



**Franklin Fueling Systems**

***PV-ZERO™***

**Liquid-Filled Pressure/Vacuum Vent Valve**

*FFS P/N 407215901*

**Installation, Testing  
and Maintenance Manual**

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This symbol identifies a warning. A warning sign will appear in the text of this document when a potentially hazardous situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous situation may involve the possibility of severe bodily harm or even death.



This is a caution symbol. A caution sign will appear in the text of this document when a potentially hazardous environmental situation may arise if the instructions that follow are not adhered to closely. A potentially hazardous environmental situation may involve the leakage of fuel from equipment that could severely harm the environment.



This symbol identifies an electrical danger. An electrical danger sign will appear in the text of this document when a potentially hazardous situation involving large amounts of electricity may arise if the instructions that follow are not adhered to closely. A potentially hazardous situation may involve the possibility of electrocution, severe bodily harm, or even death.

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**Follow all federal, state and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30, 30A and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage and/or environmental contamination.**



**Always secure the work area from moving vehicles. To help eliminate unsafe conditions, secure the area by using a service truck to block access to the work environment, or by using any other reasonable means available to ensure the safety of service personnel.**



**The PV-ZERO is used with tanks containing gasoline or other flammable substances, you may create an explosion hazard if you do not follow the requirements in this manual carefully.**

## Description of the FFS PV-ZERO Liquid Filled P/V Vent Valve

The PV-ZERO operates using a similar concept to a common P-Trap used in plumbing drain applications to create a liquid air seal. The liquid seals the UST ullage vapors from the atmosphere while still maintaining the proper differential pressure set-points. After the differential pressure has been exceeded, air or vapor bubbles through the liquid media until the pressure returns to the operational pressure settings. Figures 1-3 illustrate the operation of the PV-ZERO.

The PV-ZERO has no moving parts and the only maintenance required is periodic inspection of the liquid.

Because the PV-ZERO does not use seals or gaskets to seal off the UST ullage from atmosphere, the unit will not allow vapor or air to pass through at pressure less than the cracking set-point. As long as the valve is filled with 1.6 liters (54 ozs) of PV-ZERO fluid, the stainless steel valve housing is not damaged, and the pipe fittings are correctly installed, the unit should be leak free.

The liquid used for the PV-ZERO unit is silicone-based and has an very low vapor pressure and low toxicity.

The PV-ZERO can be mounted either at the top of the vent rack or in-line (mid-mount at working level). To avoid the risk of climbing a ladder and to maximize the simplicity of inspection and service, the preferred installation of the PV-ZERO is to be mounted in-line. It can be mounted on a single riser pipe or many riser pipes manifolded to a single line. The PV-ZERO is designed to mount on 3" riser piping, but can also be installed on 2" riser piping.

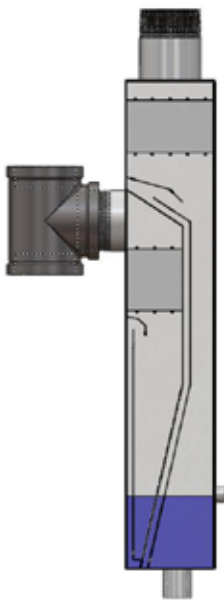
See drawings on pages 9-11 for mounting options.

\*\*\* Refer to CARB EVR documents regarding equipment rules for manifold systems.\*\*\*

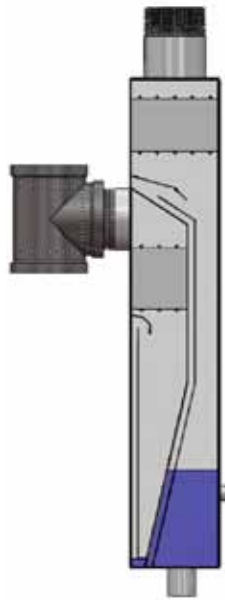
A support frame should be used for mounting all vent riser piping and must be used to stabilize the piping above the PV-ZERO if it is to be mounted in-line.

