



MANN+HUMMEL  
Filters for  
compressors



**Compressed air, as a flexible, easy-to-handle energy source, is indispensable in modern production processes. Almost all familiar industrial products are manufactured, packaged or transported using compressed air and therefore compressors.**



**YOUR SATISFACTION IS IMPORTANT TO US!**

The type of filter selection and determination is based on certain requirements, which may differ in individual cases. If you are not satisfied with the performance of your compressor, please contact your MANN+HUMMEL partner.



**WE MEET YOUR INDIVIDUAL NEEDS!**

Individual requirements can be covered by an extensive product range. If this does not meet the requirements, MANN+HUMMEL can offer individual concepts based on proven technology.



**WE CONTINUOUSLY FURTHER DEVELOP THE PRODUCT RANGE!**

For this reason, we expressly reserve the right to make changes to our products and delivery program. Information regarding changes and availability can be obtained from your MANN+HUMMEL contact.

# MANN+HUMMEL

## Filters for Compressors

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# Filters for compressors

## Product overview



### AIR/OIL SEPARATORS

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<b>Application</b>	Oil-injecting screw-type and sliding-vane compressors
<b>Installation site</b>	In pressure reservoir
<b>Residual oil content</b>	3.0 mg/m <sup>3</sup> (n)
<b>Operating temperature</b>	Long-term: 100°C Short-term: +120°C
<b>Pressure drop for a given nominal flow rate</b>	0.17 bar
<b>Available nominal flow rates</b>	0.8 – 76 m <sup>3</sup> (n)/min
<b>Advantages</b>	<ul style="list-style-type: none"> <li>■ Process reliability through high-quality media</li> <li>■ Low oil consumption through low residual oil content</li> <li>■ Thoroughly tried and tested and reliable</li> <li>■ Space-saving achieved through compact design</li> </ul>



### SPIN-ON SEPARATORS

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<b>Application</b>	Oil-injecting screw-type and sliding-vane compressors
<b>Installation site</b>	Vertically in pressure reservoir
<b>Residual oil content</b>	1.5 / 3.0 mg/m <sup>3</sup> (n)
<b>Operating temperature</b>	Long-term: 100°C Short-term: +120°C
<b>Pressure drop for a given nominal flow rate</b>	Type-specific / specification in relevant description
<b>Available nominal flow rates</b>	0.1 – 6.5 m <sup>3</sup> (n)/min
<b>Advantages</b>	<ul style="list-style-type: none"> <li>■ Process reliability through high-quality media</li> <li>■ Easy and time-saving installation and removal</li> <li>■ Lower maintenance costs*</li> <li>■ Lower oil consumption through lower residual oil content</li> </ul>
<b>Accessories</b>	Screw-on connectors and heads with connections for oil extraction

\* Compared to conventional air/oil separators

# Filters for compressors

## Product overview



# Filters for compressors

## Configuration and selection

### HOW TO SELECT YOUR FILTER:

- 1 Find the right column for your vessel pressure
- 2 Find the right range for your FAD or similar
- 3 Ensure compliance with the limit pressures under load variation in operation
- 4 All filters listed to the right of this are suitable for your compressor

