



HEATLESS DESICCANT AIR DRYERS
HHS, HHL AND HHE SERIES

HANKISON HEATLESS DESICCANT DRYERS **HHS, HHL AND HHE SERIES**

Since 1948, sensitive applications requiring clean, dry, compressed air have turned to Hankison for the optimal solution. Utilizing twin towers filled with premium grade activated alumina, Hankison Heatless dryers are available with 3 application specific control systems to meet the needs of industry with economy and performance. Hankison HHS, HHL or HHE Series heatless desiccant dryers provide consistent outlet pressure dew points to -100°F (-73°C).

Microelectronics, food packaging, paper, glass, pharmaceutical, powder painting, hospital laboratories: these industries are a small representative sample of industries utilizing desiccant dryers. They all have one thing in common...they need to save space on the factory/laboratory floor. HH Series' sleek designs and compact footprints help engineers address those needs.

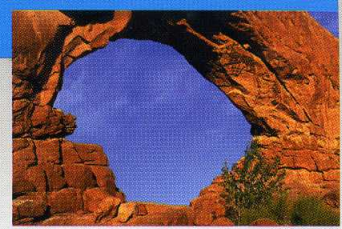


CONSISTENT OUTLET PRESSURE DEW POINTS: INDUSTRY-LEADING DESICCANT BEDS

- Premium grade 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
- 30% extra desiccant provided to compensate for natural bed aging...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

SAFETY BUILT TO CODE

- Pressure vessels are CRN and ASME Certified
- Heavy-duty mufflers for quiet operation – dryers 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. Hankison Heatless dryer designs allow you to optimize performance and dew points in-the-field to adapt to your environment and meet the following ISO 8573.1 Classes of air quality.

ISO 8573.1 Class	Dew Point		Remaining Moisture		HHS Series	HHL Series	HHE Series
			ppmw	mg/m ³			
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	-

TARGET THE WEAKEST LINK

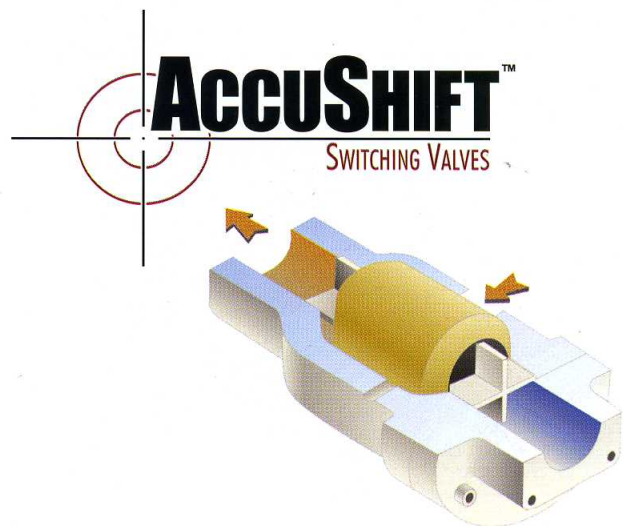
Flow direction components, such as switching valves and check valves, are typically the weakest link in any heatless desiccant dryer design. Valve diaphragms tear, check valves break and valve stems leak. Wet air and unplanned maintenance results when you can least afford the downtime, too. That is what makes the simplicity and durability of AccuShift™ Switching Valves so desirable.

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

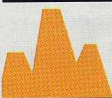
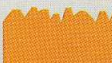

- AccuShift™ Inlet and Outlet switching valves automatically shift to the low pressure side of the circuit to control process flow
- AccuShift™ valve life tested to over 500,000 cycles with tough desiccant dust challenge
- AccuShift™ position memory ensures drying continues, even with the loss of electrical power to the dryer
- 5 year AccuShift™ valve replacement warranty¹
- 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

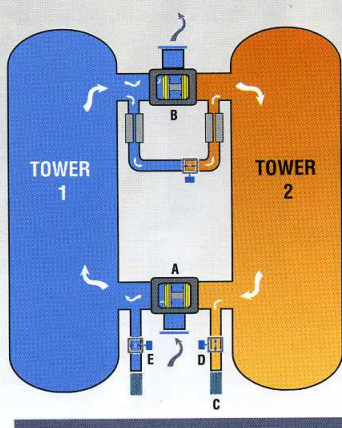
¹ Dryer must be protected by properly sized Hankison prefilter.
Parts and labor covered through first year of warranty, parts only in second through fifth years.



