



Baldwin Hybrid Sample Gas Cooler

PCD-3000-W

PCD-3000-DP

PCD-3000-PR

PCD-3000-PR-CD

Sample Conditioning
System Featuring
Nafion™ Membrane
Drying Technology

User's Manual

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Caution Statement



1 CAUTION STATEMENT

Thank you for purchasing sample gas conditioning equipment from Perma Pure LLC. We want your new sample gas conditioning equipment to operate safely. Anyone who installs or uses this equipment should read this publication before installing or operating this equipment.

To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and usually change with time. It is your responsibility to determine which codes should be followed and to verify the equipment, installation and operation is in compliance with the latest revision of these codes.

At a minimum, you should follow all applicable laws and regulations with regard to the installation and use of this system. There may be local regulatory or government offices that can also help determine which codes and standards are necessary for safe installation and operation.

Equipment damage or serious personal injury can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your system design, installation or operation. This product should not be operated in any manner that is inconsistent with its intended use.

If you have any questions concerning the installation or operation of this equipment, or you need additional information, please call us at 1-800-337-3762.

This publication is based on information that was available at the time it was printed. At Perma Pure we constantly strive to improve our products and services, so we reserve the right to make changes to the products and/or publications at any time without notice and without any obligation. This publication may also discuss features that may not be available in certain revisions of the product

Trademarks

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2 IMPORTANT SAFETY WARNINGS

Please be sure to review the following basic safety procedures. These procedures represent the MINIMUM requirements to operate the equipment safely. It is the ultimate responsibility of the operator to ensure proper safety practices are utilized at the point of operation.

NEVER attempt to operate this equipment in an explosive, wet, or otherwise hazardous area.

NEVER exceed any specified rating for the equipment. Temperature and pressure ratings must be closely observed and not exceeded. Voltage rating of the equipment **MUST** match the rating on the data label. Please make sure that it matches before powering up the equipment.

Condensate is potentially dangerous. **NEVER** handle drain lines, impingers or any other item that may have come in contact with the gas stream or any hazardous material, without adequate personal protective equipment. **ALWAYS** assume that any liquid present is hazardous.

Sample gas is potentially dangerous. A leak test is recommended at initial start-up and as often as necessary to maintain a safe working environment around the equipment. The gas stream exhaust must exit away from all personnel to prevent dangerous exposure.

NEVER operate the equipment with any part of the enclosure unsecured. All operated doors and covers must be in place and secured prior to operation. Electrical current may be present behind covers or doors, even if tools are not necessary to access these components.

NEVER attempt service on this equipment without first disconnecting all energy sources. Repair of this equipment should only be done by properly trained personnel that are familiar with the potential risks involved with servicing of the equipment.

NEVER operate this equipment if it is visibly damaged or the possibility exists that it may have been damaged.

The use of components that have not been purchased through an authorized Perma Pure dealer or directly from Perma Pure may compromise the safety of the operator. Additionally, use of non-authorized components may change the operating characteristics of this equipment. Any changes to the equipment, that modify its operation in any way, are dangerous, and are strictly prohibited.

Read the entire operating manual before attempting to set up or operate the equipment.

Please heed all warning labels on the equipment. They are there to remind you of possible hazardous conditions.

Verify the integrity of any connections that are made to the unit.

Verify that the unit is plumbed properly to operate effectively.

3 WARRANTY INFORMATION

Perma Pure (Seller) warrants that product supplied hereunder shall, at the time of delivery to Buyer, conform to the published specifications of Seller and be free from defects in material and workmanship under normal use and service. Seller's sole obligation and liability under this warranty is limited to the repair or replacement at its factory, at Seller's option, of any such product which proves defective within one year after the date of start-up (or within 18 months after original shipment at the discretion of Seller) and is found to be defective in material or workmanship by Seller's inspection.

Buyer agrees that (1) any technical advice, information, suggestions, or recommendations given to Buyer by Seller or any representative of Seller with respect to the product or the suitability or desirability of the product for a particular use or application are based solely on the general knowledge of Seller, are intended for information guidance only, and do not constitute any representation or warranty by Seller that the product shall in fact be suitable or desirable for any particular use or application; (2) Buyer takes sole responsibility for the use and applications to which the product is put and Buyer shall conduct all testing and analysis necessary to validate the use and application to which Buyer puts the product for which Buyer may recommend the use or application of the product by others; and (3) the characteristics, specifications, and/or properties of the product may be affected by the processing, treatment, handling, and/or manufacturing of the product by Buyer or others and Seller takes no responsibility for the nature or consequence of such operations or as to the suitability of the product for the purposes intended to be used by Buyer or others after being subjected to such operations.

