

Instruction Manual for PUREGAS[®] Compressed Air Dryers and Adsorbers

**Models: PHF
PCR
PCDA
PHCA
PCME
PMD
TOC**



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Instruction Manual for PUREGAS® Compressed Air Dryers and Adsorbers

IMPORTANT NOTE!

This instruction manual is designed for the benefit of our customers and is intended to assist them with the installation, operation, and maintenance of their PUREGAS compressed air dryer or adsorber. The entire manual should be read thoroughly prior to the installation of the unit and should be retained for future reference. Failure to do so could result in safety issues and poor performance, and could void the warranty.

LIMITED WARRANTY AGREEMENT

All PUREGAS products carry a one-year warranty against defective workmanship and material. This period starts with the date of shipment. PUREGAS retains the right to address warranty claims by shipping replacement parts or by having the unit returned to our factory for repair.

No claims for labor in replacing defective parts or for consequential damages will be allowed. Replacement parts will be invoiced in the regular way, with invoices subject to adjustment after the parts claimed defective are examined at our factory. No units or parts will be accepted at our factory for warranty repairs or credit without previous authorization from PUREGAS.

Damage incurred to the product in transit will be the responsibility of the customer, who in turn should file a damage claim against the responsible carrier.

This warranty shall not apply to any product which has been repaired or altered in any way by anyone other than PUREGAS, so as to affect its proper function. Neither will this warranty apply to a product subjected to misuse, negligence, or accidental damage.

CAUTION!

Pressure: Do not exceed maximum operating pressure as listed on the serial label and be sure that the system is depressurized before servicing.

Electrical: Install this product in compliance with national and local electrical codes.

Breathing Air: This product is not intended for breathing air applications, and air treated by this equipment may not be suitable for breathing without further purification.

Instruction Manual for PUREGAS® Compressed Air Dryers and Adsorbers

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SECTION 1 – GENERAL

Scope of Manual

This instruction manual is intended to assist our customers with the installation, operation, and maintenance of their PUREGAS compressed air dryer or adsorber. The information contained in this manual is designed to ensure a productive, trouble-free ownership experience and should be retained for future reference.

Initial Inspection

PUREGAS products are produced in a lean manufacturing environment, where quality assurance practices are built into all processes. Moreover, all products are thoroughly inspected and tested prior to shipment. If shipping damage is noted, immediately contact the responsible carrier to file a freight claim to cover the repair.

Warranty

Please read this instruction manual carefully prior to installing and operating your PUREGAS product. Failure to follow these instructions could lead to potential safety concerns and may void the warranty. The warranty agreement can be found on the inside cover of this instruction manual.

SECTION 2 – DESCRIPTION OF OPERATION

General Description

PUREGAS compressed air dryers and adsorber are used to separate various elements in compressed air using Pressure Swing Adsorption (PSA) technology. This method employs two identical desiccant chambers, precision orifices, and solenoid valves controlled by a solid state electronic timer.

The process is simple. The compressed air is directed through a desiccant chamber, which contains an adsorbent material with strong affinity for moisture, CO₂, and/or other elements within the air stream. Once purified, the majority of the compressed air goes directly to the application, while a portion is diverted through an orifice to regenerate the off-line chamber. The solid state timer reverses the flow through the chambers on a timed cycle by opening and closing the solenoid valves.

Applications

As described above, PUREGAS compressed air dryers and adsorbers are typically used to purify a compressed air source. They may, however, be used with inert gases (nitrogen, argon, neon, helium, and carbon dioxide), as well as other common gases with certain restrictions. For example, oxygen requires a completely oil-free system and hydrogen (being explosive) should be handled with explosion-proof equipment.

Please consult the factory PRIOR to installing a unit for any application other than air or inert gases. Use with certain liquids or gases could be harmful to the unit, result in a combustible condition, or cause hazardous leakage. In the event of a misapplication, the product warranty is voided and PUREGAS will assume no responsibility or liability for any resulting loss.

Operation of PHF, PCDA, PHCA and PCME Models

The PHF, PCDA, PHCA and PCME models utilize a common die-cast aluminum manifold, to which the desiccant towers (chambers), 3-way solenoid valves, timer, and other components are attached. The inlet air passes upward through the desiccant tower immediately above the energized DC solenoid valve. When the air reaches the top of the tower, it is redirected back down the return air tube in the center of the tower, through the open check valve, and into the outlet passageway. Most of the air is delivered to the application, while a portion is diverted for purging the off-line desiccant tower. This air passes through the fixed orifice beneath the off-line tower, upward through the air tube, and then downward through the desiccant, removing the accumulated moisture and/or other contaminants. These unwanted elements of the gas stream exit the unit through the purge port of the de-energized solenoid. This process is reversed every 30 seconds to provide a continuous source of pure, ultra-dry air.

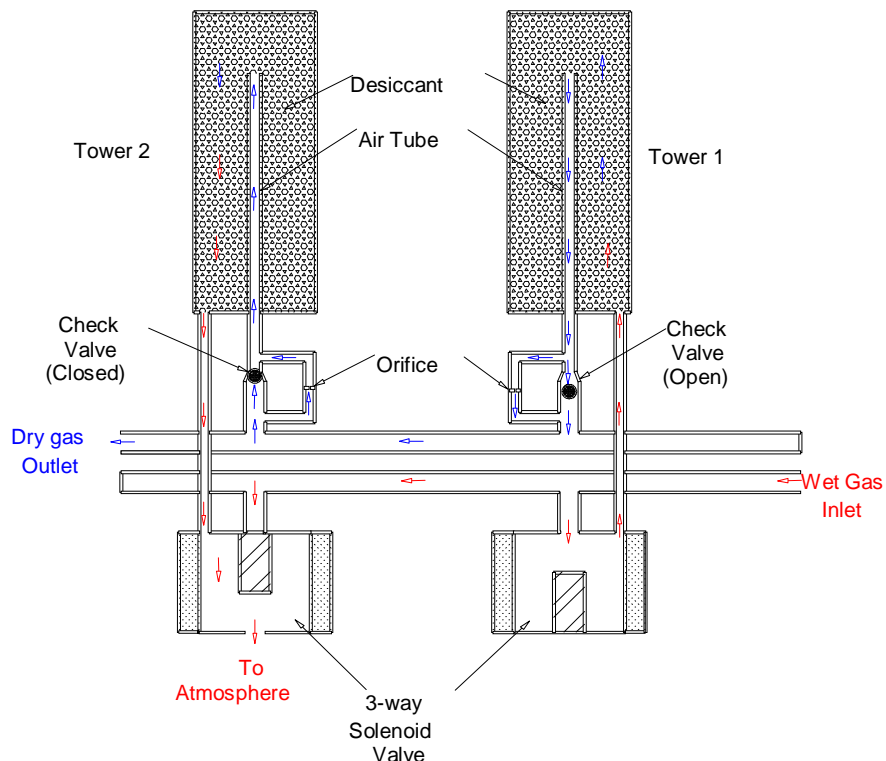


FIGURE 1: OPERATION OF PHF, PCDA, PHCA AND PCME MODELS

Operation of PCR Model

As previously described, the PCR model employs PSA technology to effectively remove moisture (or other unwanted components) from a compressed air stream. It is, however, configured differently than other PUREGAS models based on a common air manifold. Instead of a manifold and 3-way valves to direct the airflow through the unit, the PCR model uses shuttle valves and 2-way solenoid valves.

The inlet (lower) shuttle valve directs the compressed air flow into one of the two desiccant chambers where nearly all of the water vapor is removed. The shuttle valve contains an internal disk, which “shuttles” back and forth in the valve body based on the pressure differential created by the 2-way valves (one of which is open and the other closed).

