Pioneer Air Systems inc.

Specializing in Air, Water & Gas Processes

Since 1980

TEN-YEAR LIMITED WARRANTY 10 years OUR SIGNATURE

LCNG & HCNG - Series

NATURAL GAS DRYERS

ENERGY SAVING DESIGN

CNG

clean fuel alternative.

The CNG technology described here is commercially-proven, robust and expanding at a rapid pace.

Pictured below are Two Pioneer LCNG2000 Dryers used for Fueling Jakarta Transportation

Two Pioneer Dryers

Pioneer Air Systems, Inc. 210 Flat Fork Rd. Wartburg TN, 37887 USA Phone: 423-346-6693 sales@pioneerair.com

Energy Saving Design

LCNG & HCNG OPERATION

Gas enters the pre-filter which removes moisture and oil in liquid and aerosol form. The gas flows into the left tower for drying, then through the after-filter, which prevents desiccant dust particle carry-over downstream.

While the left tower dries, a captive volume of dry gas flows through the right tower for regeneration. The blower moves the gas and the heater raises its temperature. The hot & dry gas flows through the right tower and absorbs moisture to regenerate the desiccant.

The moisture-loaded gas then flows through the gas cooler which condenses the moisture. The coalator (coalescer + seperator) removes the maximum amount of moisture from the gas. The right tower is cooled by turning the heater off.

Energy Saving Design: The heater cycles based on the gas temperature which saves evergy. When the desiccent in the right tower reaches the 250°F or 121°C temperature it indicates regeneration of desiccent is complete. At this time the heater switches "OFF" and the desiccent is cooled by circulating cooler gas. After a preset time, the towers switch roles.

DEW POINT ANALYZER

The Pioneer Dewpoint Analyzer "PDM ULTRA" is supplied with filter, two isolation valves, exhaust coil, adsorber, visual moisture indicator, sensor holder and cable.

(see page 3)

The PDM ULTRA is a precision dewpoint monitor with digital dewpoint indication (in °C or °F) installed at the dryer.

PDM ULTRA

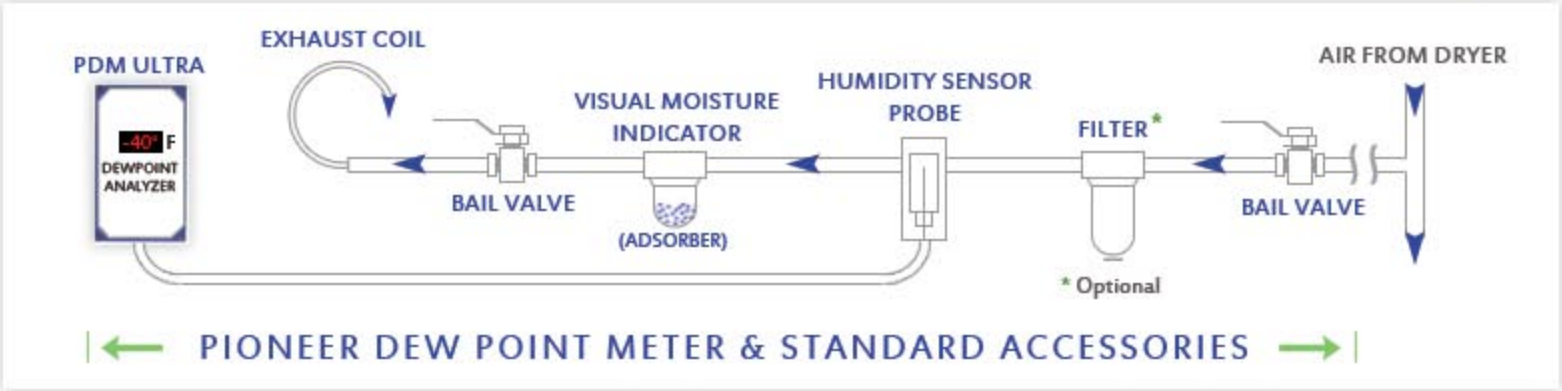
Standard with Dewpoint Demand Cycle Control Option