SELLER MAKES NO OTHER WARRANTY, EXPLICIT OR IMPLIED, OF THE PRODUCT SUPPLIED HEREUNDER, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, AND ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED. SELLER SHALL HAVE NO LIABILITY FOR LOSS OF PROFITS, OR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES UNDER ANY CIRCUMSTANCES OR LEGAL THEORY, WHETHER BASED ON NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY, TORT, CONTRACT, OR OTHERWISE. SELLER SHALL IN NO EVENT BE LIABLE IN RESPECT OF THIS ORDER AND OR PRODUCT DELIVERED ON ACCOUNT OF THIS ORDER FOR ANY AMOUNT GREATER THAN THAT PAID TO SELLER ON ACCOUNT OF THIS ORDER.

4 UNPACKING

Perma Pure has made every effort to ship you a high-quality product that has been thoroughly inspected and tested. It has been carefully packed to ensure that it arrives at your facility in good condition. Even though every effort has been made to prevent damage during transportation, damage can occur by the carrier. This is out of Perma Pure's control and is the responsibility of the carrier to ensure that your equipment arrives intact and undamaged.

Inspect outside packaging. If there is any visible damage, inform the carrier at the time of delivery. ***This inspection is important! Once the package is signed for, responsibility for any visible damage then transfers to the consignee.***

Unpack your equipment. Visually inspect the outside of your equipment for any damage. If there is any damage, ***contact the carrier immediately.*** Generally, a carrier must be notified within 24 hours of the delivery to make a hidden damage claim. Save the packing material in the event a damage claim must be verified by the carrier.

Items in the carton include:

- PCD-3000-W, PCD-3000-W-DP, PCD-3000-PR, or PCD-3000-PR-CD Hybrid Sample Gas Cooler sampling system
- This user's manual
 - Associated drawings attached within this file.
- Q.C. Checklist

If any of the above parts are missing or damaged, contact Perma Pure at 1 (800) 337-3762.

5 SPECIFICATIONS AND FEATURES

See appendix and refer to drawing PCD-3000-01-01 THRU -04 for details of the different models

6 SYSTEM INSTALLATION

6.1 SYSTEM ENCLOSURE

The system enclosure is constructed of fiberglass. It is UL and C UL listed and certified to NEMA 4, 4X standards (UL 508).

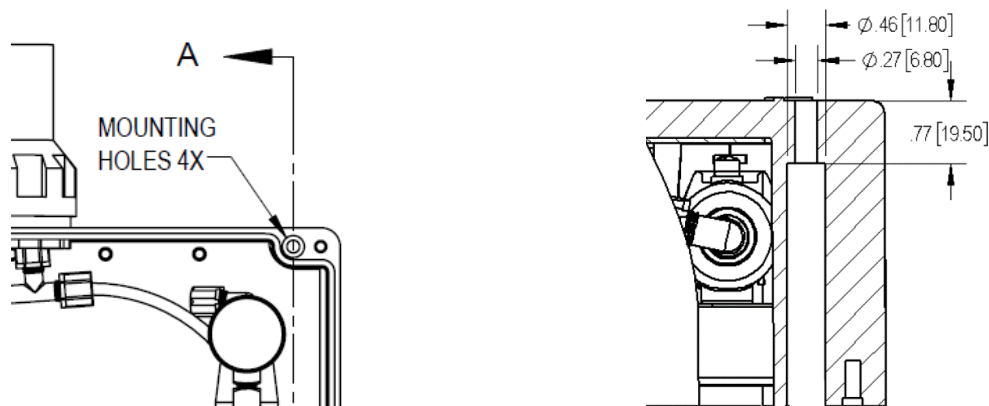
The system is designed to be wall mounted vertically with the inlet at the top.

It is suitable for outdoor installation. If installed outdoors, it is highly recommended to install it in a location that does not get direct sunlight or provide a method of shading the system. In addition, a method of protecting the system from direct rain is also highly recommended.

6.2 MOUNTING

Mount the system enclosure to a wall or other rigid structure using four maximum ¼" (6mm) screws installed through the provided holes. (The holes are concealed when the cover is in place).

The system must be installed on a vertical surface with the heated umbilical line entry located at the top. See below for mounting screw locations.



6.3 UTILITY CONNECTIONS

6.3.1 Electrical Connections

This model has no electrical power requirements.

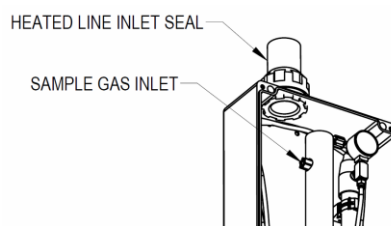
Grounding lug must be connected to earth ground to prevent electrostatic build up.

6.3.2 Instrument Air Inlet

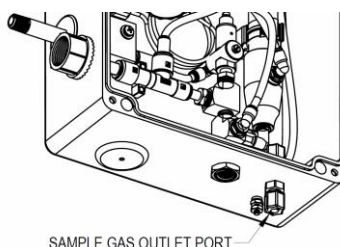
The instrument air supply must be cleaned of particulates, liquids, and regulated to 60PSI-100PSI at the required flow rate. Perma Pure recommends both coalescing filtering and particulate filtering of the instrument air just before entry into the unit. Intrusion of particulates or liquid into the system will compromise performance.

