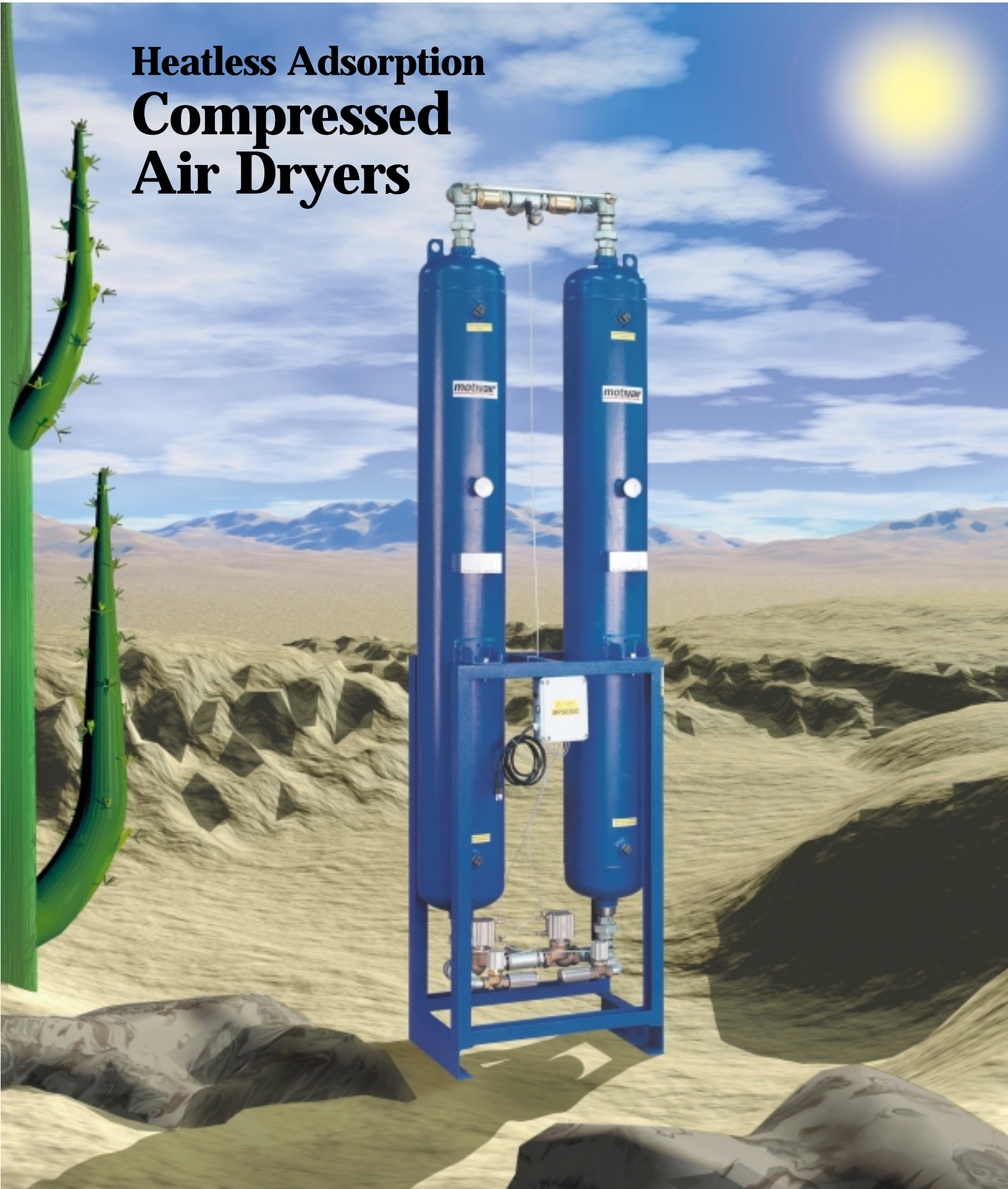


Heatless Adsorption Compressed Air Dryers

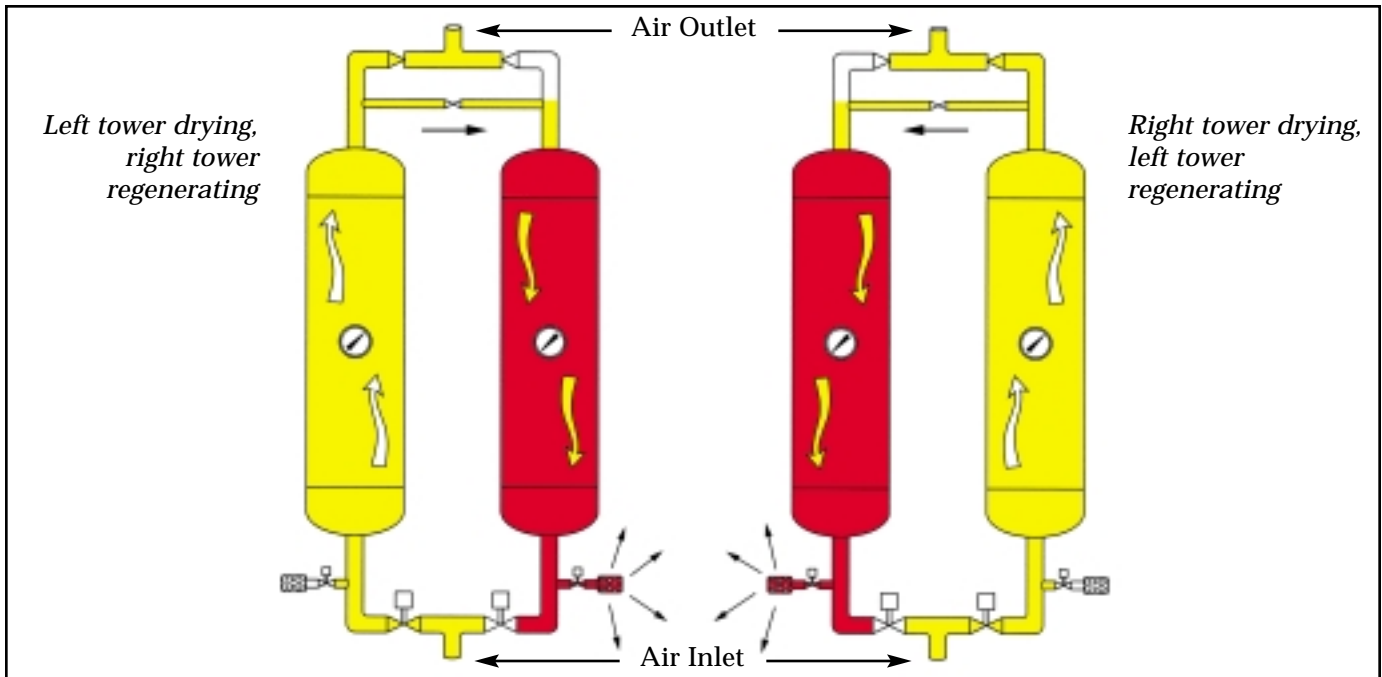


Application

Many industrial and process compressed air applications must be completely free of all suspended water vapor. A refrigeration dryer is suitable for most general applications, but for those requiring absolutely dry air, an adsorption dryer is the only solution. Some of these applications are: outside air lines & instrumentation subject to freezing conditions, air conveying of hygroscopic materials, special manufacturing processes, chemical, pharmaceutical & laboratory equipment. For these applications, a Motivair MPS heatless adsorption dryer, also known as a pressure swing dryer, will provide a constant pressure dew point of -40°F , or even -100°F for special applications.

Operation

Two parallel towers are filled with beads of activated alumina. Compressed air flows upwards, within one tower, while the second tower is regenerated with a small stream of the dried air. Then the cycle is automatically reversed. In operation, the activated alumina beads adsorb moisture directly onto their surface. This is a physical, not a chemical reaction, and is therefore completely reversible over many thousands of cycles. Activated alumina is a hard, durable desiccant material, specially developed for this application. Provided it is adequately protected against contamination by compressor oil, each desiccant fill should last for approximately 5 years.