The ultra-dry air leaving the desiccant chamber passes through the outlet shuttle valve to the application. A precision orifice in the outlet shuttle disk, however, allows a portion of the dry outlet flow to be redirected back through the off-line tower to purge it of the accumulated moisture. The purge stream exits the unit through the open solenoid valve directly below the chamber. The solid state timer controls the process by opening and closing the solenoid valves every 60 seconds, which switches the inlet flow to the regenerated tower.

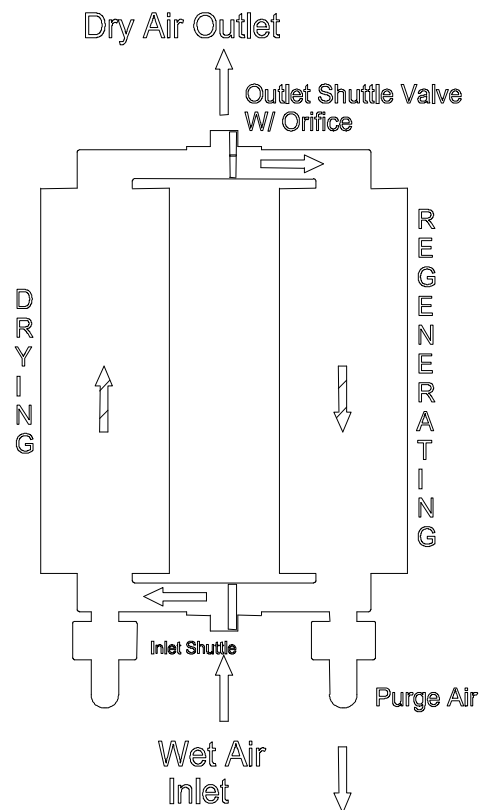


FIGURE 2: OPERATION OF PCR MODEL

Operation of PMD and TOC Models

The PMD and TOC models also employ Pressure Swing Adsorption (PSA) technology to remove water vapor and/or CO₂ from ordinary compressed air. These models are configured differently than the PHF or PCR models, in that they employ a shuttle valve and 4-way valve to direct the airflow through the unit.

The 4-way valve directs the incoming air into one of the two desiccant chambers, where the water vapor and/or CO₂ are removed. Most of the purified air leaving the desiccant chamber passes through the outlet shuttle valve to the application. A precision orifice in the outlet shuttle disk, however, allows a portion of the purified air to be redirected back through the off-line tower, purging it of the accumulated moisture and CO₂. The purge air exits the unit through the 4-way valve and muffler. A solid state timer governs the process by controlling the 4-way valve.

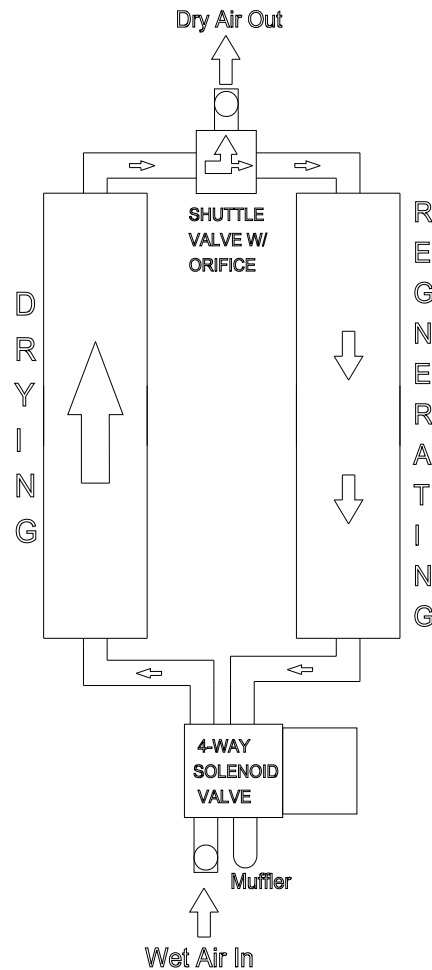


FIGURE 3: OPERATION OF PMD AND TOC MODELS

SECTION 3 – INSTALLATION AND OPERATION

Inspection

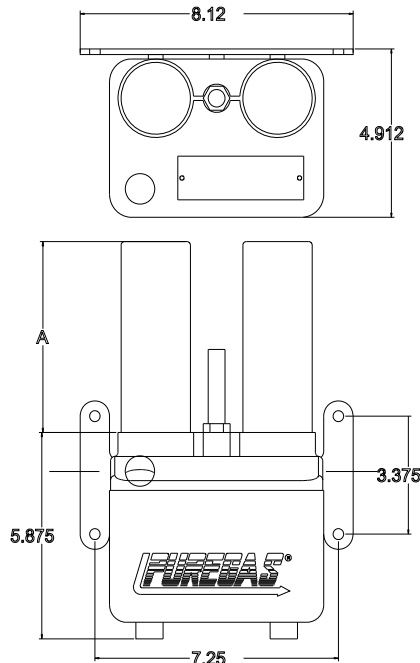
Remove the compressed air dryer or adsorber from the shipping carton. Inspect the unit for any visible shipping damage. If shipping damage is noted, immediately contact the responsible carrier to file a freight claim to be reimbursed for the repair.

Location

Desiccant-type compressed air dryers and adsorbers should be installed in the coolest practical location that is not subject to freezing temperatures. An acceptable temperature range is between 40°F (4°C) and 125°F (52°C). Although the unit will operate at higher temperatures, the operating life of the components will decrease at temperatures much above 85°F (29°C). Bear in mind that abrasive dust and chemicals will also reduce the life of any electromechanical device.

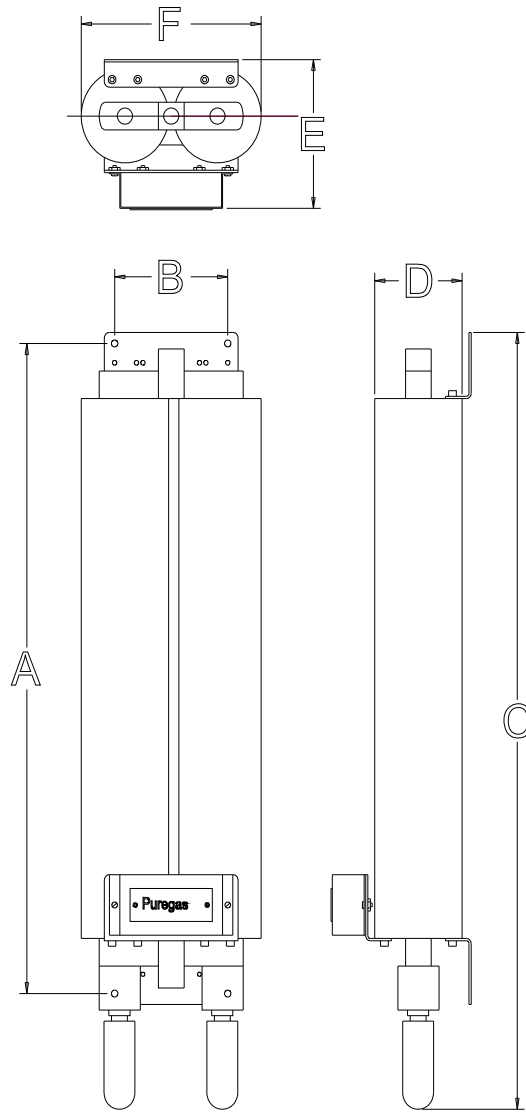
Mounting

All of the models covered by this instruction manual can be wall-mounted using the brackets provided. Products should be mounted with the desiccant towers in a vertical orientation for best results. Be careful to not overtighten purge mufflers.



NOTE: Dimension "A" can be 6, 9, 12, or 20, depending on model. Dimensions in inches.