Specifications	Model PDM Ultra
Sensor Type	High Capacitance Aluminum Oxide
Range	-148°F to +68°F / -100°C to +20°C
Calibration	Automatic
Alarms	NO/NC contacts, 10 AMP
Output	adjustable
Power	4-20 MA
Requirements	110 VAC, 60 HZ
Indication	°F or °C, user programmable
Enclosure	Polycarbonate NEMA 4/4X
Temp. Range	32°F to 122°F / 0°C to 50°C
(L x W x H) In	3.5" x 7.5" x 4.7"
(L x W x H) MM	90 x 160 x 120mm
Shipping Weight	2.5 lb/1.1 kg
Pressure Range	500 PSI/34 bar maximum

Table 1

DEW POINT ANALYZER DIAGRAM

Figure 1



DEW POINT DEMAND CYCLE (DPDC) To save energy, and for safety

PIONEER standard LCNG dryer is equipped with heater cycling based on regeneration gas temperature. In addition, the heater and blower shut-down based on the temperature of the desiccant being re-generated.

The optional Dew Point Demand Cycle provides additional savings by increasing the drying time of a desiccant tower.

STANDARD DRYER CYCLE -

In a standard LCNG dryer the gas is dried by a tower e.g. left tower, for four (4) hours. During this time the desiccant in the other (right) tower is re-generated and cooled. After four (4) hours the wet gas flow switches from left to right tower, which dries the gas for additional four (4) hours, and during this time the right desiccant is re-generated. The total cycle time is eight (8) hours. Longer cycle times are available upon request.

DEW POINT DEMAND CYCLE (DPDC)

In dryers equipped with DPDC, the switching of gas flow, from one tower to other, is based on outlet gas dew point in lieu of time. The process increases the drying time on a tower when the gas flow and its moisture content are below the maximum drying capacity of the tower. In addition, it increases the total cycle time and decreases the frequency of valves switching. Less frequent gas flow valves switching means less maintenance.

DEW POINT DEMAND CYCLE ADVANTAGES

BETTER SENSOR -

The PDM Ultra uses highcapacitance aluminum oxide sensors.

INSALLATION -

Sensor is installed at a clearer location and protected by an inlet and outlet filter as well as an adsorber.

EASY CALIBRATION -

Designed for convenient and inexpensive calibration at job site.

MORE RELIABLE -

Less frequent tower switching means longer component and desiccant life.

