SPXFLOW

Externally Heated Desiccant Compressed Air Dryers

PHD SERIES 300 - 3,200 SCFM

Pneumatic Products®

Since 1946, the world has turned to SPX FLOW's Pneumatic Products brand for the quality and service demanded by the most critical of applications. Global leaders of industry require durable components that deliver unquestionable reliability. Our precision engineered components and designs deliver outstanding service life and operational longevity. Invest in our experience and gain annuities that will grow for years.

Based in Charlotte, North Carolina, SPX FLOW is a leading global supplier of highly engineered flow components, process equipment and turn-key systems, along with the related aftermarket parts and services, into the food and beverage, power and energy and industrial end markets. SPX FLOW has more than $2 billion in annual revenues and approximately 8,000 employees with operations in over 35 countries and sales in over 150 countries around the world. To learn more about SPX FLOW, please visit our website at www.spxflow.com

PHD Series Dryers

PHD SERIES DRYERS REDUCE PURGE AIR ENERGY COSTS

For decades, compressed air users have relied on Pneumatic Products to deliver technology that reduces the cost of operation and improves the reliability of air driven processes. The PHD Series is engineered to deliver ISO 8573.1 Air Quality and reduce purge air consumption. In combination with our advanced Ambient Air Amplification (A^3) Purge Technology™, we offer externally heated purge desiccant dryers with dew point performance guaranteed from 300 to 3,200 scfm.

THE PNEUMATIC PRODUCTS GUARANTEE

Pneumatic Products guarantees that PHD Series dryers will produce the design dew point while operating continuously at maximum rated flow (100% duty cycle) at CAGI ADF 200 inlet standards of 100°F inlet temperature and 100% relative humidity at 100 psig.

-4°F TO -40°F PRESSURE DEW POINTS

Applications that simply want seasonal protection against freezing are exactly what the standard PHD Series dryers are designed to address. ISO 8573.1 dew points between Class 2 and Class 3 are delivered automatically with the standard design. Class 2 (-40°F) dew points protect usage points from freezing during winter. Class 3 (-4°F) dew points keep air systems nice and dry all summer long. Applications that require Class 2 (-40°F) dew points year round simply need to select the Jet Injection option package.

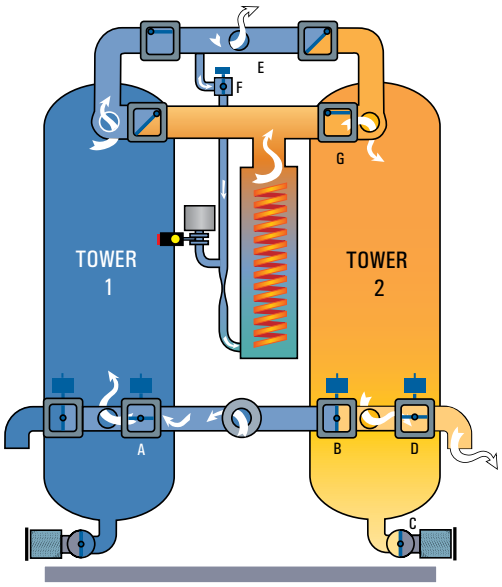
AIR QUALITY CLASS	SOLID PARTICLES MAXIMUM NUMBER OF PARTICLES PER M^3			WATER VAPOR PRESSURE DEW POINT		OIL TOTAL OIL CONCENTRATION: AEROSOL, LIQUID & VAPOR	
	0.10 - 0.5 micron	0.5 - 1.0 micron	1.0 - 5.0 micron	°C	°F	mg / m^3	ppm $_{w/w}$
0	**As specified by the equipment user or supplier and more stringent than class 1**						
1	≦ 20,000	≦ 400	≦ 10	≦ -70	≦ -94	0.01	0.008
2	≦ 400,000	≦ 6,000	≦ 100	≦ -40	≦ -40	0.1	0.08
3	-	≦ 90,000	≦ 1,000	≦ -20	≦ -4	1	0.8
4	-	-	≦ 10,000	≦ +3	≦ +37	5	4
5	-	-	≦ 100,000	≦ +7	≦ +45	-	-