If the PV-ZERO is to be top mounted, the support frame must stabilize the piping below the unit (and the unit itself). Check local agencies for support frame requirements and consult a licensed structural engineer if in doubt of the structural integrity of the vent rack support system.

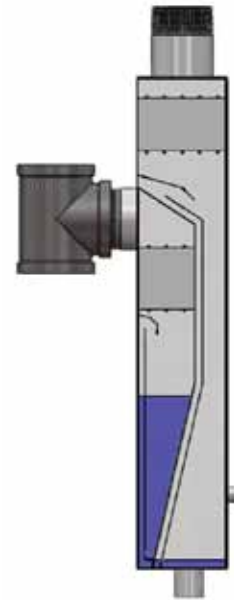
**Note:** Do not mount the PV-ZERO unit on a free standing vent piping system without a support frame!



**Figure 1: No Differential**



**Figure 2: Positive Cracking**



**Figure 3: Negative Cracking**

## Installation

**Note:** Use a thread sealant that is approved for gasoline and gasoline-ethanol blends such as Gasoila Soft Set or Jomar Heavy Weight for all threaded pipe fittings and plugs. The 3" side tee and 1" bottom drain plug are factory installed. Tighten all fittings per recognized industry installation standards.

1. Thread the bottom of the 3" side tee onto the vent riser piping. The PV-ZERO may be mounted mid-line or top mounted on a single riser or a manifolded system (see drawings, pages 9 & 10). For 2" riser piping systems, use a 3x2" NPT reducing coupling with a 3" pipe nipple at least 6" long (see drawing, page 11).
2. Make sure the PV-ZERO unit is plumb within  $\pm 3^\circ$  and not set at an angle. Failure to set in the vertical position may cause improper operation.
3. For mid-line mounting installations, install and secure the rest of the 3" discharge piping on the vent rack (refer to NFPA 30 for specific fuel system vent piping requirements). **Be sure to use a pipe wrench to counteract the tightening force to the valve!**
4. Fill the PV-ZERO unit through the side port with 1.6 liters (54 oz.) of PV-ZERO fluid (FFS p/n 407220001) provided with the unit. It may also be filled through the discharge outlet fitting (top). **Do not pour into the 3" side tee fitting!**

**Note:** To fill the fluid in the PV-ZERO, the UST (Underground Storage Tank) must be open to the atmosphere OR the inflatable test plug needs to be installed to reach the correct level. If the tank is under pressure or vacuum, the correct fill level cannot be obtained.

5. Install the side plug.
6. Perform the **Field Testing Procedure**.
7. Install the 3" pipe plug on top of the tee.
8. Attach the 3" upward-venting rain cap provided. Attach to the top of the vent pipe (mid-mount installation) or directly to the top of the PV-ZERO (top mount) **Keep the rain cap installed to minimize water intrusion, and to ensure proper operation.**

The PV-ZERO may be painted, however, do not paint over or cover the nameplate placards decals.

## Field Testing

**Note:** Compliance testing of the PV-ZERO, if required by the local air quality district, shall be conducted in accordance with California Air Resources Board (CARB) test procedure TP-201.1E and Exhibit 2 of the Executive Order. This test shall be conducted using the PV-ZERO test cap assembly (FFS p/n 407225901) with the valve in its installed condition. The PV-ZERO can be tested without removing the unit from the vent rack.

There are (3) ports on the PV-ZERO test cap assembly (see page 8):

- 1 – Schrader valve connection for the inflatable plug
  - 1 – 1/4" hose barb (for pressure/vacuum supply)
  - 1 – 1/8" hose barb (for manometer)
1. Remove 3" pipe plug from top of tee (if necessary).
  2. Install the test cap assembly through the top of the 3" tee, allowing the inflatable plug to extend into the vent riser pipe - tighten fully.
  3. Inflate the inflatable plug to 35 PSI.
  4. Test per CARB TP-201.1E
  5. Deflate the inflatable plug.
  6. Remove test cap assembly from 3" tee.

