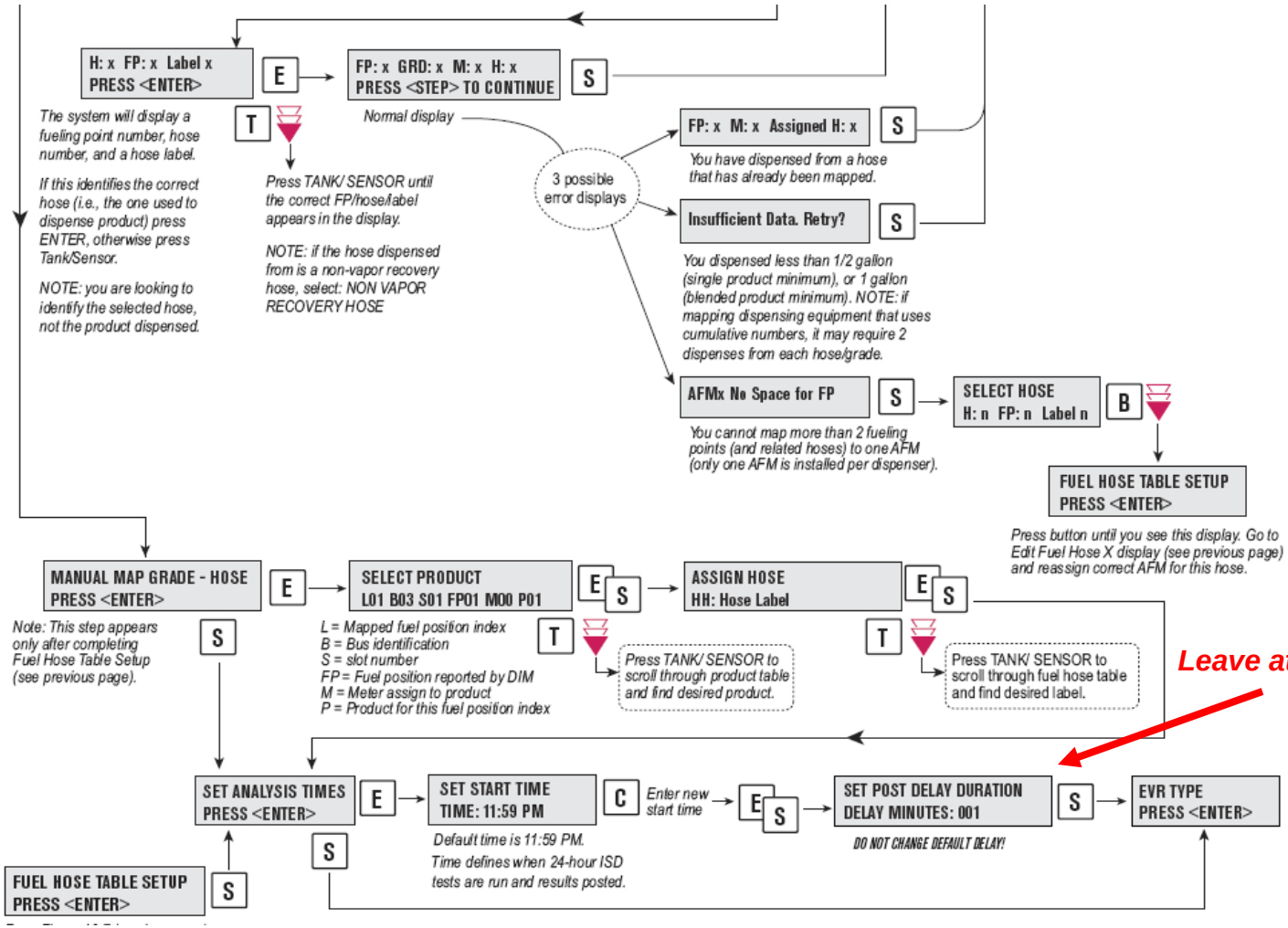


EVR/ISD Set-up (Sensors and Hose Set-up)

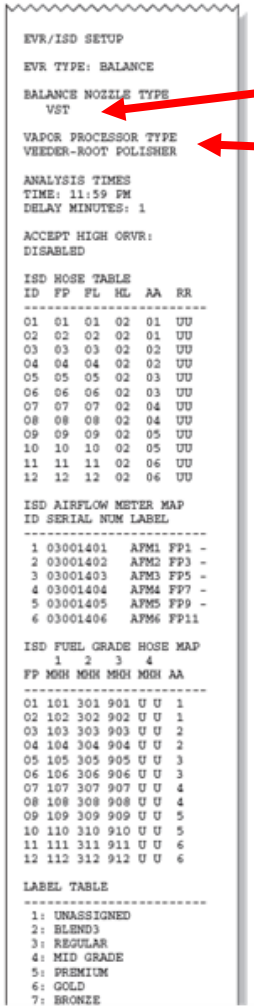


Enable ISD Vapor Flow Meters (Airflow Meters) & ISD Pressure Sensor

EVR/ISD Setup (Hose Mapping)



EVR/ISD Setup Print Out



```
EVR/ISD SETUP

EVR TYPE: BALANCE

BALANCE NOZZLE TYPE
   VST

VAPOR PROCESSOR TYPE
VEEDER-ROOT POLISHER

ANALYSIS TIMES
TIME: 11:59 PM
DELAY MINUTES: 1

ACCEPT HIGH ORVR:
DISABLED

ISD HOSE TABLE
ID  FP  FL  HL  AA  RR
-------------------------
01  01  01  02  01  UU
02  02  02  02  01  UU
03  03  03  02  02  UU
04  04  04  02  02  UU
05  05  05  02  03  UU
06  06  06  02  03  UU
07  07  07  02  04  UU
08  08  08  02  04  UU
09  09  09  02  05  UU
10  10  10  02  05  UU
11  11  11  02  06  UU
12  12  12  02  06  UU

ISD AIRFLOW METER MAP
ID SERIAL NUM LABEL
-------------------------
 1 03001401    AFM1 FP1 -
 2 03001402    AFM2 FP3 -
 3 03001403    AFM3 FP5 -
 4 03001404    AFM4 FP7 -
 5 03001405    AFM5 FP9 -
 6 03001406    AFM6 FP11

ISD FUEL GRADE HOSE MAP
    1   2   3   4
FP M&H M&H M&H M&H AA
-------------------------
01 101 301 901 U U  1
02 102 302 902 U U  1
03 103 303 903 U U  2
04 104 304 904 U U  2
05 105 305 905 U U  3
06 106 306 906 U U  3
07 107 307 907 U U  4
08 108 308 908 U U  4
09 109 309 909 U U  5
10 110 310 910 U U  5
11 111 311 911 U U  6
12 112 312 912 U U  6

LABEL TABLE
-------------------------
 1: UNASSIGNED
 2: BLEND3
 3: REGULAR
 4: MID GRADE
 5: PREMIUM
 6: GOLD
 7: BRONZE
```

Balance Nozzle Type

New Vapor Processor

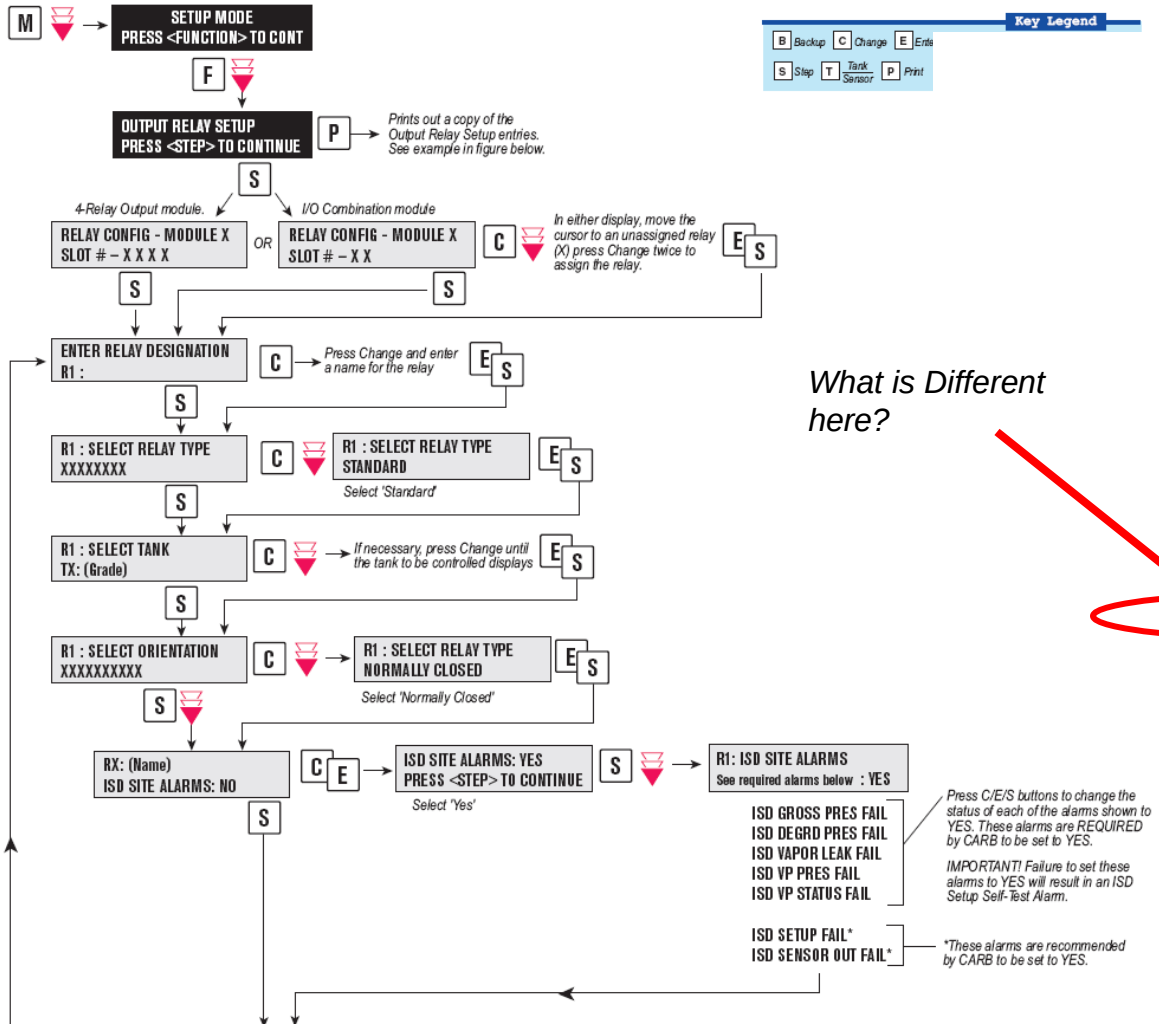
ID = Hose ID
FP = Mapped fuel position as TLS Console recognizes it
(-1 = unassigned)
FL = Fuel position label as written on dispenser
HL = Hose label
AA = Airflow meter ID assigned
RR = Relay ID
UU = unassigned

ID = Airflow meter ID assigned
Serial Number = Airflow meter's serial number

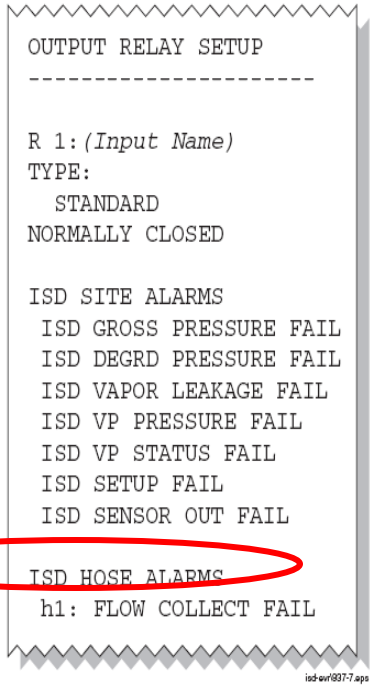
FP = Mapped fuel position
M/H = Meter and hose for product X
AA = Airflow meter assigned to first (lowest X) product with meter and hose assigned (usually same for entire dispenser)
U = Unassigned
N = Not used by ISD

ID = Label ID
Label = User definable
00 = reserved, non-ISD

Output Relay Setup-ISD



What is Different here?



ISD- Carbon Canister Set-up Checklist

Procedure

The following recommended procedure can be followed at the completion of the ISD software setup for VST Balance Systems with Veeder Root Vapor Polisher:

STEP 1.	EVR TYPE is set to BALANCE?	☐
STEP 2.	The Balance Nozzle Type is VST?	☐
STEP 3.	The Vapor Processor set to Veeder Root Polisher?	☐
STEP 4.	There is a wired and ENABLED 'AIRFLOW METER' (i.e. ISD Vapor Flow Meter) in each vapor recovery dispenser?	☐
STEP 5.	There is a wired and ENABLED 'PRESSURE SENSOR' (i.e. ISD Vapor Pressure Sensor)?	☐
STEP 6.	The FUEL HOSE TABLE is setup and filled out for each vapor recovery hose?	☐
STEP 7.	The ISD FUEL GRADE HOSE MAP does not contain entries for non vapor recovery hoses (e.g. diesel)?	☐
STEP 8.	On the TLS press the MODE key until the DIAGNOSTIC MODE menu is displayed (this will cause a TLS console System Self Test).	
STEP 9.	Using the Troubleshooting Guide respond to all ISD Setup ALARMS posted on the printer tape.	☐
STEP 10.	Repeat Steps 8 & 9 until there are no ISD setup or self-test alarms. The TLS Console display reads ALL FUNCTIONS NORMAL.	☐
STEP 11.	Using the ISD PC Setup Tool and the ISD Vapor Pressure Sensor calibration valve: The ISD Vapor Pressure Sensor reads an ambient pressure reading with an offset no greater then ±0.20 IWC?	☐
STEP 12.	Returned the ISD Vapor Pressure Sensor calibration valve so that the sensor is reading UST vapor pressure?	☐
STEP 13.	Using the ISD PC Setup Tool: An ISD A/L reading is coming in for each gas hose at the location?	☐
STEP 14.	The TLS console clock is set to the correct date & time?	☐

Course Agenda

- **Vapor Polisher Maintenance**
  - Vapor Polisher Valve Filter Replacement
  - Vapor Polisher Valve Replacement
  - Thermal Temperature Probe Replacement
  - Ambient Temperature Sensor Replacement
- **Carbon Canister Operation and PMC/ISD Reports (Printed and RS-232)**
  - Vapor Polisher Operation- How Does it work?
  - ISD Daily, Monthly and Status Reports and PMC Status Reports
  - RS-232 & Console Reports
- **PMC/ISD Warnings and Alarms and Vapor Polisher Troubleshooting**
  - Troubleshooting PMC Warnings and Alarms
  - ISD Warnings and Alarms-New Warnings and Failures
  - Troubleshooting ISD Warnings and Alarms
- **Operability Testing**
  - Vapor Polisher exhibits 11 & 12

Polisher Valve Filter Replacement

Vapor Valve Filter Replacement (P/N 332901-001)

1. Remove the four 1/4 -20 x 1" hex key bolts from the top of the Vapor Valve Filter housing (see Figure 10).
2. Swing the housing top back and remove the filter plate from its seat and the o-ring from its groove in the Vapor Valve Filter housing's lower half (see Figure 11).
3. Install a new o-ring (P/N 512700-275) in the groove and insert a new filter plate (P/N 332901-001) its seat in the lower half of the housing, close the cover and screw in the four 1/4-20 hex key bolts until tight.
4. Run the CCVP Leakage and Flow test.