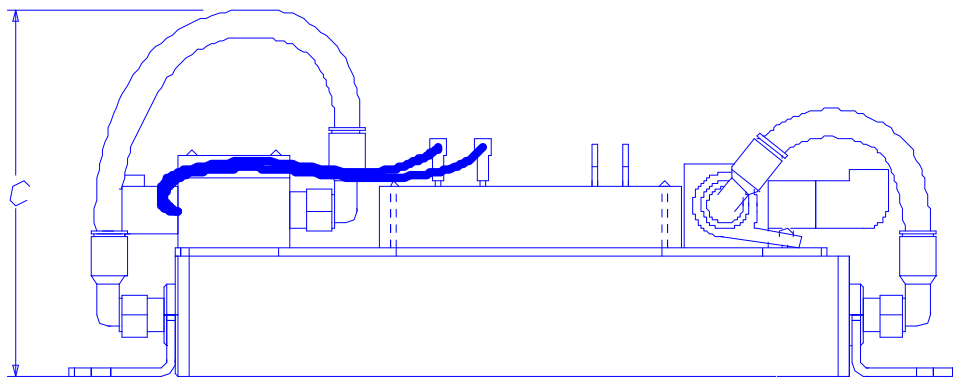
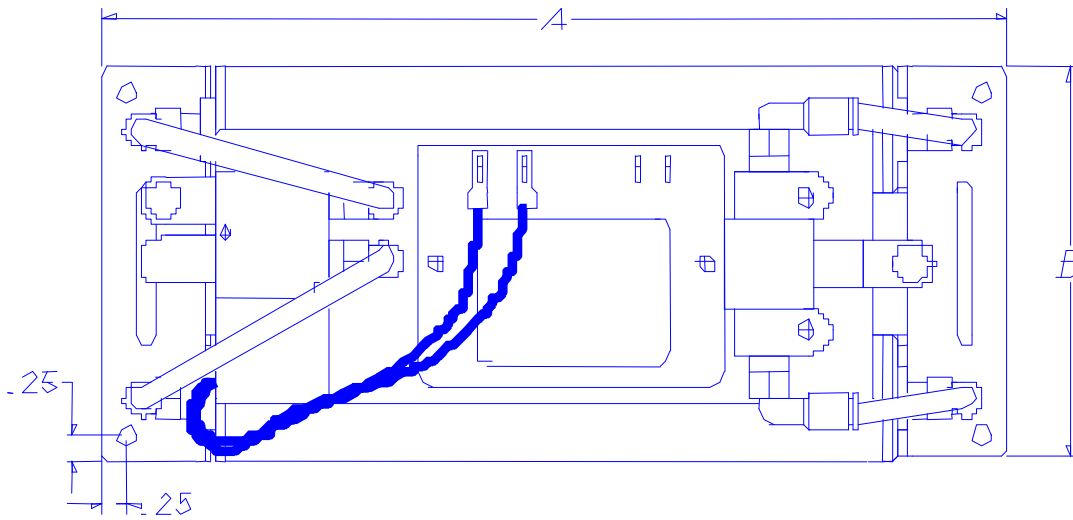
FIGURE 4: DIMENSIONS OF PHF, PCDA, PHCA, AND PCME MODELS



MODEL	A	B	C	D	E	F
PCR 15	18.625	6	25.5	3.25	5.5	8.25
PCR 25	22.935	6	30	4.25	6.4	9.25
PCR 50	28.125	6	35.25	4.25	6.4	9.25

Note: All dimensions are in inches.

FIGURE 5: DIMENSIONS OF PCR MODEL



MODEL	PMD-S	PMD-M	TOC	TOC with cabinet & filters
Height (A)	10	12	10	12
Width (B)	4	5	4	15
Depth (C)	4	5	4	5

Note: All dimensions are in inches

FIGURE 6: DIMENSIONS OF PMD AND TOC MODELS

Recommended Installation Diagram

A diagram of the recommended installation is below. It depicts all of the essential elements of a properly installed compressed air dryer or adsorber, as well as certain options described in the following sections.

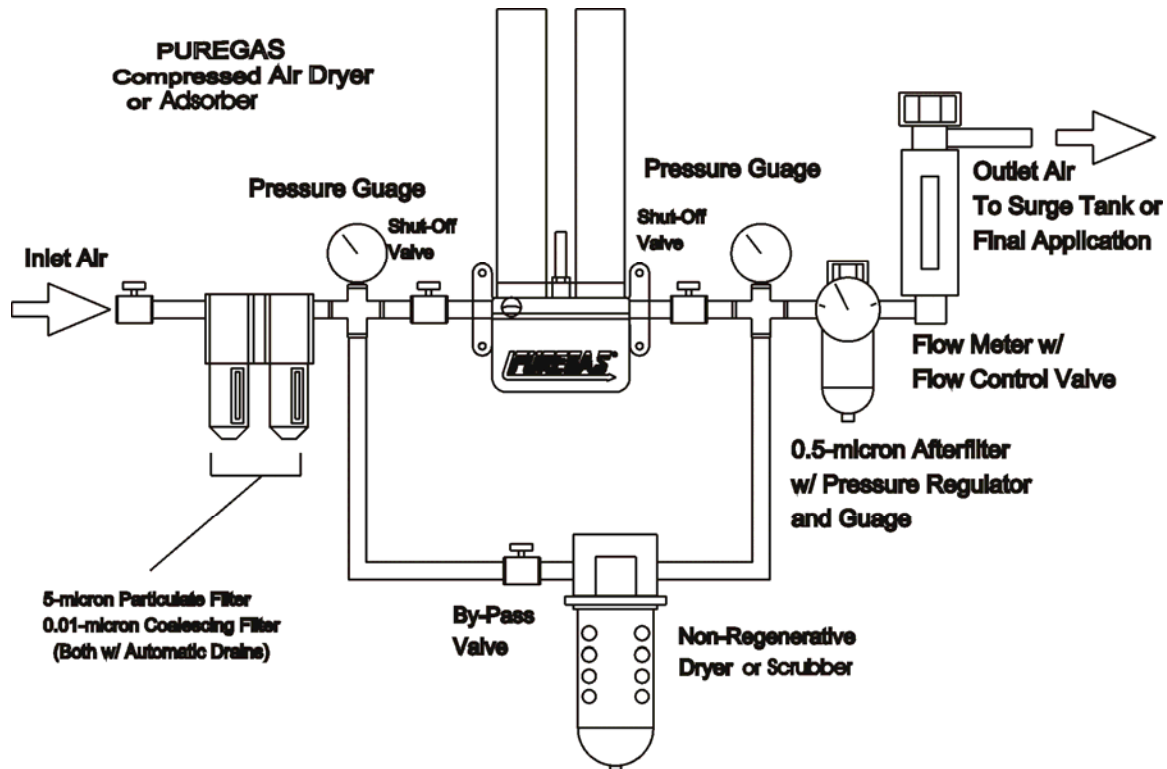


FIGURE 7: RECOMMENDED INSTALLATION DIAGRAM

Piping and Air Connections

IMPORTANT!

Do not apply air pressure to the PCR, PMD, or TOC models unless the unit is also being supplied with electrical power. Without power, the unit will not cycle and the online tower will soon become saturated.

There are four ways of connecting the **PHF, PCDA, PHCA and PCME models**. These models are set-up at the factory such that the airflow through the unit is from left-to-right (as you face the front of the unit). If an alternative arrangement is desired (airflow from right-to-left or in/out on the same side), the port plugs on either side of the unit can be rearranged accordingly. Please note that the arrows on the top surface of the manifold indicate the inlet and outlet ports on both sides.

The inlet for the **PCR model** is in the main body of the lower shuttle valve, while the outlet is in the upper shuttle valve. Please note that the orientation of both the inlet and

outlet can be changed if necessary. This is accomplished by detaching the shuttle valve from the tower and reassembling it with the desired orientation.

