

OWNER'S MANUAL

Refrigerated Air Dryer

R and ADR Series

Pioneer Air Systems Inc.

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| Maximum Working Pressure | Dryer Size |
|--------------------------|------------------------------------|
| 170 PSIG/11.7 BarG | R3000 and up ADR1500 and up |
| 200 PSIG/13.8 BarG | R235 to R2500 ADR250 to ADR1250 |
| 250 PSIG/17.2 BarG | R10 to R200 ADR15 to ADR100 |

CAUTION

The company does not test its products for breathing air or applications requiring FDA approval.
The user is advised to do its own testing.

This manual contains information and recommendations for installing, operating, and servicing the **Pioneer R and ADR Series Dryers**, as well as **Mr. Goodaire and Mr. Goodaire Plus Series**. Pioneer systems are designed and manufactured to the highest standards of quality. The self-contained units have been tested and inspected before shipment from the factory. Information in this manual is in accord with the data applicable to standard equipment at the time of printing (non-standard changes may not be included). The manufacturer reserves the right to make changes without notice and without incurring obligation. The customer should read this manual carefully before locating and installing the equipment.

Receiving and Inspection

After removing all packaging, examine the dryer for any external and internal damage. It is the customer's responsibility to notify the transportation agency of any damages immediately. Check the nameplate to ensure proper power supply. Inspect all pipe and tubing. Vibration during shipping may loosen connections. Standard refrigerated dryers are charged with refrigerant, operated, and tested before leaving the factory. Units are ready to run after proper servicing.

Location Recommendations

Pioneer R and ADR Series Dryers are designed for installation in a protected area that is clean, dry, and has an ambient temperature range of 50 to 100°F (10 to 37°C). For installation in other temperatures consult factory. Consider heat rejection when locating the unit. Position the unit to permit free circulation of cooling air for the condenser. See Table 1 for safe distance placement.

Table 1. Recommended Safe Distance from Wall

| Model | Intake | Discharge |
|--|--------|-----------|
| thru R60A (ADR30A) | 12" | 18" |
| R75A to R200A (ADR40A to ADR100A) | 12" | 28" |
| R235A to R600A (ADR120A to ADR300A) | 18" | 30" |
| R800A to R2250A (ADR400A to ADR1125A) | 24" | 48" |
| R2500A and up (ADR1250A and up) | 30" | 72" |

Vertical discharge standard in sizes over R5000A (ADR2500A).

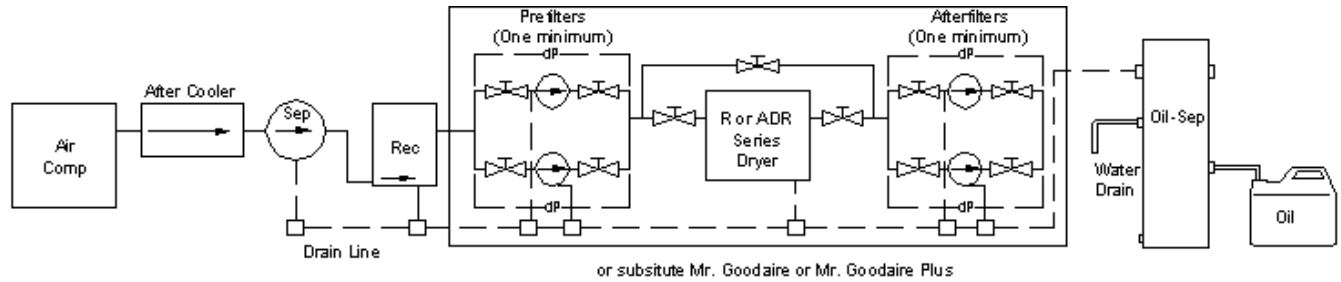
Installation Recommendations

A refrigerated compressed air dryer is normally installed downstream of the receiver tank. A compressed air line should be connected from the receiver tank outlet to the air dryer inlet. The outlet of the dryer is then piped into the pneumatic distribution system. A bypass should always be installed to permit operation of the compressed air system during dryer maintenance and servicing. See installation schematic in Figure 1. Air in/out and bypassing piping should be equal or larger than the in/out sizes provided on the dryer.

