

FIL Series
20-21, 250 SCFM
Global Air Treatment



GD
GARDNER DENVER

Experience Proven Results™

World Class Filtration



FIL Series Filters provide your compressed air system with premium quality filtration for the three typical contaminant types

- 1) Solid particles come from ambient air contaminants like dust and from rusted, oxidized pipework. They will cause pneumatic equipment to malfunction, cause instrument and control failures, and contaminate end products.
- 2) Condensed water droplets come from the humidity in ambient air. Water will oxidize pipework and pneumatic equipment, ruin paint finishes and end products.
- 3) Liquid oil and oil vapors are introduced by compressor lubricants and by hydrocarbon vapors present in ambient air. Oil-free compressed air is particularly important in food and pharmaceutical processes.

Seven Filtration Grades Provide ISO 8573.1 Standard Air Quality

Filter Grade	Description	Filtration*			ISO 8573.1 Quality Classes***	
		Water Droplets** ppm w/w	Solid Particulates micron	Oil Removal ppm w/w	solids	oil
A	Water Separator	30,000	-	-	-	-
B	Separator/Filter	25,000	3	5	3	5
C	General Purpose	2,000	1	1	2	4
D	Dry Particulate	-	1	-	2	-
E	High Efficiency Oil Removal	1,000	0.01	0.008	1	1
F	Maximum Efficiency Oil Removal	100	0.01	0.0008	1	1
G	Oil Vapor Removal	-	0.01	0.003	1	1

*Tested to CAGI ADF400 & ADF500, **Maximum inlet liquid load, ***Complete ISO 8573.1 Reference Table on page 5

Comply with Pressure Vessel Directives Worldwide

FIL Series Filters utilize housings which conform to most major pressure vessel directives in the Americas, Europe, and Asia.



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Innovative Features

An Innovative Design for all Applications

- 1 Slide Indicator**
 - Standard on 20–60 scfm models
 - Changes color based on differential pressure
- 2 Gauge**
 - Standard on 100–21,250 scfm models
 - Dual gauge face allows housings to be mounted in any flow direction
 - Indicates element change-out based on differential pressure
 - Large easy-to-read gauge face
 - Remote mounting possible
- 3 Energy Saving Element Monitor**
 - Optional on all models
 - Three modes determine element change: time, differential pressure, element performance
- 4 Simple Maintenance**
 - 1/8" turn, self-locking bayonet head to bowl connection (up through 1" connection sizes)
 - Audible warning by escaping air if housing is not depressurized before disassembly
 - Ribbed bowls allow use of C-spanner
 - Color-coded elements for easy identification
- 5 Modular Housings Save Space and Time**
 - Standard on 20–780 scfm models
 - Large flow paths reduce pressure drop
 - Chromated and epoxy powder painted (interior and exterior) add durability and corrosion resistance
 - MWP 300 psig (21 bar)
 - Can be mounted for left or right entry
 - High-quality aluminum, zinc, and steel materials
- 6 Internal Automatic Drains**
 - Reliable discharge of condensate
 - Pilot operated, pneumatically actuated, particulate-resistant mechanism
 - Viton seals and inlet screen for additional protection
- 7 Element Grades Offer Superior Filtration**
 - Large effective surface areas ensure high capture rates
 - Large open areas minimize pressure drop
 - Silicone-free, withstand temperatures to 150° F (66° C)
 - Push-on elements for quick replacement
 - Corrosion resistant, stainless steel cores



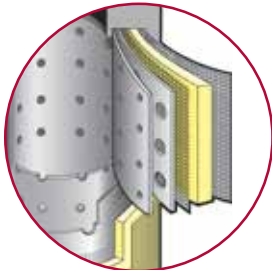
Filter Element Grades



Filter Elements for all Grades of Filtration

Compressed air systems continually challenge filtration with moisture, solid particulates, and liquid oil or oil vapors. FIL Series filter elements represent state-of-the-art filter designs which allow for custom filtration at every installation.