### AIR/OIL SEPARATORS – filter selection based on the free air delivery (FAD) of your compressor

Vessel pressure 5 [bar <sub>g</sub> ]				Vessel pressure 7 [bar <sub>g</sub> ]				Vessel pressure 9 [bar <sub>g</sub> ]				Vessel pressure 11 [bar <sub>g</sub> ]				Order No.
FAD5 [m <sup>3</sup> /min]		Limiting pressure [bar <sub>g</sub> ]		FAD7 [m <sup>3</sup> /min]		Limiting pressure [bar <sub>g</sub> ]		FAD9 [m <sup>3</sup> /min]		Limit pressure [bar <sub>g</sub> ]		FAD11 [m <sup>3</sup> /min]		Limiting pressure [bar <sub>g</sub> ]		
min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	
0.6	1.1	3.7	10.9	0.8	1.5	5.5	14.8	1.0	1.9	7.2	18.8	1.2	2.3	8.9	22.7	LE 3004 x
0.7	1.3	4.0	11.5	0.9	1.7	5.6	15.1	1.1	2.1	7.1	18.6	1.4	2.5	8.7	24.0	LE 4007 x
1.0	1.8	3.8	11.3	1.3	2.4	5.4	15.0	1.7	3.0	7.0	19.9	2.0	3.6	8.6	23.6	LE 5004
1.0	1.8	3.8	11.3	1.3	2.4	5.4	15.0	1.7	3.0	7.0	19.9	2.0	3.6	8.6	23.6	LE 5006
1.0	1.8	3.8	11.2	1.3	2.4	5.4	14.9	1.7	3.1	7.3	19.8	2.0	3.7	8.8	23.5	LE 6004
1.5	2.8	3.9	11.1	2.0	3.7	5.5	15.1	2.5	4.6	7.0	19.1	3.0	5.6	8.8	23.1	LE 7004 x
1.7	3.1	3.9	11.4	2.2	4.1	5.5	15.0	2.8	5.1	7.1	19.4	3.4	6.2	8.8	23.7	LE 8003 x
1.7	3.1	3.9	11.4	2.2	4.1	5.5	15.0	2.8	5.1	7.1	19.4	3.4	6.2	8.8	23.7	LE 8004 x
2.0	3.6	3.9	11.5	2.6	4.8	5.5	15.3	3.3	6.0	7.2	19.6	3.9	7.2	8.8	23.4	LE 9020 x
2.1	3.8	3.9	11.5	2.7	5.0	5.5	15.1	3.4	6.3	7.1	19.2	4.1	7.5	8.7	23.4	LE 9001 x
2.3	4.2	3.9	11.3	3.0	5.6	5.5	15.1	3.8	7.0	7.1	19.3	4.6	8.4	8.8	23.6	LE 10 001
2.6	4.8	3.9	11.1	3.5	6.4	5.5	15.3	4.4	8.0	7.1	19.5	5.3	9.6	8.7	23.7	LE 12 001 x
3.0	5.4	3.8	11.4	4.0	7.3	5.5	15.5	4.9	9.1	7.2	19.2	5.9	10.9	8.8	23.3	LE 13 001 x
3.0	5.5	3.9	11.3	4.0	7.3	5.5	15.4	5.0	9.1	7.1	19.5	6.0	11.0	8.8	23.6	LE 13 012 x
3.9	7.1	3.9	11.3	5.2	9.5	5.5	15.4	6.5	11.8	7.1	19.6	7.7	14.2	8.8	23.3	LE 16 008
4.1	7.4	3.8	11.4	5.4	9.9	5.5	15.3	6.8	12.4	7.1	19.5	8.1	14.9	8.8	23.4	LE 17 011 x
4.2	7.7	3.9	11.3	5.6	10.2	5.5	15.4	7.0	12.8	7.1	19.5	8.4	15.4	8.8	23.6	LE 17 008 x
5.0	9.2	3.9	11.1	6.7	12.3	5.5	15.3	8.4	15.4	7.1	19.4	10.1	18.5	8.8	23.5	LE 20 001
5.1	9.4	3.9	11.2	6.8	12.6	5.5	15.2	8.6	15.7	7.1	19.5	10.3	18.8	8.7	23.5	LE 21 001 x
5.7	10.5	3.9	11.2	7.6	14.0	5.5	15.3	9.5	17.4	7.1	19.4	11.4	20.9	8.7	23.4	LE 23 002 x
6.1	11.2	3.9	11.2	8.1	14.9	5.5	15.3	10.2	18.6	7.1	19.5	12.2	22.4	8.8	23.5	LE 24 002 x
7.2	13.2	3.9	11.3	9.6	17.6	5.5	15.3	12.0	22.0	7.1	19.4	14.4	26.4	8.8	23.5	LE 28 002 x
7.2	13.2	3.9	11.3	9.6	17.6	5.5	15.3	12.0	22.0	7.1	19.4	14.4	26.4	8.8	23.5	LE 28 003 x
7.5	13.8	3.9	11.2	10.0	18.3	5.5	15.3	12.5	22.9	7.1	19.4	15.0	27.5	8.8	23.5	LE 29 005 x
7.5	13.8	3.9	11.2	10.0	18.3	5.5	15.3	12.5	22.9	7.1	19.4	15.0	27.5	8.8	23.5	LE 29 001 x
7.8	14.2	3.9	11.3	10.4	19.0	5.5	15.4	12.9	23.7	7.1	19.3	15.5	28.5	8.8	23.4	LE 30 005 x
7.9	14.6	3.9	11.2	10.6	19.4	5.5	15.3	13.2	24.3	7.1	19.3	15.9	29.1	8.7	23.5	LE 31 001 x
8.3	15.3	3.9	11.2	11.1	20.4	5.5	15.3	13.9	25.5	7.1	19.4	16.7	30.5	8.7	23.5	LE 32 004
8.7	15.9	3.9	11.3	11.6	21.2	5.5	15.3	14.5	26.5	7.1	19.4	17.4	31.9	8.8	23.5	LE 33 001 x
8.7	15.9	3.9	11.2	11.6	21.3	5.5	15.3	14.5	26.6	7.1	19.4	17.4	31.9	8.8	23.5	LE 33 003 x
9.2	16.8	3.9	11.3	12.2	22.4	5.5	15.3	15.3	28.0	7.1	19.5	18.3	33.6	8.8	23.5	LE 35 004 x
10.1	18.4	3.9	11.3	13.4	24.6	5.5	15.3	16.8	30.7	7.1	19.5	20.1	36.9	8.8	23.5	LE 39 007
11.6	21.2	3.9	11.3	15.4	28.3	5.5	15.3	19.3	35.4	7.1	19.4	23.2	42.5	8.8	23.5	LE 44 001 x
11.6	21.2	3.9	11.3	15.4	28.3	5.5	15.3	19.3	35.4	7.1	19.4	23.2	42.5	8.8	23.5	LE 44 002
12.0	22.1	3.9	11.2	16.1	29.4	5.5	15.4	20.1	36.8	7.1	19.4	24.1	44.1	8.7	23.5	LE 46 001 x
12.4	22.7	3.9	11.3	16.5	30.3	5.5	15.3	20.6	37.9	7.1	19.4	24.8	45.4	8.8	23.5	LE 47 002 x
12.7	23.2	3.9	11.3	16.9	31.0	5.5	15.3	21.1	38.7	7.1	19.4	25.4	46.5	8.8	23.5	LE 48 007 x
12.7	23.2	3.9	11.3	16.9	31.0	5.5	15.3	21.1	38.7	7.1	19.4	25.4	46.5	8.8	23.5	LE 48 003
13.7	25.2	3.9	11.2	18.3	33.6	5.5	15.3	22.9	42.0	7.1	19.4	27.5	50.4	8.8	23.5	LE 51 001 x
15.3	28.1	3.9	11.2	20.4	37.5	5.5	15.3	25.6	46.8	7.1	19.4	30.7	56.2	8.8	23.5	LE 57 002 x
15.4	28.2	3.9	11.3	20.5	37.5	5.5	15.3	25.6	46.9	7.1	19.4	30.7	56.3	8.8	23.5	LE 57 004 x
16.3	29.8	3.9	11.3	21.7	39.7	5.5	15.3	27.1	49.7	7.1	19.4	32.5	59.6	8.8	23.5	LE 61 001
17.1	31.4	3.9	11.2	22.8	41.8	5.5	15.3	28.5	52.3	7.1	19.4	34.2	62.8	8.8	23.5	LE 64 001 x
17.6	32.3	3.9	11.2	23.5	43.1	5.5	15.3	29.4	53.9	7.1	19.4	35.3	64.7	8.8	23.5	LE 66 002 x
18.0	33.0	3.9	11.3	24.0	44.0	5.5	15.3	30.0	54.9	7.1	19.4	36.0	65.9	8.8	23.5	LE 66 004 x
20.6	37.8	3.9	11.2	27.5	50.4	5.5	15.3	34.4	63.0	7.1	19.4	41.3	75.7	8.8	23.5	LE 76 002 x
21.2	38.9	3.9	11.2	28.3	51.9	5.5	15.3	35.4	64.8	7.1	19.4	42.4	77.8	8.8	23.5	LE 78 002 x
28.2	51.8	3.9	11.2	37.7	69.0	5.5	15.3	47.1	86.3	7.1	19.4	56.5	103.5	8.8	23.5	LE 104 001
31.1	57.0	3.9	11.2	41.5	76.0	5.5	15.3	51.8	95.0	7.1	19.4	62.2	114	8.8	23.5	LE 114 001