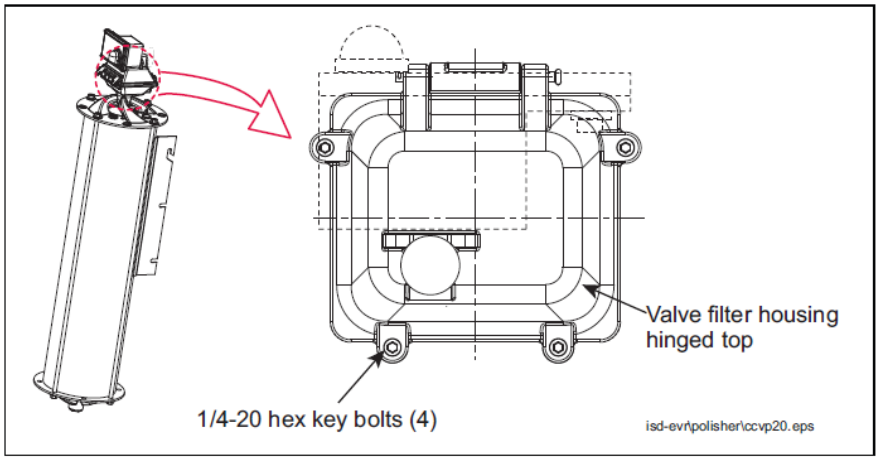


Figure 10. Accessing the valve filter and o-ring

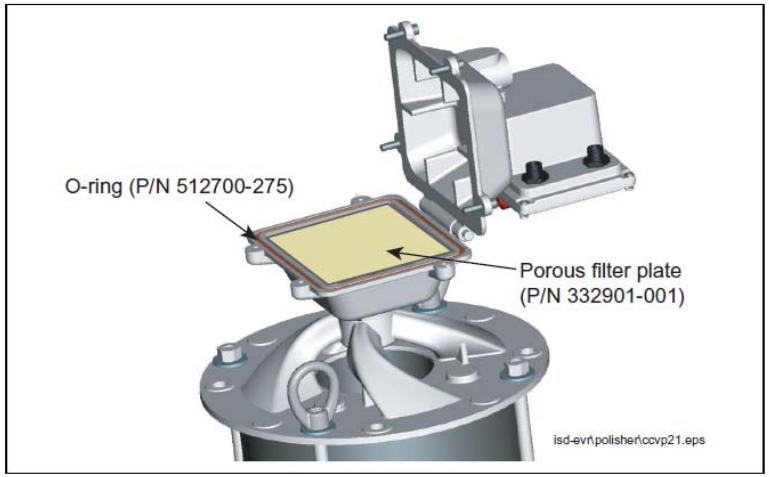


Figure 11. Replacing the valve filter and o-ring

Vapor Valve Replacement

Vapor Valve Assembly Replacement ((P/N 332672-002)

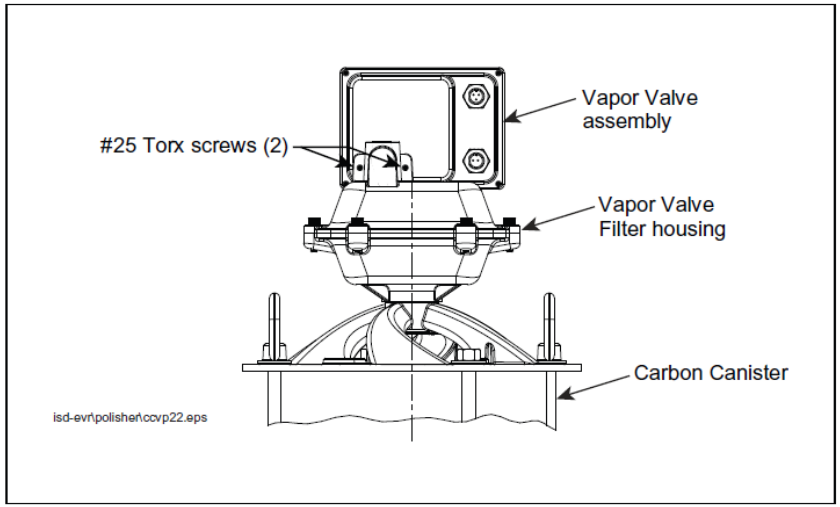


Figure 12. Removing Vapor Valve assembly

1. Remove the cables from the two connectors on the Vapor Valve assembly.
2. Remove the two #25 Torx head screws that secures the Vapor Valve assembly to the Vapor Valve Filter housing (see Figure 12).
3. Remove the Vapor Valve assembly (and remove the Shuttle Connector if necessary, see Figure 13).
4. Push the replacement Shuttle connector into the port on the back of the replacement Vapor Valve assembly. Remove and retain the two #25 Torx Taptite screws on each side of the Shuttle connector port on the back of the back Vapor Valve assembly.
5. Line up the Vapor Valve assembly shuttle connector with the port in the Vapor Valve Filter housing and push the Vapor Valve assembly in until it seats against the Vapor Valve Filter housing.
6. Insert the two #25 Torx head taptite screws through the holes in each side of the Vapor Valve Filter housing and screw them into the Vapor Valve assembly until tight (see Figure 13).
7. Reconnect the two cables to the two connectors on the Vapor Valve assembly.
8. Run CCVP Leakage and Flow test.

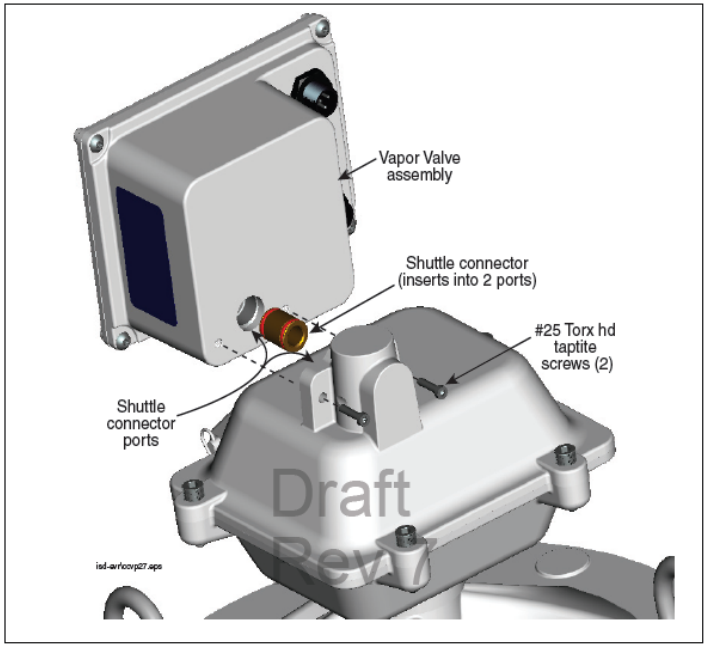


Figure 14. Replacing Vapor Valve assembly and Shuttle Connector

Polisher Thermal Probe Replacement

Canister Thermal Probe Replacement (P/N 332923-018)

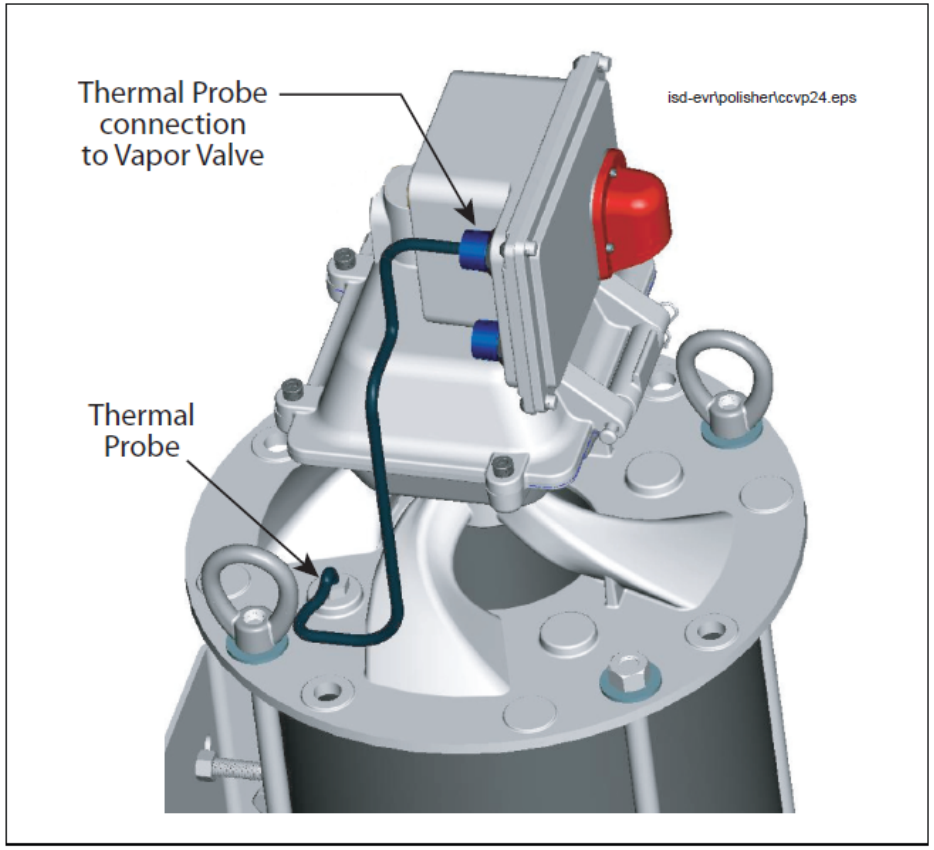


Figure 14. CCVP Thermal Probe

1. Remove the thermal probe cable connector from the back of the Vapor Valve assembly (see Figure 14).
2. Using a 9/16"open-end wrench, remove the thermal probe from the top of the CCVP.
3. Install and tighten the replacement Thermal Probe into its port in the CCVP and reconnect the cable to the Vapor Valve connector.
4. Run CCVP Leakage and Flow test.

Ambient Temperature Sensor Replacement

Ambient Temperature Sensor Assembly Replacement (P/N 332796-001)

1. Remove the three #25 Torx screws holding the Ambient Temperature Sensor assembly to the Vapor Valve assembly (see Figure 8).
2. Pull the sensor assembly straight out (unplugging it).
3. Align the replacement Ambient Temperature Sensor assembly's connector with the connector in the Vapor Valve assembly and push in the assembly until it seats against the Vapor Valve assembly (see Figure 9).
4. Replace the three #25 Torx screws in the Ambient Temperature Sensor assembly cover until tight.

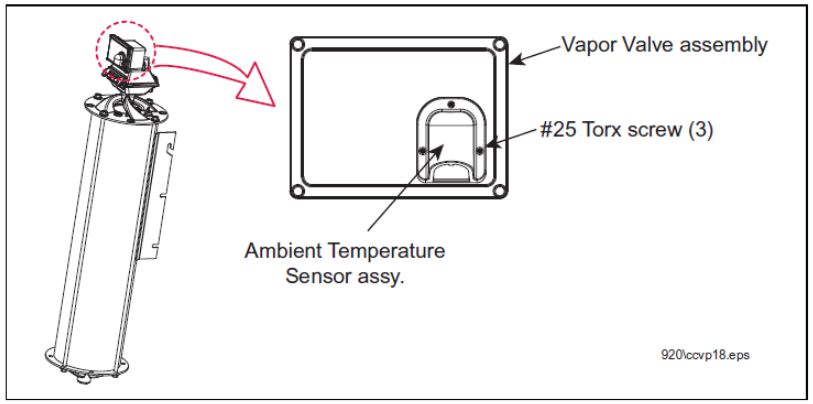


Figure 8. Remove Ambient Temperature Sensor assembly

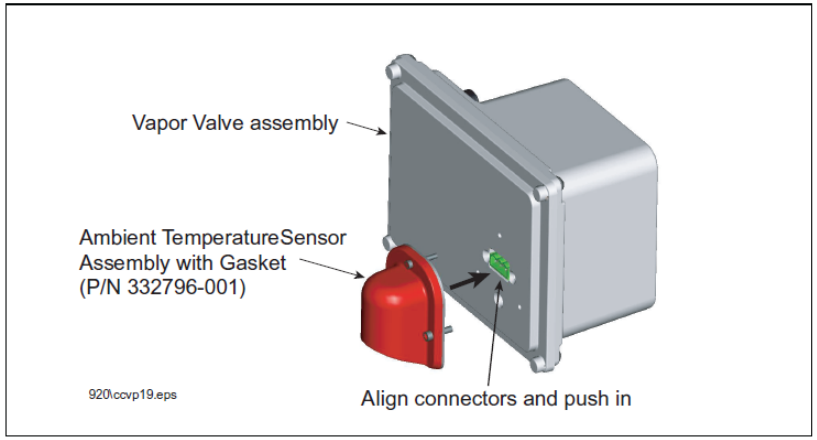


Figure 9. Replacing Ambient Temperature Sensor Assembly

Course Agenda

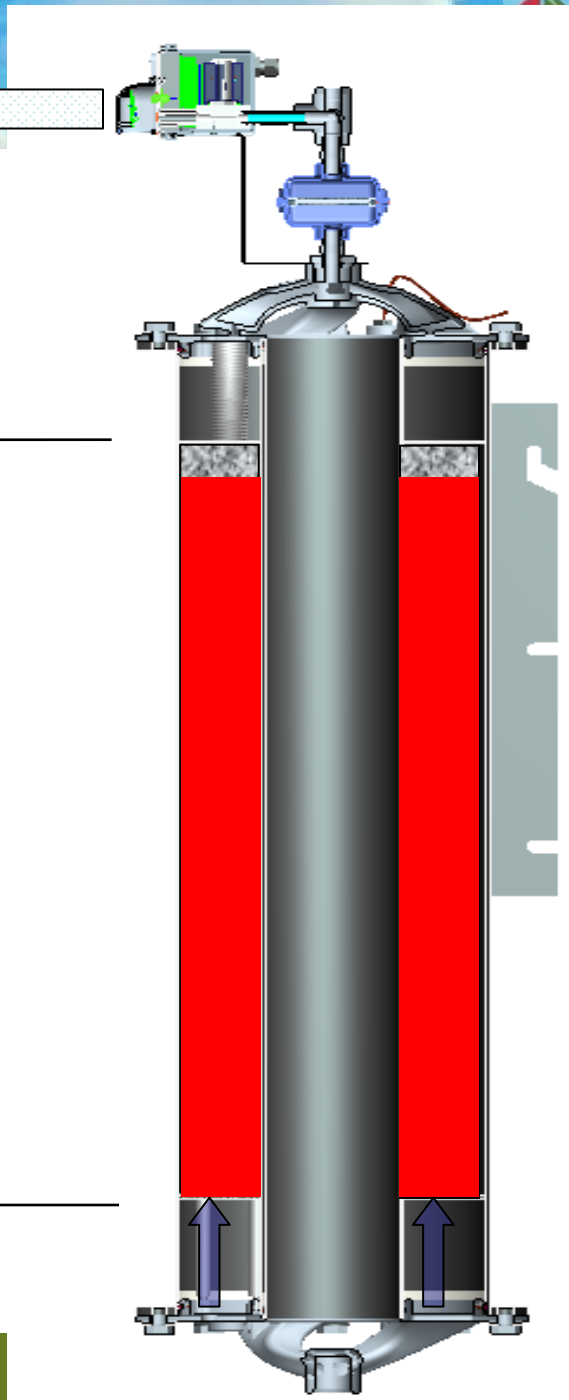
- **Carbon Canister Operation and PMC/ISD Reports (Printed and RS-232)**
  - Vapor Polisher Operation- How Does it work?
  - ISD Daily, Monthly and Status Reports and PMC Status Reports
  - RS-232 & Console Reports
- **PMC/ISD Warnings and Alarms and Vapor Polisher Troubleshooting**
  - Troubleshooting PMC Warnings and Alarms
  - ISD Warnings and Alarms-New Warnings and Failures
  - Troubleshooting ISD Warnings and Alarms
- **Operability Testing**
  - Vapor Polisher exhibits 11 & 12

