PNEUMATIC PRODUCTS
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Heat–Les™ Desiccant Compressed Air Dryers

DSE Series
DSS Series
DHD Series

DSE, DSS and DHD Series Heat–Les™ Desiccant Dryers

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 DSE Series, DSS Series and DHD Series are engineered to deliver ISO 8573.1 Air Quality with dew point performance guaranteed from 40 to 5,400 scfm.

Models 590-5400

Models 40-450

The Pneumatic Products Guarantee

Pneumatic Products guarantees that DSE Series, DSS Series and DHD 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.

Consistent Outlet Pressure

Dew Points: Industry-leading Desiccant Beds

- Industrial grade activated alumina desiccant beads offer enhanced surface area and high crush strength which prolongs bed life
- Large desiccant beds ensure 4.8 seconds of contact time..... allows wet, saturated air at the dryer inlet to be dried to the required dew point.
- Industrial grade desiccant ensures top performance over expected 3 to 5 years of desiccant bed life.
- Large flow diffusers ensure even flow distribution through the bed and eliminate channeling
- Towers are sized so that air velocity through the bed won't fluidize the desiccant which prevents bed movement and desiccant dusting
- Up-flow drying allows water and heavy contaminants to drop out of the air stream as they enter a tower which protects the bed from contamination. This makes it simple to discharge the contaminants when the tower depressurizes
- Cleanable stainless steel flow diffusers/support screens and separate fill and drain ports for ease of desiccant replacement

Space-saving Integrated Filtration

- Pneumatic Products P-2000 Series pre-filter and after-filter, piped and mounted as standard

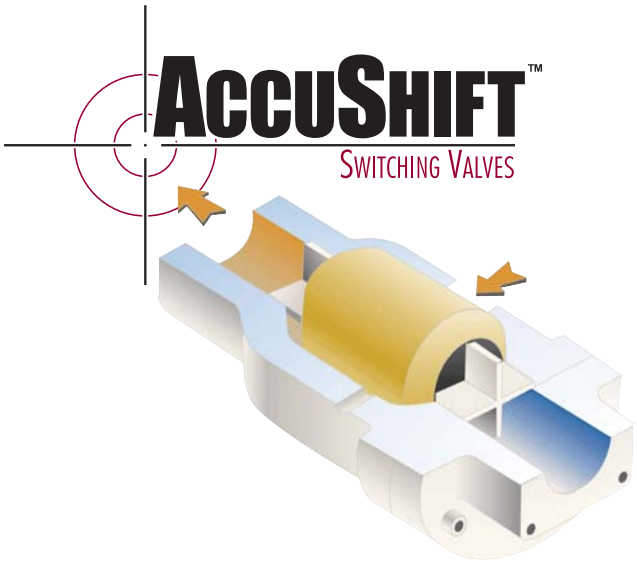
Safety Built to Code

- Pressure vessels are CRN and ASME Certified
- Heavy-duty mufflers for quiet operation-dryers are shipped with an extra set of mufflers
- NEMA 4 electrical construction is standard
- Pressure relief valves are standard

Four Dew Point Options per ISO 8573.1 Air Quality Standards

Specifying a pressure dew point is not simple work for an engineer. DSS and DSE Series dryer designs are optimized to match up to four pressure dew point classes of the ISO 8573.1 Air Quality Standard.

ISO 8573.1 Class	Dew Point	Remaining Moisture ppmw	Remaining Moisture mg/m³	DSE Series	DSS Series	DHD Series
1	-100°F -73°C	0.12	0.15	4 min. fixed	4 min. fixed	-
2	-40°F -40°C	10	12	Demand or 10 min. fixed	10 min. fixed	10 min. fixed
3	-4°F -20°C	81	97	Demand or 16 min. fixed	16 min. fixed	-
4	+38°F +3°C	610	730	Demand or 24 min. fixed	24 min. fixed	-



AccuShift™ Switching Valves – Durability for Decades

Flow direction components, such as switching valves and check valves, are typically the weakest link in any heatless desiccant dryer design. Valve diaphragms tear, check valves break, and valve stems leak. Wet air and unplanned maintenance results when you can least afford the downtime, too. That is what led Pneumatic Products to create a better solution. Simplicity and durability define AccuShift™ Switching Valves.

AccuShift™ Switching Valve cores are precision molded out of virgin nylon for quiet, resilient operation. Durable cast valve bodies provide broad flow paths to reduce pressure drop and eliminate localized abrasion. Internally powered with 1 moving part, this robust design encases the valve core and replaces common switching valves and check valves. Long life AccuShift valves target the weakest link to improve your uptime.