HHS, HHL AND HHE SERIES DRYERS: 3 APPLICATION SPECIFIC DESIGNS

Empower yourself with 3 select designs to choose from that are 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	Hankison Solution
 Fluctuating Demands (1 to 3 shifts)	40 - 5,400	HHS Series
 Reduced Demands (1 to 3 shifts)	40 - 5,400	HHS Series or HHL Series
 Peak Demands (1 to 3 shifts)	40 - 5,400	HHS Series or HHE 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

HHS SERIES

Automatic SensaTherm® Energy Savings

HHS Series with SensaTherm® automatically matches purge air use to the demand on the system. This ensures maximum performance as the energy saved goes right to your bottom line. Controller features vacuum fluorescent text display that communicates energy savings, operating mode and service reminders. Select from one of the four pressure dew point settings to optimize your savings for each season.

HHL SERIES

Selectable Purge Economizer Savings

HHL Series provides user selectable energy savings. Tailor the drying cycles, to match your peak air demand, in 10 percent increments. In addition, this state-of-the-art controller offers four pressure dew point settings to further tune your savings and adapt the system to your environment.

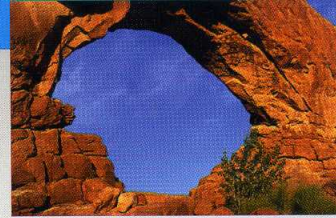
HHE SERIES

-40°F Dew Point Performance - Pure and Simple

HHE Series presents traditional heatless drying technology. Using a simple timer based controller, these are designed 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 IT WORKS

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.



SensaTherm®

Automatic Purge Saving System

HHS SERIES, AUTOMATIC SENSATHERM® ENERGY SAVINGS

Hankison's patented SensaTherm® energy saving purge system mirrors plant air demands to deliver maximum energy savings. When operating at reduced capacity, the on-line drying tower remains active longer, until its full drying capacity is utilized. Desiccant bed temperature changes are constantly monitored within each tower to precisely manage drying times and reduce purge air consumption.

SensaTherm® measures the increase in desiccant bed temperature (heat of adsorption) during the drying stage and the decrease in desiccant bed temperature (heat of desorption) during the regeneration stage. These temperature changes are accurate indicators of the moisture load on the dryer. This data is interpreted by microprocessor based controls to determine how long a tower stays on-line during the drying stage. Then, the stored heat of adsorption is released during the regeneration stage to improve energy efficiency and prepare the off-line 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.

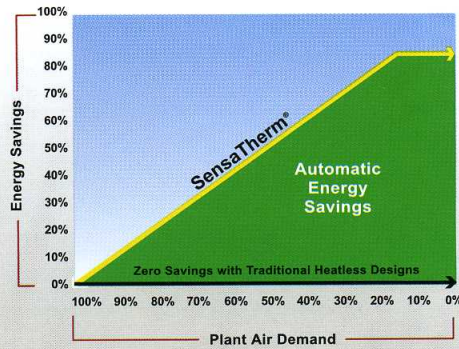
Advantages:

1. Temperature transducers (thermistors) are used as sensing devices - they are simpler, more reliable and rugged than the humidity, pressure and flow transducers others use.
2. Sensors used on the SensaTherm® system require no calibration.
3. 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.

HHS SERIES CONTROLLER FEATURES:

- Choice of four operating modes (see page 3 for ISO dew point classes)
- SensaTherm® Demand 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. The user selects between a Normal and a Severe service interval.
- Alarm LED for tower switching failure, filter monitor signals, electronic demand drain alarms on filters
- Vacuum fluorescent text display communicates energy savings, operating mode and service reminders
- RS-232 communications port is standard

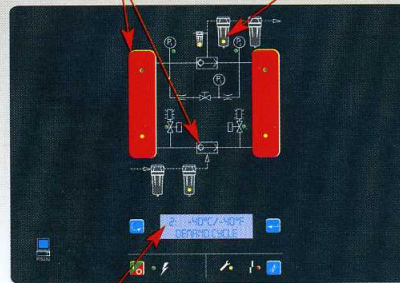
Superior energy savings and advanced communications capabilities make the HHS Series the best choice.



Maximize your return-on-investment automatically. HHS Series with SensaTherm® delivers energy savings in direct proportion to load variations from your plant air demands, making it the Auditor's Choice.