BETTER DEW POINT CONTROL -

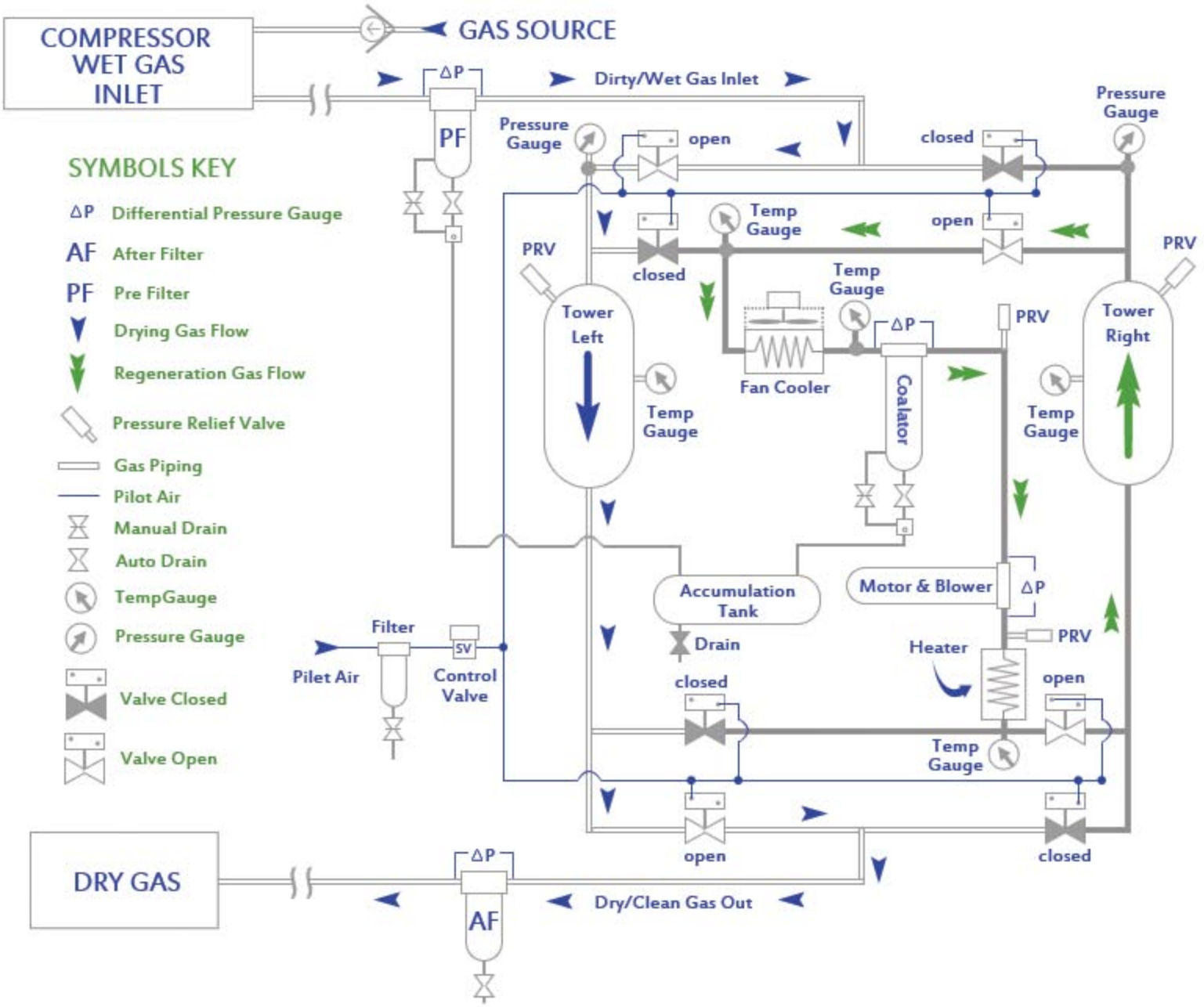
By reading the exit air dewpoint the sensor also monitors and controls the dew point of outgoing air.

COST SAVINGS -

By protecting your piping and equipment from contaminants and water vapor the system reduces maintenance and downtime; and extends the life of your equipment.

LCNG CLOSED LOOP SERIES TYPICAL FLOW DIAGRAM

While the left tower dries, a captive volume of gas flows through the right tower for regeneration.



LCNG STANDARD QUALITY FEATURES

DUAL TOWER CONTINUOUS DUTY

- Gas Cooler with Sparkless Fan and NEMA 7 Motor
- Gas Blower with NEMA 7 motor
- Stainless Steel Condensate Reservoir
- Gas Heater
- Particulate After Filter with Manual Drain
- Two Inlet Valves
- Two Outlet Valves
- Two Exhaust Valves
- Gas High Temperature Shutdown
- Gas Temperature Controller
- Coalator, a more efficient separator
- Coalescing Filter with Differental Pressure Gauge
- Two Towers - 1 Drying & 1 Regenerating
- Two Tower Pressure Gauges
- Three Temperature Gauges
- Four Pressure Relief Valves
- Two Regeneration Valves
- Pilot Air Filter (Electric Control Valves - optional)
- Coalator Auto Drain
- NEMA 7 Electrical Control Panel