Accurate and Durable Process Valves

- AccuShift™ Inlet and Outlet switching valves automatically shift to the low pressure side of the circuit to control process flow
- AccuShift™ valve life tested to over 500,000 cycles
- AccuShift™ position memory ensures drying continues, even with the loss of electrical power to the dryer.
- 5 year AccuShift™ valve replacement warranty*
- Purge/repressurization valves are normally closed, pneumatic piston actuated, Y-angle poppet valves or premium quality butterfly valves.
- Three-way pilot operated solenoid valves manage the pilot air flow to direct the purge/repressurization valves
- Purge pressure adjustment valve

* Parts and labor covered through first year of warranty, parts only in second through fifth years.

Three Application Specific Dryer Designs

Empower yourself with 3 select designs to choose from. Each is engineered to balance economy and performance. Why three? Many applications operate with a large swing in air demands due to variations in production scheduling or shifts of operation. Some applications operate at a fraction of the flow of the compressor due to air system efficiency improvements. Some applications operate continuously at-or-near full capacity. The following table serves as a guide to help determine which design is best suited for your critical application.

Air Demand Profile		Flow Range	Pneumatic Products Solution
	Fluctuating Demands (1 to 3 shifts)	40 - 5,400	**DSE Series**
	Reduced Demands (1 to 3 shifts)	40 - 5,400	**DSE Series or DSS Series**
	Peak Demands (1 to 3 shifts)	40 - 5,400	**DSE Series DSS Series or DHD Series**

Standard Instrumentation

- Left and right tower pressure gauges
- Purge pressure gauge
- Moisture indicator – alerts operator of elevated dew point
- Throttling valve provides accurate purge pressure adjustment

DSE Series

Automatic Energy Savings with EMS-Energy Management System

DSE Series with the EMS-Energy Management System automatically computes purge air requirements to deliver maximum energy savings in proportion to the demand on the system. The energy savings go right to your bottom line. The EMS Controller features vacuum fluorescent text display that communicates energy savings, operating mode and service reminders. Select from one of four ISO 8573.1 pressure dew point settings for seasonal efficiencies.

DSS Series

Load Selectable Savings

DSS Series provides load selectable energy savings with Purge Economizer. Tailor the drying cycles, to match reduced peak air demands. This advanced controller offers 8 capacity settings, in 10 percent increments and, 4 pressure dew point settings to further tune your savings and, adapt to climatic changes in your environment.

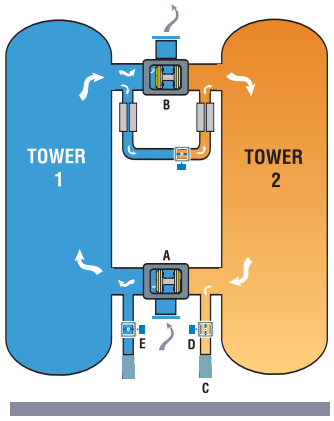
DHD Series

-40°F Dew Point Performance - Pure and Simple

DHD Series presents traditional heatless drying technology. A simple timer based controller delivers precise operation to deliver maximum value to applications that operate at or near full capacity. Automatic time controlled bed regeneration cycles offer consistent performance and economy of purchase.

How They Work

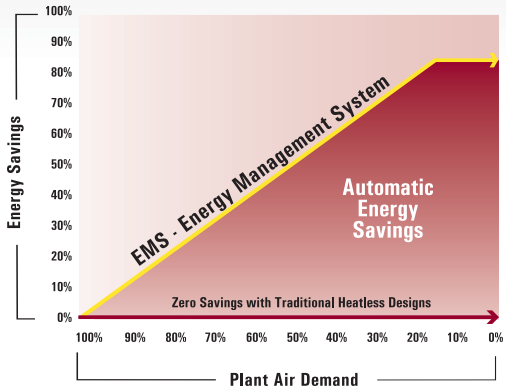
Moist, filtered compressed air enters the pressurized on-line desiccant-filled drying Tower 1 through AccuShift™ valve (A). Up-flow drying enables the desiccant to strip the air stream of moisture. Clean, dry compressed air exits through AccuShift™ valve (B) to feed the air system. Tower 2 (when in regeneration mode) depressurizes to atmosphere through muffler (C) when valve (D) opens. A portion of dry compressed air (purge air) is diverted before exiting (B) and passes through off-line Tower 2 and exits at valve (D) to desorb the moisture from the desiccant. Once desorbed, valve (D) closes and Tower 2 is repressurized. At tower shift-over, valve (E) will open, causing AccuShift™ Valves (A & B) to shift. Tower 2 will be placed on-line to dry the bed. Operations will switch and Tower 1 will be regenerated.