# Filters for compressors

## Configuration and selection

### SPIN-ON SEPARATORS – separator selection based on the pressure [bar<sub>g</sub>] in the pressure vessel

Vessel pressure 5 [bar <sub>g</sub> ]				Vessel pressure 7 [bar <sub>g</sub> ]				Vessel pressure 9 [bar <sub>g</sub> ]				Vessel pressure 11 [bar <sub>g</sub> ]				Order No.
FAD5 [m <sup>3</sup> /min]		Limiting pressure [bar <sub>g</sub> ]		FAD7 [m <sup>3</sup> /min]		Limiting pressure [bar <sub>g</sub> ]		FAD9 [m <sup>3</sup> /min]		Limiting pressure [bar <sub>g</sub> ]		FAD11 [m <sup>3</sup> /min]		Limiting pressure [bar <sub>g</sub> ]		
min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	
<b>StarBox<sup>2</sup></b>																
1.1	5.1	3.3	18	1.5	6.8	4.8	18	1.9	8.5	6.1	18	2.3	10.2	7.7	18	<b>LB 13 145/30</b>
0.6	2.8	3.9	18	0.8	3.7	5.4	18	1.0	4.6	6.9	18	1.2	5.5	8.5	18	<b>LB 1374/30</b>
0.4	1.9	2.4	18	0.6	2.6	3.7	18	0.7	3.3	5.0	18	0.8	3.9	6.1	18	<b>LB 962/30</b>
0.3	1.5	2.5	18	0.4	2.1	4.0	18	0.6	2.6	5.2	18	0.4	3.1	6.4	18	<b>LB 950/30</b>
<b>StarBox<sup>XT</sup></b>																
1.0	4.5	2.8	20	1.4	6.3	4.1	20	1.7	7.5	5.4	20	2.1	9.0	6.6	20	<b>LB 13 145/50</b>
0.5	2.5	3.4	20	0.6	3.3	4.8	20	0.8	4.1	6.1	20	1.0	5.0	7.8	20	<b>LB 1374/50</b>
0.3	1.7	2.1	20	0.5	2.2	3.1	20	0.6	2.8	4.1	20	0.7	3.3	5.0	20	<b>LB 962/50</b>
0.2	1.5	2.5	20	0.3	2.0	3.7	20	0.4	2.4	4.7	20	0.3	3.0	6.1	20	<b>LB 950/50</b>

### OIL FILTERS – filter selection based on the pressure [bar<sub>g</sub>] in the pressure vessel

Nom. flow rate [l/min] [gpm]	Max. pressure [bar <sub>g</sub> ] [psi]	Max. FAD <sup>1)</sup> [m <sup>3</sup> /min]	Max. compressor performance <sup>1)</sup> [kW]	Order No.
<b>Standard filter</b> filter fineness according to ISO 16889 [μm (c)], 50% = 14 / 99% = 38, service life approx. 2,000 h				
50 (13.21)	25 (363)	7	41	<b>WD 940/2</b>
65 (17.17)	14 (203)	9	54	<b>W 950/31</b>
75 (19.82)	14 (203)	10	62	<b>W 962/14</b>
90 (23.78)	25 (363)	12	74	<b>WD 962/8</b>
128 (33.82)	14 (203)	18	106	<b>W 11 102/16</b>
180 (47.56)	20 (290)	25	149	<b>WD 13 145/4</b>
<b>Long life filter</b> filter fineness according to ISO 16889 [μm (c)], 50% = 4 / 99% = 10, service life approx. 4,000 h				
65 (17.17)	25 (363)	9	54	<b>WD 962/21</b>
100 (26.42)	20 (290)	14	83	<b>WD 1374/6</b>
205 (54.16)	20 (290)	28	169	<b>WD 13 145/14</b>
<b>High-pressure filter</b> filter fineness according to ISO 16889 [μm (c)], 50% = 4 / 99% = 11, service life approx. 4,000 h				
70 (18.49)	35 (508)	10	58	<b>WH 945/2</b>
100 (26.42)	35 (508)	14	83	<b>WH 980/1</b>

1) The figures for max. FAD and compressor performance are to be understood as guidance values. The requirements of the manufacturer of the pressure stage apply or, if necessary, the suitable oil volume for the whole system has to be observed.

### NOTES ON INTEGRATION OF AIR/OIL SEPARATORS IN THE PRESSURE VESSEL

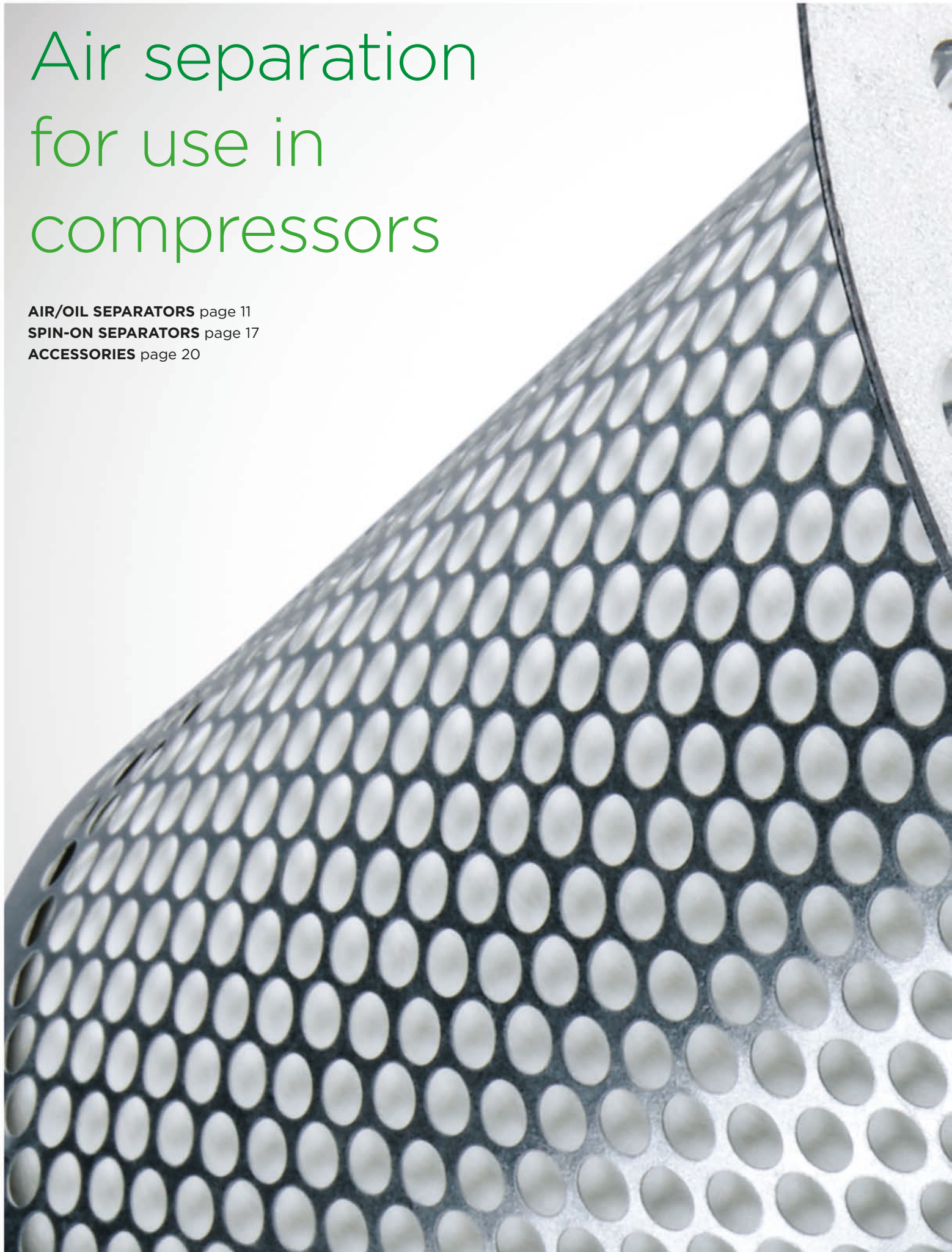
- Maximum oil content of the compressed air approx. < 5 g/m<sup>3</sup>(n)
- Minimum distance of element base to oil level > 0.5 diameter of the element
- No direct flow to the element (integration of a shield is recommended)
- Observe specified permissible functional areas
  - Flow rate (pressure and temperature-dependent)
  - Minimum pressure
  - Maximum pressure
  - Adequate dimensioning of the oil return line (scavenge line)

