



**HL TYPE
HEATERLESS DRYERS**



GENERAL AIR
Making the world's air dryer

Introduction

The General Air Division of PSB Industries Inc. manufactures the most extensive variety of air and gas dehydration equipment on the market today for industrial, commercial, laboratory, military and other applications. These products are supplemented by the popular GAD Filters and Timer-Controlled Automatic Drains.

Clean, dry, compressed air is essential in any application to maintain maximum efficiency in the use of pneumatic equipment. It offers energy savings a thousand-fold the cost of its installation.

The Type HL Heaterless Dryer, with its -40°F pressure dewpoint, was developed following extensive and comprehensive tests, involving desiccant type evaluation, flow rate and regeneration times. Other parameters such as non-lubricated control valves were also taken into consideration. This series of HL Dryers is designed to provide industry with super dry, compressed air combined with maximum reliability and lowest possible maintenance.

Features

- Provides super dry air with dewpoints at line pressure of -40°F, or below.
- Does not appreciably increase temperature of processed air.
- Low temperature operation and reactivation reduces corrosion to near zero.
- Long lasting desiccant bed of activated alumina.
- Maintains drying capacity; moisture is removed from the desiccant by counterflow of clean, dry air at lower dewpoint and pressure. Prevents formation of oil varnish build-up, maintaining desiccant adsorptive ability.
- Automatic repressurization equalizes desiccant chamber pressures before changeover to protect desiccant and prevent downstream pressure fluctuations.
- Stainless steel diffuser screens in each desiccant chamber to retain desiccant and disperse air flow to prevent channeling.
- Separate drain and fill ports to replace desiccant. No piping disconnects required.
- Fully automatic, operates continuously without attention. Dual towers are alternately on stream or purge for uninterrupted air flow.
- Low pressure drop
- 60 PSIG to 150 PSIG standard operating pressure range. (Higher working pressure ranges available.)
- GAD solid-state control timer. Controls transfer valves and solenoids. Eliminates traditional cam timers.
- Soft seated check valves in output air lines to withstand shocks over a long period of time.
- Adjustable purge flow rate regulating device – shipped in locked position at standard purge flow rate.
- 4-way solenoid valve directs dry air from dryer output to actuator for control of valve switching
- GAD 4-way switching valve with integral actuator is of the sliding action and has full port openings. Valve is non-lubricated with floating Teflon sealing surfaces. Seals may be replaced without disconnecting piping. Larger units utilize a non-lubricated 4-way rotor valve.
- Compact design. Large capacity with minimum floor space.
- Pneumatic devices protected by in-line pilot filter.
- High performance – low initial installation and operating costs. No cooling water, nearly zero maintenance.

Design Ratings

All models are design rated to produce a -40°F pressure dewpoint at 100 PSIG with 100°F saturated inlet air. Maximum inlet air temperature is 120°F. Maximum working pressure is 150 PSIG. All models are designed and built in accordance with the ASME unfired pressure vessel code. Models with chambers large enough to require it are ASME inspected and stamped.

Standard units have a 115V control circuit, timers and solenoids. (Total amp draw less than 0.5 amps.)