LCNG SELECTION GUIDE

MODEL #	Inlet Cap. SCFM / NM^3HR @100 PSIG / 7 BarG	Blower HP	Heater KW	Desiccant Per Tower lb / kg	IN / OUT in / mm	APPROX WEIGHT lb / kg	APPROX DIM in / mm L x W x H
LCNG100	100 / 156	1	2.5	80 / 36	1 / 25	1500 / 682	48x48x84 / 1200x1200x2100
LCNG150	150 / 234	1	3	120 / 55	1.5 / 37	2000 / 909	60x48x84 / 1500x1200x2100
LCNG200	200 / 312	1.5	5	160 / 72	2 / 50	2500 / 1136	72x60x90 / 1800x1500x2250
LCNG250	250 / 390	1.5	6	200 / 91	2 / 50	3000 / 1364	72x72x90 / 1800x1800x2250
LCNG300	300 / 468	2	7.5	240 / 110	2 / 50	3500 / 1591	84x72x90 / 2100x1800x2250
LCNG400	400 / 624	3	10	320 / 144	2 / 50	4000 / 1818	84x84x90 / 2100x2100x2250
LCNG500	500 / 780	3	12	400 / 182	3 / 75	5000 / 2273	96x90x90 / 2400x2250x2250
LCNG650	650 / 1014	5	15	520 / 236	3 / 75	6000 / 2727	108x90x90 / 2700x2250x2250
LCNG800	800 / 1248	5	20	640 / 288	3 / 75	7000 / 3182	120x90x96 / 3000x2250x2400
LCNG1000	1000 / 1560	7.5	25	800 / 364	3 / 75	8000 / 3636	120x90x108 / 3000x2250x2700
LCNG1250	1250 / 1950	7.5	30	1000 / 455	3 / 75	9000 / 4091	120x90x108 / 3000x2250x2700
LCNG1500	1500 / 2340	10	35	1200 / 545	4 / 100	10,500 / 4773	144x90x108 / 3600x2250x2700
LCNG1750	1750 / 2730	10	40	1400 / 636	4 / 100	12,000 / 5454	144x90x108 / 3600x2250x2700
LCNG2000	2000 / 3120	15	50	1600 / 727	4 / 100	13,500 / 6136	144x90x108 / 3600x2250x2700
LCNG2500	2500 / 3900	15	60	2000 / 910	6 / 150	16,500 / 7500	156x90x120 / 3900x2250x3000
LCNG3000	3000 / 4680	20	70	2400 / 1090	6 / 150	18,000 / 8182	180x90x120 / 4500x2250x3000
LCNG3500	3500 / 5460	20	80	2800 / 1272	6 / 150	19,500 / 8864	192x90x120 / 4800x2250x3000
LCNG4000	4000 / 6240	25	90	3200 / 1454	8 / 200	22,500 / 10,227	204x90x120 / 5100x2250x3000
LCNG4500	4500 / 7020	25	100	3600 / 1636	8 / 200	25,000 / 11,363	216x90x120 / 5400x2250x3000
LCNG5000	5000 / 7800	30	110	4000 / 1820	8 / 200	27,500 / 12,500	228x90x120 / 5700x2250x3000