# Air separation for use in compressors

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# Air/Oil Separation for use in compressors Air/Oil Separators

**Through integration of air/oil separators in the compressor pressure vessel, the best separating performance across the elements can be achieved at the lowest possible pressure drop. MANN+HUMMEL air/oil separators elements feature a highly developed separation technology. This increases the power density and thus reduces the size compared to conventional elements.**

## ADVANTAGES

- Minimization of compressor oil loss
- High separation rate over the service life
- Low residual oil content
- Low pressure drop
- Compact design
- Metallic parts are connected to one another to prevent electrostatic charging

## TECHNICAL DATA

- Operating temperature<sup>1)</sup>:  
max. 100°C, short-term: max. 120°C
- Tested with standard oils for compressors (ISO VG46)<sup>2)</sup>
- Pressure drop (500 h): 3.0 mg/m<sup>3</sup>
- Residual oil content (500 h): < 0.3 bar
- Service life: 500 h up to 4,000 h (depending on operating conditions)



### OPERATING TEMPERATURE<sup>1)</sup>

Long-term: max. 100°C

Short-term: max. 120°C

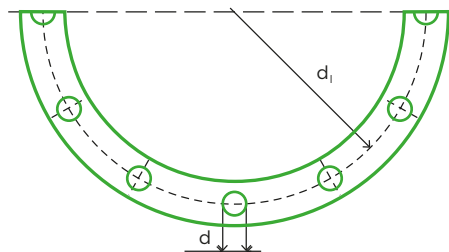
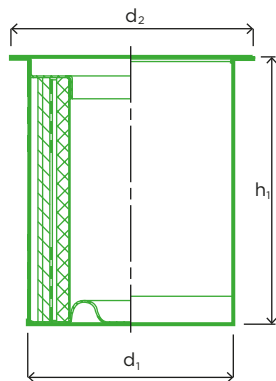
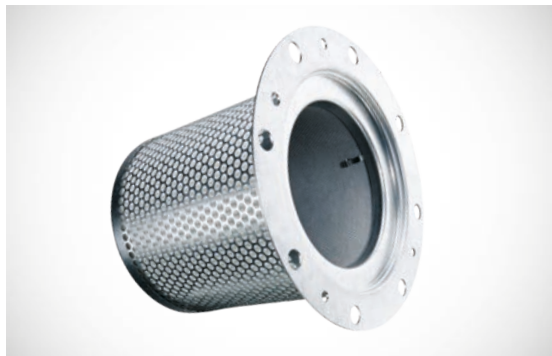
1) Short-term: Dwell time at the short-term temperature of not more than 10 min. The distance between 2 short-term peaks must be at least 0.5 h. After approx. 300 peaks have been reached, we recommend changing the seal and filter.

2) Validation is required for the use of strongly deviating oils.

**Notes on integration in the pressure vessel can be found on page 7**

# Air/Oil Separators

## Technical data

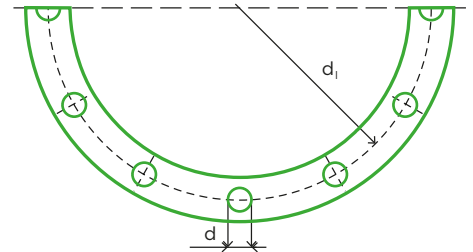
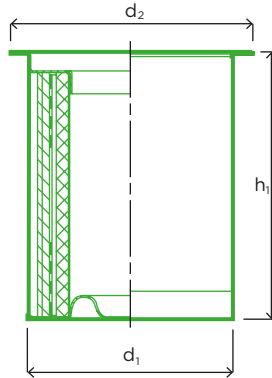
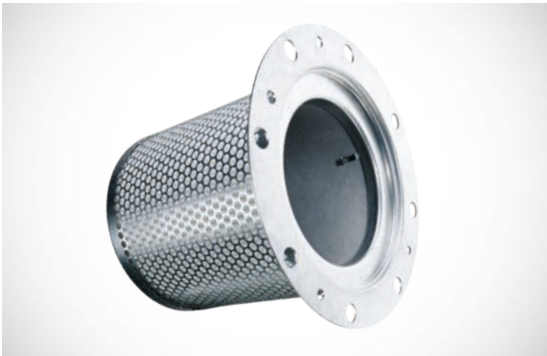


### ORDER NUMBERS AND DIMENSIONS

Order No.	Dimensions in mm (dimensions in inches)						Technical features
	d <sub>1</sub>	d <sub>2</sub>	h <sub>1</sub>	d <sub>i</sub>	d	Number of holes	Fleece preseparator
LE 3004 x	135 (5.31)	160 (6.30)	65 (2.56)	-	-	-	-
LE 4007 x	100 (3.94)	128 (5.04)	110 (4.35)	-	-	-	X
LE 5004	100 (3.94)	175 (6.89)	150 (5.91)	150 (5.91)	14 (0.55)	8	-
LE 5006	100 (3.94)	142 (5.59)	150 (5.91)	-	-	-	-
LE 6004	100 (3.94)	128 (5.04)	170 (6.69)	-	-	-	-
LE 7004 x	135 (5.31)	170 (6.69)	160 (6.30)	-	-	-	-
LE 8003 x	135 (5.31)	220 (8.66)	175 (6.89)	192 (7.56)	13.5 (0.53)	6	-
LE 8004 x	135 (5.31)	170 (6.69)	175 (6.89)	-	-	-	-
LE 9020 x	135 (5.31)	170 (6.69)	200 (7.87)	-	-	-	-
LE 9001 x	170 (6.69)	245 (9.65)	165 (6.50)	210 (8.27)	17 (0.67)	8	-
LE 10 001	135 (5.31)	165 (6.50)	230 (9.06)	-	-	-	X
LE 12 001 x	220 (8.66)	274 (10.79)	274 (10.79)	-	-	-	-
LE 13 001 x	135 (5.31)	182 (7.17)	293 (11.54)	-	-	-	-
LE 13 012 x	170 (6.69)	200 (7.87)	230 (9.06)	-	-	-	-
LE 16 008	160 (6.30)	200 (7.87)	310 (12.20)	-	-	-	-