In the case of water cooled systems, make water connections to the dryer. Make sure water piping is large enough to handle the flow requirements. The factory recommends making the pipe size equal to or larger than the water connections on the dryer.

Make drain connection of equal to or larger size than the drain size on the dryer to the **Pioneer Oil-Sep Coalescer Plus** (optional). The oil-water drain should be connected to an appropriate drainage.

Figure 1: Recommended Installation



Heat Rejection

Air cooled units:

Approximately 100 BTU/min (25.2 Kcal/min) per 100 SCFM (170 NM³/HR) to ambient.

Water cooled units:

Approximately 92 BTU/min (23.2 Kcal/min) per 100 SCFM (170 NM³/HR) to water.

Approximately 8 BTU/min (2.02 Kcal/min) per 100 SCFM (170 NM³/HR) to ambient.

Minimum water pressure 20 PSIG/1.38 BarG

| Temperature °F/°C | R Series Water flow per 100 SCFM (170 NM ³ /HR) |
|----------------------|--|
| 50/10.0 | 0.40 GPM (1.5 L/M) |
| 60/15.6 | 0.50 GPM (1.9 L/M) |
| 70/21.1 | 0.65 GPM (2.5 L/M) |
| 80/26.7 | 1.00 GPM (3.8 L/M) |
| 90/32.2 | 1.50 GPM (5.7 L/M) |

For ADR series, heat rejection and water requirements are twice that of R series of the same capacity.

Start Up

Purge clean all compressed air piping prior to installation and start up of the unit, to remove all pipe scale, weld sludge, rust, and free moisture. In a newly installed piping system, the prefilter element may need to be changed within a few days of installation to remove weld sludge, rust, and etc.

After all power and connections have been made, the unit is ready for operation. Generally, dryers are shipped with a charge of refrigerant, with all refrigeration service ports closed. Switch the main disconnect on, allowing the compressor crankcase heater (standard in three phase units) to warm up the compressor lubricating oil and evaporate liquid refrigerant in the compressor. **Leave crankcase heater on for a minimum of eight (8) hours before switching the dryer on.**

Units equipped with semi-hermetic compressors are shipped with vibration blocks. These must be removed prior to start up.

Start the dryer and observe the suction gauge pressure. Normal operating range is 55-67 PSIG (3.8–4.6 BarG) for R-22 units, and 31-37 PSIG (2.1-2.5 BarG) for R-134a units. On units equipped with Micro-Monitors, the normal suction temperature range is 35 to 45°F (2 to 9°C). The data label indicates the type of refrigerant in the unit. After the dryer has run for about ten minutes, open the compressed air

inlet and outlet valves, and close the bypass line valve. Allow the unit to run for one hour with airflow. Adjustment to the hot gas bypass valve or expansion valve may be necessary at this time to obtain the desired refrigeration suction temperature (this is not under warranty). See Figure 2.

