PNEUMATECH®


# Cycling Refrigerated Air Dryers

## Range AC-250 to AC-4000

Section 10
Bulletin A-9

## How it Works

**Pneumatech cycling dryers operate based on load, unlike standard non-cycling refrigerated dryers that operate continuously. A circulating Chilled Media™ system cools the compressed air and provides the needed Chilled Media™ to cycle the refrigeration system on and off. The benefit is energy savings.**

## Exclusive Design

**Instant cooling dehumidifies your plant's compressed air when conditions change from low load to full load.**

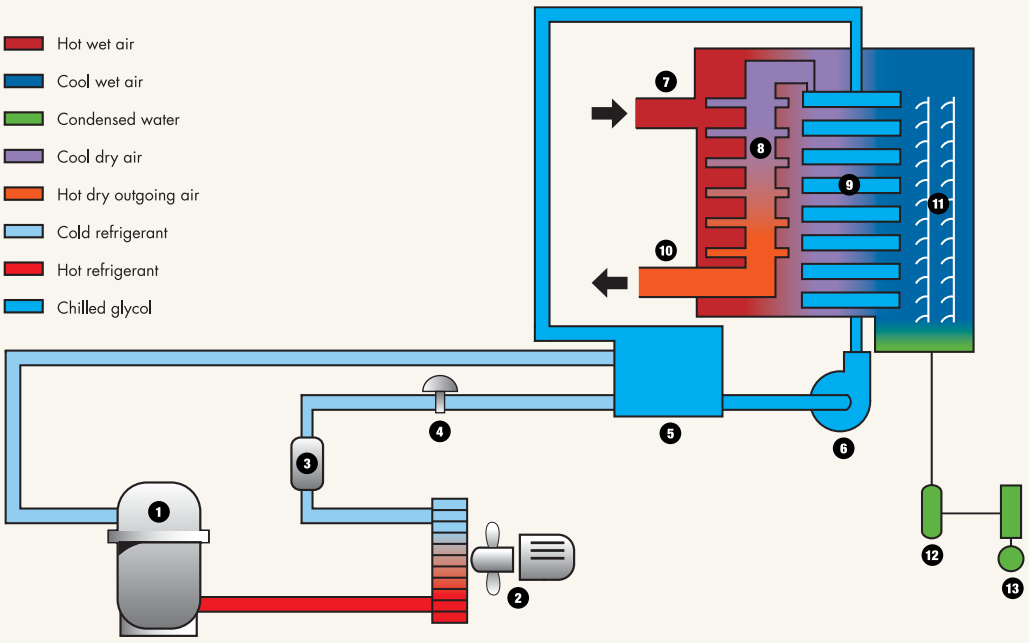
- Our unique fully immersed chiller barrel is the heart of the Chilled Media™ circuit and means a more efficient heat transfer and longer compressor life.
- The Chilled Media™ circuit utilizes both conduction and convection heat transfer principles for more efficient operation. A pump continuously circulates the Chilled Media™, in our exclusive Counter Flow Convection Cooling™ (3C™) design heat exchangers, giving an undercurrent effect or cyclonic action.
- System will pull down to operating temperatures within minutes, unlike other cycling designs.
- Dryer cycles based on precise compressed air dewpoint temperature, unlike other designs.
- Programmable auto drains with a particle strainer and shut-off valve. Air Free drain option available.

## Exclusive 3C Heat Transfer Technology

1. Counter Flow: Heat transfer efficiency is significantly improved by flowing the fluids (air, Chilled Media™ and refrigerant) in opposite directions.
2. Convection: Circulating Chilled Media™ creates turbulent flow for more efficient cooling.
3. Cooling: The refrigeration system is designed to take advantage of conduction where cooling is transferred and heat is dissipated across the aluminum block heat exchanger.

| FEATURES | BENEFITS |
|---|---|
| Propylene glycol (food grade) Chilled Media™ | Environmentally friendly fluid |
| Field proven heavy duty CM™ circulating pump | More efficient convection method of heat transfer |
| Electronic field programmable cycling thermostat | Field adjustable dewpoint settings |
| Refrigeration system controller with manual reset | Safer operation |
| Heavy duty fan motors with permanently lubricated ball bearing | Long life |
| Individual fan cycling switches | Steady cooling in a wide range of ambient temperatures |
| Easy access door to electrical control panel | Easy, trouble-free maintenance and reduced service costs |

# F L O W  D I A G R A M




## Refrigerant / Glycol Circuit

**Refrigerant Compressor**
Takes refrigerant gas and compresses it to a high pressure and temperature.

**Condenser**
Cools the refrigerant and changes it to liquid form. In this state, it will absorb the BTU's necessary to cool the compressed air to the stated dewpoint.