Note: Larger sizes available contact us

Table 3

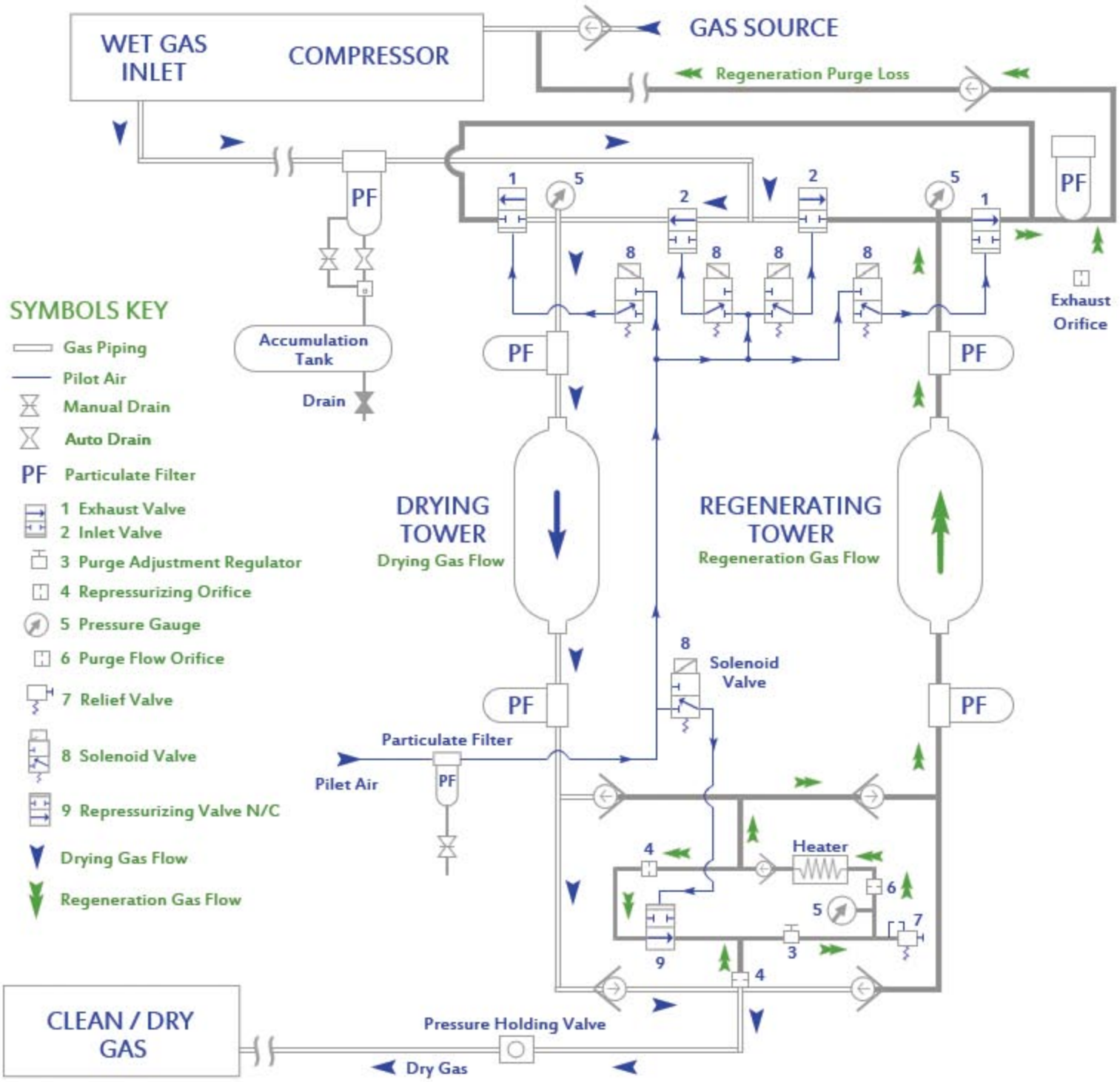
Pressure through 150 PSIG standard

LCNG purifiers are ideal for large gas flow continuous duty service.

LCNG
OPTIONAL FEATURES

- Three Valve Block and By-pass
- Pioneer Dewpoint Analyzer with Alarm
- Inlet/Outlet Valving
- Visual Moisture Indicator
- Duplex Prefilter with block and by-pass
- Duplex Afterfilter with block and by-pass
- Automatic Drain for Accumulator
- Demand Cycle Control
- NEMA 4x, 7 Enclosure
- Electric Valves
- Pressures up to 2000 PSIG

HCNG SERIES TYPICAL FLOW DIAGRAM



HCNG
OPTIONS FEATURES

- Three Valve Block and by-pass system
- Pioneer Dewpoint Analyzer with Alarm
- Dedicated Filter Protection
- Inlet/Outlet Valving
- Visual Moisture Indicator
- NEMA 4, 7, 12
- Duplex Prefilter with block and by-pass
- Duplex Afterfilter with block and by-pass
- Stainless Steel Condendsate Accumulator
- Automatic Drain for Accumulator
- Demand Cycle Control

HCNG SELECTION GUIDE

MODEL #	Inlet Cap. SCFM / NM^3HR @2500 PSIG / 250 BarG	In / Out Inch / mm	Desiccant Per Tower lb / kg	APPROX WEIGHT lb / kg	APPROX DIM in / mm L x W x H
HCNG100	100 / 156	.375 / 9.5 NPT	10 / 4.5	500 / 227	36x36x48 / 900x900x1200
HCNG150	150 / 234	.375 / 9.5 NPT	15 / 6.8	600 / 272	36x36x48 / 900x900x1200
HCNG200	200 / 312	.375 / 9.5 NPT	20 / 9	750 / 341	48x36x60 / 1200x900x1500
HCNG300	300 / 468	.50 / 12.7NPT	30 / 13.6	1000 / 455	48x48x60 / 1200x1200x1500
HCNG400	400 / 624	.50 / 12.7 NPT	40 / 18.1	1200 / 545	60x48x72 / 1500x1200x2592
HCNG500	500 / 780	.50 / 12.7 NPT	50 / 22.7	1400 / 636	60x48x72 / 1500x1200x2592
HCNG650	650 / 1014	.50 / 12.7 NPT	65 / 29.5	1600 / 727	60x48x72 / 1500x1200x2592
HCNG800	800 / 1248	1.00 / 25 FLG	80 / 36.4	1800 / 818	72x60x72 / 2952x1500x2592
HCNG1000	1000 / 1560	1.00 / 25 FLG	100 / 45.5	2000 / 909	72x72x84 / 2592x2592x2100
HCNG1200	1200 / 1872	1.00 / 25 FLG	120 / 54.5	2500 / 1136	84x72x90 / 2100x2592x2250