## Recommended Maintenance Intervals

- **Every year:** Visually inspect the housing, pipe, fittings, and rain cap for obvious signs of damage, missing parts, or fluid leaks.
- **Every year:** Visually inspect the rain cap, from ground level, for signs of bird nests or insect activity.
- **Every year:** Drain and inspect the fill fluid per the **Fluid Inspection Procedure**.

### Fluid Handling

The PV-ZERO is filled with a silicone based fluid, p/n 407220001 (contact FFS for MSDS sheet). The PV-ZERO fill fluid is resistant to UV exposure, does not support bioactivity and is resistant to oxidation.

Since the PV-ZERO is exposed to tank ullage vapors, used PV-ZERO fill fluid may contain trace amounts of ethanol and gasoline. The maintenance technician servicing the PV-ZERO should wear appropriate eye protection and nitrile gloves when inspecting or servicing the fill fluid. Check with local and state regulations regarding handling, transportation, recycling and disposal of silicone based fluids.

### Fluid Inspection Procedure

1. Remove the 3" NPT plug from the top of the side tee.
2. Remove the 3/8" NPT side plug.
3. Remove the 1" NPT bottom plug and drain the fluid into a clean, transparent container.
4. Visually inspect the fill fluid for debris or water contamination. Since the specific gravity of the fluid is slightly less than water, any water in the fluid will settle to the bottom. The fluid can be reused indefinitely as long as it is free of sediment and water.

Note: Clean fluid can be refilled into the valve and topped off with new fluid, or it can be completely replaced with new fluid.

5. Reinstall the 1" NPT bottom plug.
6. Refill the PV-ZERO valve with fluid through the side-port until it spills out of the port. This is the correct fill level of 1.6 liters (54 oz.).
7. Reinstall the 3/8" NPT side plug.
8. Perform the **Field Testing Procedure**
9. Reinstall the 3" NPT plug in the top of the side tee.

Only use the approved PV-ZERO fluid (P/N 407220001). Substitution of other fluids voids the warranty and can cause vapor leaks!

## PV-ZERO Specifications

Height:	33.5"
Width:	5.0"
Length:	12.3"
Dry weight:	20#
Inlet piping connection	3" NPT
Discharge piping connection	3" NPT
Fill port	3/8" NPT
Drain port	1" NPT
Construction material	304 stainless steel
Fuel Compatibility	Gas & E85
Pressure leak rate	<< 0.05CFH at +2.0 W.C.
Vacuum leak rate	<< 0.21 CFH at -4.0 W.C.
Pressure drop at 60 cfm flow rate with tank positive pressure	14" W.C.
Pressure drop at 90 cfm flow rate with tank positive pressure	28" W.C.
Minimum operating temperature	-40°F (-40°C)
Maximum operating temperature	130°F (54°C)
Maximum test pressure	5 PSI
Maximum mounting angle deviation from vertical	3°

### Drawing List:

Page	Drawing Description
6	PV-ZERO Operating Assembly
7	PV-ZERO Overall Dimensions
8	Test Cap Description
9	3" Manifolded Mid Mount
10	3" Mounting Assembly
11	2" Mounting Assembly

The drawings are on the following pages.

8				NOT PROVIDED	*** 3X2 NPT REDUCING COUPLING	1
7				NOT PROVIDED	*** 3" NPT NIPPLE (MIN OF 6")	1
6				407219001	3" NPT SQUARE HEAD PIPE PLUG	1
5				407218001	3" NPT TEE	1
4				407217001	PLUG BRASS 1"NPT	1
3				407154001	PLUG BRASS 3/8" NPT	1
2				80020301	TANK VENT ASSY, 3"	1
1				407209001	PV-ZERO BODY ASSEMBLY	1
ITEM				PART NUMBER	DESCRIPTION	REQD