**Refrigerant Filter**
Protects the Thermal Expansion Valve (4) from particulate matter.

**Thermal Expansion Valve**
Reduces the refrigerant pressure, lowering its temperature and increasing its ability to chill the glycol in the Glycol-to-Refrigerant heat exchanger (5). The refrigerant is now all liquid. It will change back to the gaseous state as it cools the glycol.

**Chiller Barrel**
The Glycol-to-Refrigerant heat exchanger (chiller barrel) chills the glycol solution to the desired temperature. The chiller barrel is submersed inside the reservoir tank for complete cooling efficiency.

**Glycol Circulation Pump**
The pump draws the chilled glycol out of the reservoir tank and pumps it into the Air-to-Glycol heat exchanger (9).

## Air Circuit

**Air Inlet**
Hot saturated air enters the dryer from the compressor. This should be 100% saturated air with no residual liquid.

**Air-to-Air Heat Exchanger**
As the air exits the dryer, it cools the incoming air. There are two benefits. First, air exiting is re-warmed, so pipes downstream do not sweat. Second, the air entering the dryer is pre-cooled, which decreases the load on the refrigeration circuit.

**Air-to-Glycol Heat Exchanger**
Allows for the cooling of compressed air by the chilled glycol, condensing water vapor in the compressed air stream.

**Air Outlet**
Where cooled compressed air (approximately 80°F / 26.7°C), with a pressure dewpoint of 39°F / 4°C, exits the dryer to the piping system.

**Water Separator**
Separates the condensed water vapor from the cooled compressed air stream, where it will be collected in the "silent zone" for removal. Efficient separation is critical to assure the pressure dewpoint is equal to the lowest temperature achieved in the Air-to-Glycol heat exchanger (9).

**Strainer**
Uses a screen that traps particulate and rust particles. This prevents the drain valve from plugging and therefore malfunctioning.

**Electronic Auto Drain**
Condensed water droplets are evacuated from the separator through an electronic timer drain.

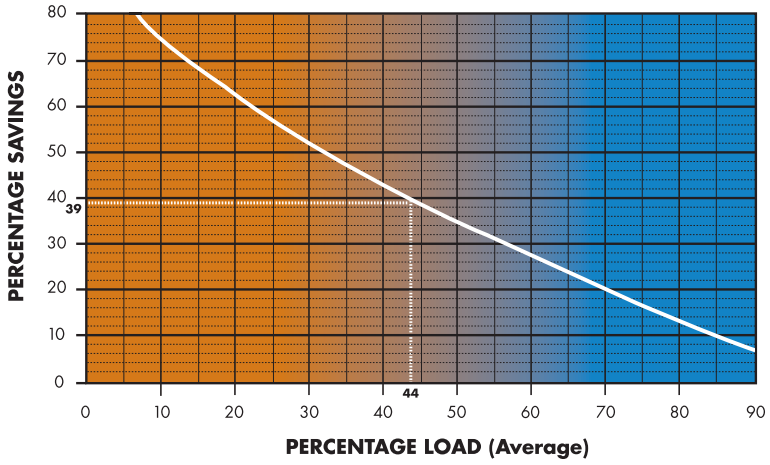
## SPECIFICATIONS Models AC-250 to AC-600