Full complement of Function Indicator LEDs

Filter Service Indicator LEDs



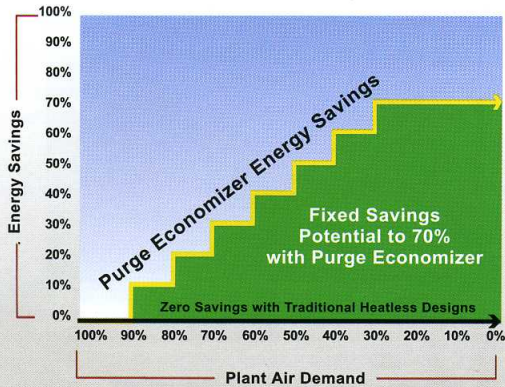
Controller Displays Energy Savings, Cycle Modes, Dew Point Selection, Service Reminders, and Alarm Conditions

Automatic Energy Savings with HHS Series

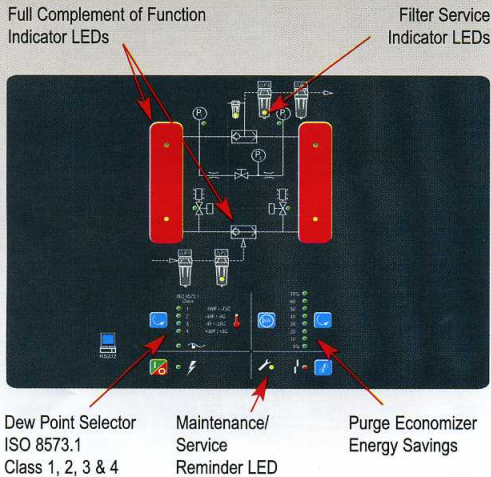
Load	Sensatherm Energy Savings *							
	590	750	930	1,130	1,350	1,550	2,100	3,000
100%	-	-	-	-	-	-	-	-
95%	\$ 741	\$ 941	\$ 1,167	\$ 1,418	\$ 1,694	\$ 1,945	\$ 2,636	\$ 3,765
90%	1,481	1,883	2,335	2,837	3,389	3,891	5,271	7,531
85%	2,222	2,824	3,502	4,255	5,083	5,836	7,907	11,296
80%	2,962	3,765	4,669	5,673	6,778	7,782	10,543	15,061
75%	3,703	4,707	5,836	7,091	8,472	9,727	13,179	18,827
70%	4,443	5,648	7,004	8,510	10,166	11,673	15,814	22,592
55%	6,665	8,472	10,505	12,764	15,250	17,509	23,722	33,888
40%	8,886	11,296	14,007	17,019	20,333	23,345	31,629	45,184
25%	11,108	14,120	17,509	21,274	25,416	29,181	39,536	56,480

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

HHL SERIES AND HHE SERIES DESICCANT DRYERS



Purge Economizer lets you align your purge costs with your air demands to optimize your return-on-investment. Tailor HHL 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 HHL Series the better alternative.

HHL SERIES, SELECTABLE PURGE ECONOMIZER SAVINGS

Reducing the amount of time the dryer spends purging in the regeneration cycle can save energy. Eight settings (0% to 70% in 10% increments) are furnished to allow end users to reduce the purge to match reduced air loads on the dryer. Each energy saving setting has an LED which will illuminate when it is selected. Simply use the supplied switch to select the desired energy saving setting.

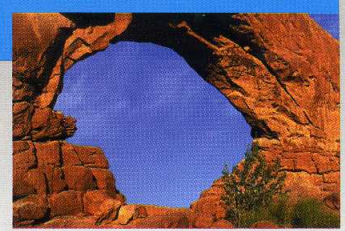
HHL Controller Features:

- Choice of four fixed cycle operating modes corresponding to ISO 8573.1 Air Quality Classes (see page 3 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
- Alarm LED for valve switching failure
- RS-232 communications port is standard
- Service reminder LED lights for filters and drains, valves and desiccant. The user selects between a Normal and a Severe service interval.

Energy Saving Settings from HHL Series

Load	Purge Economizer Energy Savings *							
	590	750	930	1,130	1,350	1,550	2,100	3,000
100%	-	-	-	-	-	-	-	-
90%	\$ 1,481	\$ 1,883	\$ 2,335	\$ 2,837	\$ 3,389	\$ 3,891	\$ 5,271	\$ 7,531
80%	2,962	3,765	4,669	5,673	6,778	7,782	10,543	15,061
70%	4,443	5,648	7,004	8,510	10,166	11,673	15,814	22,592
60%	5,924	7,531	9,338	11,346	13,555	15,563	21,086	30,123
50%	7,405	9,413	11,673	14,183	16,944	19,454	26,357	37,653
40%	8,886	11,296	14,007	17,019	20,333	23,345	31,629	45,184
30%	10,367	13,179	16,342	19,856	23,722	27,236	36,900	52,715

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



HHE SERIES, -40°F DEW POINT PERFORMANCE, PURE AND SIMPLE

Engineered to address the need for raw performance and value. This traditional design uses a simple timer to alternate the flow between the two towers filled with premium 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 prepares it for the next drying cycle.