- Inside-to-out air flow maximizes filtration efficiency
- Two-stage filtration ensures long element life
- Stainless steel inner and outer cores add structural integrity
- Uniquely blended coalescing fiber media design
- Coated foam sleeves provide protection against chemical attack
- 100% silicone free, withstand temperatures to 150° F (66° C)

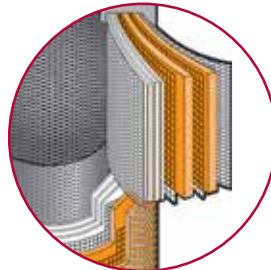


Grade A - Water Separator

Installation: after an air compressors' (or a stand-alone) aftercooler.

Design: One-stage filtration with two stainless steel orifice tubes. Labyrinth style air flow path removes liquid water by forcing abrupt directional changes.

Performance*: Handles bulk liquid inlet loads to 30,000 ppm w/w and provides 10 micron solid particulate separation. Efficient to flows as low as 5% of rated flow.

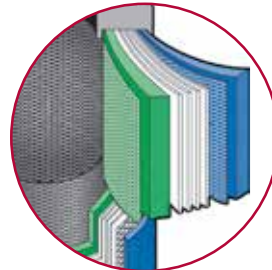


Grade B - Separator/Filter

Installation: after an air compressors' (or a stand-alone) aftercooler or as a prefilter to a refrigerated dryer.

Design: Two-stage filtration with first stage of two stainless steel orifice tubes which remove bulk liquids and solid particulates to 10 micron. Second stage has in-depth coalescing fiber media which captures solid particulates to 3 micron.

Performance*: Handles bulk liquid inlet loads to 25,000 ppm w/w and provides 3 micron solid particulate filtration.



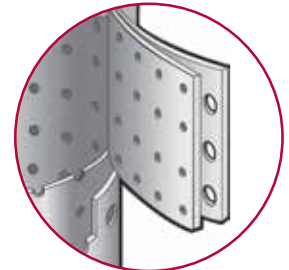
Grade C - General Purpose Filter

Installation: 1 micron particulate prefilter for refrigerated dryers and high efficiency oil removal filters.

Design: Two-stage filtration with a first stage of multiple layers of fiber media which pre-filter the air.

Second stage has in-depth coalescing fiber media which coalesces oil aerosols and removes finer particulates to 1 micron.

Performance*: Handles bulk liquid inlet loads to 2,000 ppm w/w, provides 1 micron solid particulate filtration and oil removal to 1 ppm.



Grade D - Dry Particulate Filter

Installation: Dry, solid particulate afterfilter for heatless desiccant dryers

Design: Two-stage filtration with life-prolonging outside/in air flow with first stage of alternate layers of fiber media and a media screen capturing large particulates.

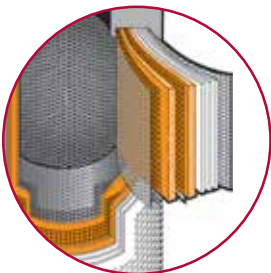
Second stage captures finer particulates. Not designed for any liquid loading.

Performance*: Provides 1 micron solid particulate filtration of desiccant dust.

Quality Classes	Solid Contaminants (max. particle size) microns	Maximum Pressure Dew Points °F (°C)	Maximum Oil Content (droplets, aerosols, vapor) ppm w/w (mg/m ³)
1	0.1	-94 (-70)	0.008 (0,01)
2	1	-40 (-40)	0.08 (0,1)
3	5	-4 (-20)	0.8 (1)
4	15	38 (3)	4 (5)
5	40	45 (7)	21 (25)
6	-	50 (10)	-

Air Quality/Pressure Drop Table

Filter Grade	Description	Pressure Drop at Rated Conditions – psid [kgf/cm ²]	
		dry	wet
A	Water Separator	0.8 (0.06)	0.8 (0.06)
B	Separator/Filter	1 (0.07)	1.5 (0.11)
C	General Purpose	1 (0.07)	2 (0.14)
D	Dry Particulate	1 (0.07)	-
E	High Efficiency Oil Removal	1 (0.07)	3 (0.21)
F	Max. Efficiency Oil Removal	2 (0.14)	6 (0.42)
G	Oil Vapor Removal	1 (0.07)	-

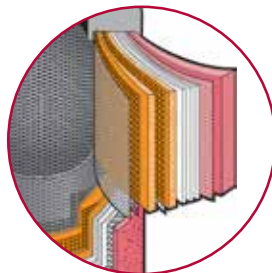


Grade E - High Efficiency Oil Removal Filter

Installation: Prefilter to desiccant and membrane dryers, afterfilter to refrigerated dryers and stand-alone oil removal at the point-of-use of compressed air.