Drying Cycle

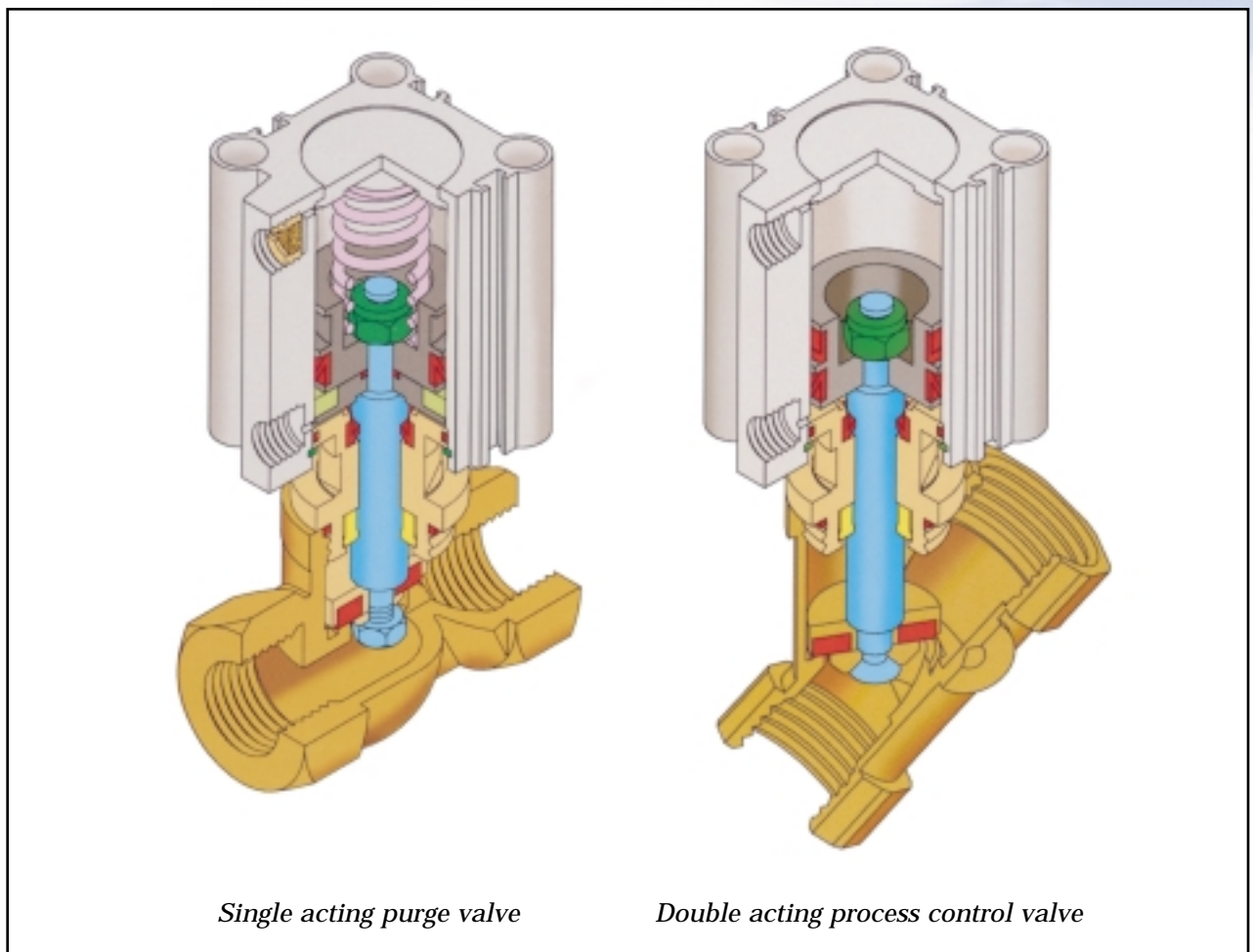
The drying duty is alternated between the two towers on a ten-minute cycle. Each tower dries on-stream for 5 minutes, with the air flowing upwards through the desiccant bed. This is followed by 4.5 minutes of depressurization & regeneration, then 30 seconds gradual re-pressurization.

The regeneration process starts with de-pressurization of the tower, via the purge valve and muffler. Larger models are fitted with separate depressurization and purge valves, both with mufflers, to insure controlled depressurization. 15% of the dried air is directed downwards through the bed to be regenerated, in the reverse direction of the drying process. This -40°F purge air, when expanded to near atmospheric pressure reaches an extremely low dew point and rapidly drives the moisture from the desiccant bed. The purge air is exhausted to atmosphere through the purge valve and muffler. The regenerated tower is then gradually re-pressurized for 30 seconds, before it reverts to drying the compressed air stream.