3" VENT RISER				2" VENT RISER			

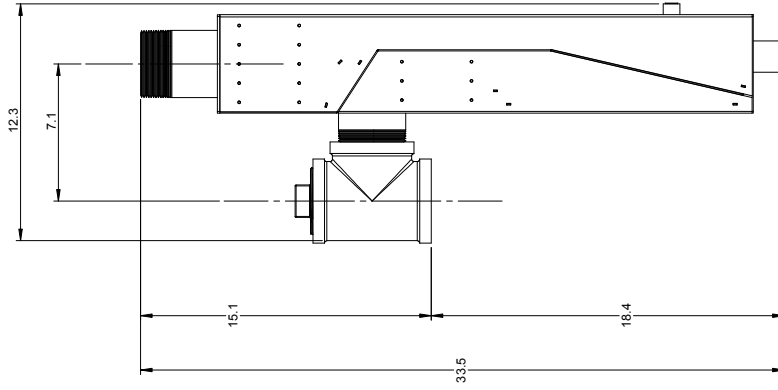
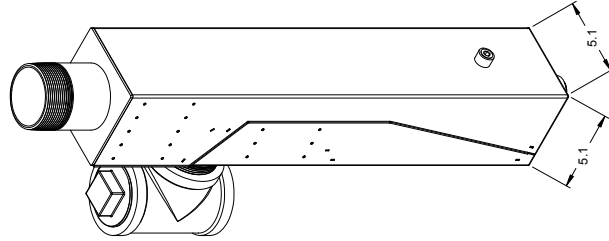
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REV	DESCRIPTION	ECN NO	BY	DATE	
<div><div></div><div>Franklin Fueling Systems Madison, WI 53718</div></div>					
TITLE: PV-ZERO OPERATING ASSEMBLY					
DRAWN: KV		DATE: 11/14/08		SUFFIX: 901	
APPROV: JFK		DATE: 11/14/08		SHEET 1 OF 1	