Design: Two-stage filtration with a first stage of multiple layers of fiber media which prefilter the air. Second stage has in-depth coalescing fiber media which coalesces oil aerosols. Includes an outer-coated, closed cell foam sleeve.

Performance*: Handles bulk liquid water inlet loads to 1,000 ppm w/w and provides 0.008 ppm oil aerosol removal and 0.01 micron solid particulate separation.

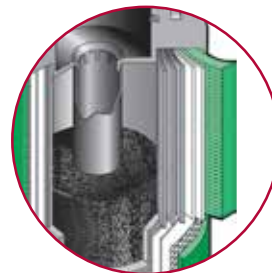


Grade F - Maximum Efficiency Oil Removal Filter

Installation: Prefilter to desiccant and membrane dryers with a Grade C prefilter, oil-free air applications.

Design: Two-stage filtration with a first stage of a coated, closed-cell foam sleeve which acts as a prefilter and flow disperser. Second stage has in-depth coalescing fiber media which coalesces fine oil aerosols. Includes an outer-coated, closed cell foam sleeve.

Performance*: Handles bulk liquid water inlet loads to 100 ppm w/w and provides 0.0008 ppm oil aerosol removal and 0.01 micron solid particulate separation.



Grade G - Oil Vapor Removal Filter

Installation: Afterfilter to high efficiency liquid oil removal filters for true oil-free applications.

Design: Two-stage filtration with a generously-sized first stage of a stabilized bed of carbon particles which remove the majority of the oil vapor. Second stage has multiple layers of fiber media with bonded microfine carbon particles which remove the remaining oil vapors. Includes an outer-coated, closed cell foam sleeve which prevents fiber migration.

ISO 8573.1 Quality Classes

ISO 8573.1 was developed in 1992 by ISO (International Organization for Standardization) to help plant engineers specify desired compressed air quality globally by providing “Quality Classes” for solid particulates, humidity and oil. Quality classes provide engineers with an internationally accepted unit of measure. A typical pharmaceutical plant, for example, would have a compressed air specification of ISO Quality Classes 1.2.1. This is equivalent to 0.1 micron particulate filtration, -40° F (-40° C) dew point, and 0.008 ppm (0.01 mg/m³) oil filtration.

No matter what language is spoken and what unit of measure is used, using ISO 8573.1 Air Quality Classes ensures that your factory will get the compressed air quality you specified.

Performance**: No liquid should be present at filter inlet. Provides 0.003 ppm w/w oil (as a vapor) removal and 0.01 micron solid particulate separation.

* Filter efficiencies have been established in accordance with CAGI standard ADF400 and are based on 100° F (38° C) inlet temperature

** Filter efficiency has been established in accordance with CAGI standard ADF500 and is based on 100° F (38° C) inlet temperature

System Monitoring & Design

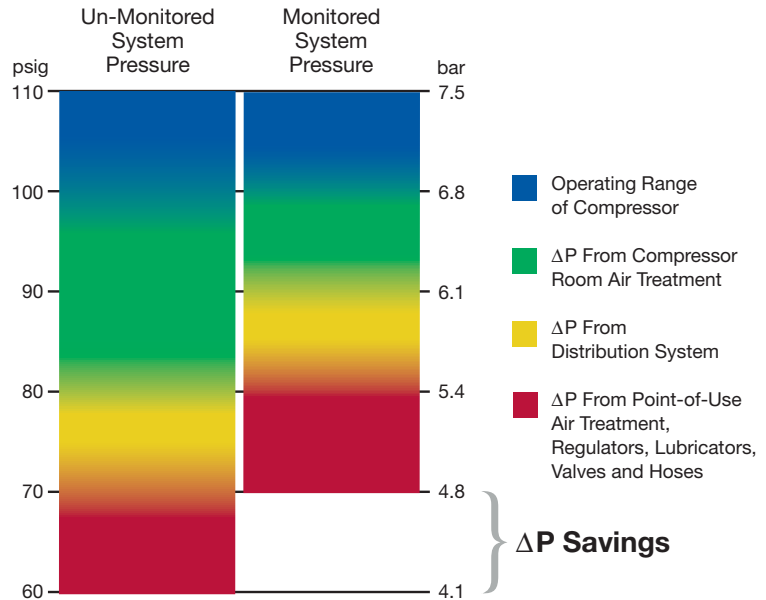
Element Monitor Provides System Energy Savings & Internet Remote Monitoring