How It Works - Loading

When pressure is positive (nighttime low or no dispensing), PMC opens valve to reduce pressure…

- Valve opens at 0.75 IWC
- Vapor/air mix flows into canister
- HC's adsorb (load) onto carbon
- Cleansed air is vented to atmosphere

Operation-Loading



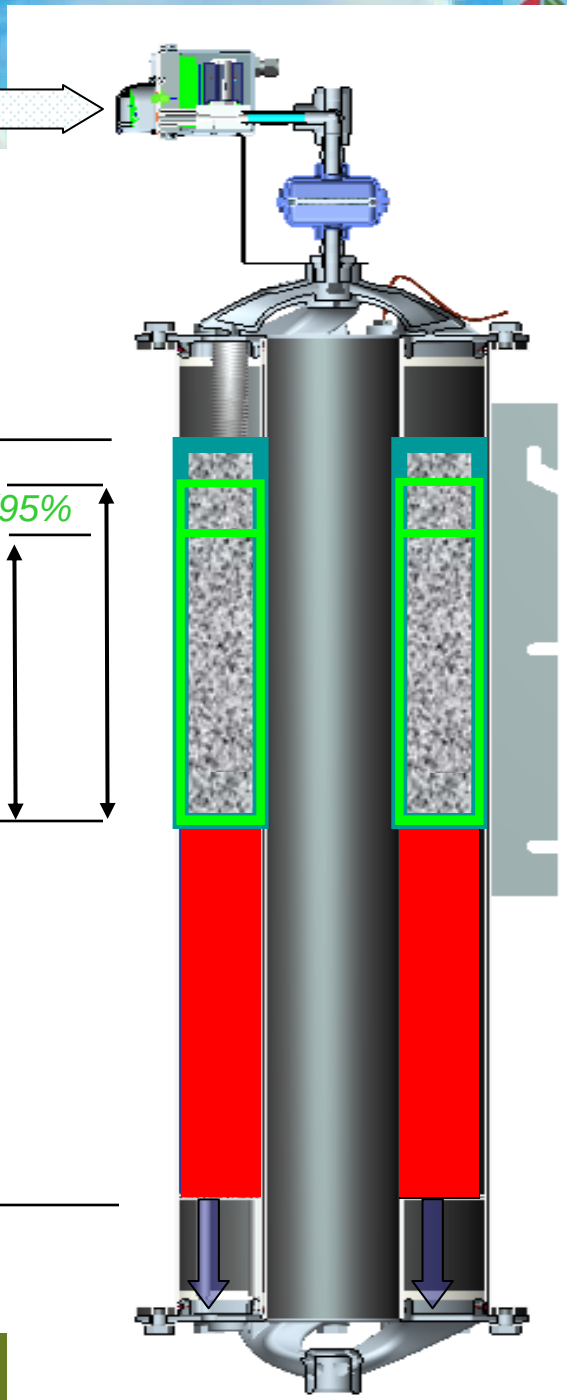
Total Capacity
7.4 lbs*

** Estimates will vary under different conditions*

How It Works – Loading Estimation

- **PMC estimates HC loading**
  - Calculates orifice flow from UST pressure
  - Estimates HC concentration
    - Uses real time UST and Polisher temperatures.
    - Adjusts vapor density assumption for seasonal RVP changes
- **PMC maintains continuous estimation of % operational capacity**
  - When HC load reaches PMC set points, valve is closed.
    - 80% operational capacity shutoff
    - 100% operational capacity shutoff
- **PMC assumes at 0% operation capacity heel is at 50% Total Capacity**

Operation - Estimation



100% Operational Capacity 3.5 lbs (95% WC)*

Working Capacity 3.7 lbs*

80% Operational Capacity 2.8 lbs*

Total Capacity 7.4 lbs*

Heel 3.7 lbs*

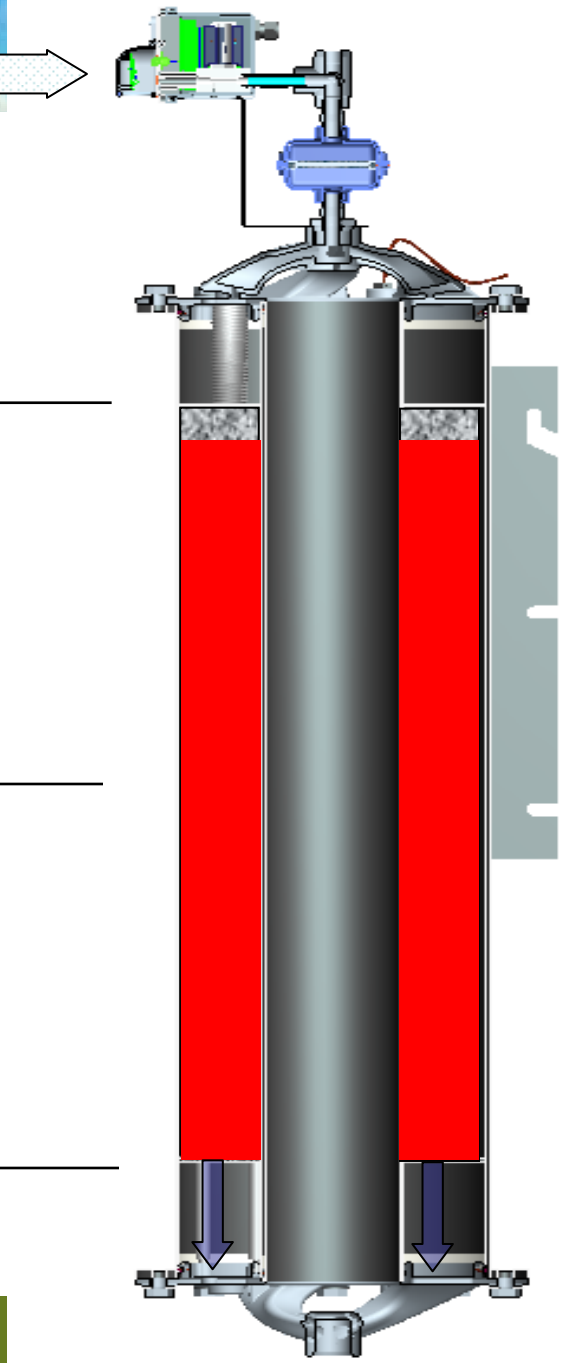
* Estimates will vary under different conditions

How It Works - Purging

When pressure is negative (daytime dispensing), PMC holds valve open to purge HC's from carbon…

- Air from atmosphere flows into top of canister
- HC's desorb (purge) from carbon
- HC's return to ullage space in UST's
- Closes valve when purged – 0% Operational Capacity

Operation - Purging



*Total Capacity 7.4 lbs**

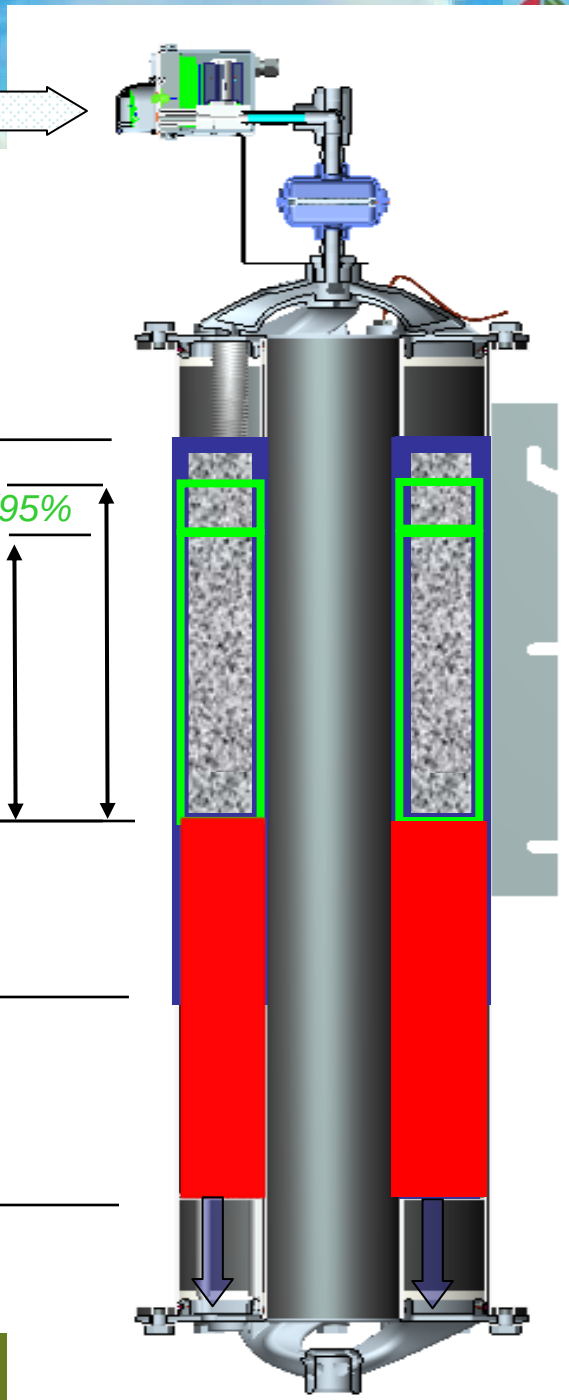
*Heel 3.7 lbs**

** Estimates will vary under different conditions*

Operation – Excess Purging

- **Excess purging is not required for effective polisher operation.**
- **Removes HC in carbon heel for more conservative loading estimates.**
- **Provides additional emission protection.**
- **After standard purging is complete, excess purging is allowed under the following conditions**
  - Begins
    - When UST pressure is less than -1.5 IWC
    - After 6 am
  - Stops
    - When UST pressure is greater than -0.5 IWC
    - When excess purge is complete
    - After 4 pm.