6.3.3 Heated Sample Gas Inlet and Dry Sample Gas Outlet

Run the heated sample inlet line through the heat shrink entry seal and into enclosure. Connect the sample tubing to the compression fitting port, as indicated in the image below. Shrink entry seal tubing around the heated sample line with a heat gun to provide a water-tight seal.

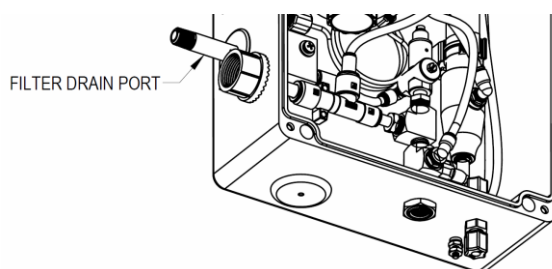


Connect the system to the sample gas analyzers or downstream sample pump via the port labeled “Sample Gas Outlet”.

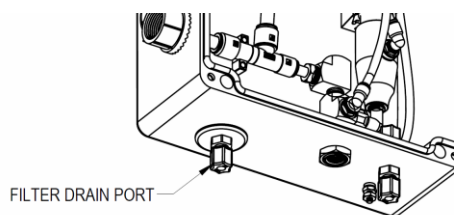


6.3.4 Filter Drain Outlet

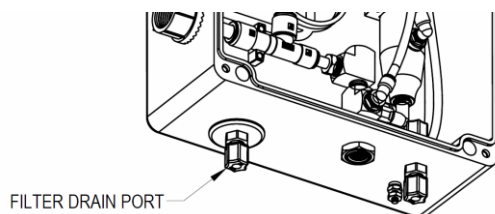
Vent the exhaust to a remote location, connect a line to the port labelled “Drain Port”. For runs under 10 ft., 1/4” ID tubing is acceptable. For runs 10-40 ft., 3/8” ID tubing is recommended, and the number of elbows should be kept to a minimum. This port must be connected to an appropriate drain that can accept potentially acidic condensate and, in the case of model PCD-3000-W, a minimum of 0.25 scfm (7 lpm) of air with entrained acidic mist. See below for location of the drain port on the specific models.



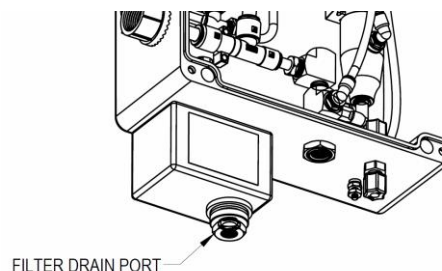
PCD-3000-W



PCD-3000-W-DP



PCD-3000-PR



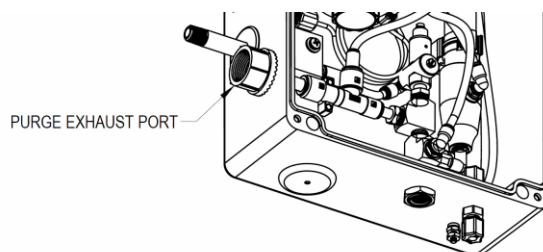
PCD-3000-PR-CD

WARNING!

***Failure to properly connect this port may result in personal injury and/or property damage!
Connect the line from the filter drain outlet to designated collection/exhaust basin that is
capable of accepting acid mist and the sample gas present at this location.***

6.3.5 Purge Air Exhaust Vent

Connect tubing or pipe of an appropriate material from port labeled Purge Exhaust to a permanent vent designed for this type of discharge. 1/2" I.D. tubing can be used for runs up to 30 feet. Too small of an ID and/or too long of a piping run may cause inadequate purge vacuum performance and/or collapse of the PD sample gas dryer membrane tubes resulting in poor drying performance and/or high sample gas flow restriction.



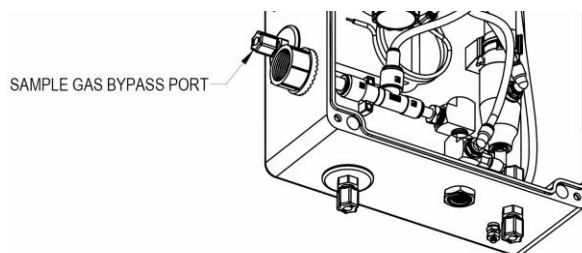
WARNING!

FAILURE TO PROPERLY VENT THE SYSTEM MAY RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE!