The inlet for the **PMD model** (and the TOC model without a cabinet) is the brass fitting fastened to the bottom of the 4-way valve, and the outlet is the brass fitting in shuttle valve at the top of the unit. The word "OUT" is inscribed in the shuttle valve body. The inlet of the standard **TOC model**, is the filter on the left side of the cabinet (as you face the front of the unit). The outlet is on the right side of the filter-regulator body.

All ports on the **PHF, PCDA, PHCA and PCME models** are ¼" female NPT, while the **PCR model** ports are ½" female NPT. The ports on the **PMD and TOC models** are typically 1/8" female NPT, although ¼" NPT is optional with the cabinet. Use Teflon tape or pipe sealant on all threaded connections. Prior to putting the unit into service, it is advisable to check air connections for leakage by applying a diluted soap solution. If tubing is used, be sure it has low moisture permeation and a sufficient pressure rating.

A bypass line is optional. It should be installed, however, if the application requires constant airflow while the dryer or adsorber is being serviced. Moreover, adding an inline scrubber to this bypass line will protect the downstream application while the dryer or adsorber is being serviced. Electrically controlled shut-off valves and check valves should also be employed as needed to prevent air from entering the de-energized unit.

Inlet and Outlet Filtration

Appropriate inlet filtration is mandatory for all models. Particles of dirt, rust or scale, as well as condensed moisture and oil, are readily adsorbed by the desiccant, but cannot be purged during the regeneration cycle. Thus, these solid and liquid contaminants will significantly deteriorate the product's performance and shorten its useful life.

For most compressed air sources, both a 5-micron particulate filter and a 0.01-micron coalescing filter are recommended to optimize performance and extend maintenance intervals. If the compressed air source is of instrument grade quality, the coalescing filter by itself will usually offer sufficient protection. In both cases, the filters should have automatic drains to avoid the frequent maintenance required by manually drained filters.

Outlet filtration is recommended for many applications. A 5-micron filter, installed at the outlet of the dryer or adsorber, will effectively remove any desiccant dust that may migrate from the desiccant chambers over time. PUREGAS offers an outlet filter, with an integrated pressure regulator and gauge, for all models.

Pressure and Flow Control

Some means of regulating pressure and flow is required for nearly every application. This should always be done AFTER the dryer or adsorber. Pressure and flow regulation is especially important for applications near atmospheric pressure. As previously stated, PUREGAS offers an outlet filter-regulator for all models, as well as a flow meter with a built-in flow control valve. For those applications especially sensitive to pressure

or flow variation, PUREGAS manufactures various tanks, which will completely eliminate downstream pressure surges.

IMPORTANT!

For optimum performance, the maximum available operating pressure should be maintained across the unit -- up to 150 psig for most models (the maximum operating pressure for the PMD and TOC models is 125 psig). Any pressure reduction or flow control should be done downstream of the unit.

Instrumentation

The primary purposes of instrumentation in the system are process control and troubleshooting. The instruments shown in the Recommended Installation Diagram are therefore in most cases optional, but their initial cost will be quickly justified through improved process stability and problem analysis.

A simple, inexpensive means of measuring the moisture content of the outlet air stream can be accomplished with a vial of color-changing crystals. PUREGAS offers such an accessory, which can be mounted directly to the dryer or adsorber. The crystals will change from a dark blue (dry) to pink (wet) depending on the moisture content in the air stream.

For sensitive or remote applications, PUREGAS manufactures an electronic humidity alarm, which continuously tracks moisture levels and helps prevent costly repairs caused by moisture damage. It features simultaneous audible and visual alarms, as well as open- and closed-circuit conditions for integration into a control system.

Electrical Connections and Timer

Before wiring, check the product label for electrical characteristics. Although standard electrical characteristics are 115 Volts, 50/60 Hz or 230 Volts, 50/60 Hz, most products are also available in 12 V_{DC} and 24 V_{DC}.

There is no electrical overload protection in the product and it should be wired into a protected circuit. While standard on some units, an 8-foot, 3-wire grounded power cord is available as an optional accessory for all products. The unit can be grounded by attaching a wire to a timer assembly bracket screw. Please see the Wiring Diagrams that follow.

As previously described, the solid state timer controls the switching of the solenoid valves, which in turn direct the air through the unit. All timers are designed with a one-hour memory; if power is interrupted, the dryer will resume operation at the same point in the cycle when the power is restored.

The standard timer for the **PHF and PHCA models** simultaneously switches the solenoid valves every 30 seconds (for a total cycle time of 1 minute). The timer used on the **PHFR, PCDA and PCME models** maintains the same cycle, but allows a re-pressurizing period of 3.75 seconds prior to switching chambers. Re-pressurizing helps

minimize the outlet pressure and flow variation, as well as desiccant shock as the flow switches from one chamber to the other.

The **PCR model** also utilizes a re-pressurizing timer. It maintains a 2-minute cycle, with a 7-second re-pressurizing period prior to switching towers. The **PMD and TOC models** follow a standard 1-minute cycle like the PHF300A model.

The timer wiring diagrams for all models are shown in Figure 8.

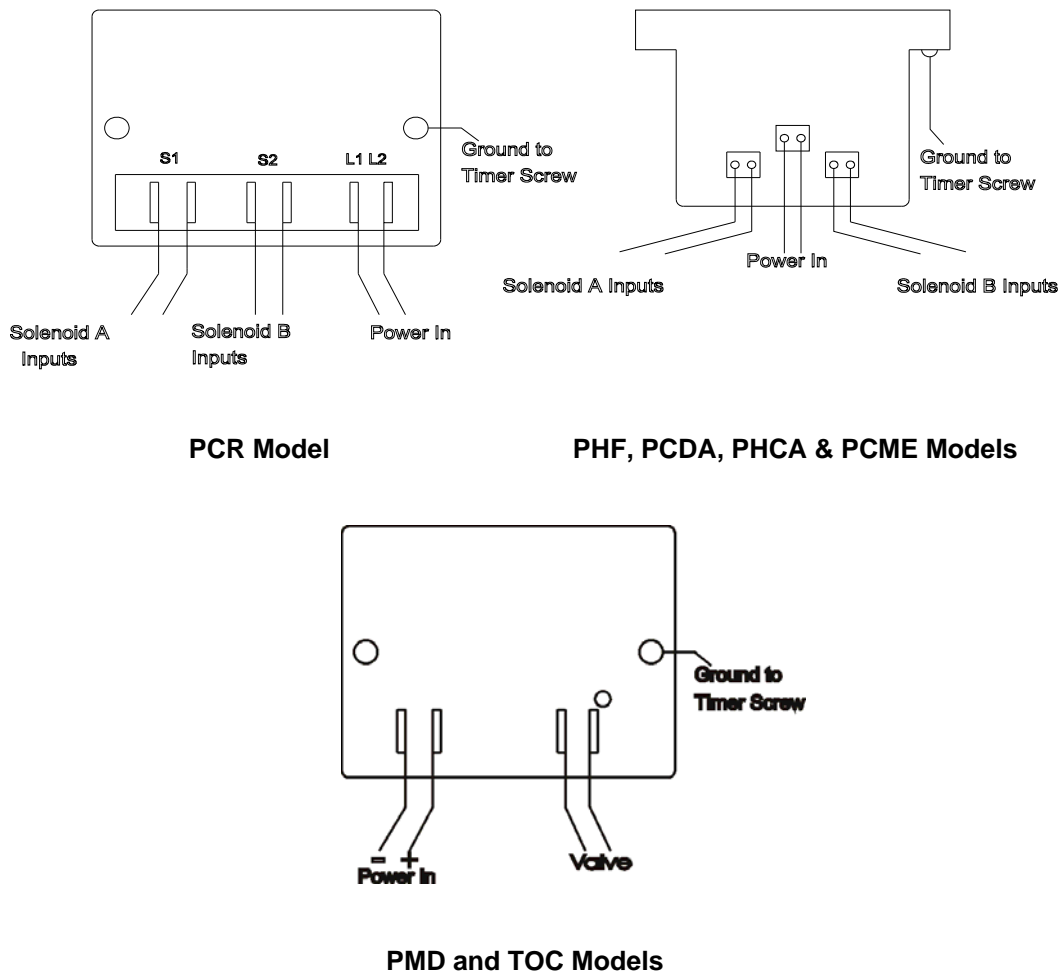


FIGURE 8: WIRING DIAGRAMS

Operating Pressure and Sizing

Most PUREGAS models are designed to operate at pressures up to a maximum of 150 psig. The only exceptions are the PMD and TOC models, which have a maximum operating pressure of 125 psig. It is important to note that all models based on PSA technology will achieve better performance at higher operating pressures. Therefore, any pressure regulation should be done downstream of the dryer or adsorber.

