

RHP & FHP Series

High Pressure Air Treatment
Global Air Treatment



GD GARDNER DENVER®
Experience Proven Results

High Pressure Air Treatment

RHP Series Refrigerated Dryers and E Series Filters for 700-900 psig Applications

The demand for clean, dry compressed air systems at 700-900 psig (49-63 bar) has never been greater. Industries like PET blow molding, injection molding, aeronautical valve and control testing require dry and filtered compressed air. A carefully engineered high pressure refrigerated dryer design provides a reliable method to remove moisture as a water vapor while coalescing filters remove solid particles, liquid water droplets, liquid oil and oil vapors from the compressed air system.

RHP Series Refrigerated Dryers offer Pressure Dew Points of 38°F (3°C)

Moisture (water vapor) is present in ambient air as a gas and cannot be filtered. A stainless steel plate heat exchanger designed for high pressure compressed air teams with a self-regulating, environmentally-friendly refrigeration system to ensure design dew point.



FHP Series Coalescing Filters Remove Water Droplets and Solid Particles to 0.01 Micron

Water droplets are formed by the condensed water vapor present in ambient air. Solid particles come from ambient air contaminants like dust and from rusted, oxidized pipework. They can obstruct orifices used in laboratory testing procedures and cause pneumatic equipment to malfunction.

FHP Series Coalescing Filters Remove Oil and Oil Vapors to 0.0008 ppm (0,001 mg/m³)

Liquid oil and oil vapors are introduced by compressor coolants and by hydrocarbon vapors present in ambient air. Oil-free compressed air is particularly important in food and pharmaceutical processes where direct and indirect contact with compressed air occurs. Pharmaceutical testing and packaging is a common application for compressed air at 700-900 psig (39-63 bar) working pressure.



High Pressure Filtration

FHP Series Filters Offer 5 Grades of High Pressure Filtration

1. Grade B Separator/Filter removes bulk liquid and particles to 3 micron. Maximum inlet liquid load: 25,000 ppm w/w. Ideal as a particulate prefilter for RHP Series High Pressure Refrigerated Dryers.
2. Grade C General Purpose 1 micron particulate filter. Ideal as the first afterfilter after a high pressure refrigerated dryer.
3. Grade E High Efficiency Oil Removal Filter eliminates oil aerosols to 0.008 ppm (0,01 mg/m³). Maximum inlet liquid load: 1,000 ppm w/w.
4. Grade F Maximum Efficiency Oil Removal Filter eliminates oil aerosols to 0.0008 ppm (0,001 mg/m³). Maximum inlet liquid load 100 ppm w/w. This is the preferred "second afterfilter" for oil removal in high pressure systems.
5. Grade G Oil Vapor Removal Filter utilizes activated carbon to eliminate oil vapors to 0.003 ppm (0,004 mg/m³).



Instrumentation

- RHP Series models for 13-178 scfm feature: a power-on light which indicates when the dryer is energized and a high temperature warning light which gives immediate indication of malfunction or overload condition. A standard 6 foot power cord is included.
- RHP Series models for 50-178 scfm also feature: On/off switch and a refrigeration suction pressure gauge to indicate proper system operation.
- RHP Series models for 300 to 3750 scfm feature the following gauges: suction pressure gauge, inlet temperature gauge, outlet pressure gauge.
- RHP Series models for 300 to 3750 scfm feature the following lights: power-on, compressor-on, high evaporator temperature, refrigerant fault alarm. A high pressure reset switch is standard. An optional disconnect switch can also be supplied (pictured).

Integral FIL Series Filtration

- Integral FIL Series Grade B Separator/Filters are standard on all RHP Series models for air flows at 64 scfm and above. A two-stage process first removes the bulk liquid to 10 micron which has condensed in the heat exchangers using stainless steel orifice tubes. The second stage has in-depth coalescing fiber media which captures solid particulates to 3 micron and oil droplets to 5 ppm w/w (6 mg/m³).
- An automatic electric drain provides reliable condensate removal and the ability to program valve open time and time between cycles.

Features

Compact Heat Exchangers

- Models for 13-100 scfm utilize smooth surface, self-cleaning copper heat exchangers.
- Models for 300-3750 scfm feature space-saving, smooth surface, stainless steel plate heat exchangers designed for high heat transfer efficiencies.