# Air/Oil separators

## Technical data

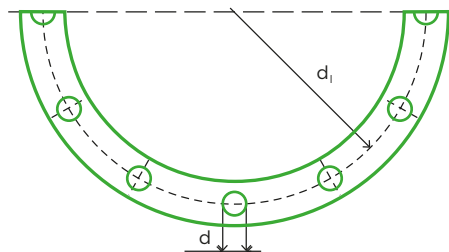
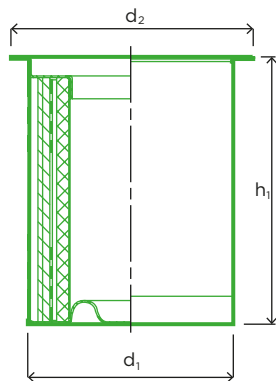
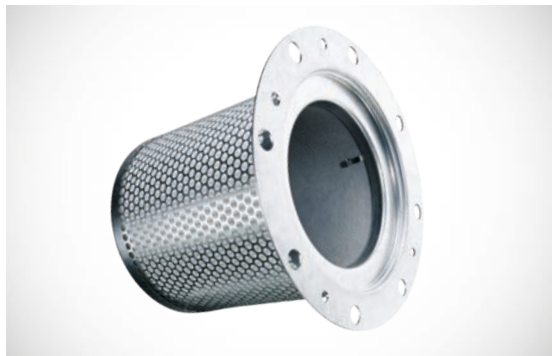


### ORDER NUMBERS AND DIMENSIONS

Order No.	Dimensions in mm ( <i>dimensions in inches</i> )					Technical features	
	$d_1$	$d_2$	$h_1$	$d_1$	$d$	Number of holes	Fleece preseparator
LE 17 011 x	170 (6.69)	200 (7.87)	305 (12.01)	-	-	-	-
LE 17 008 x	170 (6.69)	245 (9.65)	314 (12.36)	210 (8.27)	17 (0.67)	8	-
LE 20 001	275 (10.83)	328 (12.91)	230 (9.06)	-	-	-	-
LE 21 001 x	170 (6.69)	200 (7.87)	380 (14.96)	-	-	-	-
LE 23 002 x	170 (6.69)	245 (9.65)	420 (16.54)	210 (8.27)	17 (0.67)	8	-
LE 24 002 x	170 (6.69)	245 (9.65)	447 (17.60)	210 (8.27)	17 (0.67)	8	-
LE 28 003 x	220 (8.66)	274 (10.79)	400 (15.75)	-	-	-	-
LE 29 005 x	300 (11.81)	355 (13.98)	305 (12.01)	-	-	-	-
LE 29 001 x	300 (11.81)	348 (13.70)	305 (12.01)	-	-	-	-
LE 30 005 x	300 (11.81)	343 (13.50)	315 (12.40)	-	-	-	-
LE 31 001 x	275 (10.83)	328 (12.91)	350 (13.78)	-	-	-	-
LE 32 004	220 (8.66)	290 (11.42)	460 (18.11)	-	-	-	-
LE 33 001 x	300 (11.81)	400 (15.75)	350 (13.78)	350 (13.78)	26 (1.02)	12	-
LE 33 003 x	300 (11.81)	355 (13.98)	350 (13.78)	-	-	-	-
LE 35 004 x	275 (10.83)	328 (12.91)	400 (15.75)	-	-	-	-

# Air/Oil Separators

## Technical data



### ORDER NUMBERS AND DIMENSIONS

Order No.	Dimensions in mm (dimensions in inches)						Technical features
	d <sub>1</sub>	d <sub>2</sub>	h <sub>1</sub>	d <sub>i</sub>	d	Number of holes	Fleece preseparator
LE 39 007	350 (13.78)	439 (17.28)	350 (13.78)	-	-	-	-
LE 44 001 x	275 (10.83)	360 (14.17)	500 (19.69)	-	-	-	-
LE 44 002	275 (10.83)	328 (12.91)	500 (19.69)	-	-	-	-
LE 46 001 x	393 (15.47)	440 (17.32)	370 (14.57)	-	-	-	-
LE 47 002 x	400 (15.75)	434 (17.09)	370 (14.57)	-	-	-	-
LE 48 007 x	300 (11.81)	355 (13.98)	500 (19.69)	-	-	-	-
LE 48 003	300 (11.81)	355 (13.98)	500 (19.69)	-	-	-	-
LE 51 001 x	300 (11.81)	355 (13.98)	540 (21.26)	-	-	-	-
LE 57 002 x	300 (11.81)	355 (13.98)	600 (23.62)	-	-	-	-
LE 57 004 x	300 (11.81)	355 (13.98)	600 (23.62)	-	-	-	-
LE 61 001	400 (15.75)	434 (17.09)	480 (18.90)	-	-	-	-
LE 64 001 x	393 (15.47)	440 (17.32)	515 (20.28)	-	-	-	-
LE 66 002 x	400 (15.75)	434 (17.09)	520 (20.47)	-	-	-	-
LE 66 004 x	300 (11.81)	355 (13.98)	700 (27.56)	-	-	-	-
LE 76 002 x	300 (11.81)	355 (13.98)	800 (31.50)	-	-	-	-
LE 78 002 x	400 (15.75)	434 (17.09)	620 (24.41)	-	-	-	-
LE 104 001	400 (15.75)	450 (17.72)	820 (32.28)	-	-	-	X
LE 114 001	400 (15.75)	450 (17.72)	900 (35.43)	-	-	-	X







# Air/Oil Separation for use in compressors Spin-On Separators

## DESIGN

- Robust metal housing with integrated separator filter element
- A undetachable seal fitted into the cover ensures reliable sealing under all operating conditions
- Square seal: NBR

## ADVANTAGES

- Easy integration
- Service friendly
- Low pressure drop
- Low residual oil content
- High separation rate
- High power density
- Metallic parts are connected to one another to prevent electrostatic charging

## FEATURES

- Large matched range of filter heads
- Suitable connector
- FKM replaceable seals

## TECHNICAL DATA

- Operating temperature<sup>1)</sup>:  
max. 100°C, short-term: max. 120°C
- Tested with standard oils for compressors (ISO VG46)<sup>2)</sup>
- Pressure drop (500 h): < 0.3 bar
- Residual oil content StarBox<sup>2</sup>: 3 mg/m<sup>3</sup><sub>(n)</sub>  
StarBox<sup>XT</sup>: 2.0 mg/m<sup>3</sup><sub>(n)</sub>
- Service life: 3,000 h  
(depending on operating conditions)
- Further information through maintenance instructions and labeling

## THREAD ON TOP SIDE



## THREAD ON UNDERSIDE



### OPERATING TEMPERATURE<sup>1)</sup>

Long-term: max. 100°C  
Short-term: max. 120°C

1) The residual oil content in the compressed air may be subject to regulation depending on the application. If necessary, the compressed air must be prepared using suitable filters. 2) Validation is required for the use of strongly deviating oils.