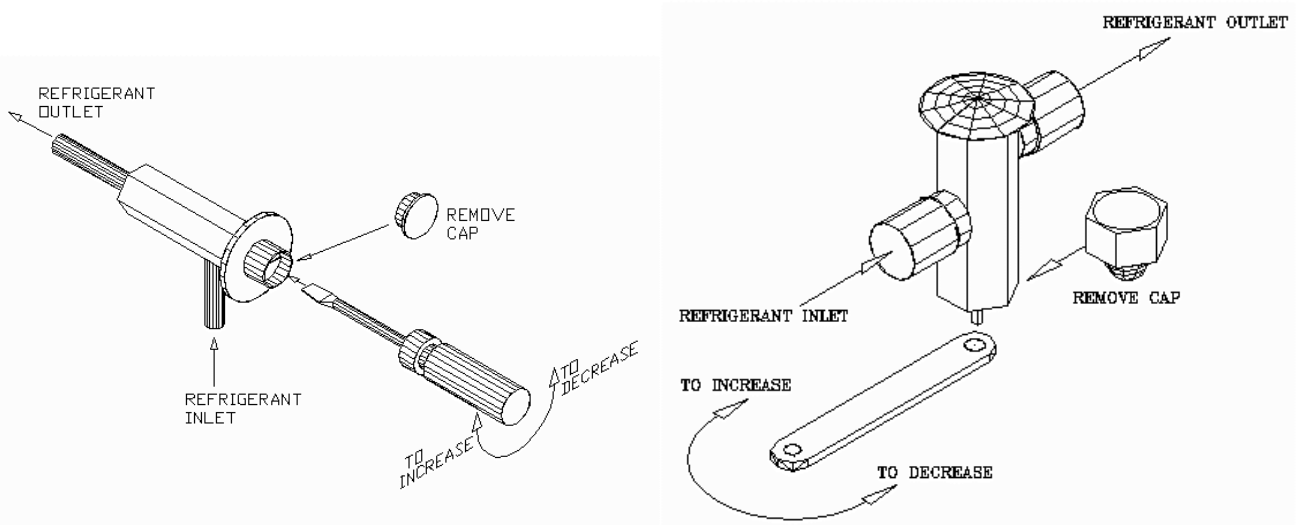


Figure 2: Adjustment of Hot Gas Bypass and Expansion Valve.

Models R20 and larger are equipped with a timer operated drain to remove water from the moisture separator. The drain open time is adjustable in seconds. The close time is adjustable in minutes. The open time should be adjusted to exhaust water for approximately 80% of the open time and air for the remainder of the time. The closed time shall be adjusted to prevent condensate carry-over or over accumulation of condensate.

Caution: Starting unit immediately without following the above instructions may cause damage.

How a Typical Refrigerant Dryer Works

Air Circuit: The warm moist air enters the air-air heat exchanger, where it is pre-cooled with outgoing cool air (R30A/W & larger). Pre-cooling allows use of a smaller refrigeration unit and lowers the cost of drying. The air is further cooled to the 35°F/2°C range in the air-refrigerant heat exchanger. Cooling the compressed air causes condensation of moisture which is separated by a highly efficient moisture separator. An automatic drain periodically drains the condensate. Cold dry air from the separator flows through the air-air heat exchanger where it is reheated by the incoming warm air. Reheating increases the volume of air, pre-vents moisture condensation on the air lines, and lowers the relative air humidity. The clean dry air is then available for use.

Refrigerant Circuit: The refrigerant compressor compresses cold refrigerant vapor into warm or hot high-pressure gaseous refrigerant. Because of compression, the refrigerant temperature is high enough to transfer heat to the atmosphere (air-cooled units) or water (water-cooled units). Hot or warm refrigerant flows into the condenser where it is cooled and condensed into liquid. Liquid refrigerant flows to the receiver (R75 or ADR40 and larger). From the receiver, the liquid refrigerant flows through a filter dryer to an expansion valve. The function of the receiver is to assure availability of liquid refrigerant for expansion. The expansion valve lowers the refrigerant pressure and temperature. In a typical air dryer system of 35°F/2°C PDP, the refrigerant temperature is lowered to the 30 to 34°F (-1 to