Model	MWP PSIG	Inlet Capacity	Purge Loss	Outlet Capacity	Overall Dimensions in Inches (For Reference Only)						Weights (Lbs.)	
		SCFM @ 100 PSIG & 100°F			A	B	C	D	E	F	Total	Desiccant
HL-2	150	11.7	1.7	10	54	24	14	1/4" NPT	8	17	134	14
HL-4	150	23.4	3.4	20	59	26	14	1/2" NPT	8	17	209	29
HL-10	150	58.5	8.5	50	65	28	14	3/4" NPT	8	17	355	75
HL-20	150	117	17	100	79	31	19	1" NPT	—	—	550	150
HL-30	150	176	26	150	92	36	21	1" NPT	—	—	885	285
HL-40	150	234	34	200	88	40	23	1 1/2" NPT	—	—	1,115	355
HL-60	150	351	51	300	103	39	23	1 1/2" NPT	—	—	1,300	450
HL-80	150	468	68	400	110	45	26	1 1/2" NPT	—	—	1,550	600
HL-100	150	585	85	500	100	57	26	2" Flg.	—	—	2,070	770
HL-120	150	702	102	600	111	57	26	2" Flg.	—	—	2,510	910
HL-150	150	878	128	750	93	68	32	2" Flg.	—	—	3,130	1,180
HL-180	150	1,054	154	900	102	68	34	2" Flg.	—	—	3,550	1,400
HL-225	150	1,317	192	1,125	127	78	40	3" Flg.	—	—	4,100	1,750
HL-280	150	1,639	239	1,400	114	82	43	3" Flg.	—	—	4,800	2,300
HL-350	150	2,049	299	1,750	128	82	43	3" Flg.	—	—	5,600	2,800
HL-400	150	2,342	342	2,000	117	90	43	3" Flg.	—	—	6,300	3,300
HL-500	150	2,927	427	2,500	112	121	48	4" Flg.	—	—	8,000	4,000
HL-575	150	3,366	491	2,875	122	121	48	4" Flg.	—	—	9,600	4,600
HL-600	150	3,513	513	3,000	106	127	48	4" Flg.	—	—	10,900	4,900
HL-750	150	4,365	615	3,750	119	131	52	6" Flg.	—	—	13,500	6,000

The GAD Heaterless Dryer is air reactivated by directing a small portion of the dry air from the drying tower to the tower being reactivated in reverse flow direction. The process is automatically switched from one tower to the other on a timed sequence basis. All regenerative dryers should be preceded by a coalescing prefilter with automatic drain and followed by a particulate afterfilter. GAD filters are recommended to assure super dry, oil-free and clean compressed air of instrument quality.

Theory of Operation

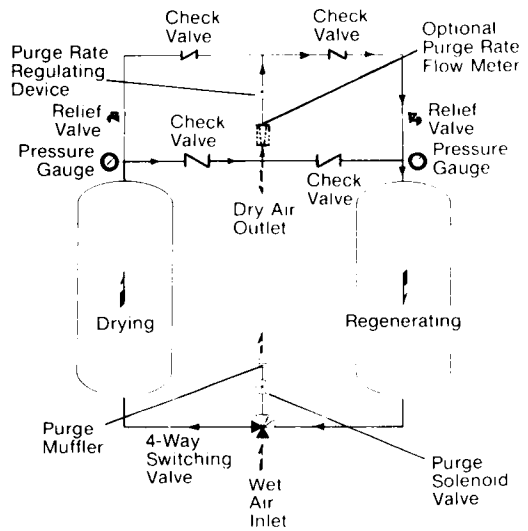
GAD Heaterless Dryers take advantage of the natural tendency of desiccants to establish equilibrium with their surroundings. During the drying cycle, the desiccant adsorbs moisture from the incoming wet air stream. During the regeneration cycle, a small portion of the super-dried air is passed through the desiccant at near atmospheric pressure, to pick up and remove the adsorbed moisture, which is then vented to atmosphere.

Actual Operation

The compressed air flow cycles between the two desiccant towers by means of valving controlled by a solid-state timer. Wet air enters at the bottom of one tower and passes upward through the desiccant bed, where the entrained moisture is adsorbed. The clean, dry air exits at the top.