| Model | Capacity scfm ($nm^3/hr$)* | Pressure Drop PSID (bar) | Comp H.P. | Elect. KW Input | Max Inlet Press PSIG (bar) | Heat Rejection (BTU/hr) | In/Out Conn. Size | Refrigerant Type | L in (mm) | W in (mm) | H in (mm) | Approx. Shipping Wt. Lbs. (Kgs.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AC-250 | 250 (425) | 2.25 (0.16) | 1.8 | 2.8 | 188 (12.96) | 21,000 | 1 ½" NPT (F) | R-404a | 40 (1016) | 32 (813) | 46 (1168) | 520 (236) |
| AC-325 | 325 (552) | 3.6 (0.25) | 1.8 | 2.8 | 188 (12.96) | 21,000 | 1 ½" NPT (F) | R-404a | 40 (1016) | 32 (813) | 46 (1168) | 549 (249) |
| AC-400 | 400 (680) | 4.35 (0.3) | 2.3 | 3.9 | 188 (12.96) | 27,000 | 2" NPT (F) | R-404a | 40 (1016) | 32 (813) | 46 (1168) | 561 (255) |
| AC-500 | 500 (850) | 4.35 (0.3) | 3.0 | 4.6 | 188 (12.96) | 35,000 | 2" NPT (F) | R-404a | 40 (1016) | 32 (813) | 46 (1168) | 577 (262) |
| AC-600 | 600 (1020) | 4.35 (0.3) | 3.3 | 5.1 | 188 (12.96) | 39,000 | 2" NPT (F) | R-404a | 40 (1016) | 32 (813) | 46 (1168) | 621 (282) |

* Capacity and kW ratings are at full load at CAGI ADF-100 standard conditions of 100°F / 38°C ambient, 100°F / 38°C inlet and 100 psig / 7 bar delivering a pressure dewpoint of 36°F to 48°F.

Max Inlet Temperature: 100°F (38°C)
Max Ambient Temp: 100°F (38°C)
Available Voltages: 208/230V-3Ph-60Hz, 460V-3Ph-60Hz std.
575V-3Ph-60Hz optional

## ENERGY SAVINGS ESTIMATES Chilled Media™ Cylcling Dryers vs. Non-Cycling Refrigerated Air Dryers




### USAGE CHART

| | Mon - Fri | | Saturday | | Sunday | |
|---|---|---|---|---|---|---|
| | FLOW (SCFM) | TAU (SCF) | FLOW | TAU | FLOW | TAU |
| 1st Shift | 800 | 1,920,000 | 750 | 360,000 | 0 | 0 |
| 2nd Shift | 300 | 720,000 | 0 | 0 | 0 | 0 |
| 3rd Shift | 150 | 360,000 | 0 | 0 | 0 | 0 |

**Annual Operating Hours:**
6,656 hours

**Assumptions:**
Non-cycling dryers run continuously
Power cost of **$0.12** / KWH
Both dryers are shut off 1st shift Sat. to Sun.
Ambient Air Correction Factors
Cool Climate = **1.20**
Warm Climate = **1.15**

**Example:** AC-1000, Capacity 1000 SCFM

1. **Determine Total Weekly Usage vs. Total Capacity**
   Total Air Usage **(TAU)** per week: 3,360,000 cu. ft.
   Total Dryer Capacity **(TDC)** per week: 7,680,000 cu. ft.

2. **Determine Average Load**
   Average load percentage = TAU / TDC x 100 = 3,360 / 7,680 x 100 = 44%

3. **Determine Load Savings**
   Non-cycling dryer power input/year: 6.5 KW* x 6,656 hrs. = 43,264 KWH
   *Power consumption of AD-1000 non-cycling dryer from bulletin A-7.

   Cycling dryer at 44% load (average) runs 61% of the time = **39% savings** (see graph above)
   6.5 KW x 6,656 hrs. x .61 = 26,391 KWH
   Savings = 16,873 KWH

4. **Determine Annual Dollar Savings using Ambient Air Correction Factors**
   16,873 KWH x $0.12 / KWH x 1.2 = **$2,429.71**