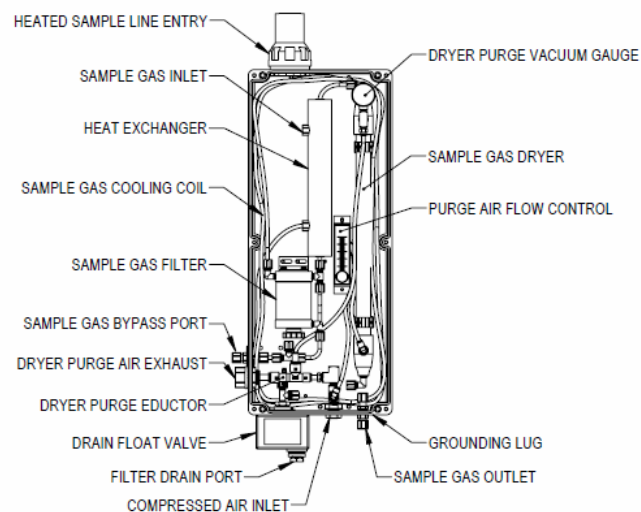
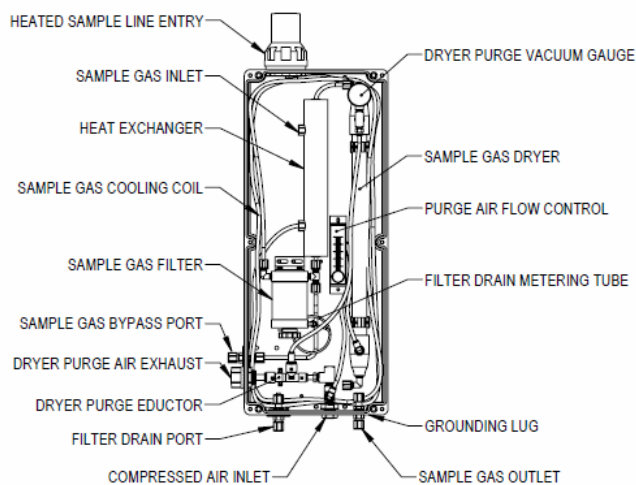
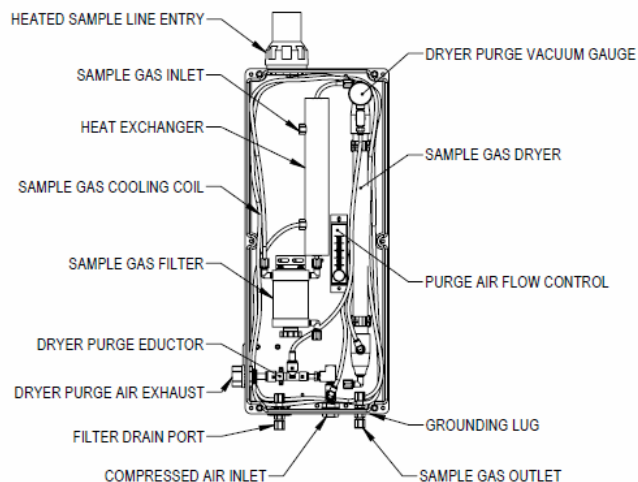
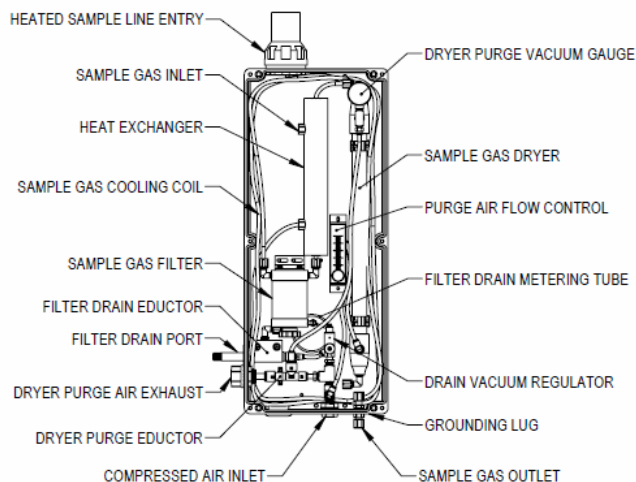
The gas exhausted from the purge exhaust port under normal operation is humid air. However, in the event of an internal failure of the PD sample gas PD dryer installed in the system, the exhaust may contain sample gas that may be hazardous. The purge exhaust must be permanently routed to a vent system or directly outdoors. Do not allow the purge to vent into a structure or confined space.

6.3.6 Sample Gas Bypass Port

This port is included on the PCD-3000-PR and PCD-3000-PR-CD models and is capped at the factory. It is typically used to decrease the system response time in applications where the sample gas is under pressure. Use of this function is optional.