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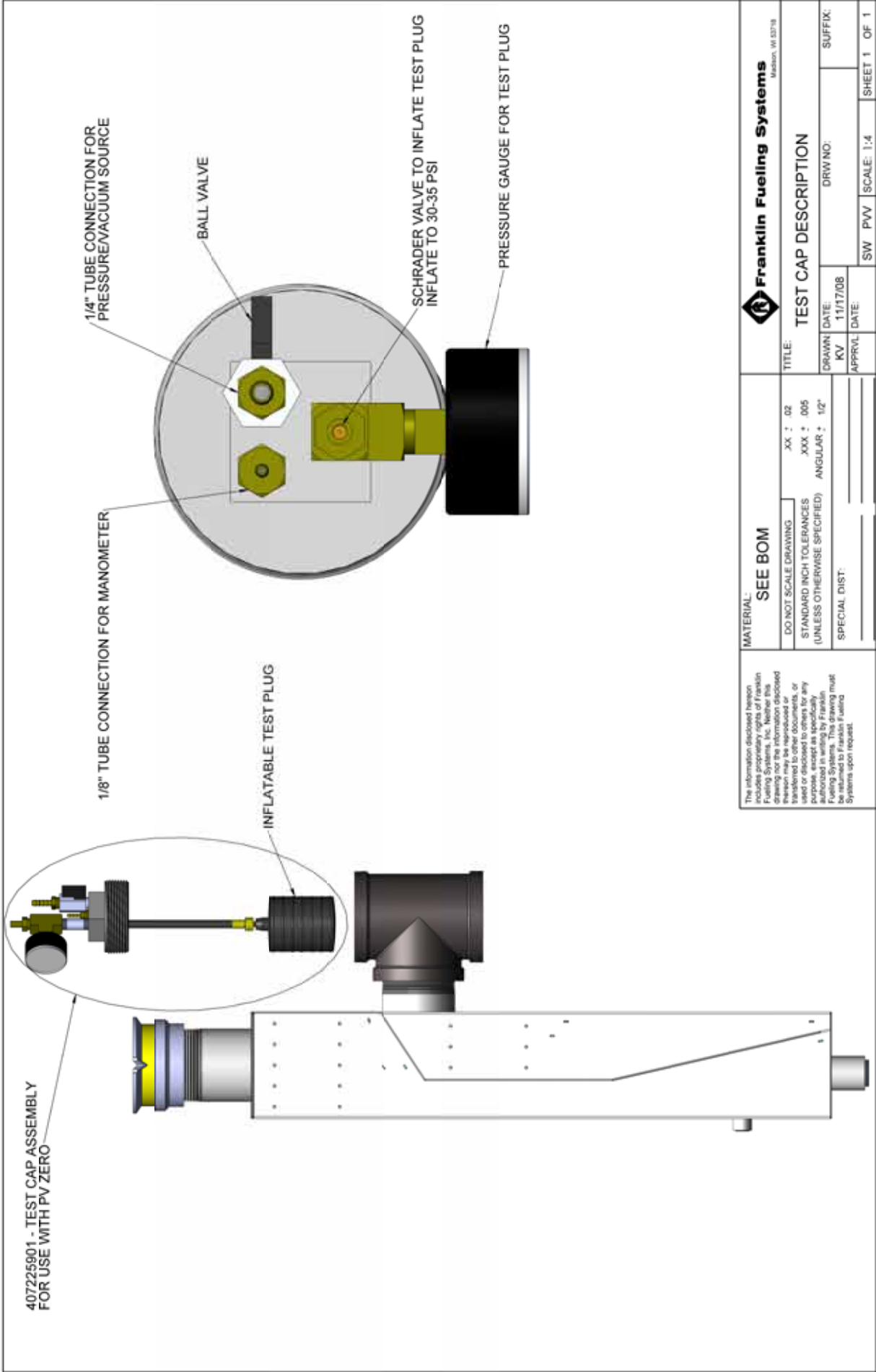
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DO NOT SCALE DRAWING  
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(UNLESS OTHERWISE SPECIFIED)  
SPECIAL DIST:

.XX ± .02  
.XXX ± .005  
ANGULAR ± 1/2°

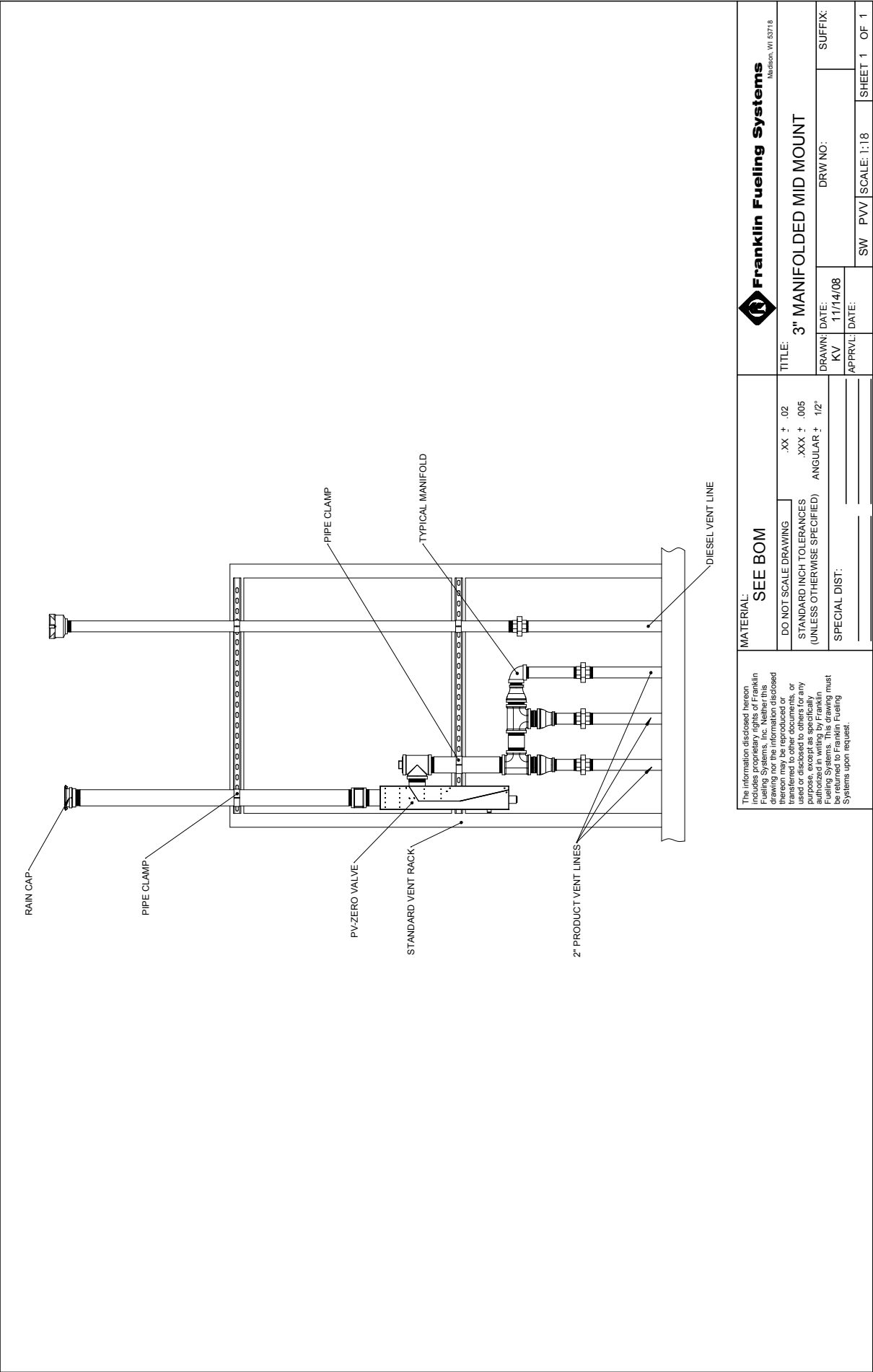


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<p><b>MATERIAL:</b> <b>SEE BOM</b></p>		<p><b>TITLE:</b> <b>PV-ZERO OVERALL DIMENSIONS</b></p>	
<p>DO NOT SCALE DRAWING STANDARD INCH TOLERANCES (UNLESS OTHERWISE SPECIFIED) ANGULAR ± 1/2°</p>		<p>DRAWN: KV DATE: 11/14/08</p>	
<p>SPECIAL DIST:</p>		<p>APPROVAL: DATE: 11/14/08</p>	
<p>SW PVV SCALE: 1:6</p>		<p>SHEET 1 OF 1</p>	