Per ISO 8573-1: 2001(E)

How it Works

STANDARD DESIGN

Moist, filtered compressed air enters the pressurized on-line desiccant-filled drying Tower 1 through valve (A). Up-flow drying enables the desiccant to strip the air stream of moisture. Clean, dry compressed air exits through valve (E) to feed the air system. Tower 2 (when in regeneration mode) closes valve (B), then depressurizes to atmosphere through muffler (C). Valves (D & G) open and the heater turns on. A portion of dry compressed air (purge air) is diverted before exiting (E) and passes through the heater. Hot dry purge air desorbs the moisture from the desiccant as it flows down through Tower 2 to exit at valve (D). Once desorbed, the heater turns off and cool dry purge air continues to pass until the desiccant bed is cooled. Finally, valve (D) closes and Tower 2 is repressurized. At a fixed time interval, valve (B) will open and Tower 2 will be placed on-line to dry the bed and valves (A & D) will close. Operations will switch and Tower 1 will be regenerated.



Shown with Jet Injection Option

JET INJECTION OPTION PACKAGE

Whereas the standard design operates on a fixed time interval basis, Jet Injection versions manage the drying and regeneration cycles with precision for systems with variable air demands. The on-line Tower will continue to dry the air stream until the "moisture front" is detected. Only then will the switchover sequence begin. In regeneration mode the Jet Injection is engaged and a portion of dry purge air exits valve (F) to be injected into the Y-axis of the Jet Injection. A^3 Purge Technology™ draws ambient air into the X-axis to desorb the desiccant at better than 1:1 amplification. Sensors detect the retreat of the moisture front, disengages the Jet Injection, eliminates the purge air usage and, initiates the repressurization cycle. The dry, pressurized off-line Tower will remain ready and isolated until sensors detect that the on-line drying Tower is saturated. Then, the switchover will occur and the process will repeat.

PURGE AIR OPERATING COST COMPARISON

Annual Cost of Compressed Purge Air
(constant operation at average air demand)

AVERAGE AIR DEMAND		REGENERATION COST BY TECHNOLOGY[1]		
		HEATLESS (Industry average 15% purge)	PHD SERIES (Standard 7% purge)	PHD SERIES (Optional Jet Injection 6% purge)
(flow)	(scfm)			
100%	1050	$20,585	$9,606	$8,234
90%	945	$20,585	$9,606	$7,411
75%	788	$20,585	$9,606	$6,176
50%	525	$20,585	$9,606	$4,117
35%	368	$20,585	$9,606	$2,882
20%	210	$20,585	$9,606	$1,647

[1] Assumes 8760 hours, 10 cents per KwH, 5 scfm per HP

DEW POINT PERFORMANCE TABLE

CONTROLLER	PRESSURE DEW POINT		EMS ENERGY SAVINGS
	-40°F	-4°F	Automatic
Standard	S	G	-
Jet Injection Option	G	-	✓

S – Seasonal G – Guaranteed ✓– Included

Energy-Efficient Design

Soft-seated check valves for tight shutoff and durability

Towers filled with extra, high-grade activated alumina to deliver superior performance