Regenerative Compressed Air Dryers

Features

- Exclusive, pneumatically powered shuttle valves with self-cleaning seats from 12 to 125 scfm
- Pneumatically powered globe valves, for maximum power and reliability, from 250 to 900 scfm
- Solenoid valves on 5 scfm wall-mounting model; pneumatic butterfly valves from 1,300 to 5,100 scfm
- Large desiccant beds allow lower velocity and 5 seconds contact time for maximum performance
- Stainless steel support screens/diffusers for even air distribution through the desiccant beds
- Counter-flow purging increases desiccant bed efficiency
- Slow re-pressurization prevents fluidization & extends desiccant life
- Pressure relief valves for maximum safety in operation
- ASME "U" stamped vessels from 100 scfm capacity
- NEMA 4 control panels standard with on/off switch, & 6' power cable with plug
- 4-position + rapid-cycle purge adjustment switch



Standard Controls & Instrumentation

- Power on/off switch
- Tower status LEDs
- Purge rate flow selector switch – allows manual selection of 4 different purge rates to match reduced load, or rapid test cycle for service inspection
- Failure to switch alarm
- Color-change dew point indicator
- Pressure gauges on both towers

Automatic Purge Saver

The standard 10-minute pressure swing cycle is designed to completely regenerate the desiccant, under full load operating conditions, with a purge rate of 15%. Therefore, considerable energy savings can be achieved by reducing this purge loss whenever the dryer is operating on less than maximum load. The load is reduced whenever the inlet flow (SCFM) or the inlet temperature is reduced. The standard 4-position purge switch enables an operator to reduce the purge air in increments to approximately match any reduced load condition.



The optional Motivair automatic purge saver utilizes the latest dew point monitoring technology to automatically reduce purge losses in direct proportion to the reduced load. A probe in the leaving air-stream monitors the dew point. Using a thin polymer film, this device measures extremely small variations in dew point. By holding one tower on stream, until the outlet dew point reaches an adjustable high limit, (normally -40°F) the time between regeneration cycles is extended. Because the standard 4.5 minutes of purge-loss occurs less frequently, the purge saving is directly proportional to the decrease in load. Example: A 1,000 scfm dryer operating at 500 scfm, at standard rated conditions. The on-stream tower will remain on line for 10 minutes instead of 5 minutes, before change-over & regeneration. In this case the 15% purge is used once every 10 minutes instead of once every 5 minutes, for an average of 7.5% purge air. The Motivair polymer film moisture sensor is more reliable than temperature sensors, which rely on electrical resistance, and are more prone to failure. The Motivair purge saver includes an adjustable high dew point alarm for extra security.



Pre and After-Filters

Motivair coalescing pre and after-filters feature pleated elements for increased surface area, and lower pressure drop. The energy saving is significant, since the pressure drop through Motivair pleated elements is typically 1/2 that of competitive “wrap” designs. Consider that on a 100 PSIG system, if the pressure drop across the filters can be reduced by 4 PSI, the saving is 2% of the total air compressor horsepower. Motivair filter elements are mounted in stainless steel screens & epoxy sealed into the end-caps. All Motivair filters are certified “silicone-free”.

Pre-Filters

The life and effectiveness of the desiccant bed depends on the effective removal of compressor oil. All lubricated air compressors have varying degrees of oil carry-over and failure to effectively filter this oil from the compressed air will result in drastically reduced desiccant life. Once contaminated by oil, the desiccant is rendered useless. Motivair offers a complete range of high-efficiency, oil coalescing pre-filters. The recommended pre-filters are “M” series (0.1 micron) or “S” series (0.01 micron). For maximum security & desiccant protection, both should be installed in series, (M followed by S) with automatic drain traps and pressure differential gauges.

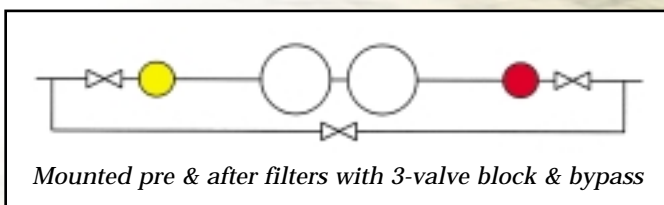
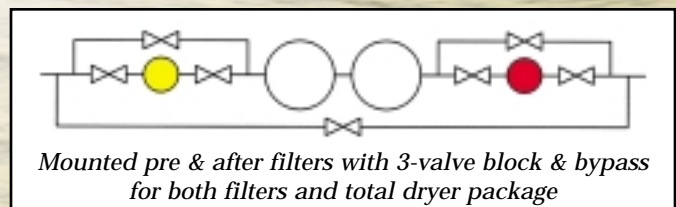
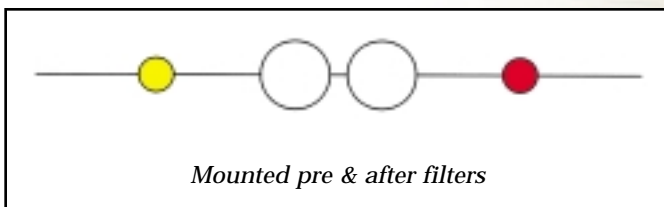