Operation – Excess Purging



100% Operational Capacity 3.5 lbs (95% WC)*

Working Capacity 3.7 lbs*

80% Operational Capacity 2.8 lbs*

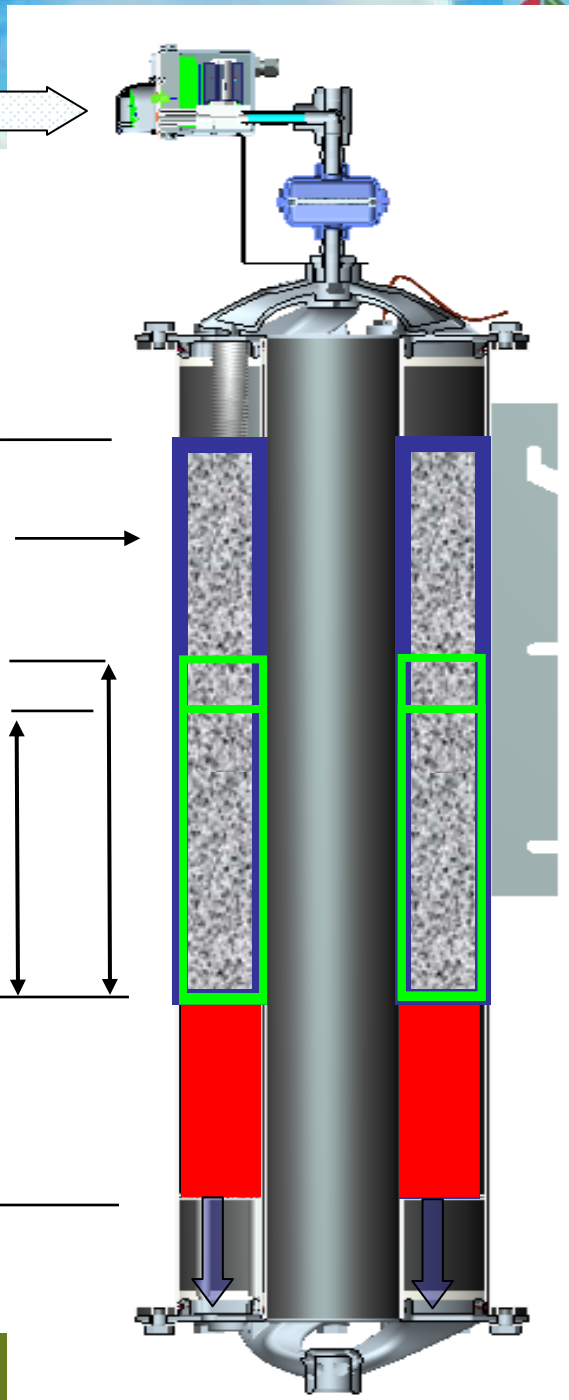
Total Capacity 7.4 lbs*

Heel 3.7 lbs*

Heel

* Estimates will vary under different conditions

Operation – Excess Purging



Increased Safety Margin

Working Capacity

100% Operational Capacity 3.5 lbs

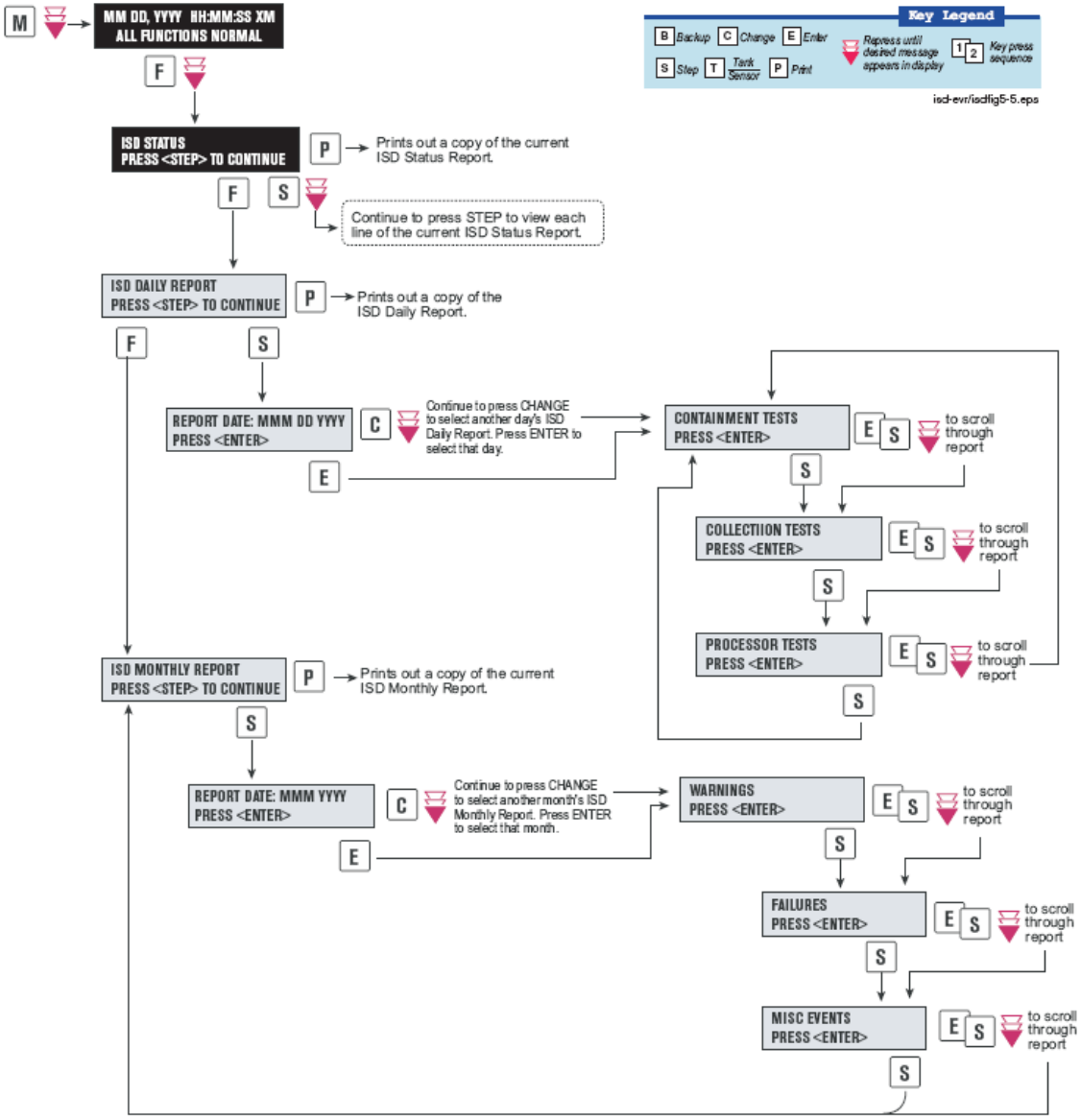
Total Capacity 7.4 lbs*

80% Operational Capacity 2.8 lbs*

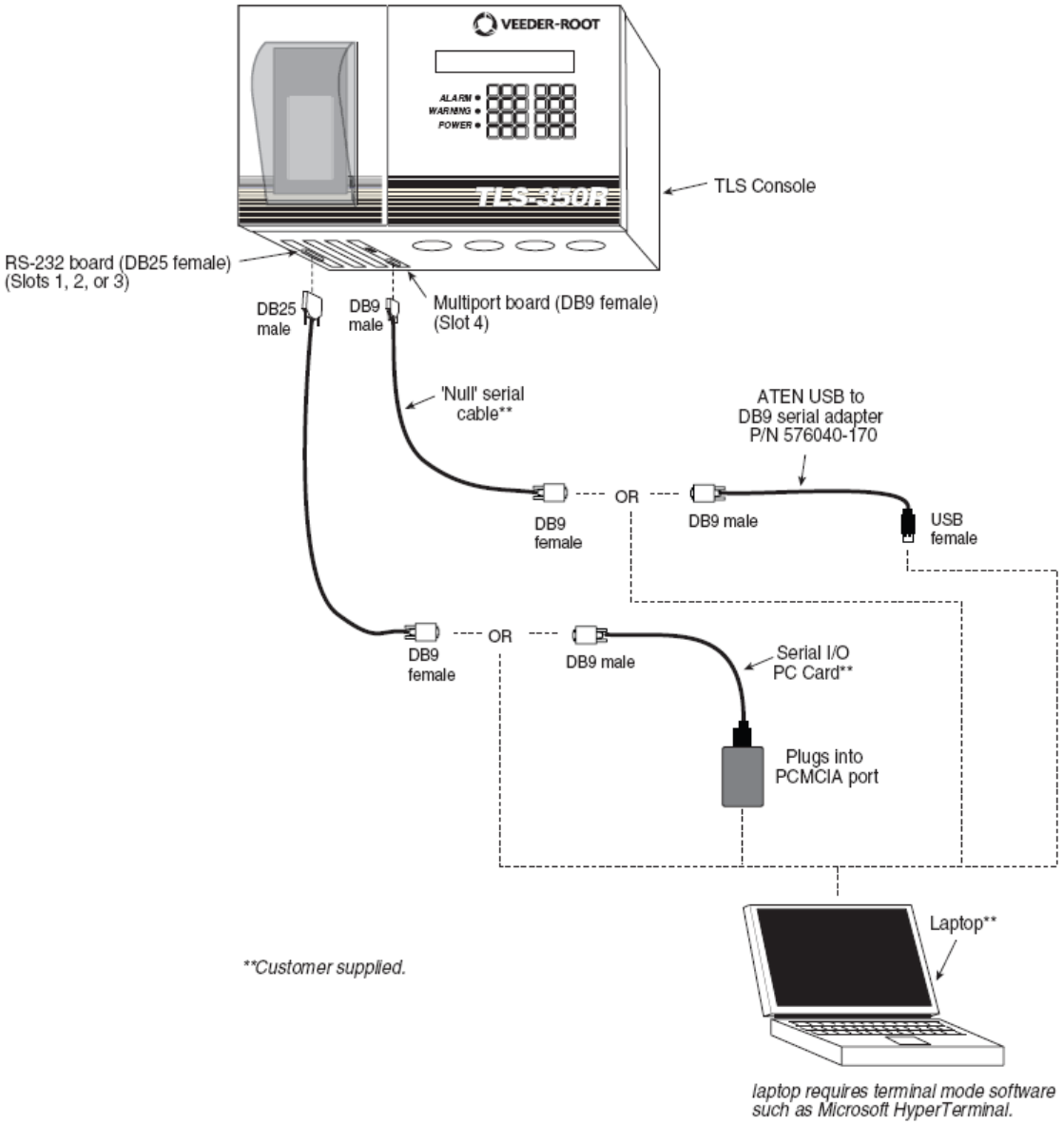
Heel

* Estimates will vary under different conditions

ISD Reports- Front Panel Access



Connecting to TLS



Daily Report - Printout

```
AUG 28, 2002 10:14:18 AM
 ALL FUNCTIONS NORMAL
        <FUNCTION>
IN-TANK INVENTORY
PRESS <STEP> TO CONTINUE
        <FUNCTION>
            :
        <FUNCTION>
TEST OUTPUT RELAY
PRESS <STEP> TO CONTINUE
        <FUNCTION>
VIEW ISD ALARM STATUS
PRESS <STEP> TO CONTINUE
        <FUNCTION>
VIEW ISD DAILY REPORT
PRESS <STEP> TO CONTINUE
```

New ISD Version

New Vapor Processor Type

Only Processor Test done with Canister

```
ISD DAILY REPORT

Sacramento-2 Balance
7300 W. FRIENDLY AVE
GREENSBORO, NC 27420
1-336-547-5000

JAN 10, 2007 12:05 AM

EVR TYPE: BALANCE
ISD VERSION 01.02
VAPOR PROCESSOR TYPE
VEEDER ROOT POLISHER

REPORT DATE: JAN  9
ISD VERSION 01.02

OVERALL STATUS    PASS
EVR CONTAINMENT   PASS
EVR COLLECTION    PASS
STAGE1    8 of    8 PASS
VAPOR PROCESSOR   PASS
SELF TEST         PASS
ISD MONITOR UP-TIME 100%

    ----------------
CONTAINMENT TESTS

GROSS     95%     1.0   "WC
DGRD      75%    -0.3N  "WC
VAPOR LEAK          0   CFH
MAX               2.9   "WC
MIN              -3.3   "WC

    ----------------
COLLECTION TESTS
GROSS
V/L(#)

FP 1: BLEND4
V/L = 1.13( 29)
FP 2: BLEND4
V/L = 1.05( 59)
FP 3: BLEND4
V/L = 1.08( 58)
        :::::
    ----------------
PROCESSOR TESTS

VP OVER PRESSURE TEST
STATUS  0.01"WC   PASS

VP STATUS TEST
STATUS            PASS

    ----------------
SELF TEST

SETUP TEST        PASS
SENSOR OUT TEST   PASS
```

ISD Daily Details Report (RS232)

IV0500
JAN 8, 2008 3:52 PM isd-evr\937-11.eps

(SITE NAME)
(SITE STREET)
(CITY, ST)
(PHONE)

ISD DAILY REPORT DETAILS

EVR TYPE: BALANCE
ISD TYPE: 01.02
VAPOR PROCESSOR TYPE: VEEDER-ROOT POLISHE

OVERALL STATUS :WARN EVR VAPOR COLLECTION :PASS
EVR VAPOR CONTAINMENT :WARN
ISD MONITOR UP-TIME :100% STAGE I TRANSFERS: 10 of 10 PASS
EVR/ISD PASS TIME : 81% VAPOR PROCESSOR :PASS

Status Codes: (W)Warn (F)Fail (D)Degradation Fail (G)Gross Fail
(ISD-W)ISD Self-Test Warning (ISD-F)ISD Self-Test Fail (N)No Test

	ISD	ISD	---CONTAINMENT TESTS---					STAGE		---COLLECTION TESTS		
	EVR	%UP	GROSS	DGRD	MAX	MIN	LEAK	I	VAPOR	FP1	FP2	FP3
DATE	STATUS	TIME	95%	75%	"WC	"WC	CFH	XFR	PRCSR	BLEND	BLEND	BLEND
12/28	W	100%	0.2	-0.3	0.7	-2.5	18W	PASS	PASS	0.94	1.07	1.10
12/29	W	100%	0.2	-0.3	0.7	-3.0	16W	PASS	PASS	0.95	0.85	1.11
12/30	PASS	100%	0.2	-0.3	0.7	-4.1	0	PASS	PASS	0.95N	0.99	1.02
12/31	PASS	100%	0.2	-0.3	0.8	-3.0	0	PASS	PASS	0.97	0.96	1.17
01/01	PASS	100%	0.2	-0.3	-0.2	-3.3	0		PASS	0.86	1.02	0.99
01/02	PASS	100%	0.2	-0.3	0.9	-5.0	0	PASS	PASS	0.94	0.96	1.20
01/03	PASS	100%	0.2	-0.3	1.1	-4.3	0	PASS	PASS	0.82	1.10	1.13
01/04	PASS	100%	0.4	-0.3	1.9	-2.8	0		PASS	1.07	1.01	1.10
01/05	PASS	100%	0.2	-0.3	2.8	-5.0	0	PASS	PASS	0.97	1.12	0.84
01/06	PASS	100%	0.2	-0.3	0.4	-5.0	0	PASS	PASS	0.80	1.23	1.11
01/07	PASS	100%	0.2	-0.3	0.6	-5.0	0	PASS	PASS	0.93	0.96	1.07

---COLLECTION TESTS-DAILY AVERAGE HOSE FLOW PERFORMANCE----------

	FP4	FP5	FP6	FP7	FP8	FP9	FP10	FP11	FP12
DATE	BLEND	BLEND	BLEND	BLEND	BLEND	BLEND	BLEND	BLEND	BLEND
12/28	1.06	1.16	0.96	1.21	1.10	1.03	1.08	1.13	1.13
12/29	1.03	1.12	1.16	1.07	1.13	1.01	0.97	1.06	1.06
12/30	1.04	0.96	0.95	1.06	1.11	0.97	1.14	1.18	0.94
12/31	1.07	1.20	1.05	1.10	1.00	0.90	1.09	1.07	1.27
01/01	1.03	1.18	1.19	0.85	1.16	1.24	1.13	1.31	1.16
01/02	0.94	0.98	1.10	0.97	1.10	0.91	0.98	1.08	1.09
01/03	1.12	0.96	1.17	1.12	1.07	1.06	1.12	1.12	1.10
01/04	1.04	1.18	1.09	1.16	1.16	0.90	1.19	1.05	1.13
01/05	1.13	0.94	1.11	1.02	1.10	1.10	1.21	1.19	1.04
01/06	1.11	1.14	1.09	1.10	1.18	0.95	1.15	1.09	1.05
01/07	0.96	1.13	1.07	0.84	1.13	1.02	1.06	1.12	1.00

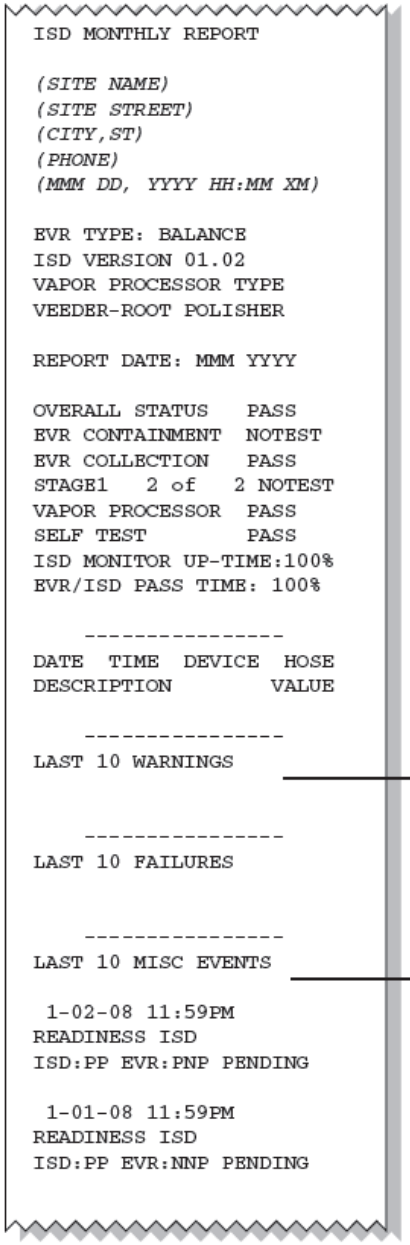
New ISD Version

New Processor Type

Monthly Report- Balance

New Vapor Processor Type

- ISD equipment self-tests:
  - "A" - ISD setup tests pass
  - "B" - ISD sensor out self-tests pass
- EVR system tests:
  - "C" - 1-day vapor collection tests pass
  - "D" - 7-day vapor containment tests pass
  - "E" - 1-day vapor processor tests pass
- Where "AB" and "CDE" are a "P", "F", or "N" (Pass, Fail or No Test) depending on the test result



```
ISD MONTHLY REPORT

(SITE NAME)
(SITE STREET)
(CITY,ST)
(PHONE)
(MMM DD, YYYY HH:MM XM)

EVR TYPE: BALANCE
ISD VERSION 01.02
VAPOR PROCESSOR TYPE
VEEDER-ROOT POLISHER

REPORT DATE: MMM YYYY

OVERALL STATUS    PASS
EVR CONTAINMENT   NOTEST
EVR COLLECTION    PASS
STAGE1    2 of    2 NOTEST
VAPOR PROCESSOR   PASS
SELF TEST         PASS
ISD MONITOR UP-TIME:100%
EVR/ISD PASS TIME: 100%

    ----------------
DATE  TIME  DEVICE  HOSE
DESCRIPTION        VALUE

    ----------------
LAST 10 WARNINGS


    ----------------
LAST 10 FAILURES


    ----------------
LAST 10 MISC EVENTS

 1-02-08 11:59PM
READINESS ISD
ISD:PP EVR:PNP PENDING

 1-01-08 11:59PM
READINESS ISD
ISD:PP EVR:NNP PENDING
```

Note: Warning & Failu
include monitoring res
• Containment • Stag
• Collection • Proc

Up to 10 failures and

FP is fueling position
BLEND is a hose labe
BLKD refers to blocke

Note: Events
At least 1 action even
failure listed above.