7 SYSTEM COMPONENTS



7.1 FUNCTION OF SAMPLE GAS FLOW COMPONENTS

7.1.1 Heat Exchanger

After condensate has been removed in the sample filter, the heat exchanger utilizes heat from the incoming sample gas stream to slightly preheat the filtered sample gas just before it enters the PD dryer. This keeps the

sample gas temperature above the sample gas dew point temperature and minimizes the possibility of liquid water in the sample gas from reaching the PD sample gas dryer which could compromise performance.

7.1.2 Sample Gas Cooling Coil

A coil of tubing is located around the perimeter of the enclosure backplate to help cool the sample gas if it enters the system hot. It improves the moisture removal capability of the coalescing filter and helps prevent liquid water from getting to the PD sample gas dryer.

7.1.3 Sample Gas Filters/Eductor

The sample filter is FF-250 series with a 0.1 um, 95% efficiency standard coalescing element which removes small particles and prevents liquid water and condensable vapors from passing through the system to the analyzer.

Consisting of parts machined from solid PVDF fluoro-polymer, the filter body is designed to hold standard filter elements as mentioned above for the purpose of removing particulate matter, water and aerosols of high boiling point liquids like sulfuric acid.

The particulate matter is removed by collection on the filter element. Any aerosol liquids are removed by first coalescing on the filter element and then collecting at the bottom of the filter bowl where the condensate can be removed by the drain system.

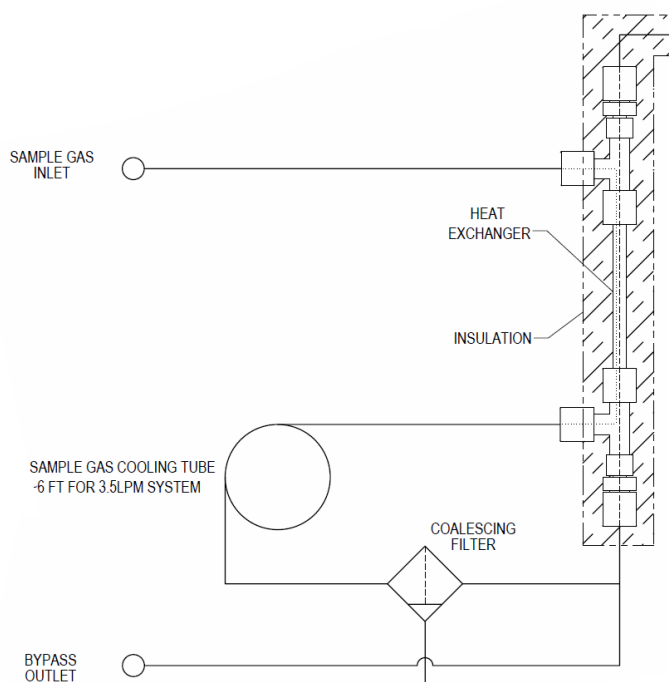
7.1.4 Sample Gas Bypass Port

Response time is the time it takes for the sample gas to travel from the sampling point to the analyzer. In emission monitoring applications, a long response time is usually not problematic. However, in process control applications, fast response can be very important.

To reduce the response time without overwhelming the Hybrid Sample Gas Cooler system's drying capacity, the bypass port can be used to increase the sample gas flow from the sample point to the Hybrid Sample Gas Cooler system. While the bypass flow is not dried in the Hybrid Sample Gas Cooler system, it is cooled, filtered, and liquid water is removed. This helps reduce corrosion and contamination of any bypass flow regulation equipment that is connected to the bypass port.

It should be noted that the increased sample flow created by use of the bypass port may increase the need for filter element maintenance.

There are several ways to control the bypass flow using a needle valve/flowmeter, back-pressure regulators, etc. This will be left to the customer to determine the best method for their application. The internal plumbing of the bypass port is shown below.



Bypass Port Plumbing

7.1.5 PD Sample Gas Dryer

The Nafion™ polymer transfers water molecules from one side of the membrane to the other by a first order kinetic reaction. This is unlike a porous membrane that depends on the physical size of molecules. Nafion™ Polymer selectivity is based on chemical reactivity, not the size of the molecule – therefore, not traditional permeation. The Nafion™ polymer selectively transfers water vapors, leaving most analytes in the gas stream untouched. The driving force for the Nafion™ polymer to transfer water molecules is the difference in humidity levels (water vapor pressure) on either side of the membrane. The Nafion™ polymer tries to attain equilibrium of the partial pressure of water vapor on either side of its membrane.

PD-Series sample gas dryers consist of a bundle of 0.030" O.D. Nafion™ membrane tubing housed within a single large tube shell. Sample gas flows within the Nafion™ membrane tubing while water vapor absorbs into the tubular membrane walls and is removed. Moisture permeating the tubing is carried away by a dry purge gas within the shell that flows counter-current to the sample gas. The sample gas dryer purge air flow rate is controlled by a needle valve located in the purge inlet port. The purge flow rate and vacuum level can be monitored with the installed rotameter and vacuum gauge.