HHE Controller Features:

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

HHS, HHL AND HHE SERIES ENGINEERED-TO-ORDER

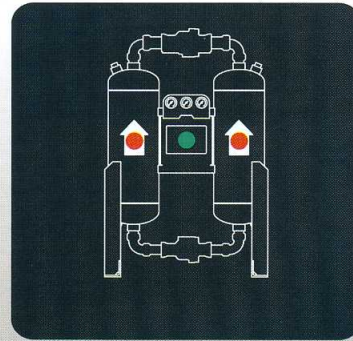
Options

- High dew point alarm which includes light and voltage free contacts for remote alarm
- Dew point monitor, 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

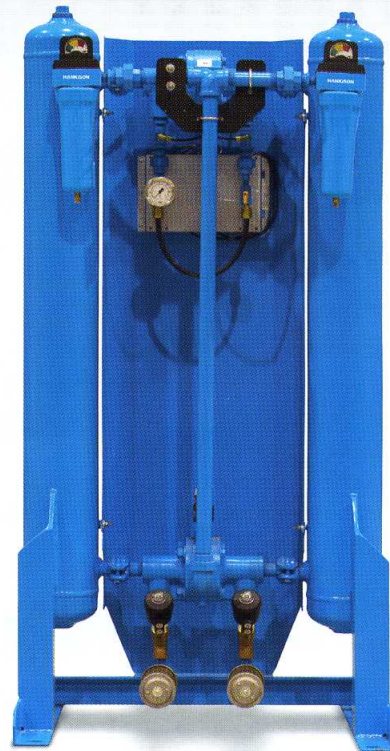
SPACE-SAVING INTEGRATED FILTRATION MODELS 40 - 5,400 SCFM

Optional pre-filter and after-filter packages, featuring Hankison HF Series coalescing filters, can be pre-installed at the factory to save time and labor.

- HF Series Grade 9 (3 micron bulk liquid) and Grade 5 (0.008 ppm oil aerosols) pre-filters are recommended for -40°F to +38°F (-40°C to +3°C) dew points
- HF Series Grade 7 (1 micron particulate) and Grade 3 (0.0008 ppm oil aerosols) pre-filters are recommended for -100°F (-73°C) dew points
- HF Series Grade 6 (1 micron dry particulate) and Grade 1 (oil vapor) are the recommended after-filters



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



Models HHS/HHL/HHE-40-450

HHS, HHL AND HHE SERIES PRODUCT SPECIFICATIONS

Model	Inlet Flow		Dimensions			Inlet / Outlet Connections ¹	Weight lbs.
	@ 100 psig (7 bar)	scfm	H	W Inches	D		
HHS/HHL/HHE-40	40		46	32	32	1" NPT	365
HHS/HHL/HHE-60	60		61	32	32	1" NPT	445
HHS/HHL/HHE-90	90		78	32	32	1" NPT	575
HHS/HHL/HHE-115	115		54	44	38	1" NPT	685
HHS/HHL/HHE-165	165		54	44	38	1" NPT	685
HHS/HHL/HHE-260	260		72	49	38	2" NPT	1,010
HHS/HHL/HHE-370	370		63	55	38	2" NPT	1,215
HHS/HHL/HHE-450	450		71	55	38	2" NPT	1,350
HHS/HHL/HHE-590	590		101	50	53	2" NPT	1,473
HHS/HHL/HHE-750	750		109	51	48	3" ANSI Flg.	2,134
HHS/HHL/HHE-930	930		113	56	56	3" ANSI Flg.	2,414
HHS/HHL/HHE-1130	1,130		113	59	56	3" ANSI Flg.	2,875
HHS/HHL/HHE-1350	1,350		118	60	56	3" ANSI Flg.	3,722
HHS/HHL/HHE-1550	1,550		113	66	56	3" ANSI Flg.	4,167
HHS/HHL/HHE-2100	2,100		116	73	56	4" ANSI Flg.	4,417
HHS/HHL/HHE-3000	3,000		122	78	65	4" ANSI Flg.	9,010
HHS/HHL/HHE-4100 ²	4,100		124	93	88	6" ANSI Flg.	9,900
HHS/HHL/HHE-5400 ²	5,400		126	102	92	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: 120°F (49°C)

Pressure Drop at Rated Flow: Less than 5 psi (0.34 bar)

Available Voltages: HHE - 100-120V/1ph/50-60Hz, HHL/HHS - 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

CAPACITY CORRECTION FACTORS

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.

Table 1 - Correction Factors (multipliers) for Inlet Pressure

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
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.



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Specifications may change without notice.