Description is truncat

ISD Monthly Report (RS232)

New VP Over-Pressure Threshold

```
IV0200
OCT 17, 2008  1:11 PM

127992 UNOCAL NO. 25
2701 WEST MARCH LANE
STOCKTON, CA 95219
50835357505001

ISD MONTHLY STATUS REPORT

EVR TYPE: BALANCE
ISD TYPE: 01.02
VAPOR PROCESSOR TYPE: VEEDER-ROOT POLISHER

OVERALL STATUS              :FAIL          EVR VAPOR COLLECTION :WARN
EVR VAPOR CONTAINMENT       :PASS
ISD MONITOR UP-TIME         : 99%          STAGE I TRANSFERS: 33 of 33 PASS
EVR/ISD PASS TIME           : 81%          VAPOR PROCESSOR      :FAIL


ISD MONITORING TEST PASS/FAIL THRESHOLDS
                                                    PERIOD    BELOW  ABOVE

VAPOR COLLECTION BALANCE SYS FLOW PERFORMANCE        1DAYS     0.60  ----
VAPOR CONTAINMENT GROSS FAIL, 95th PERCENTILE        7DAYS     ----  1.30"wcg
VAPOR CONTAINMENT DEGRADATION, 75th PERCENTILE      30DAYS     ----  0.30"wcg
VAPOR CONTAINMENT LEAK DETECTION FAIL @2"WCG         7DAYS     ----  12.50cfh
STAGE I VAPOR TRANSFER FAIL, 50th PERCENTILE        20MINS     ----  2.50"wcg
VAPOR PROCESSOR PRESSURE FAIL, 90th PERCENTILE       1DAYS     ----  2.30"wcg
VAPOR PROCESSOR SELF TEST FAIL                       1DAYS     ----  ----

WARNING ALARMS
DATE     TIME     DESCRIPTION                    READING          VALUE
08-10-16 00:00:09 VAPOR PROCESSOR OVER PRESSURE  DAILY 95%          2.63
08-10-04 00:01:47 FLOW PERFORMANCE HOSE BLOCKAGE FP10 BLEND4       BLKD
FAILURE ALARMS
DATE     TIME     DESCRIPTION                    READING          VALUE
08-10-17 00:00:21 VAPOR PROCESSOR OVER PRESSURE  DAILY 95%          2.68
SHUTDOWN & MISCELLANEOUS EVENTS
DATE     TIME     DESCRIPTION                    ACTION/NAME
08-10-17 00:00:21 READINESS ISD:PP EVR:PNF       CHECK EVR SYSTEM
08-10-17 00:00:21 VAPOR PROCESSOR PROBLEM        DISABLED DISPENSERS
08-10-16 00:00:09 READINESS ISD:PP EVR:PNF       CHECK EVR SYSTEM
08-10-15 00:00:09 READINESS ISD:PP EVR:NNN       EVR READINESS PENDING
```

ISD Status Report - Balance

```
ISD STATUS
FEB 29, 2004


Sacramento-2 Balance
7300 W. FRIENDLY AVE
GREENSBORO, NC 27420
   1-336-547-5000

JAN 10, 2007 12:05 AM


EVR TYPE: BALANCE
ISD VERSION 01.02
VAPOR PROCESSOR TYPE
VEEDER ROOT POLISHER

REPORT DATE:JAN  9, 2007


CONTAINMENT TEST GROSS
STATUS: 1.0"WC PASS

CONTAINMENT TEST DEGRADE
STATUS: -0.3"WC NOTEST

CONTAINMENT TEST CVLD
STATUS: 0.00CFH PASS

COLLECTION FLOW TEST
STATUS: PASS

ISD SENSOR SELF TEST
STATUS: PASS

ISD SETUP SELF TEST
STATUS: PASS

STAGE 1 TRANSFER TEST
STATUS:  8 of 8  PASS

VP STATUS TEST
STATUS: PASS

VP OVER PRESSURE TEST
STATUS: 0.0"WC PASS
```

ISD Status Report (RS-232)

```
ISD ALARM STATUS REPORT

EVR TYPE: BALANCE
ISD TYPE: 01.02
VAPOR PROCESSOR TYPE: VEEDER ROOT POLISHER

OVERALL STATUS              :PASS            EVR VAPOR COLLECTION :PASS
EVR VAPOR CONTAINMENT       :NOTEST
ISD MONITOR UP-TIME         :100%            STAGE I TRANSFERS:  1 of  1 PASS
EVR/ISD PASS TIME           :100%            VAPOR PROCESSOR      :PASS

WARNING ALARMS
DATE     TIME     DESCRIPTION                      READING          VALUE
07-01-05 00:02:07 VAPOR PROCESSOR OVER PRESSURE    DAILY 75%          2.60

FAILURE ALARMS
DATE     TIME     DESCRIPTION                      READING          VALUE
07-01-06 00:01:47 VAPOR PROCESSOR OVER PRESSURE    DAILY 75%          2.52

SHUTDOWN & MISCELLANEOUS EVENTS
DATE     TIME     DESCRIPTION                      ACTION/NAME
07-01-06 01:53:32 VAPOR PROCESSOR                 TEST MANUALLY CLEARED
07-01-06 00:01:47 VAPOR PROCESSOR PROBLEM         DISABLED DISPENSERS
```

PMC Status Report- Vapor Polisher

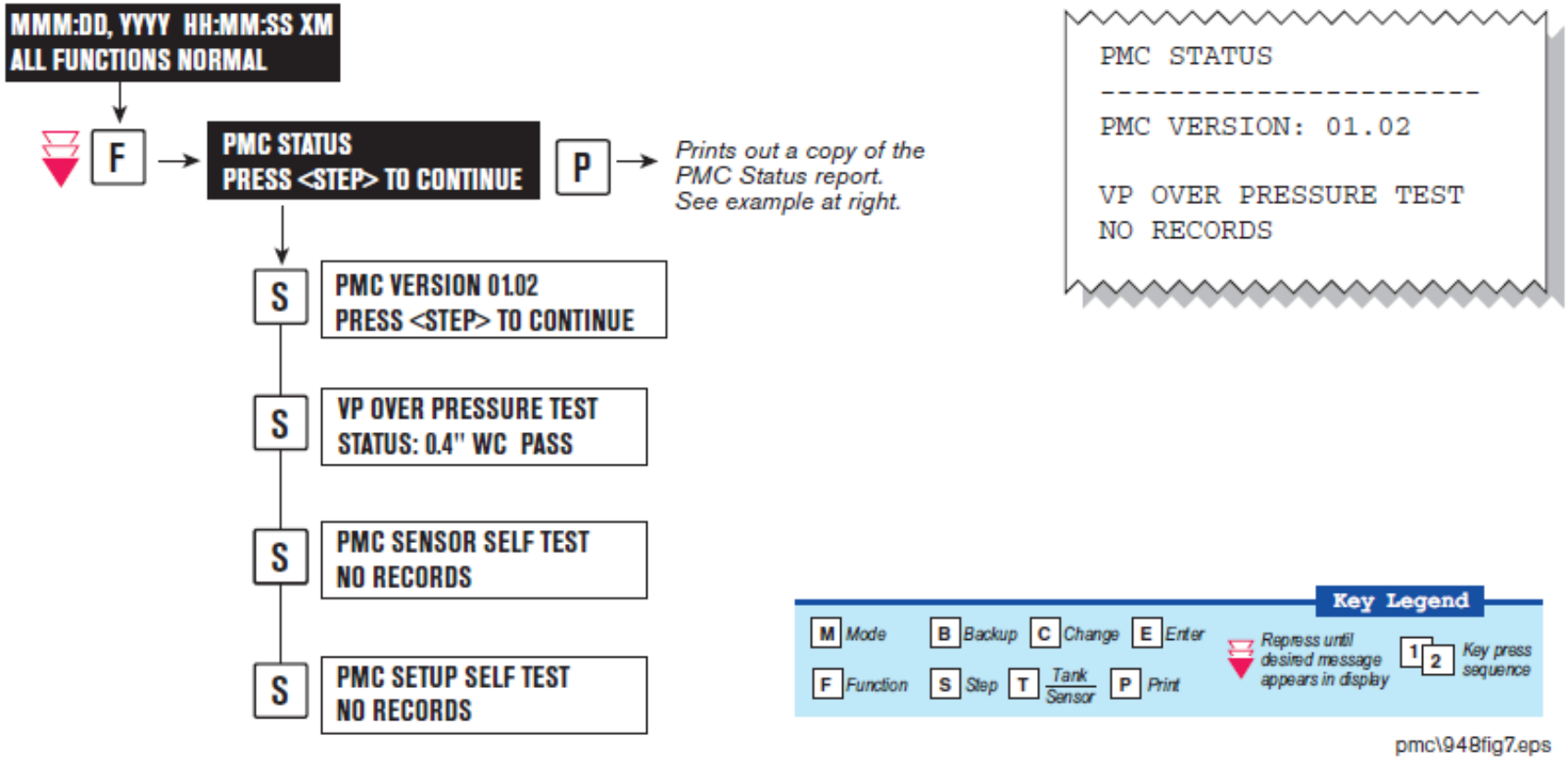


Figure 8. PMC Status Report

Carbon Canister Vapor Valve Status Report

Table 3. Serial Commands for PMC Diagnostic Reports

Report Type	Serial Command (PC to Console)*
Vapor Valve Status Report (See example Figure 14)	<SOH>IB6100
Vapor Processor Runtime Diagnostic Report (See example Figure 15)	<SOH>IV8000
Daily Vapor Polisher Diagnostic Report (See example Figure 16)	<SOH>IV8800

*<SOH> = Control A. For more information on TLS console serial commands, refer to the V-R Serial Interface Manual.

Figure 14 shows an example Vapor Valve Status report.

```
IB6100
FEB  4, 2008  1:09 PM
s 2:Vapor valve

VAPOR VALVE
SERIAL NUMBER      123456
VALVE POSITION:      OPEN
OPEN CAP:         CHARGED
CLOSE CAP:        CHARGED
AMBNT TEMP:       65.08 F
OUTLET TMP:       75.05 F
SENSOR FAULTS:
 NONE
```

Figure 14. Vapor Valve Status Report - Serial to PC Format

The IB6100 command reports the current state of the Vapor Valve Components. The current position of the valve is reported as Open or Closed. The Capacitors are used to move the valve and are reported as Charged or Discharged. Ambient Temperature is the Thermal probe temperature. Outlet Temperature is the temperature at the vapor sensor. Sensor Faults are the active faults reported by the Vapor Valve.

New Serial Commands

Course Agenda

- **PMC/ISD Warnings and Alarms and Vapor Polisher Troubleshooting**
  - Troubleshooting PMC Warnings and Alarms
  - ISD Warnings and Alarms-New Warnings and Failures
  - Troubleshooting ISD Warnings and Alarms
- **Operability Testing**
  - Vapor Polisher exhibits 11 & 12

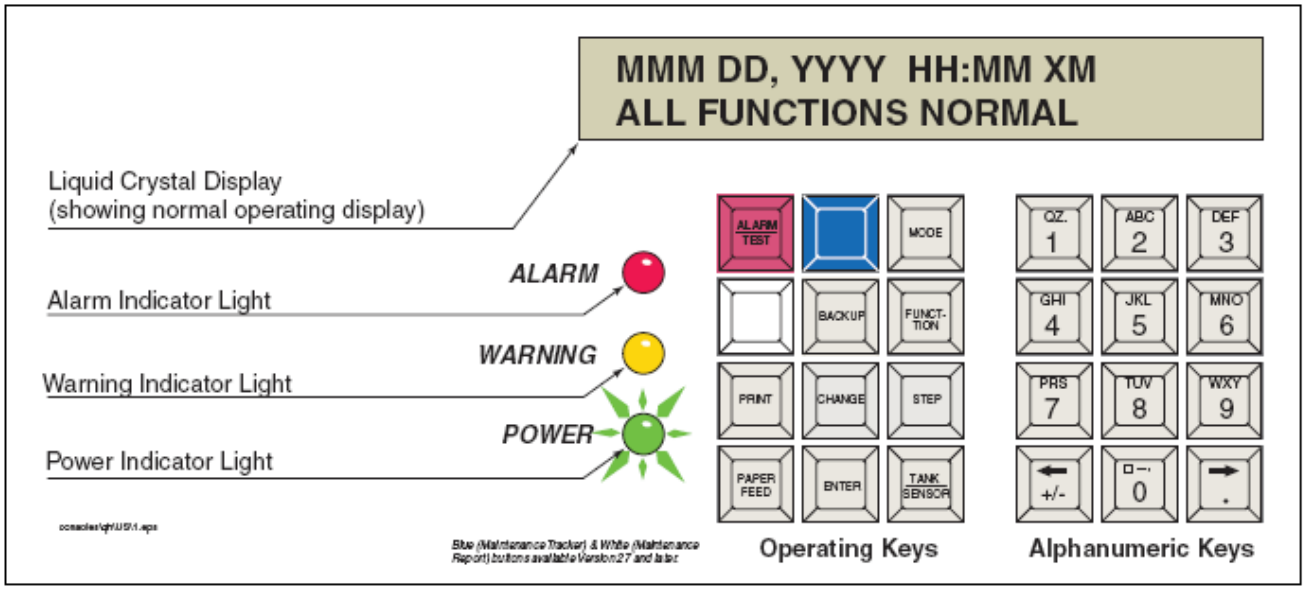
Reference Material

- **(577013-819)** ISD Troubleshooting Guide Rev D or higher
- **(577013-948) IOM 19** PMC Install, Setup and Operation for Veeder-Root Vapor Polisher Rev A or higher
- **(577013-937) IOM 16** ISD Install, Setup & Operation for Veeder-Root Polisher & VST ECS Membrane Processors Rev C or Higher
- **(576013-624)** RS-232 Serial Command Manual Version 27C or higher

Alarms

- The TLS console is continuously monitoring the PMC sensors for alarm conditions.

- During normal operation when the TLS console and monitored PMC equipment is functioning properly and no alarm conditions exist, the "ALL FUNCTIONS NORMAL" message will appear in the system status (bottom) line of the console display, and the green Power light will be On



PMC Warning Summary

Table 2 contains a listing of the PMC generated warnings including a brief description of the warning and associated front panel indicator. See Troubleshooting section for suggested corrective actions.

Table 2. PMC Warning Summary

Warning Type	Description	Light Indicator	Suggested Troubleshooting[1]
VP Pressure	A Veeder-Root Polisher failure occurs when the 90th percentile of 1-day's ullage pressure data (i.e. 10% of the pressure data) is equal to or exceeds 2.5" wc.	Yellow	Perform Operability Test on Vapor Polisher and Pressure Sensor.See EO 203 Exhibit 11 and Exhibit 8.
PMC Sensor Fault	Component used by PMC has failed or reported an error condition. See Troubleshooting section of complete description of sensors and associated conditions that can cause a sensor fault.	Yellow	Check for Smart Sensor Device Alarm or Fault.
PMC Setup	A sensor used by PMC is missing or not configured.	Yellow	Ensure that all required components are installed and operational.

[1]Refer to Troubleshooting Section of this manual.

VP PRESSURE

The polisher over-pressure test occurs at daily intervals at the daily assessment time after at least 1-day's UST ullage vapor pressure data has been collected. A Veeder-Root Polisher failure occurs when the 90th percentile of 1-day's ullage pressure data (i.e. 10% of the pressure data) is equal to or exceeds 2.5" wc. A failure of the polisher over-pressure test will result in a warning and warning event recording.

DIAGNOSTIC PROCEDURE

- Perform the operability tests as outlined in Exhibit 11 of VR 203/ VR 204.
- Refer to the Clear Test Repair Menu (on page 22) for clearing this alarm on the TLS after repairs are complete.

PMC Set-up Alarms- Troubleshooting

PMC SETUP

Incomplete PMC Setup requirements.

ISD MONITORING CATEGORY

PMC Setup Diagnostic self-tests are designed to monitor and ensure proper monitor configuration. Setup self-test will verify that the Pressure Management Control is configured.