After-Filters

The dried air carries a small amount of desiccant dust, which must be removed by a particulate filter, to prevent downstream contamination. Desiccant dust exists typically in the 10-50 micron range therefore the recommended after-filter is the “P” series (3 micron), which is also fitted with a differential pressure gauge. Finer dust filtration is usually unnecessary & creates a higher pressure drop. All filters may be shipped loose for on-site installation, or factory piped to the dryer package.

Optional Filter Mounting & By-Pass Valves

Motivair offers factory filter mounting, with an optional 3-valve by-pass, for simplified filter element changes. Duplex filters & by-pass valves are also offered to avoid any temporary interruption of service during filter changes for continuous or critical applications. Typical filter & by-pass valve arrangements are shown below.



Specifications

Model	Capacity	Dimensions (in)			in/out air	Weight
No.	SCFM	Height	Width	Depth	connections	Lbs
MPS0005	5	23	9.75	3.2	1/4" NPT	13
MPS0012	12	28.6	11.5	4	3/8" NPT	28
MPS0025	25	50.4	21.5	13.4	1/2" NPT	132
MPS0050	50	63.4	20.7	17.7	1/2" NPT	176
MPS0075	75	78.7	21	19.7	1" NPT	264
MPS0100	100	83.5	20.9	19.7	1" NPT	550
MPS0125	125	92.3	20.1	19.7	1" NPT	580
MPS0250	250	94.1	30.2	18.5	1-1/2" NPT	1000
MPS0300	300	106	30.3	18.5	1-1/2" NPT	1100
MPS0450	450	98.3	36.5	22.5	2" NPT	1650
MPS0550	550	110	36.5	22.5	2" NPT	1900
MPS0720	720	98.8	48.3	28	2-1/2" NPT	2500
MPS0900	900	114.5	48.3	28	2-1/2" NPT	2650
MHL1300	1300	96	76	42	3" Flg	2800
MHL1600	1600	92	88	48	3" Flg	3700
MHL2050	2050	108	88	48	4" Flg	4500
MHL2980	2980	118	100	58	6" Flg	6000
MHL4000	4000	118	134	52	6" Flg	7600
MHL5100	5100	118	140	60	6" Flg	9500

All capacities rated at 100 PSIG, 100°F, -40°F dew point. Average pressure-drop 3-5 PSI at rated flow. Use correction factors below for other inlet temperatures & pressures. Maximum operating or inlet temperature 120°F. Maximum working pressure 145 PSIG. Minimum working pressure 60 PSIG. Contact Motivair for other pressures or materials.

Correction Factors (cf) (Multiply dryer capacities by correction factors)

Inlet pressure	60	70	80	90	100	110	120	130	140	145	175	200	230
Cf	0.65	0.74	0.83	0.91	1.00	1.04	1.08	1.12	1.16	1.2	CONSULT FACTORY		
Inlet temperature	80	90	100	110	120								
Cf	1.14	1.125	1.0	0.76	0.67								

Motivair – Your one-stop supplier for:

Compressed Air Treatment

Cycling & non-cycling refrigeration dryers
 Heatless & heated desiccant dryers
 Particulate & coalescing filters
 Air & water-cooled aftercoolers & oil coolers
 Separators, traps & zero-loss drain valves
 Oil/water condensate separators

Industrial Water Cooling

Packaged water chillers
 Dry closed loop cooling systems
 Closed loop evaporative systems
 Plate & frame cooling systems
 Pumping systems

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Motivair Corporation
 25 John Glenn Drive
 Amherst, NY 14228

Tel: 716-689-0222 Fax: 716-689-0073
www.motivaircorp.com

Distributor