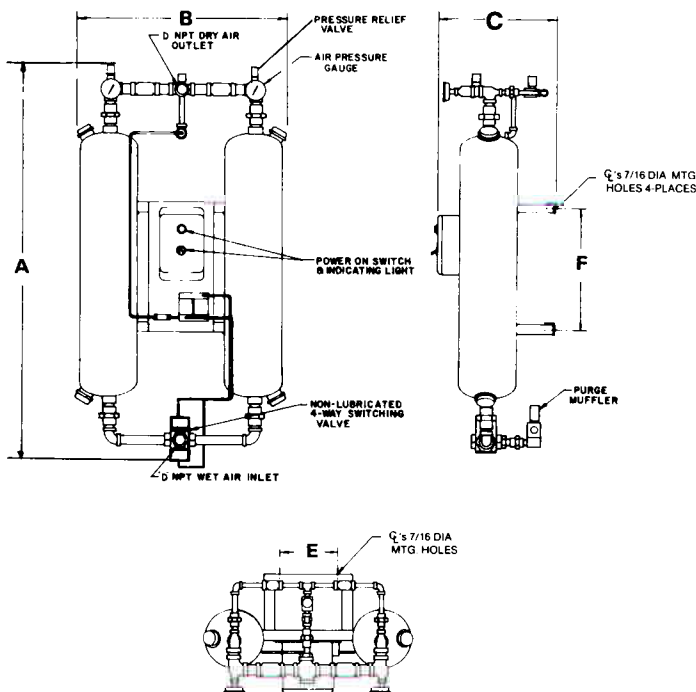
A small portion of the dried air is reduced to near atmospheric pressure and passed downward through the desiccant bed in the other tower, removing the moisture collected and reactivating the desiccant. This moisture-laden purge air is then vented to atmosphere through a muffler.

Air Flow Within Dryer

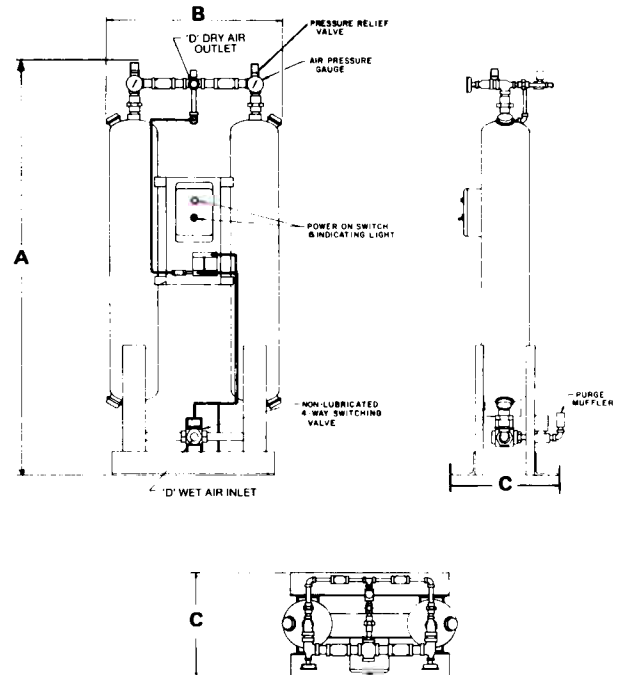


At preset intervals, the two towers are alternately placed on stream or purge, automatically and without attention. Before going on stream, each tower is s-l-o-w-l-y repressurized to prevent a sudden inrush of air which can cause excessive desiccant abrasion. Reactivation must be on a constant, continuing repetitive and reoccurring basis. Cycle failure means reactivation failure. Reactivation failure means total dryer failure.

Models HL-2, HL-4, HL-10 – Wall-Mounted



Models HL-20 and Larger



Dimensions on Page 2

Capacity Data

Inlet Pressure (PSIG)	Outlet Capacity Multiplier	Purge Air Percent of Inlet Flow
150	—	1.5
130	—	1.3
110	—	1.1
100	—	1.0
90	—	0.9
80	—	0.8
70	—	0.7
60	—	0.6

DO NOT OPERATE BELOW 60 PSIG

For operation at various inlet pressures and 100°F inlet air, use the following equation:

$$\text{Inlet Capacity} = \frac{\text{Outlet Capacity} \times \text{Outlet Capacity Multiplier}}{1 - \text{Purge Air Percent (Decimal Form)}}$$

Example: Find inlet capacity of HL-2 at 130 PSIG.