The sizing of the purge orifice is also important to the performance of a PSA system. The orifice must be large enough to admit sufficient air to purge the off-line tower, but not too large to be wasteful of the dry or purified air. Please note that the operating pressure is closely associated with the orifice sizing, since both the orifice aperture dimension and pressure determine the quantity of purge air.

The purge orifice size of a particular unit is indicated by the last 2-3 digits of the model number (found on the product label). The orifice number for the **PHF**, **PCDA**, **PHCA** and **PCME** models is also stamped on the top of the purge orifice itself. For the **PCR**, **PMD**, and **TOC** models, the orifice size is stamped on the outlet shuttle valve body.

The outlet flow should be regulated with a throttle valve and measured with a flow meter to ensure the capacity of the dryer or adsorber is not being exceeded. PUREGAS offers flow meters with built-in flow control valves for this purpose.

IMPORTANT!

Each compressed air dryer and adsorber is sized for specific operating conditions. If additional flow is required or the operating pressure decreases, the output performance will be negatively affected unless the orifice diameter is changed appropriately. Depending on the magnitude of the change, the size of the desiccant chambers may also need to be increased. Please consult the product sizing charts or contact the factory for more information.

Other Operating Issues

At the beginning of each purge cycle, there will be an audible exhaust through the solenoid valve. This sound can be made quieter by the use of purge mufflers (standard on most models) or a sound suppression kit for virtually noiseless operation. Please contact PUREGAS for more information on this option.

The exhaust stream may also be piped to a remote location. If this is done, it is important that the exhaust piping is oversized to prevent back-pressure on the purge stream; restricting the purge flow will prevent full regeneration of the desiccant chamber and lead to reduced performance.

The heat of adsorption and the operation of the solenoid valves will cause the unit to become warm to the touch. This is normal.

To prevent potential electrical shock, the timer cover should not be removed for maintenance until power is disconnected from the unit. Likewise, the unit should be completely depressurized prior to service.

SECTION 4 - MAINTENANCE

General Information

When properly installed and operated, PUREGAS compressed air dryers and adsorbers are designed to deliver years of reliable service without minimal attention. Most recommended maintenance procedures can be easily and quickly performed in the field without the need for specialized tools or skills.

Annual Inspection

Although optional, an annual inspection of the dryer or adsorber is recommended for critical processes to anticipate potential failures. This inspection should include the following checks:

- ❑ **Cycle Timer:** Listen for proper desiccant tower cycling. See the **Electrical Connections and Timer** section of this manual for information on the timing cycle of your model.

IMPORTANT!

Shut-off the air supply and depressurize the system before attempting the following maintenance checks.

- ❑ **Desiccant Towers:** Remove the desiccant towers and visually inspect their inlets for excessive dirt or oil fouling, which would indicate possible contamination of the desiccant chambers. If contaminated, replace the desiccant chambers or return them to PUREGAS (or an authorized distributor) for repacking. Please note that repacking the towers is not available for all products. No attempt should be made to repack the chambers in the field, since improper packing can cause channeling of the air stream and lead to reduced performance.

NOTE!

Removal and inspection of the desiccant chambers should NOT be necessary for at least 3-5 years, if the system includes properly functioning and maintained inlet particulate and coalescing filters with automatic drains.

- ❑ **Solenoid Valves:** For the **PHF, PCDA, PHCA and PCME models** only, inspect the sealing surface on the solenoid valve plunger. This requires unscrewing the solenoid valves from the bottom of the manifold. A deteriorated surface will lead to air leakage and reduced performance. If necessary, replace the plunger and base of the solenoid valve assembly by requesting a solenoid valve kit from PUREGAS (or an authorized distributor).

- **Purge Mufflers:** Remove the mufflers from the solenoid valves and check for excessive pressure drop by blowing through the muffler. The muffler should be replaced if significant back-pressure is sensed.
- **Filtration:** Inlet and outlet filters must be kept clean for efficient filtering. A visible coating of dirt on the element's surface or an excessive pressure drop (greater than 5-6 psig), indicate that replacement is needed. See the **Replacement Parts** section in this manual for information on replacement elements for all current filters. For older filters, please see the *Product Support* section of the PUREGAS website (www.puregas.com) for more information.

Maintenance Schedule

The following preventive maintenance schedule is recommended to ensure the optimum performance of the unit and to prevent the inconvenience of a sudden, unexpected failure. Please reference the exploded view drawings in the **Replacement Parts** section to identify specific part numbers for your model.

- **Replace Filter Elements:** Replace the inlet and outlet filter elements every 6-12 months depending on the quality of the compressed air source. PUREGAS stocks replacement elements for all of the filters offered with its products.
- **Solenoid Valves on PHF, PCDA, PHCA and PCME Models:** Replace the plunger and base of the solenoid valves every two (2) years. PUREGAS offers a Solenoid Repair Kit (P200498S) for this procedure. Two (2) kits are required for each dryer or adsorber being serviced.
- **Replace or Repack Desiccant Towers:** Replace or repack the desiccant towers every five (5) years. Please see the following exploded view drawings to determine the tower part number required. Please note that the repack option is only available for the **PHF, PCDA, PHCA** and **PCME** models. Replacement towers are available for all other models.
- **Check Valve and O-rings on PHF, PCDA, PHCA and PCME Models:** Replace the check ball, check spring, and o-rings for **PHF, PCDA, PHCA** and **PCME** models every 6 years. PUREGAS offers a Maintenance Kit (P200499S) for this procedure. One (1) kit is required per dryer or adsorber. This kit contains two Solenoid Repair Kits, two check balls, two check springs, and an assortment of o-rings.

SECTION 5 – REPLACEMENT PARTS

General Information

The following exploded view drawings and tables show the available replacement parts, accessories, and repair kits for all of the compressed air dryers and adsorbers covered by this instruction manual. Please note that parts for non-current models are not listed, but may be available.

Simply identify the required parts for your model from the exploded view drawings and contact PUREGAS (or an authorized distributor) to order. PUREGAS Parts can be contacted toll-free at 800-521-5351 or via email at parts@puregas.com.