Environmentally Friendly Refrigeration System Design

- Environmentally friendly HFC refrigerants are utilized on all models: models for 13-1000 scfm utilize R-134a and models for 1250-3750 scfm feature R-404a designs.
- Tight refrigeration temperature control is achieved even during rapid load changes which is what allows the RHP Series to provide consistent dew points.

TABLE 1 – RHP DRYERS SERIES ENGINEERING DATA

Model	Flow ⁽¹⁾ SCFM (M ³ /H)	Pressure Drop ⁽¹⁾ PSIG (Bar)	MWP PSIG ⁽⁶⁾ (Bar)	Refrigeration System ⁽²⁾ HP (kw)	Standard Voltages ⁽³⁾	In/Out Connections NPT ⁽⁴⁾	Dimensions in (mm)			Weight ⁽⁵⁾ lb (kg)	FHP Series Filters	
							H	W	D		1 Micron	0.00008 PPM Oil
RHP0013	13 (22)	1.2 (0.08)	500 (35)	1/6 (0.25)	1, 2, 4, 5	3/8" OD	14 (356)	16 (410)	15 (381)	57 (26)	FHP14C	FHP14F
RHP0020	20 (34)	2.4 (0.17)	500 (35)	1/5 (0.37)	1, 2, 4, 5	3/8" OD	14 (356)	16 (410)	15 (381)	65 (30)	FHP14C	FHP14F
RHP0050	50 (86)	1.8 (0.12)	500 (35)	1/4 (0.56)	1, 2, 4, 5	1/2"	17 (432)	22 (565)	16 (406)	104 (48)	FHP14C	FHP14F
RHP0093	93 (160)	0.9 (0.06)	500 (35)	1/2 (0.92)	1, 3, 4, 5	1"	23 (589)	32 (819)	20 (495)	206 (94)	FHP14C	FHP14F
RHP0064	64 (110)	0.2 (0.01)	900 (63)	1/2 (0.92)	1, 3, 4, 5	1"	23 (589)	32 (819)	20 (495)	186 (85)	FHP14C	FHP14F
RHP0178	178 (306)	0.8 (0.06)	500 (35)	3/4 (1.18)	1, 3, 4, 6	1 1/2"	23 (589)	32 (819)	20 (495)	235 (107)	FHP14C	FHP14F
RHP0100	100 (172)	0.5 (0.03)	900 (63)	3/4 (1.18)	1, 3, 4, 6	1"	23 (589)	32 (819)	20 (495)	208 (95)	FHP14C	FHP14F
RHP0300	300 (515)	4.1 (0.28)	725 (50)	1 (1.1)	7, 8, 9, 10, 11	1"	43 (1092)	38 (965)	32 (813)	370 (168)	FHP14C	FHP14F
RHP0500	500 (859)	5.8 (0.40)	725 (50)	1.5 (1.98)	7, 8, 9, 10, 11	1"	43 (1092)	38 (965)	32 (813)	380 (172)	FHP14C	FHP14F
RHP0750	750 (1288)	7.3 (0.50)	725 (50)	2 (2.35)	7, 8, 9, 10, 11	1 - 1/2"	43 (1092)	38 (965)	44 (1118)	465 (211)	FHP16C	FHP16F
RHP1000	1000 (1717)	11.8 (0.81)	725 (50)	3 (3.69)	7, 8, 9, 10, 11	1 - 1/2"	43 (1092)	38 (965)	44 (1118)	480 (218)	FHP16C	FHP16F
RHP1250	1250 (2146)	10.7 (0.74)	725 (50)	4 (5.34)	7, 8, 9, 10, 11	1 - 1/2"	43 (1092)	38 (965)	44 (1118)	590 (268)	FHP16C	FHP16F
RHP1750	1750 (3005)	9.5 (0.65)	725 (50)	6 (7.65)	7, 8, 9, 10, 11	3" or DN80	50 (1270)	48 (1219)	50 (1270)	1025 (465)	FHP20C	FHP20F
RHP2000	2000 (3434)	11.8 (0.81)	725 (50)	7.5 (9.81)	7, 8, 9, 10, 11	3" or DN80	60 (1524)	48 (1219)	50 (1270)	1300 (590)	FHP20C	FHP20F
RHP3000	3000 (5151)	11.8 (0.81)	725 (50)	10 (14.06)	7, 8, 9, 10, 11	3" or DN80	60 (1524)	48 (1219)	50 (1270)	1565 (710)	FHP20C	FHP20F
RHP3750	3750 (6439)	10.7 (0.74)	725 (50)	12 (16.47)	7, 8, 9, 10, 11	3" or DN80	60 (1524)	48 (1219)	50 (1270)	1585 (719)	FHP20C	FHP20F