DIAGNOSTIC CHECKLIST

Procedure	
STEP 1.	Gasoline tanks configured? ☐
STEP 2.	ATM sensor configured and enabled? ☐
STEP 3.	Vapor valve installed and configured? ☐
STEP 4.	On the TLS press the MODE key until the DIAGNOSTIC MODE menu is displayed (this will cause a TLS console System Self-Test). ☐
STEP 5.	If alarm does not clear, contact Veeder-Root Technical Support at (800) 323-1799.

PMC Fault Alarms- Troubleshooting

Table 6. Smart Sensor Device Fault Summary

Fault Message	Devices	Cause	Suggested Troubleshooting
Communication Alarm	Vapor Valve, Pressure Sensor, Tank Probe	Device not communicating with Smart Sensor Module	Check wiring and connections from the Smart Sensor board to the device in alarm.
Smart Sensor Fault Valve Command Fault	Vapor Valve	Valve will not move when commanded	Check installation of all Vapor Valve components including Thermal Probe and Vapor Sensor Assembly. Refer to manual 577013-920.
Smart Sensor Faullt Cap Not Holding		Capacitor not holding charge	
Smart Sensor Fault Cap Not Charging		Capacitor not charging	
Smart Sensor Fault Temperature Range		Temperature out of range	

EXAMPLE SMART SENSOR REPORTS

```
IB6100
FEB  4,  2008  1:09  PM
s 2:Vapor valve

VAPOR VALVE
SERIAL NUMBER       123456
VALVE POSITION:       OPEN
OPEN CAP:          CHARGED
CLOSE CAP:         CHARGED
AMBNT TMP:         65.08 F
OUTLET TMP:        75.05 F
SENSOR FAULTS:
VALVE COMMAND FAULT
```

```
IB6100
FEB  4,  2008  1:09  PM
s 2:Vapor valve

VAPOR VALVE
SERIAL NUMBER       123456
VALVE POSITION:       OPEN
OPEN CAP:          CHARGED
CLOSE CAP:         CHARGED
AMBNT TMP:         65.08 F
OUTLET TMP:        75.05 F
SENSOR FAULTS:
CAP NOT HOLDING
```

```
IB6100
FEB  4,  2008  1:09  PM
s 2:Vapor valve

VAPOR VALVE
SERIAL NUMBER       123456
VALVE POSITION:       OPEN
OPEN CAP:          CHARGED
CLOSE CAP:         CHARGED
AMBNT TMP:         65.08 F
OUTLET TMP:        75.05 F
SENSOR FAULTS:
CAP NOT CHARGING
```

```
IB6100
FEB  4,  2008  1:09  PM
s 2:Vapor valve

VAPOR VALVE
SERIAL NUMBER       123456
VALVE POSITION:       OPEN
OPEN CAP:          CHARGED
CLOSE CAP:         CHARGED
AMBNT TMP:         65.08 F
OUTLET TMP:        75.05 F
SENSOR FAULTS:
TEMPERATURE RANGE
```

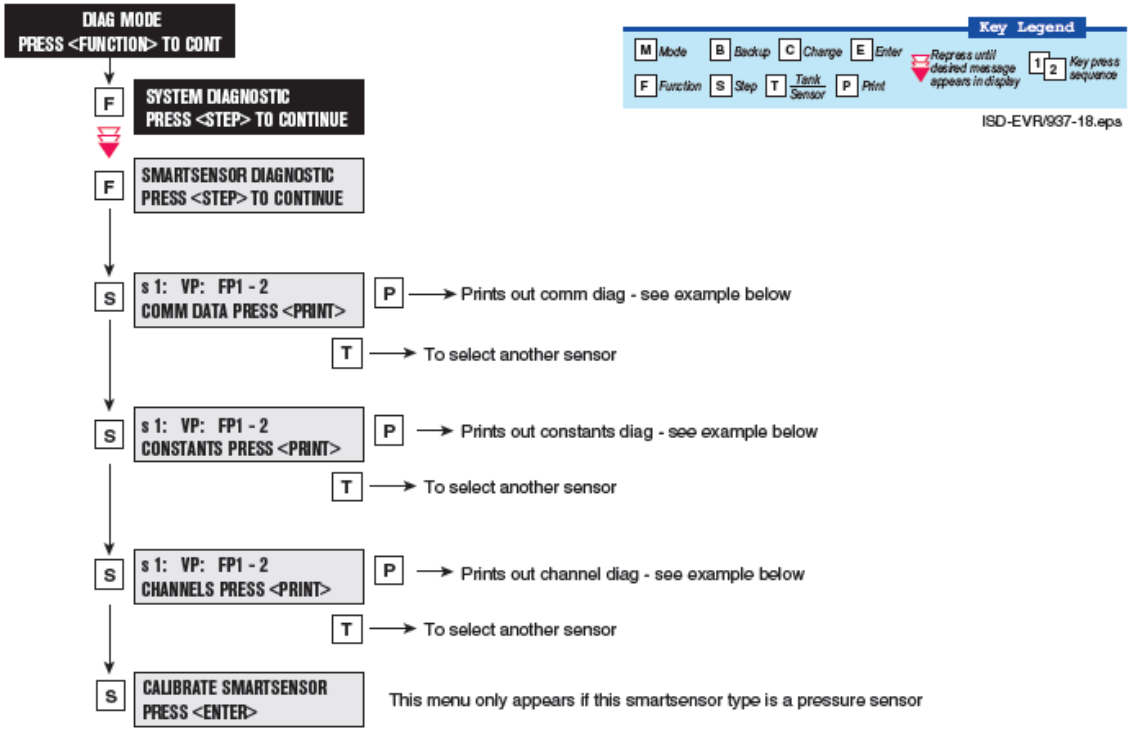
Carbon Canister Sensor Fault Alarm History Report

New Command

```
IB6200
SEP 19, 2008  1:05 PM

BIG 3 OIL
123 POWER DRIVE
HELENA, MT
(406) 123-4567

SMART SENSOR SUB ALARM HISTORY

ID  TYPE  ALARM TYPE           SUB ALARM                  STATE    DATE     TIME

 9   14   SENSOR FAULT ALARM   TEMPERATURE RANGE FAULT   CLEAR   9-19-08  11:50AM

 9   14   SENSOR FAULT ALARM   TEMPERATURE RANGE FAULT   ALARM   9-19-08  11:46AM
```

Figure 14. Smart Sensor Sub Alarm History Report - Serial to PC Format

Smart Sensor Diagnostics




```
SS COMM DIAG
------------------------
s 1: AFM1    FP1-2
SAMPLES READ     58
SAMPLES USED     54
PARITY ERR        0
PARTIAL READ      0
COMM ERR          0
RESTARTS          0
```

```
SS CONSTANTS DIAG
------------------------
s 1: AFM1    FP1-2

VAPOR PRESSURE
SERIAL NUMBER      1007
PROTOCOL VERSION      0
```

```
SS CHANNEL DIAG
------------------------
s 1: AFM1    FP1-2
YY-MM-DD  HH:MM:SS
C00 B50B 3D68 00E0 0000
C04 0000 03EF 0000 0004
C08 0A3C 3D68 5693 0081
C12 80C4 80A4 0104 2579
C16 0000 0000 00A3 03D6
C20 0709 0032 04C9 880F
```

Diagnostic Menu: Automatic Mode

- Vapor pressure readings compared to user programmable thresholds
- The TLS monitors the following to monitor Carbon Canister Loading.
  - Tank temperature
  - Vapor Temperature
  - Carbon Temperature
- When the Pressure is positive the valve is opened to relieve pressure and begin loading the Canister.
- When pressure goes negative the valve is opened until purging process begins. The Valve remains open until the Canister has reached capacity or the Canister is empty after purging.
- Automatic Mode is the default.

Diagnostic Menu: Manual Mode

Manual control

- *If PMC mode is in MANUAL, the diagnostic menu allows the valve to be opened (ON) or closed (OFF) manually.*

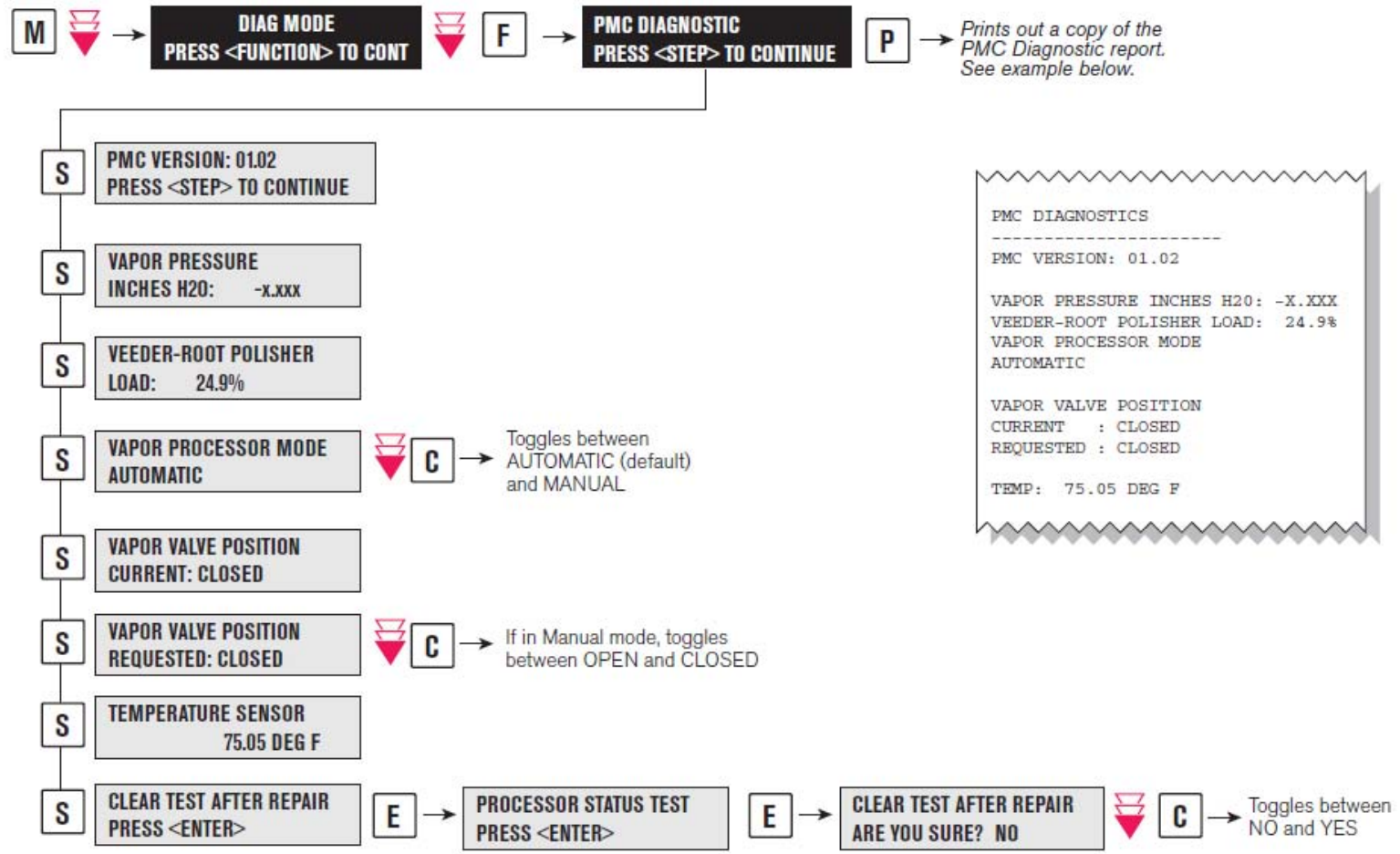
- *This feature is to support testing operation of the valve without waiting for canister to reach loading or purging thresholds.*

It also provides the necessary controls to perform 2" decay tests. The current UST ullage space vapor pressure will also be available through the diagnostic menu.

Clear Test After Repair

- Used after maintenance performed on system
- Allows technician to clear active Processor Status warning
- Same as ISD Clear Test After Repair

Veeder-Root Vapor Polisher PMC Diagnostic Menu



TLS RS232 connectivity

- Hyperterminal
- ISD PC Setup Tool V1.04 or Greater

Standard TLS commands

- IB6100 Vapor Valve Status Report
- V8000 Vapor Processor Runtime Diagnostic
- V8800 Daily Vapor Polisher Diagnostic Report

Vapor Polisher Diagnostic Report

IV8000
FEB 4, 2008 1:01 PM

TLS_350 UST
VEEDER-ROOT TEST LAB
125 POWDER FOREST DR
SIMSBURY, CT 06070

VAPOR POLISHER

VALVE EVENT DATE-TIME	PRESSURE "WC	EVENT CODE
1-31-08 3:44PM	-0.700	OPEN PURGE
1-31-08 3:47PM	0.038	CLOSE FORCE PURGE
1-31-08 3:51PM	-0.255	OPEN PURGE
1-31-08 8:08PM	-0.300	CLOSE PURGE Hi P
2-01-08 1:59PM	-0.300	OPEN PURGE
2-01-08 2:18PM	-0.263	OPEN PURGE
2-01-08 2:33PM	-0.289	OPEN PURGE
2-04-08 11:22AM	-0.560	NO EVENT
2-04-08 11:28AM	-0.560	OPEN PURGE
2-04-08 11:48AM	-0.300	OPEN PURGE
2-04-08 12:28PM	-0.263	OPEN PURGE
2-04-08 12:42PM	-0.299	OPEN PURGE

Figure 15. Vapor Processor Runtime Diagnostic Report - Serial to PC Format

Vapor Polisher Diagnostic Event codes

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Table 6. Vapor Processor Runtime Diagnostic Report Event Codes

Event Code	Cause	Event Code	Cause
NO EVENT	The valve changed state outside of the carbon canister algorithm.	CLOSE FULL	Canister load has reached 100%. Further loading is not allowed.
CLOSE TEST	Manual operation of the valve	CLOSE NEAR FULL	Canister load has exceeded 80%. Further loading is not allowed unless pressure exceeds +1.3.
OPEN TEST	Manual operation of the valve	CLOSE EMPTY	Excess purging has completed.
CLOSE PURGE HI P	The canister state is in excess purge and the pressure is above -0.5.	OPEN PURGE	Canister load is >0% and pressure <-0.25
CLOSE PURGE TIME	The canister state is in excess purge and the time is outside 6AM to 4PM.	OPEN EXCESS PURGE	Canister load is 0%, Excess purge is incomplete, pressure <-1.5, time is between 6AM and 4PM.
CLOSE FORCE PURGE	Canister is in startup period. Loading with pressures <+1.05 is not allowed until startup period is complete.	OPEN FILL	Canister valve is open for loading: • When pressure is greater than or equal to 0.75 IWC and Canister load is less than 80%.. • Pressure is greater than or equal to 1.3 IWC and Canister load is greater than 80% and less than 100%
CANISTER EMPTY	Canister was loaded above 1% and purged to 0%. No valve state change.		