High-quality pressure gauges display left tower, right tower, and purge pressure

Low-watt density heater saves energy and prevents premature desiccant aging

Function indicator LEDs for easy monitoring

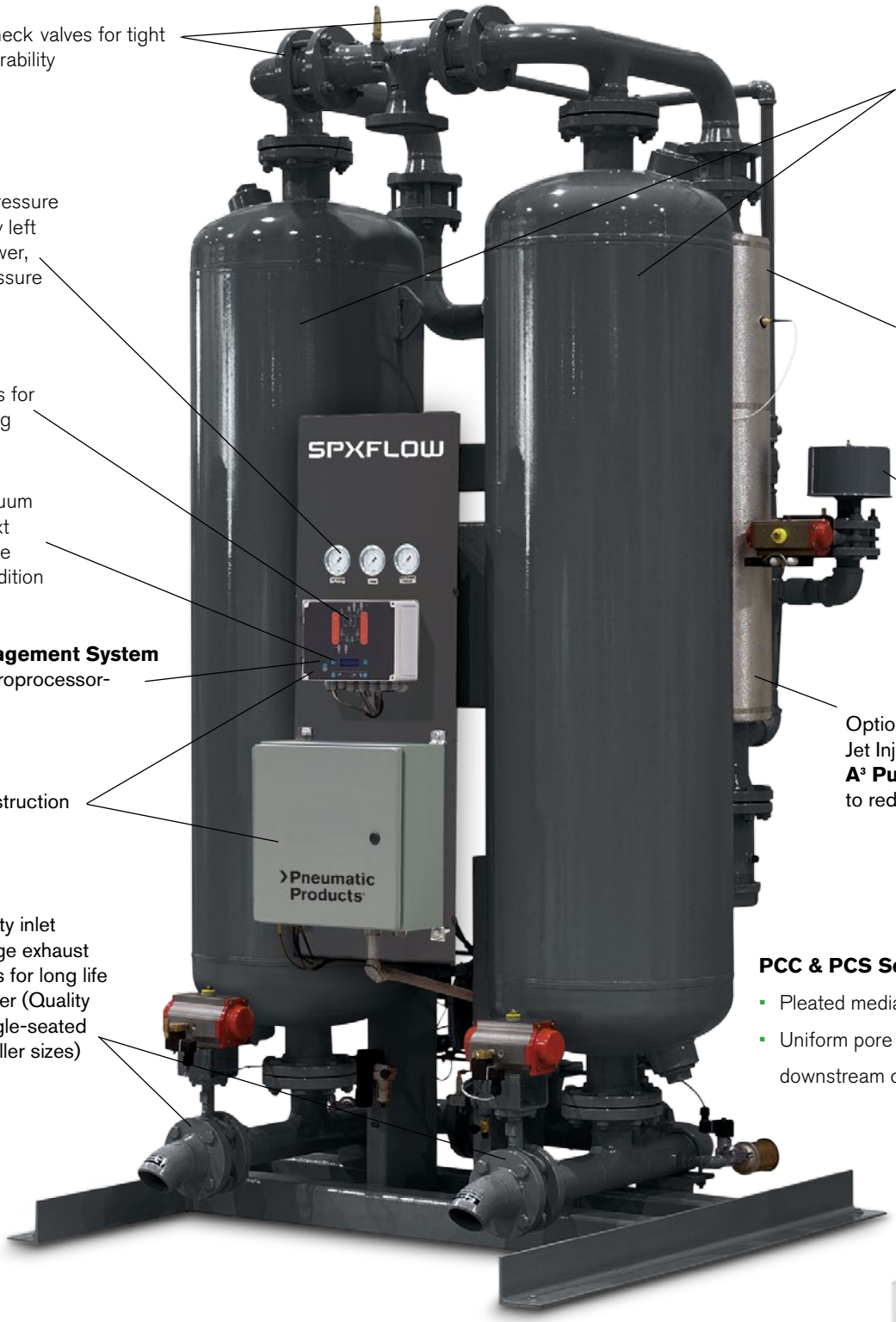
Heavy-duty air intake filter

Easy-view vacuum fluorescent text display is visible under any condition

Energy Management System advanced microprocessor-based control

Optional EMS controlled Jet Injection uses **A³ Purge Technology™** to reduce purge costs

NEMA 4 Construction



Premium quality inlet switching/purge exhaust butterfly valves for long life on 3" and larger (Quality pneumatic angle-seated valves for smaller sizes)

PCC & PCS Series Filtration

- Pleated media offers high capacity
- Uniform pore size reduces downstream contamination

**Model Shown with Optional Features*

OPTIONAL JET INJECTION ENERGY MANAGEMENT SYSTEM

Rugged temperature- & humidity-sensing technology embedded in the EMS control ensures dew point stability without the need for periodic recalibration. Constant desiccant bed monitoring uses algorithm-based protocols to deliver precise control of the A³ Purge Technology™. The Jet Injection is engaged and disengaged as needed to boost the airflow through the off-line tower. Bed regeneration cycles are managed with precision to deliver -40°F, Class 2 dew point, and reduce compressed purge air consumption to 6% or less.