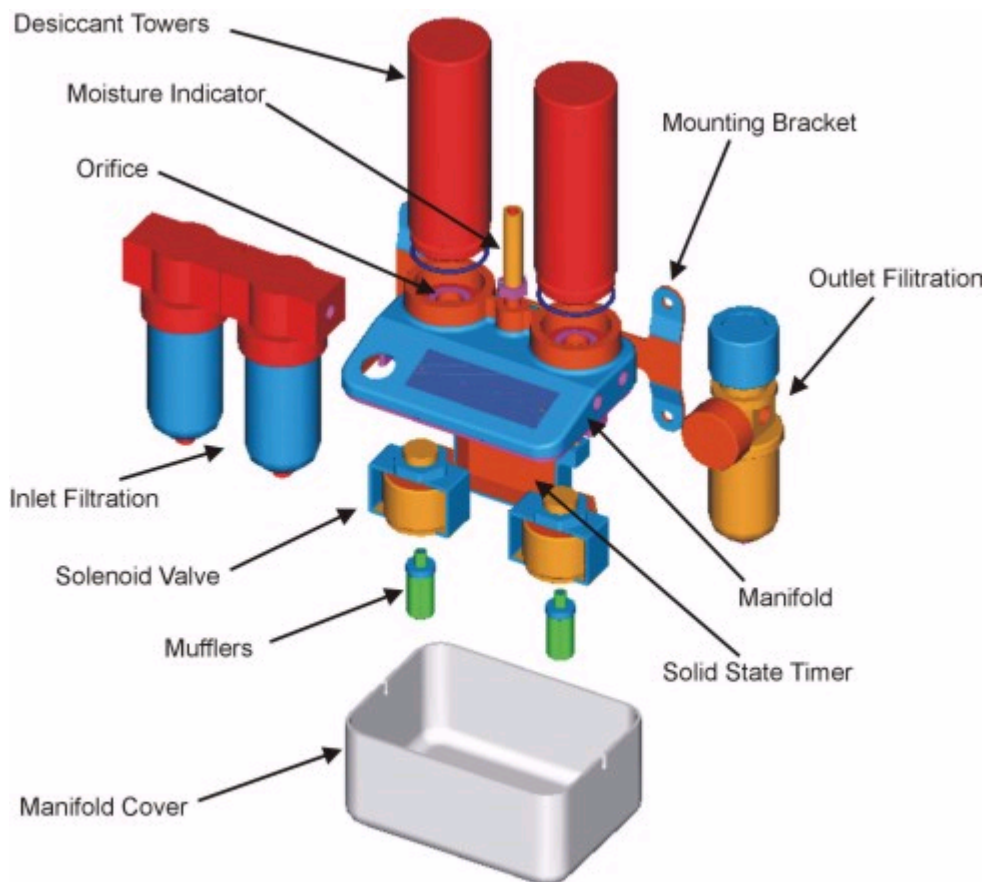


FIGURE 9: EXPLODED VIEW OF PHF, PCDA, PHCA AND PCME MODELS

REPLACEMENT PARTS	MODEL	SIZE	PART NUMBER
Desiccant Tower	PHF	6", Black	P200403-6
	PHF	6", White	P07323-G27
	PHF	9", Black	P200403-9
	PHF	9", White	P07323-G28
	PHF	12", Black	P200403-12
	PHF	12", White	P07323-G29
	PHF	20", Black	P200403-20
	PHF	20", White	P07323-G30
	PCDA	12", Black	P07323-G21
	PCDA	12", White	P07323-G46
	PCDA	20", Black	P07323-G22
	PCDA	20", White	P07323-G47
	PHCA	12", Black	P07323-G9
	PHCA	20", Black	P07323-G12
	PCME	12", Black	P07323-G8
	PCME	20", Black	P07323-G23
Solid State Timer	PHF & PHCA	110 VAC	P010530-F1
	PHF & PHCA	220 VAC	P010530-F2
	PHFR, PCDA & PCME	110 VAC	P010980F1
	PHFR, PCDA & PCME	220 VAC	P010980F2
Solenoid Valve	All models	110 VAC	P400589-DC1
	All models	220 VAC	P400589-DC2
Solenoid Repair Kit	All models	n/a	P200498S
Dryer Maintenance Kit	All models	n/a	P200499S
Purge Orifice	All models	Specify ##	P200404-##
Mounting Bracket	All models	n/a	P010437
Manifold Cover	All models	n/a	P3005052
Manifold	All models	n/a	P300495P
ACCESSORIES FOR PHF, PCDA, PHCA, and PCME MODELS			
Inlet 5-micron Particulate Filter	1/4" NPT	5-micron	P010553
	<i>Replacement Element for P010553</i>		P010554
Inlet Carbon Filter	1/4" NPT	Carbon	P010976F2
	<i>Replacement Element for P010976F2</i>		P010657
Inlet 0.01-micron Coalescing Filter	1/4" NPT	0.01-micron	P010555
	<i>Replacement Element for P010555</i>		P010556
Outlet 5-micron Filter-Regulator	1/4" NPT	5-micron	P010685
	<i>Replacement Element for P010685</i>		P010621
Purge Muffler		1/4" NPT	P400399
Moisture Indicator		n/a	P200405
Flow meter with Throttle Control Valve	0.5 - 5 scfm	P011047F11	P08353
	1 - 10 scfm	P011047F12	P08286
Surge Tank, 6.5-liter		6" diameter x 14" length	P07994
Sound Suppression Kit			P08084