DSE Series, EMS Delivers Energy Savings

Pneumatic Products's EMS-Energy Management System, mirrors plant air demands to deliver calculated energy savings.

EMS-Energy Management System detects the rise in desiccant bed temperatures (heat of adsorption) that result during the drying phase. Temperature escalation and dry time provide an indirect measure of extracted water vapor. Advanced microprocessor based controls continuously re-calculate available drying time to manage how long a tower stays active. During the regeneration phase, the stored heat of adsorption is released to improve energy efficiency and prepare the inactive tower for the next cycle. After regeneration, the off-line tower is re-pressurized and, purge air consumption ceases in anticipation of the next drying cycle.



Maximize your return-on-investment automatically. DSE Series with EMS- Energy Management System, delivers energy savings in direct proportion to load variations from your plant air demands, making it the Auditor's Choice.

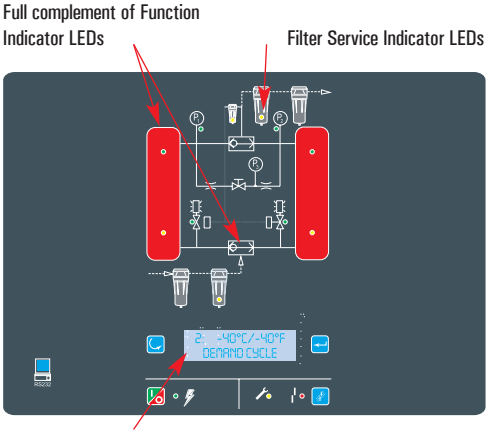
Advantages:

1. The system is based on saving the heat of adsorption - towers switch before heat is lost... maximizing purge air efficiency and minimizing the amount of purge air required.
2. Temperature transducers (thermistors) are used as sensing devices - they are simpler, more reliable, and more rugged than the humidity, pressure, and flow transducers used by others.
3. Sensors used on the system require no calibration.

Automatic Energy Savings with DSE Series*

Load	Dryer Flow Rates							
	590	750	930	1,130	1,350	1,550	2,100	3,000
100%	-	-	-	-	-	-	-	-
95%	$ 998	$ 1,268	$ 1,573	$ 1,911	$ 2,283	$ 2,621	$ 3,551	$ 5,073
90%	1,995	2,536	3,145	3,822	4,566	5,242	7,102	10,146
85%	2,993	3,805	4,718	5,732	6,848	7,863	10,653	15,218
80%	3,991	5,073	6,290	7,643	9,131	10,484	14,204	20,291
75%	4,988	6,341	7,863	9,554	11,414	13,105	17,755	25,364
70%	5,986	7,609	9,435	11,465	13,697	15,726	21,306	30,437
55%	8,979	11,414	14,153	17,197	20,545	23,589	31,959	45,655
40%	11,972	15,218	18,871	22,929	27,393	31,451	42,612	60,874
25%	14,965	19,023	23,589	28,661	34,242	39,314	53,265	76,092

* Assumes 5 scfm/HP, 8760 hours of operation per year, $ 0.10 kW/h



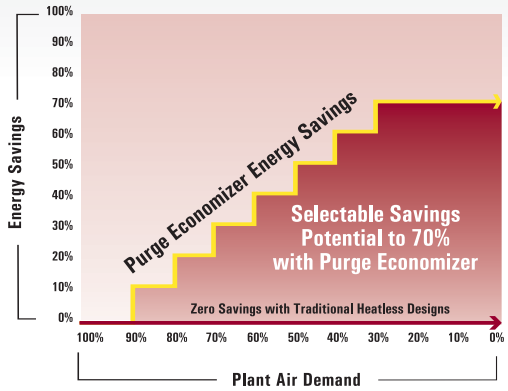
Controller Displays Energy Savings, Cycle Modes, Dew Point Selection, Service Reminders and Alarm Conditions

Superior energy savings and advanced communications capabilities make the DSE Series the best choice.