7.2 FUNCTION OF FILTER DRAIN COMPONENTS

7.2.1 Model PCD-3000-W

This model includes an internal eductor operated drain for use with sub-atmospheric pressure sample gas.

When the Hybrid Sample Gas Cooler system is located upstream of the sample pump, the sample gas in the system is under slight vacuum. To remove any liquid collected in the filter, a vacuum level higher than the vacuum level inside the filter is required. This vacuum is generated by an eductor (venturi). Compressed air is supplied to the eductor via an air pressure regulator which causes it to generate the required vacuum. Liquids including water and coalesced acid mist collected at bottom of the filter bowl are pulled out of the filter via the metering tube by the drain eductor. The eductor exhaust must be connected to an appropriate drain line as it will contain sample gas as well as potentially corrosive liquid.

7.2.2 Model PCD-3000-W-DP

This model includes provisions for an external pump operated drain for use with sub-atmospheric pressure sample gas.

When the Hybrid Sample Cooler system is located upstream of the sample pump, the sample gas in the system is under slight vacuum. To remove any liquid collected in the filter, a vacuum level higher than the vacuum level inside the filter is required. An external, separately supplied drain pump is intended to serve this purpose. Collected liquids at the bottom of the filter bowl are pulled out of the filter by the pump via the bottom drain bulkhead fitting. The pump outlet must be connected to an appropriate drain line as it will contain sample gas as well as potentially corrosive liquid.

7.2.3 Model PCD-3000-PR

This model includes a continuous drain for use with positive pressure sample gas.

When the Hybrid Sample Gas Cooler system is located downstream of the sample gas pump or the sample gas source is under positive pressure, the drain system functions continuously to remove any liquid collected in the filter. Liquids collected at bottom of the filter bowl are pushed out of the filter by the sample gas pressure via the metering tube and out of the bottom drain bulkhead fitting. The drain must be connected to an appropriate drain line as it will contain sample gas as well as potentially corrosive liquid.

7.2.4 Model PCD-3000-PR-CD

This model includes a continuous drain for positive pressure flammable/toxic sample gas.

When the Hybrid Sample Gas Cooler system is located downstream of the sample gas pump or the sample gas source is under positive pressure, the drain system functions continuously to remove any liquid collected in the filter. Liquids collected at bottom of the filter bowl are pushed out of the filter by the sample gas pressure, down to the float operated drain valve. The drain valve prevents sample gas from escaping into the drain line by closing before the liquid in the tank is fully drained. Only liquid is allowed into the drain line. The drain must be connected to an appropriate drain line as it may contain potentially corrosive liquid.

7.3 FUNCTION OF PURGE AIR FLOW COMPONENTS

7.3.1 Flowmeter and Needle Valve

For maximum drying performance, monitor the flow of purge gas through the PD sample gas dryer. Refer to the system check procedure for purge for adjustment and verification.

7.3.2 Vacuum Gauge

Allows for monitoring of the vacuum level generated by the PD sample gas dryer purge eductor. The vacuum is dependent on the instrument air supply pressure, and the purge air flow rate. Refer to the system check procedure for purge for adjustment and verification.

7.3.3 Purge Air Eductor

Nafion™ membrane PD sample gas dryers operate on the differential of the partial pressure between the sample and the purge. The purge eductor generates vacuum, which assists in generating this differential. It operates on instrument air pressure. The generated vacuum level and the resulting drying performance will be affected by fluctuations in supply pressure.

8 START-UP PROCEDURE

Read through this section completely before sample gas is allowed to flow through the system.

8.1 Primary Sample Handling System Check Procedure

If a probe filter is present upstream of the Hybrid Sample Gas Cooler system, check:

- If heated type, that heated probe and heated line are working properly and maintaining desired temperature.
- Check that the probe filter element is present and clean. It should be cleaned frequently and replaced if required.
- Check for cold spots (unheated tubing) in the heat traced sample line is always recommended upstream of the conditioning system. Sample should enter conditioning system above 100°C.
- If present, check that the blowback air operated valve or solenoid valve is operating properly.

8.2 Hybrid Sample Gas Cooler System Check Procedure

Check that instrument air, sample gas inlet and outlet, and purge exhaust/filter drain connections have been made and are operational.

All operating parameters are set and the system is fully tested at the factory. However, shipping and handling of the unit may have affected some of the settings so an initial check is important.

8.2.1 Drain and purge exhaust lines

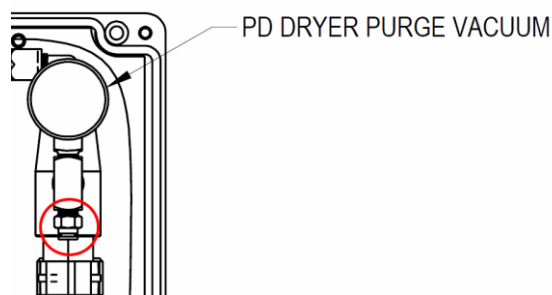
Confirm that both ports are properly connected. This is extremely important! Some sample gas will be present and must be vented properly!