FIGURE 10: REPLACEMENT PARTS FOR PHF, PCDA, PHCA AND PCME MODELS

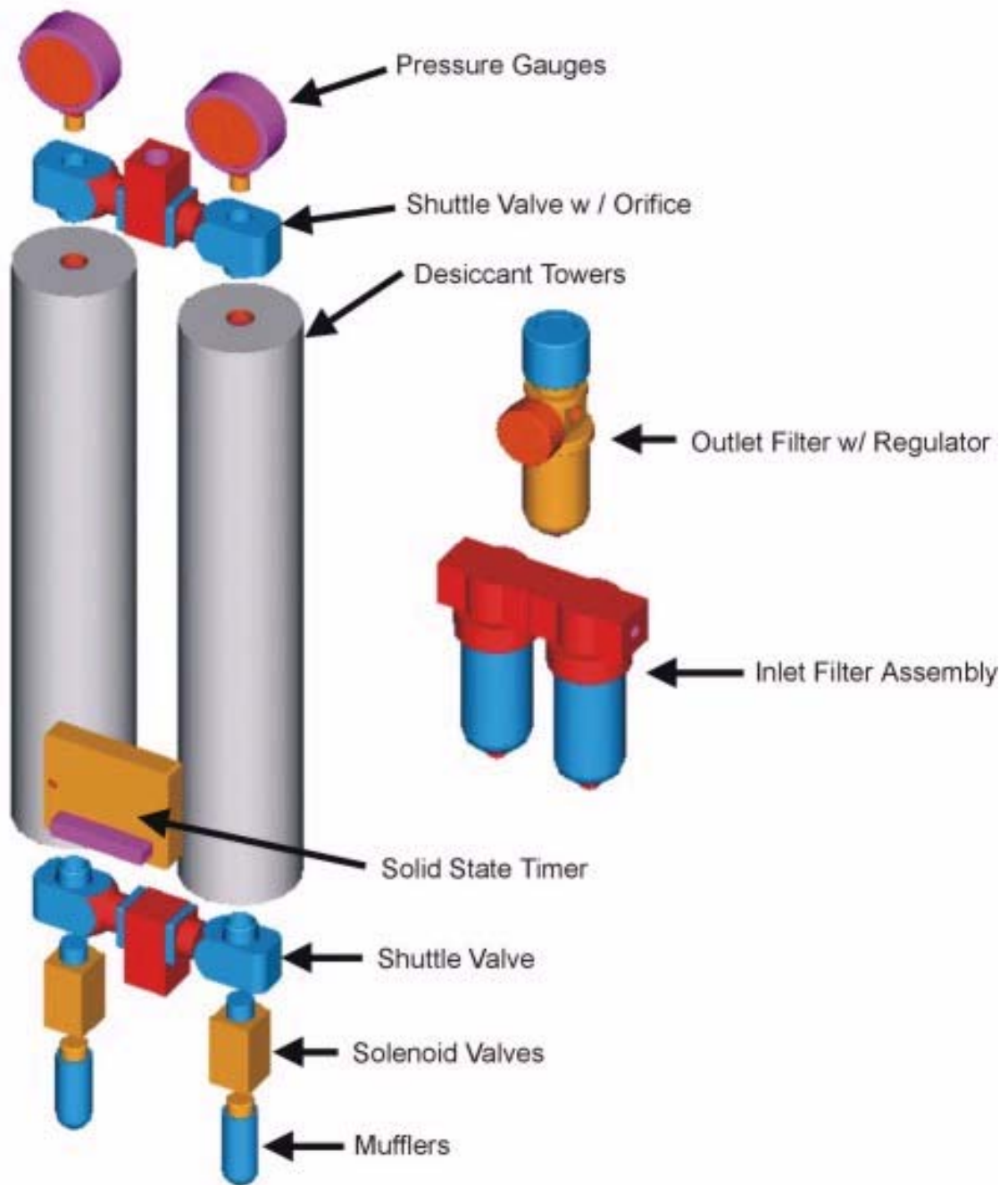


FIGURE 11: EXPLODED VIEW OF PCR MODEL

REPLACEMENT PARTS	MODEL	SIZE	PART NUMBER
Desiccant Tower	PCR-15B	15", Black	P010764-F1B
	PCR-15W	15", White	P010764-F1W
	PCR-SBX	15", Black, CO2	P010764-F2B
	PCR-SWX	15", White, CO2	P010764-F2W
	PCR-25B	19", Black	P010764-F3B
	PCR-25W	19", White	P010764-F3W
	PCR-MBX	19", Black, CO2	P010764-F4B
	PCR-MWX	19", White, CO2	P010764-F4W
	PCR-50B	25", Black	P010764-F5B
PCR-50W	25", White	P010764-F5W	
Solid State Timer	PCR-xxx-xA	110 VAC	P09740
	PCR-xxx-xB	220 VAC	P09783
	PCR-xxx-xC	24 VAC	P010762
	PCR-xxx-xD	12-24 VDC	P010670
Solenoid Valve	PCR-xxx-1A	110 VAC	P010679F1
	PCR-xxx-2B	220 VAC	P010679F2
	PCR-xxx-3D	12 VDC	P010679F3
	PCR-xxx-4D	24 VDC	P010679F4
	PCR-xxx-5C	24 VAC	P010679F5
Shuttle Valve	Inlet (all models)	n/a	P010652
	Outlet with gauge option	Specify Orifice ###	P010652, ###
	Outlet without gauge option	Specify Orifice ###	P010509, ###
	Outlet shuttle disk	Specify Orifice ###	P09881F###
	Inlet shuttle disk	n/a	P09881F000
Purge Muffler	All models	n/a	P010734F2
Tower Pressure Gauge	PCRG	n/a	P010733
ACCESSORIES FOR PCR MODELS			
Inlet 5-micron Particulate Filter	1/2" NPT	5-micron	P010547
		<i>Replacement Element for P010547</i>	P010554
Inlet Carbon Filter	1/2" NPT	Carbon	P010976F3
		<i>Replacement Element for P010976F3</i>	P010657
Inlet 0.01-micron Coalescing Filter	1/2" NPT	0.01-micron	P010549
		<i>Replacement Element for P010549</i>	P010556
Outlet 5-micron Particulate Filter	1/2" NPT	5-micron	P010683
		<i>Replacement Element for P010683</i>	P010554
Moisture Indicator Kit		1/2" NPT	P010103
Flow meter with Throttle Control Valve	2 - 20 cfm	1/2" NPT	P011047F14
	3 - 30 cfm	1/2" NPT	P011047F15
	4 - 50 cfm	1/2" or 1" NPT	P011047F16
Electronic Humidity Alarm	110 VAC	5-15% Humidity	P010124-G1
	220 VAC	5-15% Humidity	P010124-G2
	110 VAC	1.6-6% Humidity	P010124-G3
	220 VAC	1.6-6% Humidity	P010124-G4