Jet Injection with A³ Purge Technology™

MAXIMUM SAVINGS AND -40°F PRESSURE DEW POINTS

Select a Jet Injection (option A or B) option package to realize fast returns-on-investment. The A³ Purge Technology™ is controlled by the engagement cycles of the Jet Injection. Energy consumption to regenerate the desiccant bed mirrors your plant air demands. This process is governed by algorithmic logic embedded into the EMS Controller. Consistent -40°F pressure dew points are delivered while saving at least 9% on compressed purge air costs.

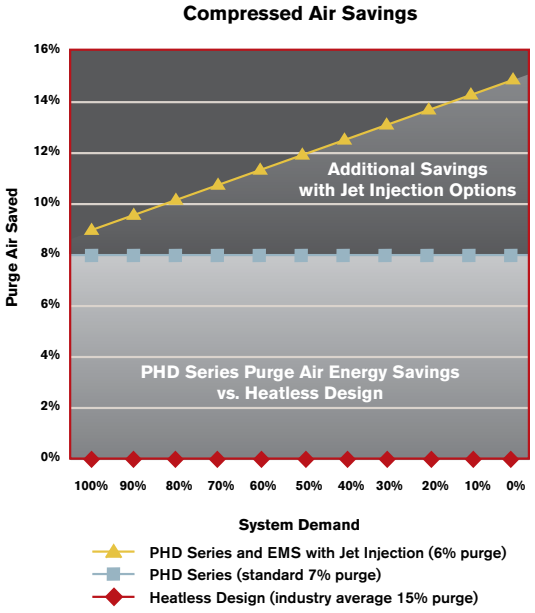
In many applications, the Jet Injection's compressed purge air requirements (6% or less) afford the selection of a smaller air compressor. System efficiencies become linear to the energy-saving potential of the dryer. Once the off-line desiccant bed has been regenerated, zero compressed purge air is required. This represents compressed air savings of up to 15% as compared to typical heatless designs.

ANNUAL PURGE SAVINGS VS. HEATLESS DESIGN

(1050 scfm System Profile Comparison)

AIR CAPACITY	AIR DEMAND	TIME (PER YEAR)		PHD SERIES SAVINGS		
Percent	(scfm)	Percent	Hours	Standard Design	Includes Option A or B	Savings with A or B
100%	1050	40%	3,504	$4,391	$4,940	$549
90%	945	5%	438	$549	$659	$110
75%	788	15%	1,314	$1,647	$2,470	$515
50%	525	15%	1,314	$1,647	$2,470	$823
35%	368	20%	1,752	$2,196	$3,541	$1,345
20%	210	5%	438	$549	$947	$398
Average	**555**	**100%**	**8,760**	**$10,979**	**$14,718**	**$3,740**

Annual savings (optional EMS with Jet Injection vs. standard PHD) **$3,740**
EMS option A – payback within 8.2 months



Product Features and Specifications

CONTROLLER FEATURE LIST

	Controller Configuration		
	Standard	Option A	Option B
Pressure Dew Point			
ISO Class 3 -4°F (-20°C)	G	—	—
ISO Class 2 -40°F (-40°C)	✓	G	G
Jet Injection			
	—	✓	✓
EMS Control			
Automatic Energy Savings	—	✓	✓
Vacuum Fluorescent Text			
Digital Dew Point Monitoring	—	—	✓
2 Line, 16 Characters (high-visibility in darkness or sunlight)	✓	✓	✓
Languages			
English, Spanish, French	✓	✓	✓
Power Recovery			
Automatic Restart after Power Loss	✓	✓	✓
Dry Contacts			
Remote Indication of Alarm	✓	✓	✓
Overlay w/Circuit Graphics & LED Indicators Alarm LEDs with Text Display			
Tower Status - (drying switchover heat, cool, etc.)	✓	✓	✓
Tower - Switchover, Failure (low heater temp/high heater temp)	✓	✓	✓
Sensor Over-range & Under-range	✓	✓	✓
Service Reminder	✓	✓	✓