8.2.2 Instrument air source

Turn on instrument air to the system (60 Psig). Air will begin exhausting from the vent port. If the airflow is absent check for proper instrument air pressure at the inlet to the system.

8.2.3 Flowmeter and Needle valve

Confirm the flow of purge gas flow through the PD sample dryer is 5 SLPM. This must be verified with the vacuum line disconnected from the eductor. See figure below. This can be done by pushing the release ring on the push-in tube fitting towards the body of the fitting and then pulling the tube out. When re-installing be sure the tube is completely seated in the fitting. With the vacuum line attached, the flow will read significantly above 5 SLPM (approximately 10 LPM).



8.2.4 Vacuum gauge

Verify that the sample gas dryer purge air vacuum is approximately 20 inHg. Since the instrument air supply pressure may vary within the specified range, the vacuum level will vary slightly from application to application. With the purge rate set at 5 SLPM (flowmeter reading will be higher due to high vacuum level) and instrument air supplied at 60PSIG, the vacuum level is expected to be approximately 20 in-Hg. Should the vacuum fall off considerably, check the instrument air supply pressure. If the vacuum remains low < 15inHg, clean the eductor.

8.2.5 Grounding Lug

Verify that the system is properly grounded.

9 SHUTDOWN PROCEDURE

- Turn OFF the sample pump.
- Turn OFF instrument air supply

10 DOS & DON'TS

- DO NOT pass sample gas through the system if the instrument air supply to the system is off.
- DO NOT clean PD sample gas dryer with high pressurized instrument air or other gas.
- DO NOT operate the system with the drain or purge exhaust vent lines disconnected.
- DO NOT operate the system in an ungrounded condition (ground lug not connected)
- DO visually inspect the condition of sample filters and any customer installed filters regularly.
- DO regularly check the PD dryer purge vacuum and flow settings.
- DO contact a Perma Pure representative with any question you may have about the operation of the system.

11 MAINTENANCE AND REPAIR

11.1 OPERATIONAL ADJUSTMENTS

If at any time the system is not operating correctly, the system adjustments should be checked for their proper setting. Refer to the Q.C. checklist for proper adjustment settings and procedures.

11.2 SAMPLE FILTER

Sample gas flow through the filter is inside to outside. The filter is plumbed in this way to allow for proper coalescing operation. Because of the flow direction, it may appear that filter element is relatively clean when

viewing it from the outside. However, the majority of collected particulate will be on the inside of the element and therefore requires disassembly for proper inspection.

11.2.1 Filter Disassembly/Reassembly –

Replace/inspect the sample filter element as follows:

1. Loosen bolt on bottom of filter until it is free of the top cap.
2. Gently pull apart assembly and remove old element.
3. Wipe surfaces clean.
4. Prior to re-assembly, inspect o-rings on top and bottom caps and on center bolt for any possible damage. Replace if necessary
5. Place the new element into the groove in the bottom cap.
6. Install glass shell onto bottom cap with a slight twisting motion to help the o-ring seat properly.
7. Be sure that element is seated correctly and parallel to glass shell.
8. Carefully assemble the bottom assembly onto top cap while being sure the element is properly aligned with the protrusion on the top cap that keeps the element centered. A slight twisting motion will help the o-ring seat properly.
9. Inspect the assembly for properly sealed o-rings. They will appear as lines that are about 1mm wide inside the glass shell. Check for gaps, twists or inconsistencies of the seal line.
10. Replace bolt through hole in bottom piece and screw clockwise into top piece. Do not over-tighten center bolt. It should be just tight enough so it does not vibrate loose. Over-tightening will not help the filter to seal.



11.3 SAMPLE GAS FILTER DRAIN

If there is visible condensate collecting at the bottom of the filter, the drain system is not operating properly.

- Model PCD-3000-W. Remove the drain metering tube at the eductor and check for vacuum at the eductor inlet.
 - If there is vacuum, it is likely that the metering tube is clogged. Clean with a fine wire or replace.
 - If there is no vacuum, confirm that system instrument air pressure is present. Check for airflow out of the eductor exhaust (drain port).
 - If no flow, shut down the system, turn off the system instrument air supply and remove the tubing from the nozzle of the eductor.

- Turn on the instrument air supply. If air is exiting the disconnected tubing, the nozzle is clogged. Otherwise, the regulator should be inspected for function.
 - Clean the nozzle carefully, PTFE plastic is soft and easily damaged.
 - Reconnect and recheck.
- Model PCD-3000-W-DP. Check for a clog in the drain line and proper operation of the external condensate pump.
- Model PCD-3000-PR. Check for a clog in the metering tube.
- Model PCD-3000-PR-CD. Check for a clogged drain line and proper operation of the drain valve
 - Pour water directly into the drain valve housing. The valve should open before the level gets to the top and then close before the housing is empty.
 - If the valve does not open, with the line from the filter to the drain valve disconnected, apply low pressure air to the drain port. This may help dislodge the needle from the seat. If not, the valve may need to be replaced.
 - If the valve is stuck open, rinse the internal components with water. Physically moving the float up and down carefully with a screwdriver may help clear any debris from the valve seat. If not, the valve may need to be replaced.