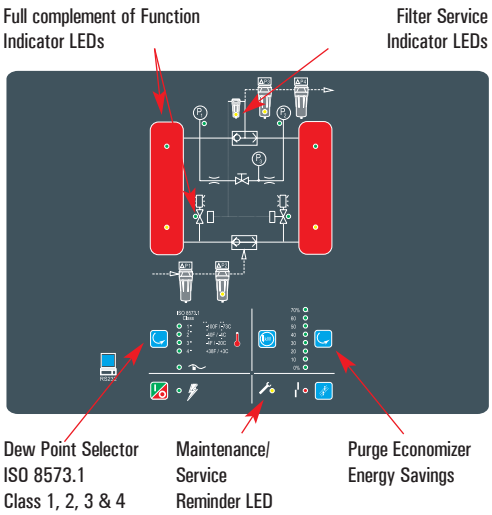
DSE Series Controller Features:

- Choice of four operating modes
- EMS-Energy Management System Demand mode or fixed cycle mode
- Switches for On/Off, Alarm and Service reminder reset
- Operational LED lights for power-on, tower status, valve status, and tower pressure
- Service reminder LED lights for filters and drains, valves, and desiccant.
- Alarm LED for tower switching failure, filter monitor signals, electronic demand drain alarms
- Vacuum fluorescent text display shows energy savings, operating mode and service reminders
- RS-232 communications port is standard

DSS Series, Load Selectable Energy Savings



Purge Economizer lets you align your purge costs with your air demands to optimize your return-on-investment. Tailor DSS Series dryers to take full advantage of air system efficiency improvements driven by air audit strategies.



Advanced energy saving capabilities and iconic circuit communications make the DSS Series the better alternative.

Eight energy saving selections, in 10% increments, deliver up to 70% in purge air energy savings, to help facilities adapt to reduced plant air demands. Ideal for facilities that are candidates for energy saving air system audits, end users can reduce dryer purge requirements to match reduced plant air loads on the dryer. Each Purge Economizer energy saving setting has an LED that illuminates to confirm the percentage of purge air energy being saved.

Energy Saving Settings from DSS Series*

Load	Dryer Flow Rates							
	590	750	930	1,130	1,350	1,550	2,100	3,000
100%	-	-	-	-	-	-	-	-
90%	$ 1,995	$ 2,536	$ 3,145	$ 3,822	$ 4,566	$ 5,242	$ 7,102	$ 10,146
80%	3,991	5,073	6,290	7,643	9,131	10,484	14,204	20,291
70%	5,986	7,609	9,435	11,465	13,697	15,726	21,306	30,437
60%	7,981	10,146	12,581	15,286	18,262	20,968	28,408	40,583
50%	9,977	12,682	15,726	19,108	22,828	26,210	35,510	50,728
40%	11,972	15,218	18,871	22,929	27,393	31,451	42,612	60,874
30%	13,967	17,755	22,016	26,751	31,959	36,693	49,714	71,019

* Assumes 5 scfm/HP, 8760 hours of operation per year, $ 0.10 kW/h

DSS Controller Features:

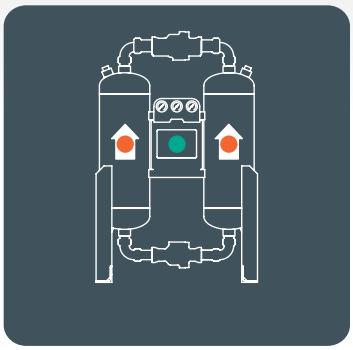
- Choice of four fixed cycle operating modes corresponding to ISO 8573.1 Air Quality Classes (see page 2 for ISO dew point classes and cycle times)
- Choice of eight Purge Economizer Energy Savings settings with an energy saving selector switch
- Switches for ISO Class dew point, On/Off, Alarm and Service reminder reset
- Operational LED lights for power-on, tower status, valve status, and tower pressure
- Service reminder LED lights for filters and drains, valves, and desiccant. The user selects between a Normal and a Severe service interval
- Alarm LED for valve switching failure
- RS-232 communications port is standard

DHD Series, -40°F Dew Point, Pure and Simple

Engineered to address the need for raw performance and value. Traditional design uses a simple timer to alternate flow between the two towers filled with industrial grade desiccant. While the on-line tower is drying the air stream, the off-line tower purges a fixed amount of compressed air to dry the bed and prepare it for the next work cycle.

DHD Controller Features:

- Control Panel overlay with LED's indicating:
  - Power On
  - Left Tower Drying
  - Right Tower Drying



Designed for durability in uncompromising applications, simple visual tower drying indicators make the DHD Series the right choice for those who want reliability without sacrificing pure performance.