# Spin-On separators

## StarBox<sup>2</sup>

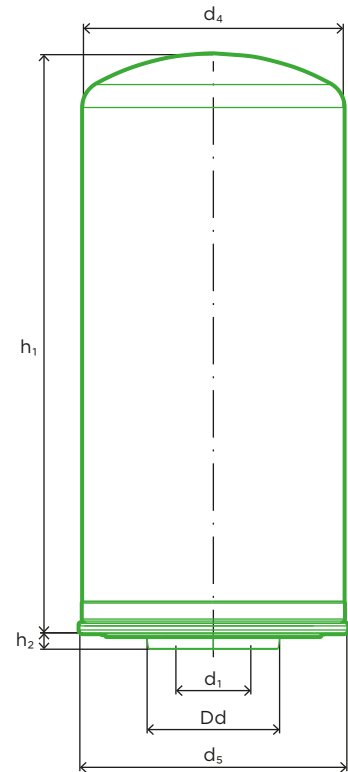


### ADVANTAGES

- Flow optimized
- Energy and cost saving
- Up to 25 % reduction in pressure drop
- 20 % higher FAD for comparable size
- Large FAD range, ideal for use on compressors with variable drive speed

### TECHNICAL DATA

- Residual oil content<sup>1)</sup>: 1-3 mg/m<sup>3</sup><sub>(n)</sub>
- Initial pressure drop<sup>1)</sup>: <3.0 bar
- Max. operating pressure: 20 (18) bar
- Service life: approx. 3,000 h / 1 bar Δp



### ORDER NUMBERS AND DIMENSIONS

Order No.	Nominal flow rate <sup>4)</sup> [m <sup>3</sup> <sub>(n)</sub> /min] [cfm]	Dimensions in mm (dimensions in inches)					Max. operating overpressure	
		d <sub>1</sub>	Dd	d <sub>4</sub>	d <sub>5</sub>	h <sub>1</sub>	[bar]	[MPa]
LB 950/30	2.5 [88.3]	M 24x1.5	-	93 (3.66)	96 (3.78)	-	20	2.0
LB 962/30	3.2 [113.0]	M 24x1.5	-	93 (3.66)	96 (3.78)	212 (8.35)	20	2.0
LB 1374/30	3.6 [127.1]	M 39x1.5	96 (3.78)	138 (5.43)	140 (5.51)	177 (5.51)	18	1.8
LB 13 145/30	6.5 [229.5]	M 39x1.5	96 (3.78)	138 (5.43)	140 (5.51)	302 (11.89)	18	1.8

4) Nominal flow rate according to DIN 1945 at 7 bar [0.7 MPa] operating overpressure



### IN ADDITION, WE OFFER YOU:

- Individual branding with your customer logo
- Technical service and training for your employees
- Samples for technical validation
- Proven MANN+HUMMEL quality

# Spin-On separators

## StarBox<sup>XT</sup>

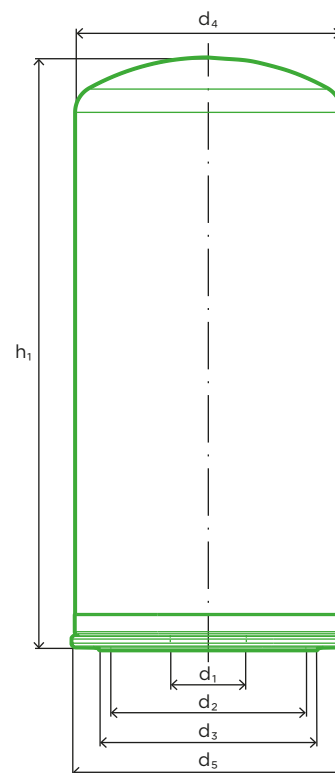


### ADVANTAGES

- Special high performance wrap
- Flow optimized
- Reduced differential pressure (energy efficiency)
- Increased efficiency density
- Energy and cost saving
- Easy maintenance with short downtime

### TECHNICAL DATA

- Residual oil content<sup>1)</sup>: <2.0 mg/m<sup>3</sup>(n)
- Initial pressure drop<sup>2)</sup>: 0.3 bar
- Max. operating pressure: 20 bar
- Service life: approx. 3,000 h / 1 bar Δp



### ORDER NUMBERS AND DIMENSIONS

Order No.	Nominal flow rate <sup>4)</sup> [m <sup>3</sup> (n)/min] [cfm]	Dimensions in mm (dimensions in inches)					Max. operating overpressure		
		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	h <sub>1</sub>	[bar]	[MPa]
LB 950/50	2.3 [88.3]	M 24x1.5	62 (2.44)	71 (2.80)	93 (3.66)	96 (3.78)	-	20	2.0
LB 962/50	3.1 [113.0]	M 24x1.5	62 (2.44)	71 (2.80)	93 (3.66)	96 (3.78)	212 (8.35)	20	2.0
LB 1374/50	3.2 [127.1]	M 39x1.5	100 (3.94)	111 (4.37)	138 (5.43)	140 (5.51)	177 (5.51)	20	2.0
LB 13 145/50	6.25 [229.5]	M 39x1.5	100 (3.94)	111 (4.37)	138 (5.43)	140 (5.51)	302 (11.89)	20	2.0

4) Nominal flow rate according to DIN 1945 at 7 bar [0.7 MPa] operating overpressure

### ACCESSORIES

Suitable for	Connector (page 22)	Filter heads (page 21)		FKM seals (page 23)
		Single	Triple	
LB 950/50 LB 962/50	1313690S01	-	-	49 999 98 013
LB 1374/50 LB 13 145/50	1313737S01	67 700 31 801	67 750 31 971	49 999 98 014

# Accessories for Spin-On Separators Filter heads



## ADVANTAGES

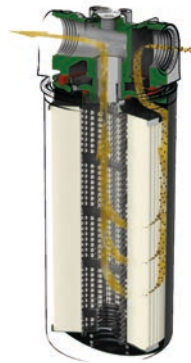
- Selection of various filter heads
- Easy installation, integration and reliable maintenance

## FEATURES

- Return of separated oil to the compressor
- Return line integrated in the head  
(not in scope of delivery)