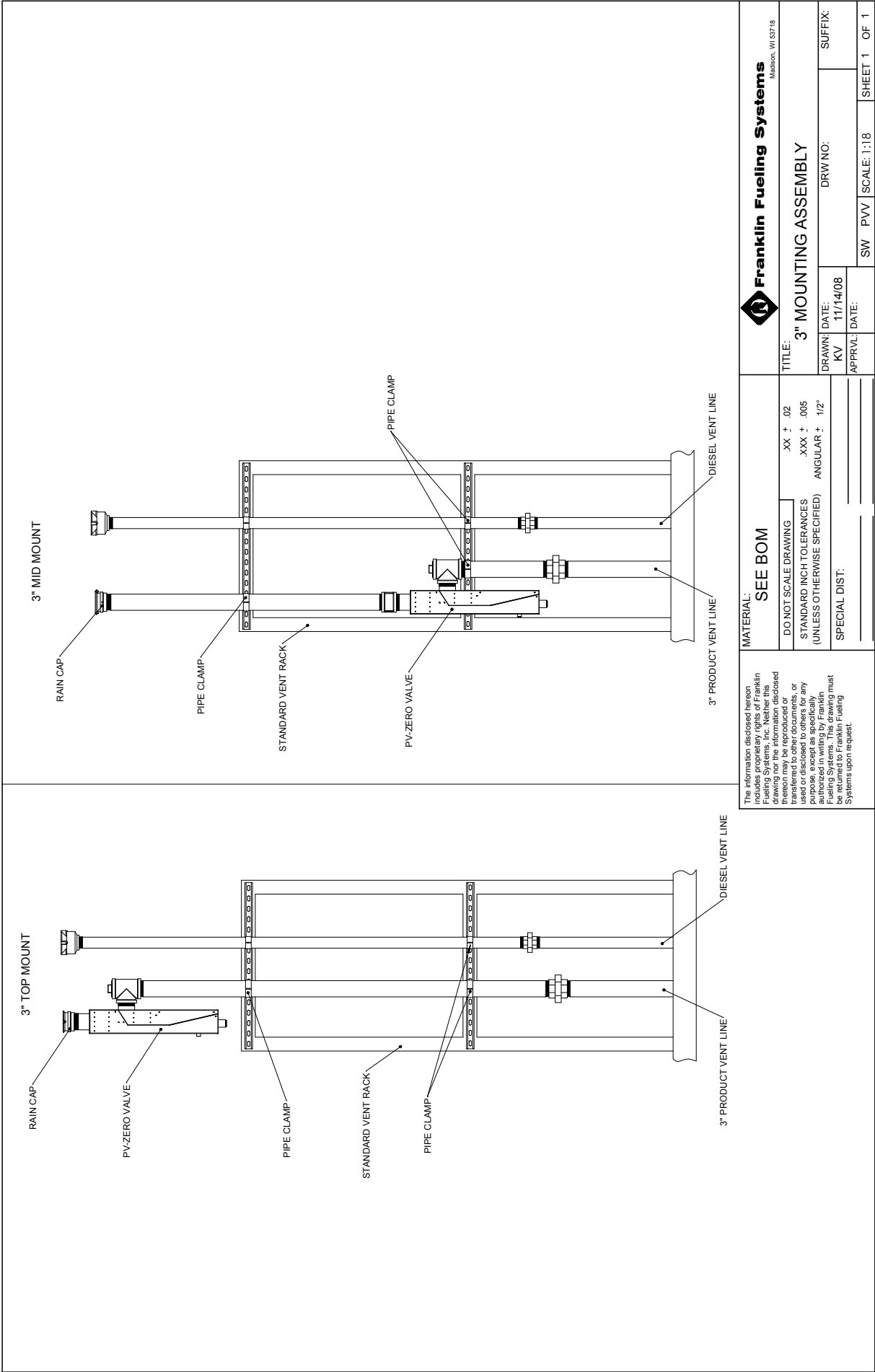


MATERIAL: SEE BOM		Franklin Fueling Systems Madison, WI 53718	
DO NOT SCALE DRAWING		TITLE: TEST CAP DESCRIPTION	
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SPECIAL DIST:		KV	
		APPROVAL DATE:	
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		SHEET 1 OF 1	