DSE, DSS, DHD Series Engineered-to-Order Options

Options

- High dew point alarm which includes light and voltage free contacts for remote alarm
- Dew point monitor which includes digital display, voltage-free contacts and recorder output
- Low ambient packages, epoxy paint, severe environment protection
- Oil-free packages with integrated activated carbon towers

Product Features and Specifications

Model	Inlet Flow @ 100 psig (7 bar) scfm	Dimensions H Inches	W	D	Inlet / Outlet Connections [1]	Weight lbs.
DSE/DSS/DHD-40	40	46	32	32	3/4" NPT	365
DSE/DSS/DHD-60	60	61	32	32	3/4" NPT	445
DSE/DSS/DHD-90	90	78	32	32	1" NPT	575
DSE/DSS/DHD-115	115	54	44	38	1" NPT	685
DSE/DSS/DHD-165	165	54	44	38	1 1/2" NPT	685
DSE/DSS/DHD-260	260	72	48	38	1 1/2" NPT	1,010
DSE/DSS/DHD-370	370	63	55	38	2" NPT	1,215
DSE/DSS/DHD-450	450	71	55	38	2 1/2" NPT	1,350
DSE/DSS/DHD-590	590	101	52	48	2 1/2" NPT	1,473
DSE/DSS/DHD-750	750	104	54	48	2 1/2" NPT	2,134
DSE/DSS/DHD-930	930	109	59	56	3" NPT	2,414
DSE/DSS/DHD-1130	1,130	112	63	56	3" NPT	2,875
DSE/DSS/DHD-1350	1,350	117	65	56	3" ANSI FLG	3,722
DSE/DSS/DHD-1550	1,550	115	71	56	4" ANSI FLG	4,167
DSE/DSS/DHD-2100	2,100	116	79	56	4" ANSI FLG	4,417
DSE/DSS/DHD-3000	3,000	122	78	65	6" ANSI FLG	9,010
DSE/DSS/DHD-4100 [2]	4,100	122	93	85	6" ANSI FLG	9,900
DSE/DSS/DHD-5400 [2]	5,400	122	102	86	6" ANSI FLG	12,000

Maximum Working Pressure: 150 psig (10.3 bar) standard. 250 psig (17.0 bar) optional. Units with higher Maximum Working Pressures are available.
Minimum Operating Pressure: 150 psig (10.3 bar) units - 60 psig (4.1 bar). 250 psig (17.0 bar) - 120 psig (8.3 bar).
Maximum Inlet Air or Ambient Air Temperature: 120ºF (49ºC)
Available Voltages: DHD - 100-120V/1ph/50-60Hz, DSE/DSS - 100-240V/1ph/50-60Hz and 12-24 VDC, NEMA 4 Standard
Dimensions and weights are for reference only. Request certified drawings for construction purposes.
[1] BSP and DIN flanges available
[2] Supplied with Premium Quality Butterfly Switching Valves

Table 1 - Correction Factors

Operating Pressure	psig	60	70	80	90	100	110	120	130	140	150	175	200	225	250
	bar	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	9.7	10.3	12.1	13.8	15.5	17.0
Multiplier		0.65	0.74	0.83	0.91	1.00	1.04	1.08	1.12	1.16	1.20	1.29	1.37	1.45	1.52

Regeneration Flow Rate

The amount of air used during the regeneration phase consists of the amount used while the purge/repressurization valve is open (purge air) plus the volume of air used to repressurize the tower after the purge/repressurization valve closes. Typically the rate shown is averaged over the cycle time. At 100 psig (7 bar), average air use is 14.4% of the inlet flow capacity (13.7% for purge +0.7% for repressurization) for dryers operating on a 10 minute cycle; 15.5% (13.7% for purge +1.8% for repressurization) for dryers operating on a 4 minute cycle. Instantaneous flow rate (air flowing while the purge/repressurization valve is open) varies with cycle selection, Energy Savings setting, and inlet pressure.

Inlet Flows

Inlet flow capacities are established in accordance with CAGI (Compressed Air and Gas Institute) standard ADF-200: Inlet air pressure 100 psig (7 bar), inlet temperature saturated at 100°F (38°C). To determine inlet flow at pressures other than 100 psig (7 bar), multiply inlet flow at 100 psig (7 bar) from Product Specifications by the corresponding multiplier in Table 1.

SPX PNEUMATIC PRODUCTS

Improvements and research are continuous at SPX Pneumatic Products. Specifications may change without notice.

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