Dimensions and weights are for reference only. Request certified drawings for construction purposes. (1) Flow and pressure drop at MWP (Maximum Working Pressure) and at 60 Hz, 100°F, 38°C inlet and 100°F, 38°C ambient temperature (2) Figures shown are condensing unit manufacturer's published ratings @ 35°F, 2°C evaporator and 100°F, 38°C ambient (3) 1. 115/1/60 2. 230/1/60 3. 208-230/1/60 4. 100/1/50 5. 220-240/1/50 6. 230/1/50 7. 208-230/3/60 8. 460/3/60 9. 200-220/3/50 10. 400/3/50 11. 575/3/60 (4) BSP available upon request. (5) Air-cooled models. Contact factory for water-cooled weights. (6) CSA certified models approved to 700 psig Maximum Working Pressure. CSA approved.

Sizing Information

TABLE 2 – CORRECTION FACTORS FOR COMPRESSED AIR INLET TEMPERATURE AND PRESSURE

Inlet Pressure	80°F (27°C)	90°F (32°C)	Inlet Temperature 100°F (38°C)	110°F (43°C)	120°F (49°C)
300 psig to MWP 20 bar to MWP	1.49	1.19	1.00	0.83	.072

TABLE 4 – CORRECTION FACTORS FOR OUTPUT PRESSURE DEW POINT

Dew Point	ISO 8573.1 Class	Factor
38°F (3°C)	4	1.0
45°F (7°C)	5	1.2
50°F (10°C)	6	1.3

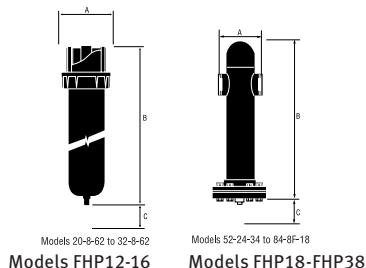


TABLE 3 – CORRECTION FACTORS FOR AMBIENT AIR TEMPERATURE

Ambient Temperature	Capacity Adjustment Factor
80°F (27°C)	1.12
90°F (32°C)	1.06
100°F (38°C)	1.00
110°F (43°C)	0.94
Water-cooled (85°F, 27°C Cooling Water)	1.15