## TECHNICAL NOTES

- The lowest specified maximum operating pressure  
(head or separator) must not be exceeded
- Observe the arrow direction on the filter head



# Accessories for Spin-On Separators Filter heads

FIG. 1

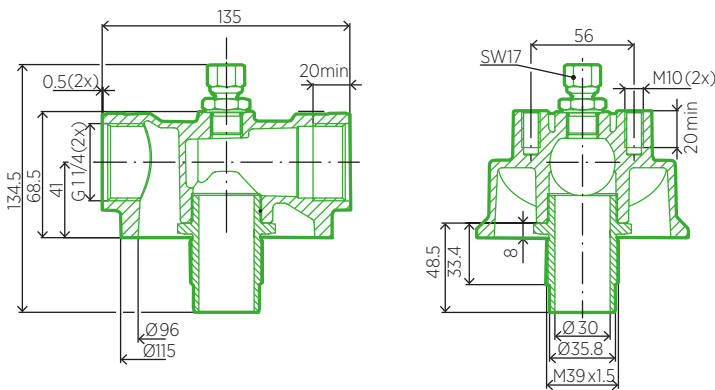
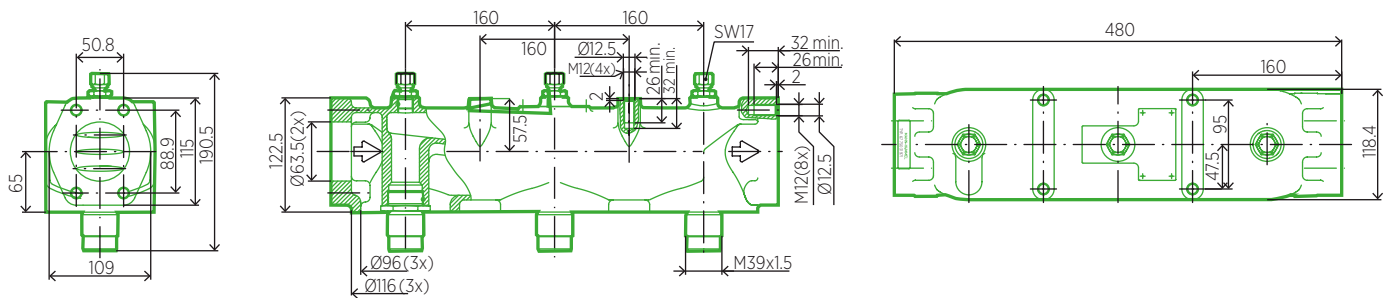


FIG. 2



## ORDER NUMBERS

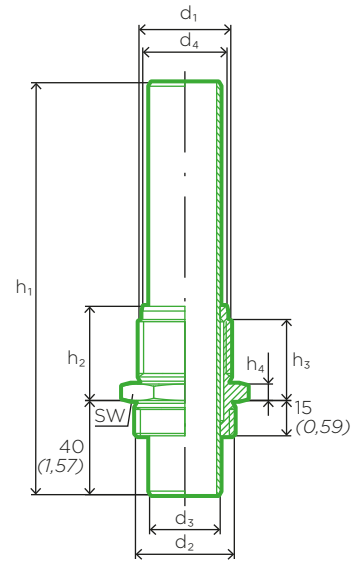
Order No.	Name	Figure	Suitable for LB box / StarBox	Max. operating overpressure	
				[bar]	[MPa]
67 700 31 801	Single	1	LB 13	20	2.0
67 750 31 971	Triple	2			

# Accessories for Spin-On Separators Screw-on connector



## ADVANTAGES

- Divided removal of separated oil and de-oiled air
- Integration in customer-specific heads in vertical version possible



## ORDER NUMBERS AND DIMENSIONS

Order No.	Suitable for StarBox <sup>XT</sup>	Dimensions in mm ( <i>dimensions in inches</i> )								
		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	h <sub>1</sub>	h <sub>2</sub>	h <sub>3</sub>	h <sub>4</sub>	SW
1313690S01	LB 950/50	M 24x1.5	M 27x1.5	15 (0.5)	19.8 (0.74)	135 (5.31)	30 (1.18)	25.4 (1)	6 (0.24)	32
	LB 962/50									
1313737S01	LB 1374/50	M 39x1.5	M 42x1.5	30 (1.18)	35.8 (1.41)	175 (6.89)	40 (0.16)	34.4 (1.35)	7 (0.28)	46
	LB 13 145/50									
	LB 1374/50									

# Accessories for Spin-On Separators

## Replacement seals



### ADVANTAGES

- Replacement for standard seals made from NBR
- For long-term or repeated exceeding of 100°C oil temperature

### TECHNICAL DATA

- Material: FKM
- Packaging unit of 20 replacement seals

### INSTALLATION: REPLACING THE SEAL

- Pull the existing seal out of the holder on the underside of the Spin-On Separator
- Replace with the replacement seal
- Note: This should fully engage in the retaining slot



### PERMISSIBLE OPERATING TEMPERATURES<sup>1)</sup>

Long-term<sup>2)</sup>: -20°C to +100°C

Short-term<sup>2)</sup>: +120°C

Observe minimum temperature!

### ORDER NUMBERS AND DIMENSIONS

Order No.	Name	Suitable for LB box / StarBox
49 999 98 013	Service kit size 7+9	LB 9
49 999 98 014	Service kit size 13	LB 13

1) Operating temperatures relate to the entire Spin-On Separator system. 2) Short-term: Dwell time at the short-term temperature of not more than 10 min. The distance between 2 short-term peaks must be at least 0.5 h. After approx. 300 peaks have been reached, we recommend changing the seal and filter.

# Oil filters for use in compressors

**STANDARD OIL FILTERS** page 28

**LONG LIFE OIL FILTERS** page 29

**HIGH-PRESSURE OIL FILTERS** page 29

**ACCESSORIES** page 30







# Oil filters for use in compressors

## DESIGN

- Robust metal housing with integrated filter element
- Can be equipped with different modular components, such as special filter medium, bypass valve etc.
- Admission of liquid to be filtered through the concentric inlet openings in the cover
- Outlet of cleaned liquid at the central connection
- A undetachable seal fitted into the cover ensures reliable sealing to the outside under all operating conditions

## QUALITY 1: STANDARD OIL FILTER

- Cellulose medium
- Service life approx. 2,000 h
- Attractive price/performance ratio

## QUALITY 2: LONG LIFE OIL FILTER

- Reliability under stringent requirements
- Glass fiber medium
- Resistance to aggressive compressor oils with high separation performance
- Service life approx. 4,000 h
- Improved pulsation resistance