11.4 NAFION™ MEMBRANE PD SAMPLE GAS DRYER

Under normal conditions, Perma Pure PD sample gas dryers require no maintenance and can last for years. However, if the tubing becomes clogged with particulate matter or saturated with water, the dryer may require repair or replacement.

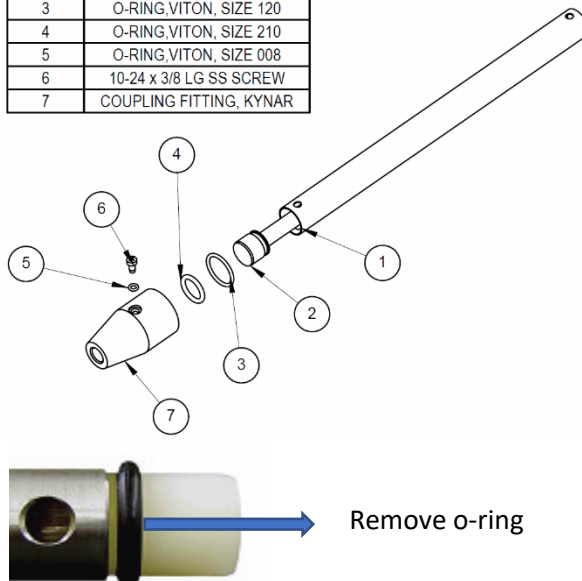
11.4.1 PD Sample Gas Dryer Disassembly –

Tools Needed:

- Phillips head screwdriver
- unsharpened pencil with eraser

1. Loosen locking screws on both ends of dryer.
2. Insert eraser end of pencil into one sample port until it rests on tube header face.
3. Hold dryer vertically and place other end of pencil down onto a hard, slip resistant surface.
4. While supporting shell tube, push lower end fitting down with consistent pressure until it slips off shell tube. Do not attempt to pull fitting from shell tube; doing this is likely to damage dryer element tubing.
5. Repeat steps 2-4 on the other end.
6. While avoiding excessive sideward force of the element on the shell tube carefully remove one o-ring from tube header (see Figure).
7. Gently pull tube element from opposite end of dryer.

ITEM	DESCRIPTION
1	SHELL TUBE, SS
2	DRYER ELEMENT
3	O-RING, VITON, SIZE 120
4	O-RING, VITON, SIZE 210
5	O-RING, VITON, SIZE 008
6	10-24 x 3/8 LG SS SCREW
7	COUPLING FITTING, KYNAR



11.4.2 PD Sample Gas Dryer Assembly –

Tools Needed:

- Phillips head screwdriver

1. Install one o-ring (item 7) in groove in one tube Header.
2. Slip opposite tube header through dryer shell.
3. Install other o-ring (item 7).
4. Push one o-ring (item 3) into groove inside coupling
5. Firmly push coupling over tube header. A rocking motion will help the o-rings slide past each other.
6. Align purge port with a hole in shell tube.
7. While being sure that the screw goes into the hole in the shell tube, tighten locking screw (item 4) into the opposite side of the coupling until underside of the screw head contacts top of boss.
8. Repeat steps 4-7 for opposite end.

12 REPLACEMENT PART LIST & RECOMMENDED SPARES

12.1 FILTER

ITEM NO.	QTY	PART NO.	DESCRIPTION
1	1	FF-250-E-2.5G	Fine Filter, Coalescing – Sample Gas
2	2	100503	O-Ring, Viton™, Size 030
3	1	100502	O-Ring, Viton™, Size 009

12.2 NAFION™ MEMBRANE PD DRYER

ITEM No.	QTY	PART NO.	DESCRIPTION
1	1	PD-AP8001	PD Sample Gas Dryer Assembly, 20 inch

13 APPENDIX A: DRAWINGS

13.1 SYSTEM INTERFACE: (PCD-3000-01-01,02,03,04)

The drawings are attached (paperclipped) to this Adobe Acrobat file.

13.2 SYSTEM ASSEMBLY: (PCD-3000-03-01)

The drawings are attached (paperclipped) to this Adobe Acrobat file.

13.3 SYSTEM PIPING AND INSTRUMENTATION DIAGRAM: (PCD-3000-05-01,02,03,04)

The drawings are attached (paperclipped) to this Adobe Acrobat file.

13.4 Q.C. CHECKOUT LIST: (SE-F-032)

The document is attached (paperclipped) to this Adobe Acrobat file.

14CONTACT US

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