TABLE 5 – CORRECTION FACTORS FOR ELECTRICAL FREQUENCY

60 Hz	1.00
50 Hz	0.83

TABLE 6 – FHP FILTER SERIES HIGH PRESSURE SPECIFICATION

Model Number	Max Operating Pressure PSIG (Bar)	Max Flow @ MOP SCFM (M ³ /H)	Flow @100 PSIG SCFM (M ³ /H)	In/Out Conn.	Dimensions in (mm)			Weight lb (kg)	FHP Series Replacement Elements		
					A*	B	C		Grade B	Grades C, D, E, F, G	Qty.
FHP12(grade B,C,E,F,G)	900 (62)	480 (840)	60 (105)	1" NPT/BSP	4.00 (102)	16.00 (406)	7 (171)	6 (2.7)	FHP12BE	FHP12(C,D,E,F,G)E	1
FHP14(grade B,C,E,F,G)	900 (62)	800 (1355)	100 (170)	1" NPT/BSP	4.00 (102)	16.00 (406)	7 (171)	6 (2.7)	FHP14BE	FHP14(C,D,E,F,G)E	1
FHP16(grade B,C,E,F,G)	900 (62)	2000 (3390)	250 (425)	1" NPT/BSP	5.13 (130)	32.44 (824)	7 (171)	21 (9.5)	FHP16BE	FHP16(C,D,E,F,G)E	1
FHP18(grade B,C,E,F,G)	500 (35)	2805 (4985)	625 (1110)	3" NPT/BSP	10.25 (260)	40.63 (1032)	24 (610)	37 (16.6)	FHP18BE	FHP18(C,D,E,F,G)E	1
FHP20(grade B,C,E,F,G)	700 (48)	4000 (6915)	625 (1110)	3" NPT/BSP	10.25 (260)	39.69 (1032)	24 (610)	128 (58.0)	FHP20BE	FHP20(C,D,E,F,G)E	1
FHP22(grade B,C,E,F,G)	450 (31)	4050 (6885)	1000 (1700)	3" NPT/BSP	16.00 (406)	46.88 (1191)	24 (610)	270 (122.0)	FHP22BE	FHP22(C,D,E,F,G)E	2
FHP24(grade B,C,E,F,G)	450 (31)	5060 (8605)	1250 (2125)	3" NPT/BSP	16.00 (406)	46.88 (1191)	24 (610)	270 (122.0)	FHP24BE	FHP24(C,D,E,F,G)E	2
FHP26(grade B,C,E,F,G)	450 (31)	7595 (12790)	1875 (3158)	3" NPT/BSP	16.25 (413)	54.13 (1375)	24 (610)	294 (133.0)	FHP26BE	FHP26(C,D,E,F,G)E	3
FHP28(grade B,C,E,F,G)	440 (30)	9900 (16870)	2500 (4250)	4" ANSI Flg	20.00 (508)	55.50 (1410)	24 (610)	403 (183.0)	FHP28BE	FHP28(C,D,E,F,G)E	4
FHP30(grade B,C,E,F,G)	440 (30)	12375 (21075)	3125 (5310)	4" ANSI Flg	20.00 (508)	55.50 (1410)	24 (610)	405 (184.0)	FHP30BE	FHP30(C,D,E,F,G)E	5
FHP32(grade B,C,E,F,G)	360 (25)	16350 (27770)	5000 (8490)	6" ANSI Flg	24.00 (610)	55.88 (1419)	24 (610)	524 (238.0)	FHP32BE	FHP32(C,D,E,F,G)E	8
FHP34(grade B,C,E,F,G)	330 (23)	20695 (35110)	6875 (11670)	6" ANSI Flg	28.00 (711)	63.88 (1622)	24 (610)	693 (314.0)	FHP34BE	FHP34(C,D,E,F,G)E	11
FHP36(grade B,C,E,F,G)	330 (23)	26340 (44680)	8750 (14850)	6" ANSI Flg	28.00 (711)	63.88 (1622)	24 (610)	700 (318.0)	FHP36BE	FHP36(C,D,E,F,G)E	14
FHP38(grade B,C,E,F,G)	260 (18)	28380 (48370)	11875 (20175)	8" ANSI Flg	33.00 (838)	66.25 (1683)	24 (610)	980 (445.0)	FHP38BE	FHP38(C,D,E,F,G)E	19

NOTE: Dimensions and weights are for reference only. Request certified drawings for construction purposes.

TABLE 7 – INLET PRESSURE CORRECTION FACTORS

To find the maximum flow at pressures other than the MOP, multiply 100 psi flow (@ 100 psig from table 1) by correction factor corresponding to minimum pressure at the inlet of the filter. Do not select filters by pipe size; use flow rate and operating pressure.

Minimum Inlet PSIG Pressure Bar	100	150	200	250	300	350	400	450	500	550	600	700	800	900
Correction Factor	1.00	1.44	1.87	2.31	2.74	3.18	3.62	4.05	4.49	4.92	5.36	6.23	7.10	7.97

* Models FHP28 and larger delivered with flange

Example: To size a filter for 1000 scfm at a pressure of 500 psi: 1. Choose approximate filter size, FHP16 (grade B,C,E,F,G). 2. Multiply the rated flow at 100 psi by the correction factor (250 scfm x 4.49 = 1,122 scfm) 3. Compare maximum calculated flow (1,122 scfm) to the required flow (1,000 scfm) 4. If the calculated flow is greater than the required flow, the filter can be used. If the calculated flow is less than the required flow, repeat the sizing process with a larger filter.

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