Daily Vapor Polisher Diagnostic Report

Figure 44 shows an example PMC Daily Vapor Polisher Diagnostic Report.

```
IV8800
OCT  2, 2008  2:58 PM

PMC DAILY VAPOR POLISHER DIAGNOSTIC

                    LOAD   PRGE   MIN%   MAX%   SELF    PRESS
DATE/TIME            HRS    HRS   LOAD   LOAD   TEST     TEST
08-10-02 14:58:58   3.1    2.5     15     69   WARN     FAIL
```

Figure 44. PMC Daily Vapor Polisher Diagnostic Report - Serial to PC Format

ISD Warning Posting

- *Displayed* messages alert to type of warning
- *Printed* messages show type of warning and time warning was posted (see Figure 5)
- Warnings logged into Non-Priority Alarm History

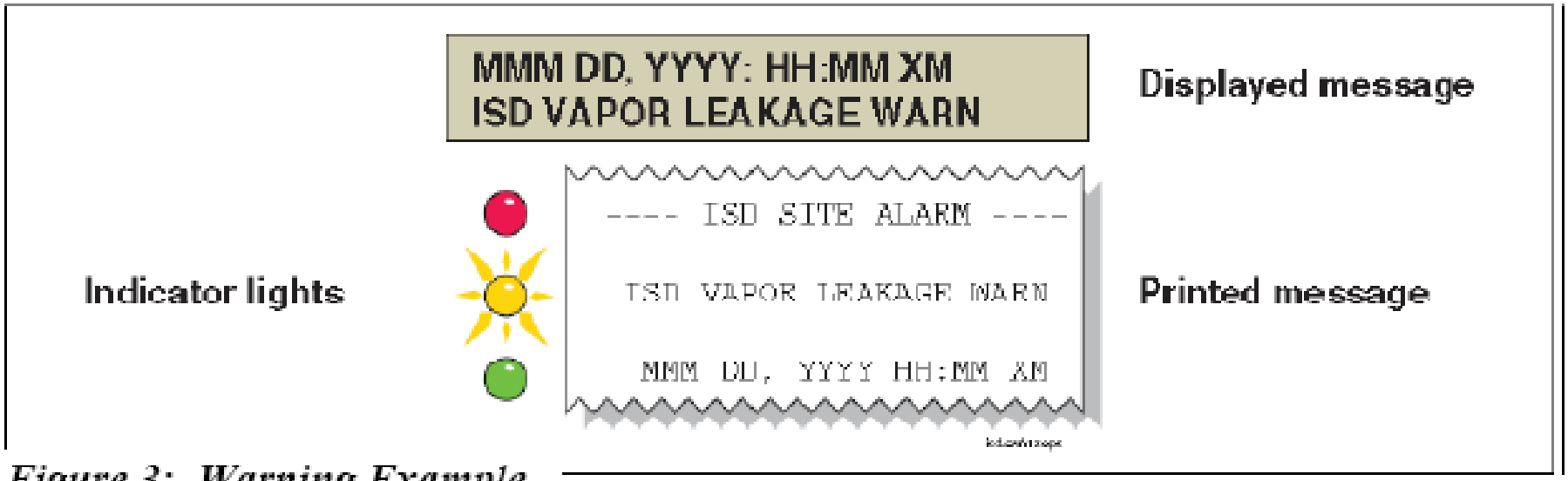
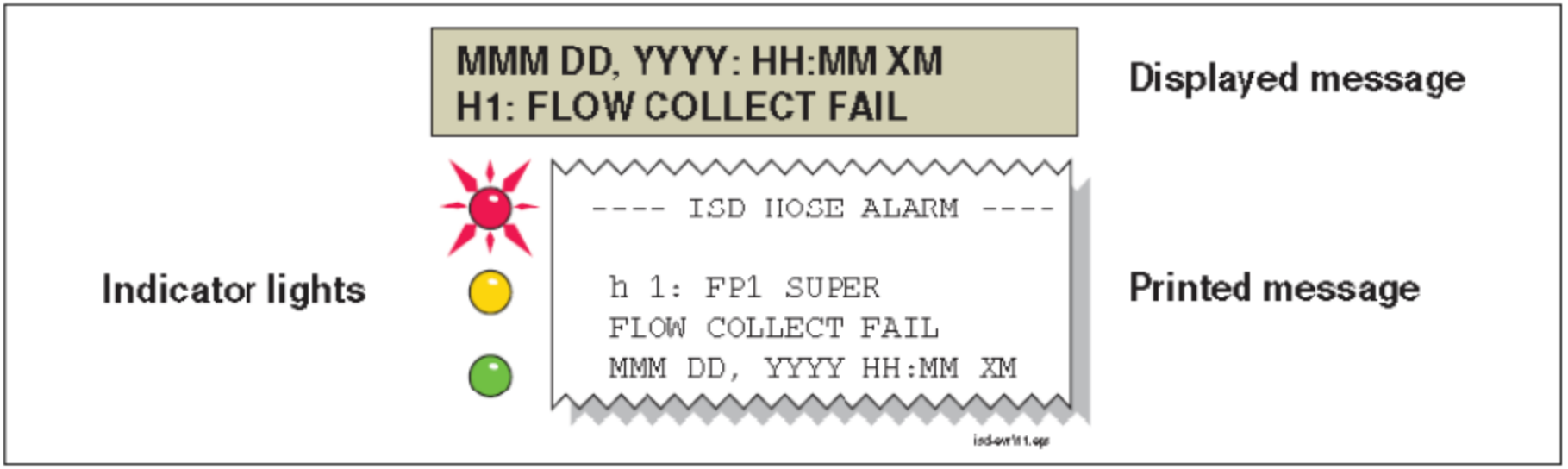


Figure 3: Warning Example

ISD Alarm Posting

- *Displayed* messages alert to alarm type
- *Printed* messages show alarm type and time alarm was posted
- PMC Alarms are logged into the Priority Alarm History



ISD Alarm override

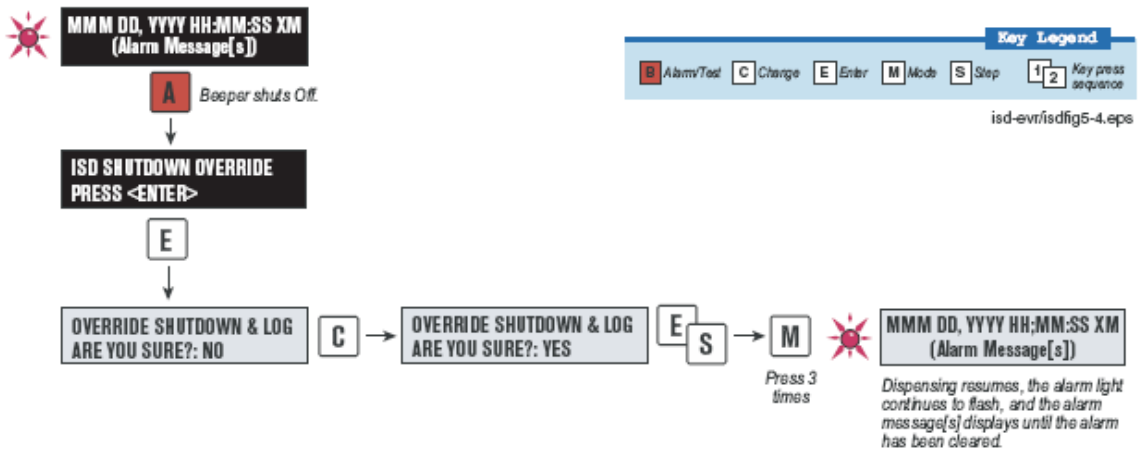


Figure 16-27. ISD Alarm Override Procedure

ALARM LOGS

Alarms will be recorded in the Warning Log or Failure Log of the monthly reports, which can be viewed electronically or via the integral printer (if queued in the most recent 10 events). The following example shows an excerpt from an electronically accessed monthly report.

Monthly Report Warning & Failure Log Examples:

Warning Alarms

Date	Time	Description	Reading	Value
2003/01/01	23:59	VAPOR VAPOR CONTAINMENT LEAKAGE	CFH@2"WC	14
2003/01/01	23:59	A/L RATIO DEGRADATION	FP2 MID	0.69
2002/12/31	23:59	VAPOR VAPOR CONTAINMENT LEAKAGE	CFH@2"WC	13
2002/12/31	23:59	A/L RATIO DEGRADATION	FP2 MID	0.67

Failure Alarms

Date	Time	Description	Reading	Value
2003/01/01	23:59	A/L RATIO GROSS BLOCKAGE	FP1 REG	0.06
2003/01/01	23:59	A/L RATIO DEGRADATION	FP1 REG	0.14
2003/01/01	23:59	A/L RATIO GROSS BLOCKAGE	FP1 MID	0.13
2003/01/01	23:59	A/L RATIO DEGRADATION	FP1 MID	0.15

ISD Alarm Summary

Table 3. ISD Alarm Summary

Displayed Message	ISD Monitoring Category	Indicator Light	Cause	Suggested Troubleshooting[1]
ISD VAPOR LEAKAGE WARN	Containment	Yellow	Containment system leaks at 2 times the TP-201.3 standard	• Troubleshooting Guide found at www.vsthose.com. • Exhibit 4
ISD VAPOR LEAKAGE FAIL[2]	Containment	Red	8th Consecutive Failure of Pressure Integrity (Vapor Leak) Test	
ISD GROSS PRESSURE WARN	Containment	Yellow	95th percentile of 7-days' ullage pressure exceeds 1.3 IWC	• Troubleshooting Guide found at www.vsthose.com. • Exhibit 8 • Exhibit 9
ISD GROSS PRESSURE FAIL[2]	Containment	Red	8th Consecutive Failure of Gross Containment Pressure Test	
ISD DEGRD PRESSURE WARN	Containment	Yellow	75th percentile of 30-days' ullage pressure exceeds 0.3 IWC	
ISD DEGRD PRESSURE FAIL[2]	Containment	Red	31st Consecutive Failure of Degradation Pressure Test	
hnn: FLOW COLLECT WARN	Collection	Yellow	Vapor collection flow performance is less than 50%	• Troubleshooting Guide found at www.vsthose.com. • Exhibit 5 • Exhibit 13
hnn: FLOW COLLECT FAIL[2]	Collection	Red	2nd Consecutive Failure of Vapor Collection Flow Performance Monitoring Test	
ISD VP STATUS WARN[4]	Processor	Yellow	Failure of Vapor Processor Effluent Emissions or Duty Cycle test	• Troubleshooting Guide found at www.vsthose.com. • VP Emission Test • VP Duty Cycle Test
ISD VP STATUS FAIL[2,4]	Processor	Red	2nd Consecutive Failure of Vapor Processor Status test	

Only with VST Processor

ISD Alarm Summary (Cont...)

Only PMC alarm with Canister

Table 3. ISD Alarm Summary

Displayed Message	ISD Monitoring Category	Indicator Light	Cause	Suggested Troubleshooting[1]
ISD VP PRESSURE WARN[4,5]	Processor	Yellow	90th percentile of 1 day ullage pressure exceeds 1 IWC[4] 90th percentile of 1 day ullage pressure exceeds 2.5 IWC[5]	• Troubleshooting Guide found at www.vsthose.com. • Exhibit 8 • Exhibit 9
ISD VP PRESSURE FAIL[2,4,5]	Processor	Red	2nd Consecutive Failure of Vapor Processor Overpressure Test	
VP EMISSION WARN[3,4]	Processor	Yellow	Mass emission exceeded the certified threshold	• Troubleshooting Guide found at www.vsthose.com. • Exhibit 6 • Exhibit 9
VP EMISSION FAIL[4]	Processor	Red	2nd Consecutive Mass emission test failure	
VP DUTY CYCLE WARN[3,4]	Processor	Yellow	Duty cycle exceeds 18 hours per day 0r 75% of 24 hours	• Troubleshooting Guidefound at www.vsthose.com. • PMC Setup Procedure • Exhibit 8 • Exhibit 9 • Exhibit 4
VP DUTY CYCLE FAIL[4]	Processor	Red	2nd Consecutive Duty Cycle Test Failure	
ISD SENSOR OUT WARN	Self-Test	Yellow	Failure of Sensor Self-Test	• Confirm ISD sensor & module installation / communication per VR 204 IOM Section 16, Chapter 2
ISD SENSOR OUT FAIL	Self-Test	Red	8th Consecutive Failure of Sensor Self-Test	
ISD SETUP WARN	Self-Test	Yellow	Failure of Setup Test	• Confirm EVR/ISD programming per VR 204 IOM Section 16
ISD SETUP FAIL[2]	Self-Test	Red	8th Consecutive Failure of Setup Test	

[1]See ISD Troubleshooting Manual, P/N 577013-819, and the VST ISD Troubleshooting Guide 9513-003 found at www.vsthose.com for a complete list of suggestions.

[2]SD Shutdown Alarms - see "Site Reenable" on page 16-36.

[3]This warning will result in a ISD VP Status Warn.

[4]VST ECS Membrane Processor.

[5]Veeder-Root Polisher

[6]VST Level C training is required to service the ECS Membrane Processor.

ISD Alarm Summary (Cont...)

Table 16-3.- VST ISD Alarm Summary

Displayed Message	ISD Monitoring Category	Indicator Light	Cause	Suggested Troubleshooting[1]
ISD SENSOR OUT WARN	Self-Test	Yellow	Failure of Sensor Self-Test	Confirm ISD sensor & module installation / communication per VR 204 IOM Section 16, Chapter 2.
ISD SENSOR OUT FAIL	Self-Test	Red	8th Consecutive Failure of Sensor Self-Test	
ISD SETUP WARN	Self-Test	Yellow	Failure of Setup Test	Confirm EVR/ISD programming per VR 204 IOM Section 16.
ISD SETUP FAIL[2]	Self-Test	Red	8th Consecutive Failure of Setup Test	

[1]See ISD Troubleshooting Manual, P/N 577013-819, and the VST ISD Troubleshooting Guide 9513-003 found at www.vsthose.com for a complete list of suggestions.

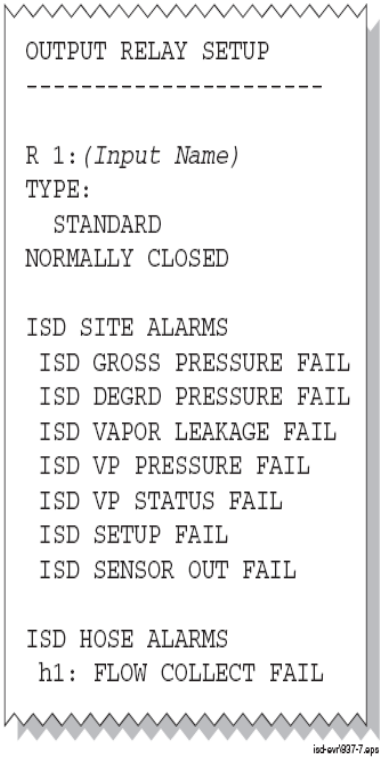
[2]SD Shutdown Alarms - see "Site Reenable" on page 16-34

OTHER ALARMS

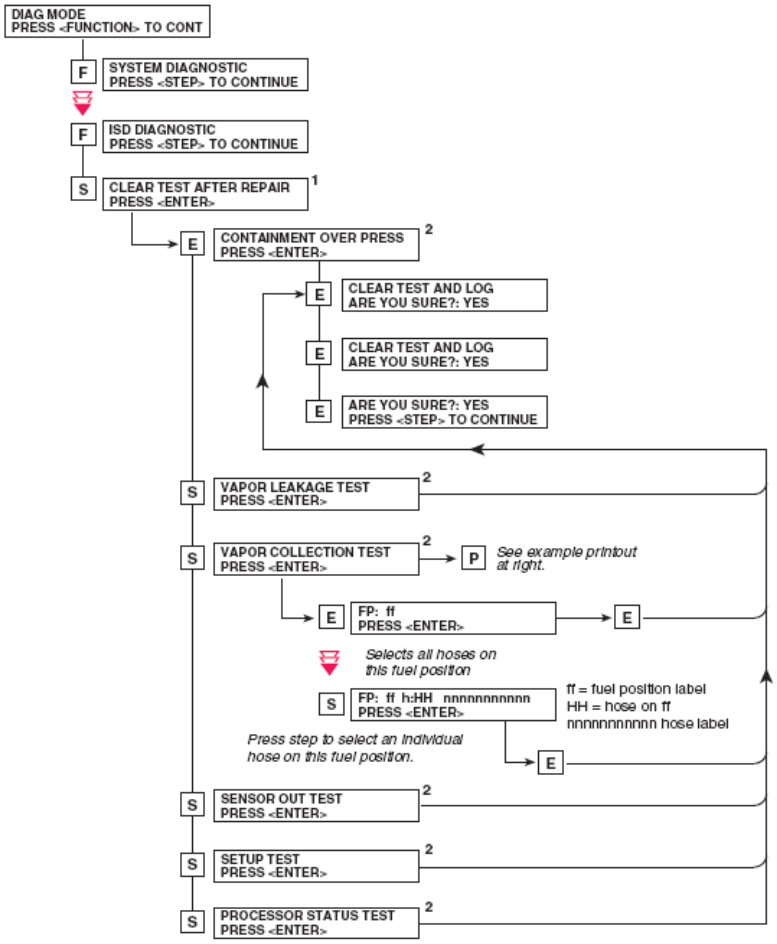
Table 16-4 summarizes additional alarms that may be posted by ISD related equipment. These alarms are not critical to vapor recovery functionality, but could indicate erroneous setup or equipment malfunction. NOTE: Additional TLS console alarms listed in the TLS-3XX Operator's manual may be posted and may lead to an ISD shutdown alarm if persistent (see ISD Troubleshooting Manual for details).