Table 3

Pressure through 3600 PSIG standard

HCNG STANDARD QUALITY FEATURES
DUAL TOWER CONTINUOUS DUTY

- Gas Cooler with Sparkless Fan and NEMA 7 Motor
- Gas Blower with NEMA 7 motor
- Stainless Steel Condensate Reservoir
- Gas Heater
- Dual Pre & After Filter, one per tower
- Particulate After Filter with Manual Drain
- Two Inlet Valves
- Two Outlet Valves
- Two Exhaust Valves
- Gas High Temperature Shutdown
- Gas Temperature Controller
- Pilot Air Filter
- Gas Heater and Controller with Safety Shut Down
- Coalator, a more efficient separator
- Coalescing Filter with Differental Pressure Gauge
- Two Towers - 1 Drying & 1 Regenerating
- Two Tower Pressure Gauges
- Three Temperature Gauges
- Four Pressure Relief Valves
- Two Regeneration Valves
- Pilot Air Filter (Electric Control Valves - optional)
- Coalator Auto Drain
- NEMA 7 Electrical Control Panel

WHAT WE NEED BEFORE YOU ORDER

1. Where are you located?
2. What does your company do?
3. What's the project location?
4. What are ambient conditions, minimum & maximum temperatures?
5. What's the H2S level in the incoming gas?
6. What's the SILOXANES level in the incoming gas?
7. What's the temperature of the in the incoming gas to our system?
8. What type of instruments required - local mount / PLC - remote monitoring & control?
9. What's the electrical requirement? Voltage ? / Classification?
10. Do you need an outdoor enclosure for the equipment?
11. Do you need Filtration?
12. Any other requirement?

COMPANY'S WITH OUR DRYERS

HYUNDAI ENGINEERING & CONSTRUCTION CO.,LTD.

Sime Darby

NEA GROUP

شركة نفط الكويت
Kuwait Oil Company
إحدى شركات مؤسسة البترول الكويتية
A Subsidiary of Kuwait Petroleum Corporation

ENSCO

Chevron

NASA

NOBLE

CAMERON

BASF
The Chemical Company

Enppi
Engineering For The Petroleum & Process Industries

PETRONAS

MTBE
MALAYSIA

Ten Year Limited Warranty

Longest Warranty in Industry

PIONEER systems are warranted to be free from defects in material and workmanship for a period of one year from the date of installation, or up to 24 months from the date of shipment, whichever comes first, provided the equipment is installed and used according to the company's recommendation.

The company's liability is limited to the repair, refund, or replacement in kind at the company's sole option. In no event will the company be liable or responsible for incidental and consequential damages, even if the possibility of such has been made known to the company. Normal maintenance items are excluded. Key components, heat exchangers & refrigerant compressors carry a ten-year pro-rated warranty.

Pioneer Air Systems inc.

"Non-Standard Equipment is our Specialty" *Since 1980*

1-800-264-1AIR

- AIR DRYERS
- FILTERS
- CHILLERS
- AFTER COOLERS
- DESICCANTS
- WATER COOLING SYSTEMS
- SEPARATORS
- A.S.M.E. VESSELS
- HEAT EXCHANGERS
- NATURAL GAS FILTRATION & DRYING
- BIOGAS CLEANING & DRYING

For more information on Pioneer products,
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PIONEER AIR SYSTEMS, INC.

FUTURE-AIRE
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"Judged as a major contribution toward more efficient and effective operation of plants in the Chemical Industries"

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