Gardner Denver Global Air Treatment focuses on maximizing the efficiencies of the entire compressed air system. FIL Series Filters feature an optional Element Monitor which focuses on reducing system pressure drop. Reducing system pressure drop has several benefits:

- Reduces air compressor kW consumption
- Reduces operating expenses
- Prolongs air compressor life

The Element Monitor allows the user to control the exact amount of pressure drop incurred from compressed air filter elements. Unlike traditional mechanical gauges which give color indications typically when pressure drop has reached the 10 to 12 psig (0.7 to 0.8 bar)

range, the Element Monitor will provide warnings to change the element at the 5 to 6 psig (0.3 to 0.4 bar) range – 60 days before pressure drop starts spiraling up. This 60 day notice gives plant maintenance ample time to order and install a replacement filter element. A state-of-the-art microprocessor is the core technology of the Element Monitor. The microprocessor technology allows the Element Monitor to perform three monitoring modes.



Time Monitoring Mode – Simply input the number of months until filter change-out to match preventative maintenance schedules. The range is 1 to 15 months, the factory default setting is 12 months. Many sensitive end use applications recommend maintenance schedules for filter elements to guarantee oil-free air.

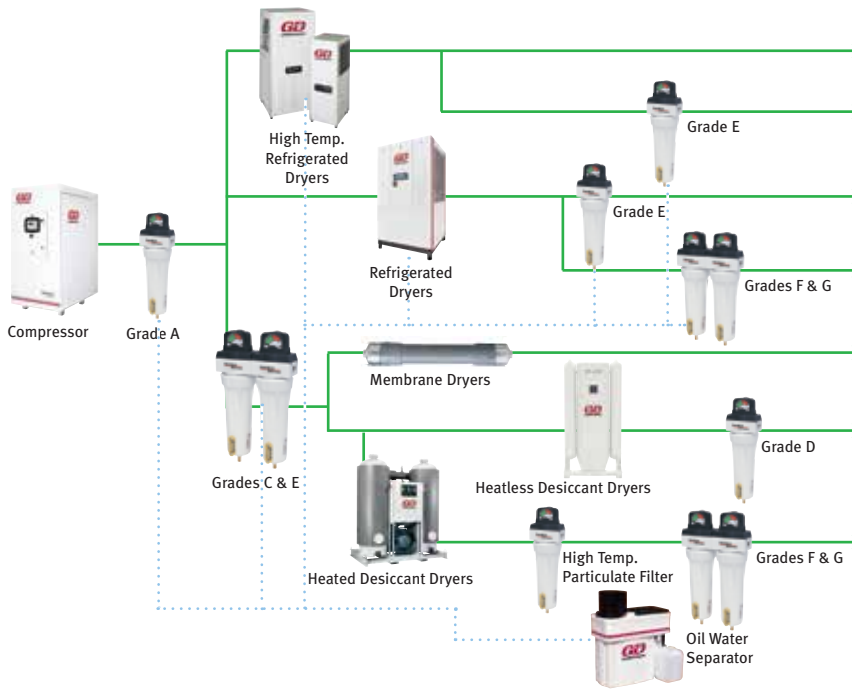
ΔP Monitoring Mode – Control system pressure drop by entering maximum allowable pressure drop across the element. Simply input within the range of 0.1 to 15 psig (0.01 to 1 bar), the factory default setting is 6 psig (0.4 bar). The Element Monitor is programmed to ignore momentary pressure drop spikes and thereby avoids false alarms.

Element Performance Mode – Receive a 60-day warning before the element gets loaded with particulates and pressure drop starts its upward spiral. This mode will develop a “particulate loading profile” and forecast out when the element should be changed. The microprocessor, which first allows the element to become “wetted” and therefore stabilized, takes measurements of instantaneous pressure drop over 1,800 times per hour during the first 8 day period upon element installation. This develops a “particulate loading profile” which is unique to the end user. This profile is then used to forecast the optimal time for element replacement and triggers a “60-day countdown to optimal element replacement” which flashes every six seconds on the Element Monitor LCD.