✓ - Standard | G - Guaranteed

TABLE 1 CORRECTION FACTORS

PRESSURE	INLET TEMPERATURE °F (°C)						
psig (kgf/cm²)	60 (15.60)	70 (21.10)	80 (26.70)	90 (32.20)	100 (37.80)	110 (43.30)	120 (48.90)
60 (4.2)	1.03	1.01	0.99	0.8	0.58	0.43	0.32
70 (4.9)	1.1	1.08	1.07	0.94	0.68	0.5	0.37
80 (5.6)	1.17	1.15	1.14	1.08	0.79	0.58	0.43
90 (6.3)	1.24	1.22	1.2	1.18	0.89	0.66	0.49
100 (7.0)	1.3	1.28	1.26	1.24	1	0.74	0.55
110 (7.7)	1.36	1.34	1.32	1.3	1.11	0.82	0.61
120 (8.4)	1.42	1.4	1.38	1.36	1.22	0.9	0.67
130 (9.1)	1.48	1.46	1.44	1.42	1.33	0.99	0.74
140 (9.8)	1.53	1.51	1.49	1.47	1.44	1.07	0.8
150 (10.6)	1.58	1.56	1.54	1.52	1.5	1.16	0.87

OPERATING CONDITIONS

PHD MODELS	MAXIMUM WORKING PRESSURE psig	MINIMUM OPERATING PRESSURE psig	MAXIMUM INLET AIR TEMP. °F	MINIMUM INLET AIR TEMP. °F	MAXIMUM AMBIENT TEMP. °F	MINIMUM AMBIENT TEMP. °F
OPTION B	150	60	120	40	120	40

Inlet Flow

Inlet Flow capacities shown in the Specifications Table have been established at an inlet pressure of 100 psig (7kgf/cm^2) and a saturated inlet temperature of 100°F (38°C). To determine maximum inlet flow at other conditions, multiply the inlet flow from the Engineering Data Table by the multiplier from Table 1 that corresponds to your operating conditions.

Dew Point

Outlet pressure dew point at rated inlet conditions of 100 psig (7kgf/cm^2) and 100°F (38°C) saturated. Dew point varies slightly at other conditions. Consult the factory to determine exact outlet pressure dew point at your operating conditions.

ENGINEERING DATA – 300 THRU 3200 SCFM*

MODEL	INLET FLOW[1] @100 psig 100°F scfm	HEATER RATED OUTPUT kW	AVERAGE kW	DIMENSIONS inches H	W	D	INLET/OUTLET CONNECTIONS inches	APPROX. WEIGHT lbs.	FILTRATION[2]
PHD-300	300	5	2.7	98	48	47	1.5" NPT	1400	PCS13401
PHD-400	400	7	3.6	104	53	55	1.5" NPT	1800	PCS15001
PHD-500	500	7	4.5	105	53	56	1.5" NPT	1800	PCS15001
PHD-600	600	8	5.4	108	55	57	2" NPT	2000	PCS16001
PHD-750	750	10	6.8	114	60	65	2" NPT	2400	PCS18001
PHD-900	900	12	8.2	114	60	65	3" FLG	2400	PCS19501
PHD-1050	1050	14	9.5	113	64	66	3" FLG	2900	PCS112001
PHD-1300	1300	17	11.8	118	66	77	3" FLG	3400	PCC114003
PHD-1500	1500	19	18.6	119	80	83	4" FLG	5100	PCC118003
PHD-1800	1800	23	16.3	119	80	82	4" FLG	5100	PCC118003
PHD-2200	2200	28	20.0	127	85	87	4" FLG	7800	PCC124004
PHD-2600	2600	33	23.6	127	85	87	6" FLG	7800	PCC136003
PHD-3200	3200	40	29.1	125	97	91	6" FLG	9000	PCC136003

1 Performance data per CAGI Standard ADF 200 for Dual-Stage Regenerative Desiccant Compressed Air Dryer. Rating conditions are 100°F (37.8°C) inlet 100 psig (6.9 bar) inlet pressure, 100% relative humidity, 100°F (37.8°C) ambient temperature, and 5 psi (0.35 bar) pressure drop. * Consult factory for larger models.

2 Prefilter element type SU: Afterfilter element type HT.

PHD Series

300 - 3,200 SCFM

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PHD_NA Version: 02/2017 Issued: 10/2014