$$\text{Inlet Capacity} = \frac{10 \text{ SCFM} \times 1.3}{1 - 0.115}$$

Inlet Capacity = 14.7 SCFM
 Outlet Capacity = 10 x 1.3 = 13 SCFM
 Purge Flow = Inlet Flow - Outlet Flow
 Purge Flow = 14.7 - 13 ⇒ 1.7 SCFM

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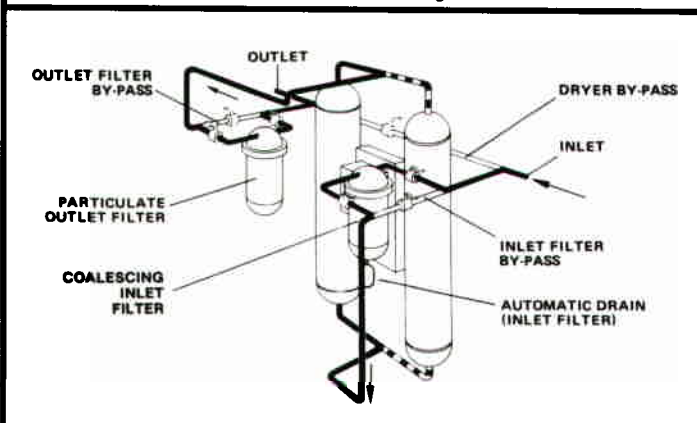
Clean, dry, compressed air is essential in any application to maintain maximum efficiency in the use of pneumatic equipment. It offers energy savings a thousand-fold the cost of its installation.

Dryer Model	Dryer Outlet SCFM @ 100 PSIG	Coalescing Prefilter	with	Automatic Float Drain	Particulate Afterfilter
HL-2	10	C 2	—	71034-39	P 2
HL-4	20	C 5	—	"	P 2
HL-10	50	C 15	—	"	P 5
HL-20	100	C 30	—	"	P 15
HL-30	150	C 30	—	"	P 15
HL-40	200	C 30	—	"	P 30
HL-60	300	CX100	—	71034-38	P 30
HL-80	400	CX100	—	"	P 50
HL-100	500	CX160	—	"	P 50
HL-120	600	CX160	—	"	PX100
HL-150	750	CX200	—	"	PX160
HL-180	900	CX200	—	"	PX160
HL-225	1,125	CX300	—	"	PX200
HL-280	1,400	CX400	—	"	PX200
HL-350	1,750	CX600	—	"	PX300
HL-400	2,000	CX600	—	"	PX300
HL-500	2,500	CX600	—	"	PX400
HL-575	2,875	CX800	—	"	PX400
HL-600	3,000	CX800	—	"	PX400

- The following items are standard features on all models:
1. Activated alumina desiccant.
 2. Non-lubricated 4-way pneumatic switching valve.
 3. 10-minute NEMA cycle (5-minute drying, 5-minute purge).
 4. Pressure gauge and relief valve for each tower.
 5. Purge flow muffler.

6. Preset purge flow control.
7. 115/1/60 solid-state timer with on/off switch and light.
8. Pilot air filter.
9. Repressurization of the towers before they go on drying cycle to prevent desiccant dusting.
10. NEMA 1 electrical enclosure.

Typical Air Flow Thru Dryer and Filters



*The filters depicted are in-line as installed on Models HL-2 through HL-180.

Optional Equipment

- Gauges, Air Temperature, set of 2
- Moisture Indicator, Color Change
- Moisture Analyzer, Digital Hygrometer with alarm
- Cycle Failure Alarm, Visual - All NEMA Classifications
- NEMA 4, 7 or 12 Electrical Enclosures
- Adjustable Purge Flow Indicator (Gauge)
- Flow Meter, Purge Air
- High Humidity Audible Alarm with Silencer Button
- Tower Reactivating Indicator Lights, set of 2
- All Pneumatic Controls for Hazardous Areas
- Stainless Controls for Sour Gas or Off-Shore Applications
- Installed Prefilter and Afterfilter Assemblies
- For higher working pressures, lower dewpoints, other optional equipment, or hazardous area classifications, contact the factory.