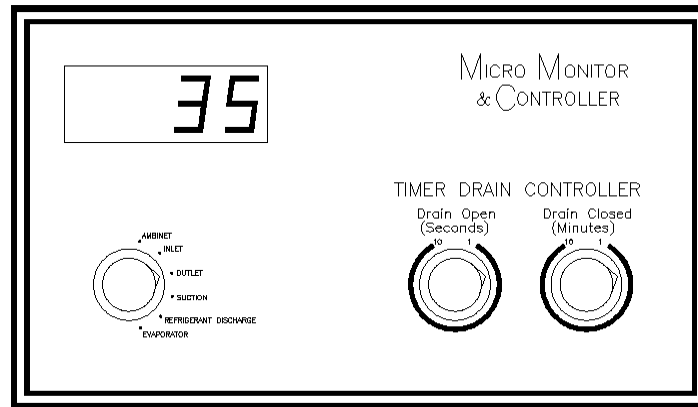
1°C) range. In a 50°F/5°C PDP, the refrigerant temperature is lowered to the 40°F/5°C range. This cold liquid refrigerant flows into the air-refrigerant heat exchanger where it cools the compressed air, and evaporates into a cold vapor. Vaporized refrigerant flows to the accumulator (R235 or ADR120 and larger). The gaseous refrigerant then flows to the compressor suction via the suction line filter (R800 or ADR400 and larger). The function of the accumulator is to hold liquid refrigerant and pass on the gaseous refrigerant. The liquid and suction line filters functions are to protect the refrigerant system from foreign particles.

To provide relatively constant temperature in the air-refrigerant heat exchanger (R75 or ADR40 and larger), the refrigeration system is also equipped with a hot gas bypass valve. These mix hot and cold refrigerant to give a stable suction pressure and temperature. Thus, near constant dew point is maintained at fluctuating load conditions.

Mr. Goodaire and Mr. Goodaire Plus Systems: The coalescer is installed after the moisture separator and before the air-air heat exchanger. The use of a coalescer at the coldest point helps it remove significantly more aerosols and condensed vapors because the cooling process condenses vapors into aerosols and liquids. It also coalesces smaller aerosols, which are then removed by the coalescer.

INSERT FLOW DIAGRAM

Micro-Monitor: The Pioneer Micro-Monitor is standard in models R75/ADR40 and larger (optional in smaller sizes). The dryer operation and performance are shown at a glance by selecting the desired reading.



Maintenance

To maximize system performance and reliability, the following maintenance procedure is required: **Air and water cooled condensers must be inspected and cleaned periodically. Inspect and replace prefilter and after-filter elements periodically (recommended monthly).** To avoid downtime, always keep spare elements in stock.

Automatic Drain Maintenance: The float type automatic drain is standard in models R10 and R15. Clean drain periodically to ensure proper functioning. Remove air pressure before loosening the separator bowl. In models R20 and larger, the three step automatic drain is standard. It includes an isolation valve, a cleanable strainer, and a timer operated solenoid valve. Close the isolation valve before removing and cleaning the strainer. Models R800/ADR400 and larger have an additional manual drain on the air-air heat exchanger.

10-year Limited Warranty

A 10-year prorated heat exchanger warranty (through R5000/ADR2500) and a 10-year prorated compressor warranty apply on standard Pioneer products. Pioneer standard dryers are warranted to be free from defects in material and workmanship for a period of one year from the date of shipment (15 months for distributor stock units), provided the equipment is used according to the company's recommended usage. Liability is limited to the repair, refund, or replacement in kind at the company's sole option. In no event will Pioneer be liable or responsible for incidental and consequential damages, even if the possibility of such has been made known to the company. The usual maintenance and replacement-type products are not covered by this warranty. To protect this warranty, use genuine Pioneer accessories and spare parts. One year mechanical parts only warranty applies to equipment outside the U.S.A., Mexico, and Canada. Extended warranties are available. Contact your distributor for details.

Please notify your distributor or the factory before working on equipment. Unauthorized work may not be covered and may void the warranty. Please contact the factory to obtain a return merchandise authorization number (RMA#) before returning equipment.

Caution: A refrigerant compressor operating under sustained overload conditions caused by excessive airflow, high inlet air temperature, and/or ambient temperature will continue to work at a higher

discharge pressure until either the compressor motor fails or the compressor cycles on high pressure cut-out control. If the dryer cycles for any reason, turn it off and contact factory; allowing it to cycle on high pressure will burn up the compressor motor. Because of higher pressure and electrical voltage, only qualified service personnel should work on the equipment. For critical applications, the factory recommends that the customer install a back-up system.