Table 16-4.- Other Alarms

Displayed Message	Indicator Light	Set Condition	Clear Condition
MISSING RELAY SETUP	Red	One or more required shutdown alarms have not been assigned to a relay.	Setup required shutdown alarms.
MISSING TANK SETUP	Red	There are no vapor recovery (gasoline) tanks defined or a gasoline pump has not been assigned to a control (shut down) device in at least one tank.	Complete gasoline tank setup.
MISSING HOSE SETUP	Red	There are no product meters assigned to a hose.	Assign at least 1 product meter to a hose.
hnn: VPRFLOW MTR SETUP	Red	Incoming transaction from a hose with an unavailable Vapor Flow Meter.	Configure Vapor Flow Meter (Smart Sensor) and enable it in ISD.
MISSING VAPOR PRES SEN	Red	There is no Vapor Pressure Sensor setup or detected.	Complete Vapor Pressure Sensor setup.
MISSING VAPOR FLOW MTR	Red	There is no Vapor Flow Meter setup or detected.	Complete Vapor Flow Meter setup.
fnn: CHK VAPOR FLOW MTR	Red	Failure of locked rotor test - possible locked vapor flow meter.	Locked rotor test passes or vapor flow meter deconfigured, or test cleared.



Clear Test After Repair



Key Legend

- E — Enter
- F — Function
- P — Print
- S — Step
- T — Tank/Sensor
- Repeat key presses

```
TEST FAIL CLEAR DATES

CONTAINMENT OVER PRESS
02-06-11  12:43

VAPOR COLLECTION TEST
FP: 1 h:   1 MIDGRADE
02-06-10 11:13
```

Table 1.- Clear Test Repair Menu

Menu Selection	Clears Alarms	Reset Dates
Containment Over Press	ISD GROSS PRESSURE WARN ISD GROSS PRESSURE FAIL ISD DEGRD PRESSURE WARN ISD DEGRD PRESSURE FAIL ISD VP PRESSURE WARN ISD VP PRESSURE FAIL	Containment Test Time
Vapor Leakage Test	ISD VAPOR LEAKAGE WARN ISD VAPOR LEAKAGE FAIL	Vapor Leak Test Time
Vapor Collection Test	GROSS COLLECT WARN GROSS COLLECT FAIL DEGRD COLLECT WARN DEGRD COLLECT FAIL FLOW COLLECT WARN FLOW COLLECT FAIL AIRFLOW MTR SETUP	Hose Test Time
Sensor Out Test	ISD SENSOR OUT WARN ISD SENSOR OUT FAIL	Sensor Out Test Time
Setup Test	ISD SETUP WARN ISD SETUP FAIL	Setup Self Test Time
Processor Status Test	ISD VP STATUS WARN ISD VP STATUS FAIL VP EMISSIONS WARN VP EMISSIONS FAIL VP DUTY CYCLE WARN VP DUTY CYCLE FAIL	Valid Vapor Processor Test Time

Course Agenda

- **Operability Testing**
  - ISD Operability Tests- Review
  - Vapor Polisher exhibits 11 & 12

Vapor Pressure Sensor Operability Test- Review

VEEDER-ROOT

Test Procedure

1. Attach the dust cap or vapor coupler test assembly to the vapor adaptor (Figure 16-19).
2. On the TLS Console front panel, use the 'mode key' to scroll to "DIAG MODE" then use the function and step keys, as shown in Figure 16-21 to view the current pressure value.
3. Simultaneously record the ullage pressure from the digital manometer (connected to the vapor coupler test assembly) and the TLS Console. Record the above information on Appendix B, Form 1 "Data Form for Vapor Pressure Sensor UST Pressure Test." Districts may require the use of an alternate form, provided it includes the same minimum parameters as identified in the Data Form.
4. Verify that the pressure reading from the TLS Console is within ±0.2 inches WC from the digital manometer reading. If difference is not within ±0.2 inches WC, the pressure sensor is not in compliance with the pressure sensor requirements.
5. Press the <MODE> key to leave the 'PMC DIAGNOSTIC' menu.

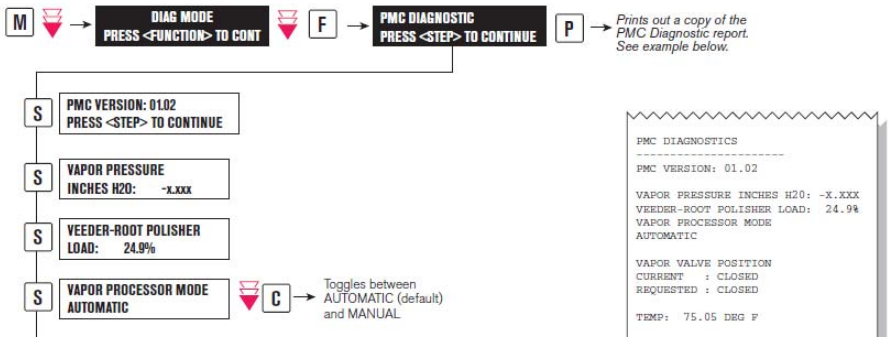
DETERMINING AMBIENT PRESSURE

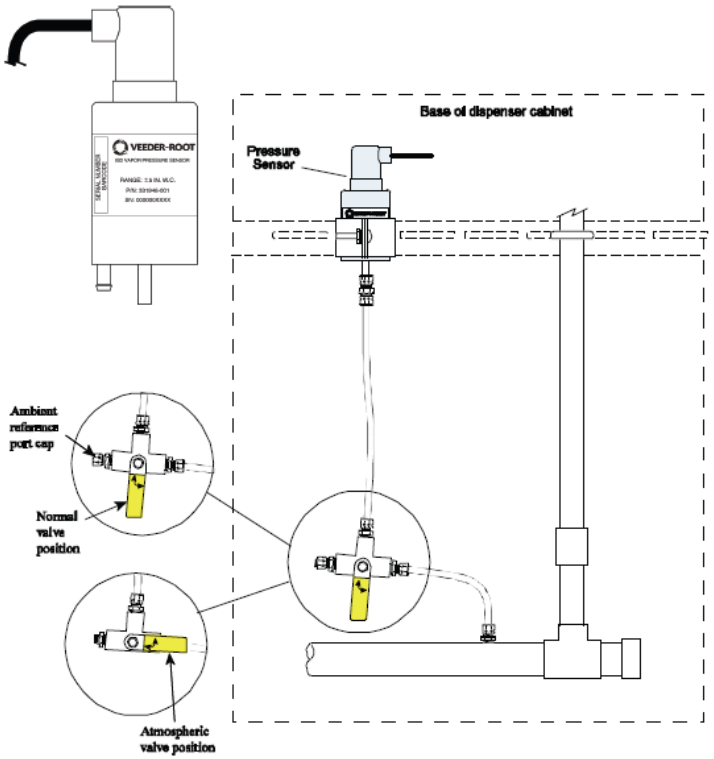
Test Procedure for Testing Sensor Under Ambient Pressure

1. Access the Vapor Pressure Sensor, which is located in the dispenser closest to the tanks. Record which dispenser contains the pressure sensor and the pressure sensor serial number on the data form.
2. Remove the cap from the ambient reference port of the Vapor Pressure Sensor valve and open the valve to atmosphere by turning it 90 degrees so that the flow arrows point to both the Vapor Pressure Sensor sensing port and the ambient reference port (see Figure 16-20).
3. On the TLS Console front panel, use the 'mode key' to scroll to "DIAG MODE" then use the function and step keys, as shown in Figure 16-21 to view the current pressure value.
4. Verify that the pressure value is between +0.2 and -0.2 inches WC. If the pressure value is not within this range, the pressure sensor is not in compliance with the pressure sensor requirements.
5. Replace the cap on the ambient reference port of the Vapor Pressure Sensor valve. Restore the Vapor Pressure Sensor valve by turning it 90 degrees so that the flow arrows point to both the Vapor Pressure Sensor sensing port and the UST vapor space sensing line (ref. Figure 16-20).
6. Press the <MODE> key to leave the 'PMC DIAGNOSTIC' menu.
7. Record the above information on Appendix B, Form 2 "Data Form for Vapor Pressure Sensor Ambient Reference Test." Districts may require the use of an alternate form, provided it includes the same minimum parameters as identified in the Data Form.

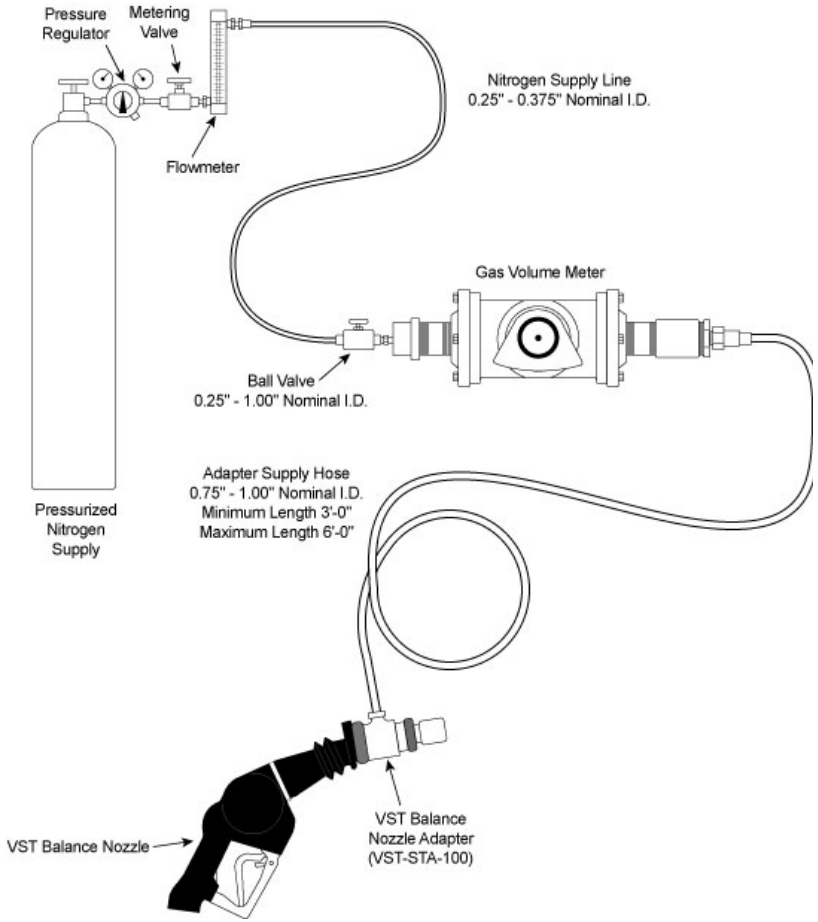
ALTERNATE PROCEDURES

This procedure shall be conducted as specified. Any modifications to this test procedure shall not be used unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 14 of CP-201.





Balance Vapor Flow Meter Operability Test Procedure- Review



Operability Test Procedure Data Worksheet

Veeder-Root In-Station Diagnostics (ISD)
Balance Vapor Flow Meter Operability Test Procedure

		Date of Test	
Service Company Name		Service Company's Telephone	
Service Technician		Veeder-Root Tech Certification #	
Station Name		District Permit #	
Station Address	City	State Zip	

		ISD Flow Meter Total			Gas Flow Meter Total						
0	0	08	4.13	4.15	4.9	4.12	4.12	4.13	4.15		
Meter SN	Fueling Pos	Start	Stop	Difference Gal (Stop – Start)	Start	Stop	Difference Cubic Feet (Stop – Start)	Cubic feet To gallons[1]	% Diff [2]	Pass	Fail

[1] $Gallons = CubicFeet \times 7.481$ [2] $\%Diff = \frac{ISDDiffGal - GasFlowMeterDiffGal}{GasFlowMeterDiffGal} \times 100$

Exhibit 11 Test Procedure

- CC Final Manuals\vr204d_ex11.pdf

Exhibit 11 Failures

Pressure Integrity test

- Check that lockable three way valve is in the test position.
  - If not in test position switch valve to test position and rerun Pressure Integrity test.
- Verify the Polisher solenoid control valve is in the closed position by accessing the TLS PMC Diagnostics.
  - If Control valve is in open position, close Valve by accessing PMC Diagnostics and rerun Pressure Integrity test.
- Check for leaks on your test equipment.
  - Find leaks using leak detection solution (I.E. Soap and Water) and repair. Rerun Pressure Integrity test.
- Check all fittings and connections on the VR Vapor Polisher for leaks.
  - Find leaks using leak detection solution (I.E. Soap and Water) and repair. Rerun Pressure Integrity test.
- Check the Filter basket for leaks
  - Tighten four filter basket screws and check filter o-ring and replace if necessary. Rerun Pressure Integrity test
- Check for leaks around the manifold
  - If leaks found call Veeder-Root Technical support at 800-323-1799

Exhibit 11 Failures (Continued)

Flow Test

- Verify all test equipment has current calibrations.
  - Have equipment calibrated per NIST specifications.
- Check that lockable three way valve is in the test position
  - If not in test position switch valve to test position and rerun Pressure Integrity test.
- Verify the Polisher solenoid control valve is in the open position by accessing the TLS PMC Diagnostics.
  - If Control valve is in closed position, put valve in manual mode, and then open the valve. Rerun Pressure Integrity test.
- Verify your nitrogen flow rate is at 18.7 SFCH
  - Adjust flow rate per test procedure and rerun Flow test.
- If flow test continues to fail contact Veeder-Root Technical support at 800-323-1799

Thermometer Test

- Replace Tank probe if gas tank thermometer fails all tests.
- Replace Vapor Valve thermometer if Vapor Valve thermometer fails all tests.
- Replace ambient temperature sensor if ambient temperature sensor is out of range.

Exhibit 12 Compliance Test Procedure

- CC Final Manuals\vr204d_ex12.pdf

Thank you!

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