Simple Operation – The Element Monitor is designed for on-board manual programming without the need for any external instruments or programs. The programs utilize easy to understand international units of measure. The LCD display automatically cycles readings on instantaneous differential pressure, average differential pressure, and remaining days until element replacement every six seconds. For easy maintenance, the Element Monitor runs on three off-the-shelf AA batteries and the operator alert light signals the need for element replacement or a low battery condition.

Maintain System Pressure: Create a Custom Air Treatment System

Maximize system pressure by choosing the combination of Gardner Denver air treatment products which perfectly match your applications' requirements.



ISO 8573.1 Air Quality Class			System	ΔP*		Application
Solids	Moisture	Oil	psi	bar		
3	6	5	<5	<0,35	Body shops, sand blasting	
1	6	1	<8	<0,56	Large pneumatic tools, spray painting	
1	4	1	<8	<0,56	Powder painting, fine pneumatic tools, air gauging & conveying, pneumatic instruments & controls	
1	4	1	<11	<0,75	Food packaging, cosmetics, photo labs, textile looms	
1	2-5	1	<10	<0,68	Telephone cable, printing, photo labs, spray painting, dental, laboratory instruments	
1	1-3	1	<10	<0,68	Air lines exposed to freezing ambient conditions, pharmaceutical, chemical, powder paint	
1	2-3	1	<15	<1,02	Food processing, dairies, breweries, air in direct contact with foods, microchips, optics, medicines, point-of-use filtration	

* Efficiencies per CAGI standards ADF100 and ADF400 and wetted element conditions.

Replacement Model Grade – Features	Capacity		Connections Npt/ Ansi Flg.	Standard Features					Max Pressure Psig [Kgf/Cm ²] & Temp °F (°C)		Dimensions			Element				
	scfm	m ³ /min		Filter Grades					Manual Drain	with D or L	Height		Width		Weight		Model – Grade	Qty.
				A	B	C,E,F	D	G			in	mm	in	mm	lb	kg		
Modular Type Housings	FIL12 – 11	20	0.57	3/8" NPTF					300 psig 21 kgf/cm ² 150°F 66°C	250 psig 21 kgf/cm ² 150°F 66°C	8.15	207	4.13	105	4.2	1.9	FIL12 – E	1
	FIL14 – 13	35	1.00	1/2" NPTF							11.05	281	4.13	105	8.1	3.7	FIL14 – E	
	FIL16 – 13	60	1.72	1/2" NPTF							13.4	340	4.13	105	8.5	3.9	FIL16 – E	
	FIL18 – 15	100	2.9	3/4" NPTF							15.32	389	5.25	133	6.3	2.9	FIL18 – E	
	FIL20 – 17	170	4.9	1" NPTF							19.57	497	5.25	133	6.9	3.1	FIL20 – E	
	FIL22 – 21	250	7.2	1 1/2" NPTF							22.8	579	6.44	164	10.2	4.6	FIL22 – E	
	FIL24 – 21	375	11	1 1/2" NPTF							27.29	693	6.44	164	11.3	5.1	FIL24 – E	
	FIL26 – 23	485	14	2" NPTF							31.08	789	7.63	194	28	12.7	FIL26 – E	
	FIL28 – 25	625	18	2 1/2" NPTF							36.83	935	7.63	194	33	15.0	FIL28 – E	
FIL30 – 25	780	22	2 1/2" NPTF					42.96	1091	7.63	194	38	17.2	FIL30 – E				
Pressure Vessels	FIL32 – 27	625	18	3" NPTM					300 psig 21 kgf/cm ²	300 psig 21 kgf/cm ²	40.88	1038	10.25	260	36	16.3	FIL32 – E	1
	FIL34 – 27	1,000	29	3" NPTM					225 psig 15.8 kgf/cm ² 150°F 66°C	225 psig 15.8 kgf/cm ² 150°F 66°C	48.00	1219	16.00	406	91	41.3	FIL34 – E	2
	FIL36 – 27	1,250	36	3" NPTM							48.00	1219	16.00	406	91	41.3	FIL32 – E	3
	FIL38 – 27	1,875	54	3" NPTM							49.00	1245	16.25	413	120	54.4	FIL32 – E	4
	FIL40 – 29	2,500	72	4" flg.							52.25	1327	20.00	508	179	81.2	FIL32 – E	5
	FIL42 – 29	3,125	89	4" flg.							52.25	1327	20.00	508	182	82.6	FIL32 – E	8
	FIL44 – 31	5,000	143	6" flg.							54.63	1387	24.00	610	271	123	FIL32 – E	11
	FIL46 – 31	6,875	197	6" flg.							62.56	1589	28.00	711	518	235	FIL32 – E	14
	FIL48 – 31	8,750	250	6" flg.							62.56	1589	28.00	711	527	239	FIL32 – E	19
	FIL50 – 33	11,875	340	8" flg.							69.13	1756	33.00	838	709	322	FIL32 – E	26
	FIL52 – 33	16,250	465	8" flg.							67.94	1726	39.00	991	918	416	FIL32 – E	34
	FIL54 – 35	21,250	608	10" flg.							70.94	1802	45.88	1165	1412	640	FIL32 – E	