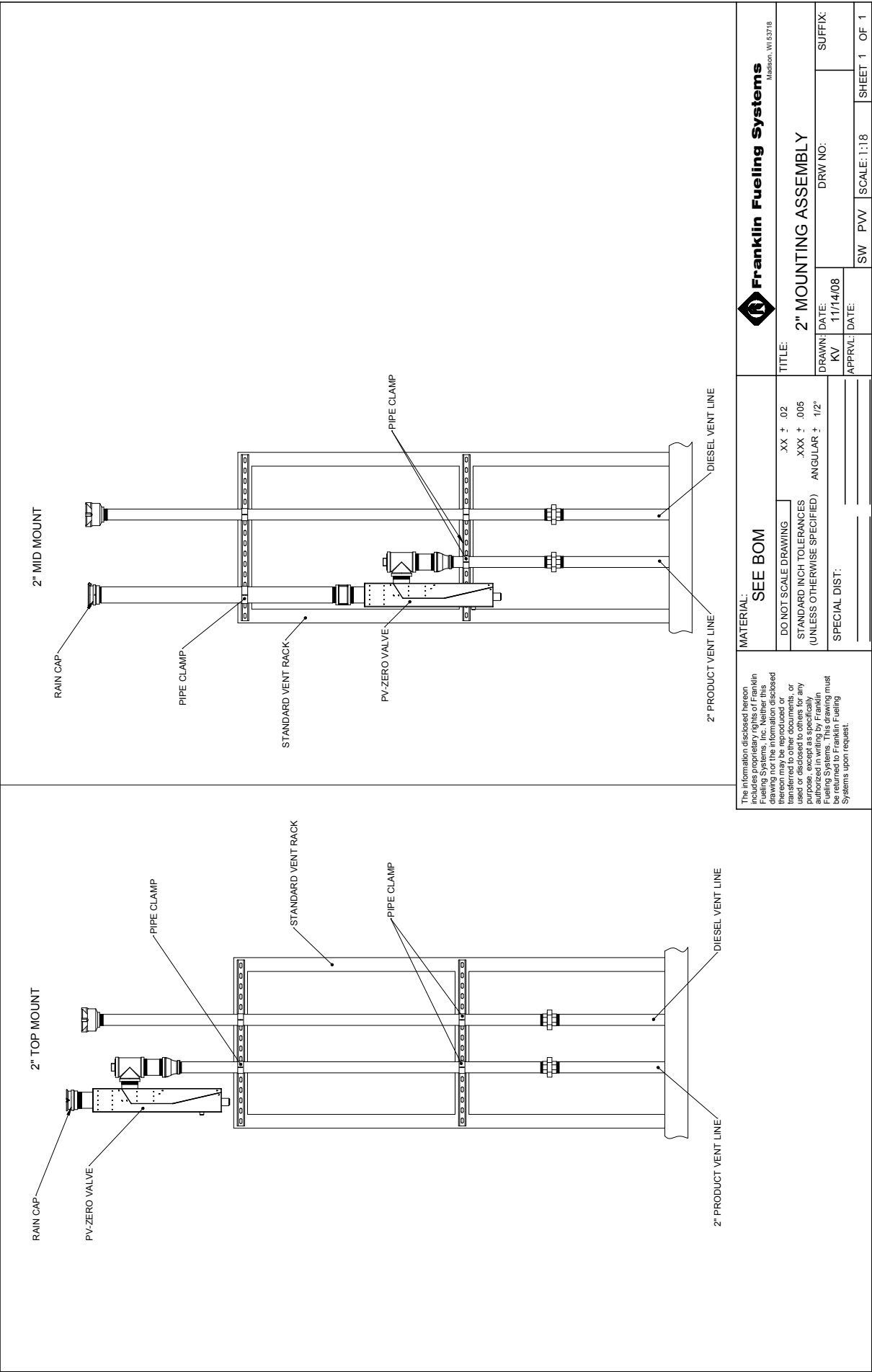




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DO NOT SCALE DRAWING		.XX ± .02		TITLE: 3" MANIFOLDED MID MOUNT	
STANDARD INCH TOLERANCES (UNLESS OTHERWISE SPECIFIED)		.XXX ± .005 ANGULAR ± .12°		DRAWN: KV DATE: 11/14/08	
SPECIAL DIST:		APPROV: DATE:		SW PVV SCALE: 1:18	
				SHEET 1 OF 1	



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DO NOT SCALE DRAWING		TITLE: 3" MOUNTING ASSEMBLY		DRAWN: DATE: KV 11/14/08
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ANGULAR ± 1/2°		.XXX ± .005		SUFFIX:
SPECIAL DIST:		APPRVL: DATE:		SW PVV SCALE: 1:18
				SHEET 1 OF 1





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