WARNING:

Remove air pressure from the device under pressure before working on it.

TROUBLESHOOTING

| PROBLEM | REMEDY |
|--|--|
| 1. System bypass open. | Close bypass valve and open inlet/outlet valves |
| 2. Excessive air flow. | Check rated output capacity of air compressor; a larger system may be needed. |
| 3. High inlet air temperature. | A larger system or after-cooler may be needed (consult factory) |
| 4. Dirty heat exchanger. | Disconnect dryer inlet/outlet and flush with steam cleaner and copper solvent. |
| 5. Drain malfunction. | Clean or replace. |
| 6. Not draining all moisture. | Adjust on/off times to drain – longer and/or more frequently. |
| 7. Refrigerant compressor cycling due to high refrigerant pressure or overload a. Overloaded unit. b. Dirty atmosphere. c. High ambient temperature. d. Condenser fan motor failure. e. Incorrect high-pressure shutdown setting. f. Bad compressor. | Reduce load or install larger system. Clean condenser and install filter. Relocate unit or convert to water-cooled unit. Provide suitable ventilation or relocate unit. Consult factory. Repair or replace. Correct to: R-134a: 235 PSIG/16.2 BarG R-22: 350 PSIG/2724.1 BarG Replace compressor and liquid and suction line filters. |
| 8. Refrigerant compressor cycling on low pressure a. Refrigerant low. b. Incorrect low pressure control setting. c. Low-pressure control malfunction. | Inspect for leaks, repair, evacuate and recharge. Consult factory. Correct to: R-134a: cut out 20 PSIG/1.38 BarG, cut in 30 PSIG/2.07 BarG R-22: cut out 40 PSIG/2.16 BarG, cut in 60 PSIG/4.14 BarG Units supplied with pump down: R-22: cut out 25 PSIG/1.73 BarG, cut in 35 PSIG/2.42 BarG Replace. |
| 9. Refrigerant suction temperature too low/freeze up. a. Check fan cycle switch (if supplied). b. Ambient temperature too low. | Correct settings: #1 Fan R-134a: cut out 75 PSIG/5.2 BarG, cut in 125 PSIG/8.6 BarG R-22 : cut out 150 PSIG/10.4 BarG, cut in 230 PSIG/15.9 BarG #2 Fan R-134a: cut out 110 PSIG/7.6 BarG, cut in 160 PSIG/11.4 BarG R-22 : cut out 200 PSIG/13.8 BarG, cut in 275 PSIG/19 BarG Relocate unit to a heated room/install low ambient package. Consult factory. |

Thank You!

Thank you for choosing Pioneer. We recognize that you had a choice. The fact that you choose Pioneer further inspires us to produce quality products of excellent value, performance, and reliability. A passionate dedication to excellence and innovation has always been the key to our success, along with our distributors and dealers who are the very best in our industry. Together, we are committed to providing you with superior quality products and services at affordable prices.

Sam Basseen
President and CEO

Get an extra month warranty – *FREE!*

The information requested below helps us to determine how well we have met your expectations, and gives us a direction for further improvements. Please complete the form and return a copy to us within 90 days of receiving the equipment. In appreciation of your efforts, we will extend the twelve month portion of the Pioneer warranty by one month, to thirteen months from the date of shipment.

Service rates (net)

Labor: \$80/hour or \$500/day

Service truck or van: 50¢/mile

Travel, food, and lodging costs are the responsibility of the customer and are invoiced on a cost basis.

Name: _____ Title: _____

Company Name: _____

Address: _____

City/St./Zip: _____

Complete and return a copy to:

Pioneer Air Systems, Inc.

210 Flatfork Road

Wartburg, TN 37887-9428

Phone: _____ Model #: _____

Serial #: _____ Start up date: _____

Application: _____

Your Opinion Counts!

| | Excellent | Good | Fair | Poor |
|-------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Performance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Appearance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Price | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Service | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Features I would like to see in future models: _____