FIGURE 12: REPLACEMENT PARTS FOR PCR MODEL

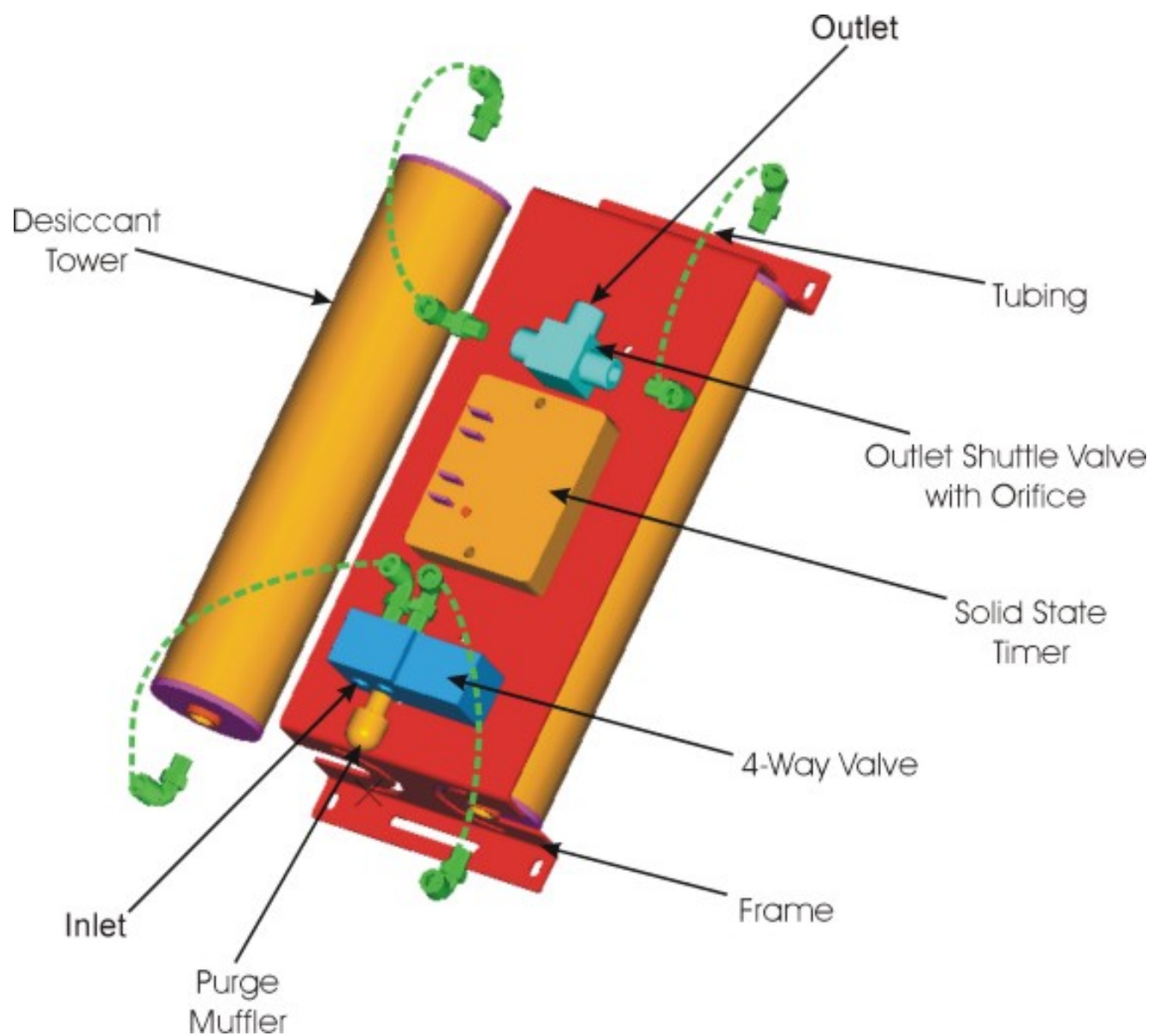


FIGURE 13: EXPLODED VIEW OF PMD AND TOC MODELS

REPLACEMENT PARTS	MODEL	SIZE	PART NUMBER
Dryer Maintenance Kit** <i>**Includes desiccant chambers (2), tubing & fittings.</i>	PMD-S	n/a	P010845F1
	PMD-SX (TOC)	n/a	P010845F2
	PMD-M	n/a	P010845F3
	PMD-MX	n/a	P010845F4
	PMD-L	n/a	P010845F5
	PMD-LX	n/a	P010845F6
Solid State Timer	PMD-xx-1A	110 VAC	P010601F1
	PMD-xx-2B	220 VAC	P010601F2
	PMD-xx-3C/D	12-24 VDC	P010567
4-Way Valve	PMD-xx-1A	110 VAC	P010605
	PMD-xx-2B	220 VAC	P010606
	PMD-xx-3C	12 VDC	P010609
	PMD-xx-3D	24 VDC	P010604
Shuttle Valve	All models	Specify Orifice ##	P010577, ##
ACCESSORIES FOR PMD and TOC MODELS			
Inlet 5-micron Particulate Filter	1/8" NPT	5-micron	P010614
	<i>Replacement Element for P010614</i>		P010615
Inlet Carbon Filter	1/8" NPT	Carbon	P010976F1
	<i>Replacement Element for P010976F1</i>		P010668
Inlet 0.01-micron Coalescing Filter	1/8" NPT	0.01-micron	P010616
	<i>Replacement Element for P010616</i>		P010617
Outlet 5-micron Filter-Regulator	1/8" NPT	5-micron	P010684
	<i>Replacement Element for P010684</i>		P010615
Flowmeter with Throttle Control Valve	2 - 25 lpm	1/8" NPT	P011047F6
	10 - 100 lpm	1/8" NPT	P011047F8
	0.3 - 3 scfm	1/8" NPT	P011047F10
Surge Tank, 6.5 liter	6" diameter x 14" length		P07994

FIGURE 14: REPLACEMENT PARTS FOR PMD AND TOC MODELS

SECTION 6 – TROUBLESHOOTING INFORMATION

General Information

The following troubleshooting guide is intended to assist in the analysis of problems related to PUREGAS compressed air dryers and adsorbers. Based on a given symptom, the troubleshooting guide suggests possible causes, items to check, and corrective actions. Please note that the most likely potential causes are listed first. Thus, each potential cause should be checked in the sequence given. It is further suggested that once the problem has been isolated, that the corresponding text in the Maintenance Section should be reviewed for further information.

Troubleshooting Matrix

The following pages provide problem-solving assistance for the most common customer concerns. If you are unable to resolve your problem after consulting this material, please contact PUREGAS for further assistance at 800-521-5351 or via email at info@puregas.com.

Problem A: Expected outlet dewpoint or purity is not met.

Model	Potential Cause	Verification	Corrective Action
A1	All Current operating conditions do not match the unit's specifications.	Verify that the actual operating pressure and inlet/outlet flow rates match the specified performance of the unit. Contact the factory if you require sizing data for your model.	Reduce the outlet flow requirements, increase the operating pressure, or resize the dryer by increasing the orifice size and/or the size of the desiccant towers.
A2	PHF PCDA PCME PHCA Sealing surface of solenoid valve core deteriorated, resulting in air leakage.	Remove and inspect solenoid valve core by unscrewing valve assembly from bottom of manifold.	Purchase solenoid repair kit from PUREGAS and replace solenoid core and base.
A3	All Desiccant tower contamination.	Check inlet filtration for proper operation and inspect outlet air line for evidence of oil.	Replace or repack desiccant towers. Replace or install proper inlet filtration. See <i>Maintenance Section</i> for details.
A4	PHF PCDA PCME PHCA Desiccant tower attrition.	Remove chamber and depress perforated disc at open end of tower.	If perforated disc can be depressed more than 1/4" from the retaining ring, replace or repack desiccant towers.
A5	All Solenoid coil burned out.	Listen for a distinctive "click" when the solenoid is energized.	Contact PUREGAS for a replacement solenoid valve assembly.
A6	All Inlet air temperature exceeds specified maximum.	Inlet air temperature should not exceed maximum for operating conditions (usually 70°F or 100°F).	Reduce inlet air temperature or resize dryer.
A6	All Dirty or obstructed inlet air filter element.	Check service life indicator on top of filter (if equipped) or inspect filter element surface for coating of dirt or condensate.	Replace filter element.
A7	All Purge orifice plugged.	Remove and inspect purge orifice.	Clean hole of debris using an air gun. Do not force a wire through the critically drilled orifice.
A8	All Timer defective.	Measure the output voltage from the timer, as per the cycle and voltage of your model. See <i>Maintenance Section</i> for more information.	Replace timer if defective.
A9	All Purge flow restricted.	Check mufflers or purge piping for excessive back-pressure.	Replace mufflers or oversize piping for purge (if so equipped).

Problem B: Excessive purge flow or blowdown.

Model	Potential Cause	Verification	Corrective Action	
B1	All	The purge orifice size is larger than what is required for the current operating conditions.	Verify that the orifice size corresponds to the actual operating pressure and flow rate. Contact the factory if you require sizing data for your model.	Resize the dryer by replacing the orifice(s) with a smaller size.
B2	PCR PMD TOC	Inlet or outlet shuttle disc not shifting.	Verify that the actual operating pressure and inlet/outlet flow rates match the specified performance of the unit. Contact the factory if you require sizing data for your model.	Line pressure too low at inlet: Increase the operating pressure or resize the purge orifice for the new conditions.
B3	PCR PMD TOC	Inlet or outlet shuttle disc not shifting.	Depressurize the system, remove shuttle valve assembly, and check for damage or contamination of inside the valve body.	Replace or clean valve body and disc. Check condition of inlet filtration (A6) and desiccant (A3).
B4	All	Timer not operating properly.	Check for incoming voltage fluctuations caused by inductive devices (eg. electric motors) on the same circuit.	Supply line voltage from another source.
B5	All	Timer defective.	Measure the output voltage from the timer, as per the cycle and voltage of your model. See <i>Maintenance Section</i> for more information.	Replace timer.
B6	All	Air leaks.	Remove electrical power from unit while it is pressurized. Check purge ports and joints for significant leaks using soapy water.	Repair as necessary using Teflon tape or thread sealer.
B7	PHF PCDA PCME PHCA	Check valve ball not seated properly.	Remove desiccant towers, orifice plugs, and inspect condition of check ball and spring for excessive wear or damage.	Replace check ball and spring.

Problem C: Excessive pressure drop across unit.

Model	Potential Cause	Verification	Corrective Action	
C1	All	Current operating conditions do not match the unit's specifications.	Verify that the maximum flow rate for the unit is not being exceeded. Contact the factory if you require sizing data for your model.	Reduce the outlet flow rate.
C2	All	Dirty or obstructed filter element.	Check service life indicator on top of filter (if equipped) or inspect filter element surface for coating of dirt or condensate.	Replace filter element.
C3	All	Desiccant tower contamination.	Check inlet filtration for proper operation and inspect outlet air line for evidence of oil.	Replace or repack desiccant towers. Replace or install proper inlet filtration.
C4	All	Plugged air passages.	Check inlet and outlet air passages and piping for blockages.	Clear restrictions.
C5	All	Solenoid coil burned out.	Listen for proper purge cycle. Once removed from the unit, the magnetic field from coil can also be checked with a screw driver or nail.	Contact PUREGAS for a replacement solenoid valve assembly.
C6	PHF PCDA PCME PHCA	Check valve ball not seated properly.	Remove desiccant towers, orifice plugs, and inspect condition of check ball and spring for excessive wear or damage.	Replace check ball and spring.
C7	All	Timer defective.	Measure the output voltage from the timer, as per the cycle and voltage of your model. <i>See Maintenance Section</i> for more information.	Replace timer.