## SPECIFICATIONS Models AC-800 to AC-4000

| Model | Capacity scfm ($nm^3/hr$)* | Pressure Drop PSID (bar) | Comp H.P. | Elect. KW Input | Max. Inlet Presure PSIG (bar) | Water Usage GPM (LPM)** City 55-60°F (13-16°C) | Water Usage GPM (LPM)** ***Tower 85-90°F (29-32°C) | Heat Rejection BTU/HR | Air | Water | Refrigerant Type | Dimensions L in (mm) | Dimensions W in (mm) | Dimensions H in (mm) | Approx. Shipping Wt. Lbs. (Kgs.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AC-800 | 800 (1359) | 2.35 (0.16) | 4.2 | 6.21 | 150 (10.3) | 6.2 (23.47) | 12.4 (46.93) | 48,129 | 3" NPT (F) | 0.75" NPT (F) | R-404a | 53.5 (1359) | 32 (813) | 46 (1168) | 700 (318) |
| AC-1000 | 1000 (1699) | 3.7 (0.25) | 5.3 | 7.59 | 150 (10.3) | 6.5 (24.60) | 13.0 (49.21) | 60,849 | 3" NPT (F) | 0.75" NPT (F) | R-404a | 53.5 (1359) | 32 (813) | 46 (1168) | 730 (331) |
| AC-1200 | 1200 (2039) | 4.45 (0.3) | 6.7 | 9.62 | 150 (10.3) | 6.7 (25.36) | 13.5 (51.10) | 76,647 | 3" NPT (F) | 1" NPT (F) | R-404a | 53.5 (1359) | 32 (813) | 46 (1168) | 765 (347) |
| AC-1500 | 1500 (2549) | 5 (0.34) | 8.3 | 11.40 | 150 (10.3) | 7.0 (26.50) | 16.0 (60.56) | 90,844 | 4" FL 150# | 1" NPT (F) | R-404a | 72 (1829) | 42 (1067) | 61.3 (1557) | 1450 (658) |
| AC-1700 | 1700 (2889) | 5 (0.34) | 10.4 | 14.19 | 150 (10.3) | 10.5 (39.74) | 21.0 (79.49) | 115,578 | 4" FL 150# | 1" NPT (F) | R-404a | 72 (1829) | 42 (1067) | 61.3 (1557) | 1500 (680) |
| AC-2000 | 2000 (3398) | 5 (0.34) | 12 | 15.91 | 150 (10.3) | 11.5 (43.53) | 23.0 (87.06) | 135,400 | 4" FL 150# | 1" NPT (F) | R-404a | 72 (1829) | 42 (1067) | 61.3 (1557) | 1650 (748) |
| AC-2500 | 2500 (4248) | 5 (0.34) | (2) 8.3 | 22.79 | 150 (10.3) | 16.0 (60.56) | 32.0 (121.12) | 181,687 | 6" FL 150# | 1.5" NPT (F) | R-404a | 106 (2692) | 92 (2337) | 74.25 (1886) | 3100 (1406) |
| AC-3200 | 3200 (5437) | 5 (0.34) | (2) 10.4 | 28.37 | 150 (10.3) | 16.0 (60.56) | 32.0 (121.12) | 231,156 | 6" FL 150# | 1.5" NPT (F) | R-404a | 106 (2692) | 92 (2337) | 74.25 (1886) | 3200 (1451) |
| AC-4000 | 4000 (6796) | 5 (0.34) | (2) 12 | 31.81 | 150 (10.3) | 23.0 (87.06) | 46.0 (174.12) | 270,800 | 6" FL 150# | 2" FL | R-404a | 106 (2692) | 92 (2337) | 74.25 (1886) | 3500 (1588) |

* Capacity and kW ratings are at full load at CAGI ADF-100 standard conditions of 100°F / 38°C ambient, 100°F / 38°C inlet and 100 psig / 7 bar delivering a pressure dewpoint of 36°F to 48°F.

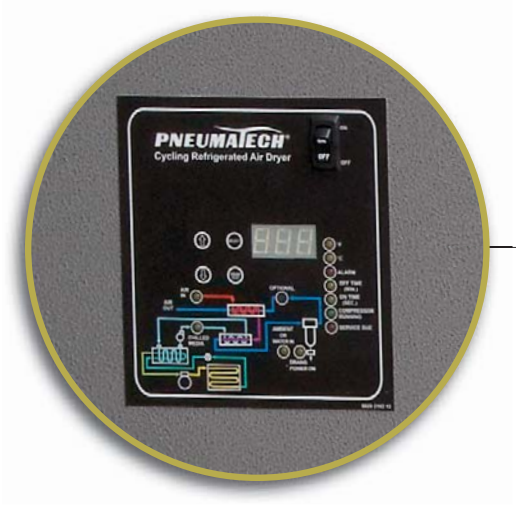
** Watercooled models only. Use ACW for designation.

*** Based on a 10°F temperature rise.

Max Inlet Temperature: 100°F (38°C)

Max Ambient Temp: 100°F (38°C)

Available Voltages: 208/230V-3Ph-60Hz, 460V-3Ph-60Hz std. 575V-3Ph-60Hz optional





**Digital Dry Guard™ (DDG) Control**

A microprocessor based control which displays:

- Inlet air temperature
- Chilled Media temperature
- Ambient temperature
- Fahrenheit and Centigrade selection
- Alarm indicator
- Compressor running indicator
- Service due indicator
- Programmable auto-drain

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