Filter Grades

- A - Mechanical Separator (bulk liquid)
- B - Separator/Filter (3 micron and bulk liquid)
- C - Air Line Filter (1 micron)
- D - Dry Desiccant Afterfilter (1 micron)
- E - High Efficiency Oil Removal Filter (0.008 ppm)
- F - Maximum Efficiency Oil Removal Filter (0.0008 ppm)
- G - Oil Vapor Removal Filter (activated carbon)

Features:

- A - Internal Automatic Drain Mechanism
- P - Differential Pressure Slide Indicator
- G - Differential Pressure Gauge Indicator
- L - Liquid Level Indicator
- S - Corrosion Proof Stainless Steel element
- M - Element Monitor

(1) Drain plugs standard.

Externally mounted automatic drains are available.

(2) Time-based Element Monitor recommended

Ordering Information

FIL

Housing
Capacity
scfm (m³/min) @
100 psig (7 kgf/cm²)

Number	Capacity
12	= 20 (0.57)
14	= 35 (1.00)
16	= 60 (1.72)
18	= 100 (2.9)
20	= 170 (4.9)
22	= 250 (7.2)
24	= 375 (11)
26	= 485 (14)
28	= 625 (18)
30	= 780 (22)
32	= 625 (18)
34	= 1000 (29)
36	= 1250 (36)
38	= 1875 (54)
40	= 2500 (72)
42	= 3125 (89)
44	= 5000 (143)
46	= 6875 (197)
48	= 8750 (250)
50	= 11875 (340)
52	= 16250 (465)
54	= 21250 (608)

Modular Housings

Pressure Vessels

Connection Sizes*
NPT/ANSI flg.

11	= 3/8" NPTF
13	= 1/2" NPTF
13	= 1/2" NPTF
15	= 3/4" NPTF
17	= 1" NPTF
21	= 1-1/2" NPTF
21	= 1-1/2" NPTF
23	= 2" NPTF
25	= 2-1/2" NPTF
25	= 2-1/2" NPTF
27	= 3" NPTM
27	= 3" NPTM
27	= 3" NPTM
27	= 3" NPTM
29	= 4" flg.
29	= 4" flg.
31	= 6" flg.
31	= 6" flg.
31	= 6" flg.
33	= 8" flg.
33	= 8" flg.
35	= 10" flg.

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- M - Element Monitor

Example 1: To order a Grade E High Efficiency Oil Removal filter with a capacity of 100 scfm and 3/4" NPTF connections, integral automatic drain, differential pressure gauge, and liquid level indicator would be configured as: FIL18E15DGL

Example 2: To order an extra replacement element for the FIL18E15DGL filter, one would order FIL18E

*Consult factory for other connection sizes

Sizing Correction Factors

To find the maximum flow at pressures other than 100 psig [7 kgf/cm²], multiply the flow (from table above) by the Correction Factor corresponding to the minimum pressure at the inlet of the filter. Do not select filters by pipe size; use flow rate and operating pressure.

psig	20	30	40	60	80	100	125	150	175	200	250	300
kgf/cm ²	1.4	2.1	2.8	4.2	5.6	7.0	8.8	10.6	12.3	14.1	17.6	21.1
Correction Factor	0.30	0.39	0.48	0.65	0.82	1	1.22	1.43	1.65	1.87	2.31	2.74

Gardner Denver®

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