## QUALITY 2: HIGH-PRESSURE OIL FILTER

- Applications at maximum operating pressure of 34.5 bar<sub>(g)</sub>

## ADVANTAGES

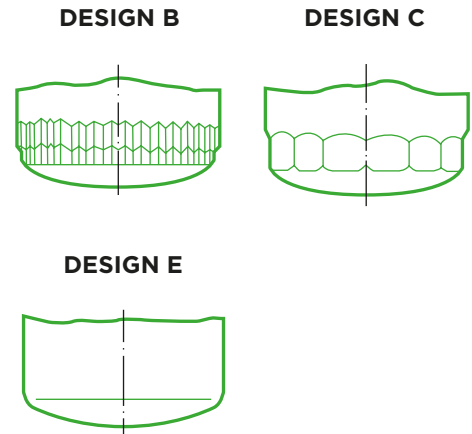
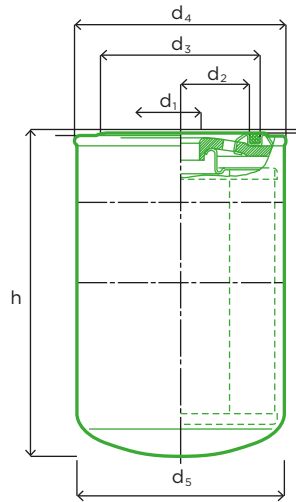
- Tried and tested in operation
- Robust design
- Efficient separation and high dirt holding capacity at low pressure drop
- Undetachable seals

## FEATURES

- Compressor-specific material and design
- Bypass valves with clearly defined opening characteristic
- Available with various filter media

# Standard oil filters

## Technical data



### ORDER NUMBERS AND DIMENSIONS

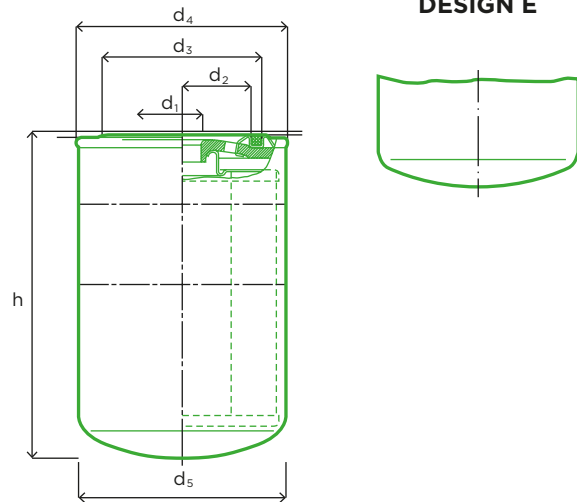
Order No.	Nominal flow rate [l/min] [gpm]	Dimensions in mm (dimensions in inches)						Bypass valve		Permissible operating pressure		Design
		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	h	[bar]	[MPa]	[bar]	[MPa]	
WD 940/2	50 [13]	1"-12 UNF	62 (2.44)	71 (2.80)	96 (3.78)	93 (3.66)	144 (5.67)	2.5	0.25	25	2.5	E
WD 962/8	75 [20]	1"-12 UNF	62 (2.44)	71 (2.80)	96 (3.78)	93 (3.66)	210 (8.27)	2.5	0.25	25	2.5	E
W 962/14	75 [20]	1"-12 UNF	62 (2.44)	71 (2.80)	96 (3.78)	93 (3.66)	210 (8.27)	2.5	0.25	14	1.4	B
WD 13 145/4	180 [48]	1½"-16 UN	100 (3.94)	111 (4.37)	140 (5.51)	136 (5.35)	302 (11.89)	2.5	0.25	20	2.0	E

### ACCESSORIES

Use for Order No.	Filter heads (page 31-33)				FKM seals (page 37)
	Single	Double	Triple	Switchable	
WD 940/2	67 506 31 652 67 506 31 535	67 512 31 851	-	-	49 999 98 013
WD 962/8	67 506 31 143 67 506 31 535	67 512 31 851	-	67 506 31 551	49 999 98 013
W 962/14	67 506 31 143 67 506 31 535	67 512 31 851	-	67 506 31 551	49 999 98 013
WD 13 145/4	67 700 31 934	67 730 31 129	67 750 31 991	-	49 999 98 014

# Long life/high-pressure oil filters

## Technical data



### LONG LIFE

Order No.	Nominal flow rate [l/min] [gpm]	Dimensions in mm (dimensions in inches)						Bypass valve		Permissible operating pressure		Design
		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	h	[bar]	[MPa]	[bar]	[MPa]	
WD 962/21	65 [17]	1"-12 UNF	62 (2.44)	71 (2.80)	96 (3.78)	93 (3.66)	210 (8.27)	2.5	0.25	25	2.5	E
WD 1374/6	95 [25]	1½"-16 UN	100 (3.94)	111 (4.37)	140 (5.51)	136 (5.35)	177 (6.97)	2.5	0.25	20	2.0	E
WD 13 145/14	210 [56]	1½"-16 UN	100 (3.94)	111 (4.37)	140 (5.51)	136 (5.35)	302 (11.89)	2.5	0.25	20	2.0	E

### LONG LIFE ACCESSORIES

Use for Order No.	Filter heads (page 31-33)				FKM seals (page 37)
	Single	Double	Triple	Switchable	
WD 962/21	67 506 31 652 67 506 31 535	67 512 31 851	-	-	49 999 98 013
WD 1374/6 WD 13 145/14	67 700 31 934	67 730 31 129	67 750 31 991	-	49 999 98 014

### HIGH PRESSURE

Order No.	Nominal flow rate [l/min] [gpm]	Dimensions in mm (dimensions in inches)						Bypass valve	Permissible operating pressure		Design
		d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	h		[bar]	[MPa]	
WH 945/2	70 [19]	1 3/8"-12 UNF	-	-	97 (3.82)	94.2 (3.71)	152 (5.98)	-	34.5	3.45	E
WH 980/1	100 [26]	1 3/8"-12 UNF	-	-	97 (3.82)	94.2 (3.71)	240 (9.45)	-	34.5	3.45	E

Filter fineness according to ISO 16889 [µm (c)], 50% = 4 / 99% = 11, service life approx. 4,000 h. Actual operating conditions can shorten filter service life.

# Accessories for oil filters

## Filter heads

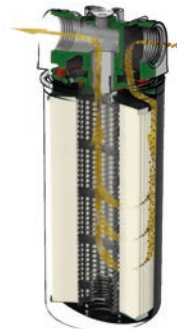


### ADVANTAGES

- Easy integration of oil filters in a compressor
- Easy installation and maintenance of oil filters

### FEATURES

- Multiple heads for higher flow rates possible
- Switchable filter heads for reliable maintenance in operation (depressurized changing, caution: pressure increase in the system must be taken into account in the design)



### NOTES

- Observe specified lowest operating pressure
- The arrow direction must be observed

# Accessories for oil filters

## Filter heads

FIG. 1

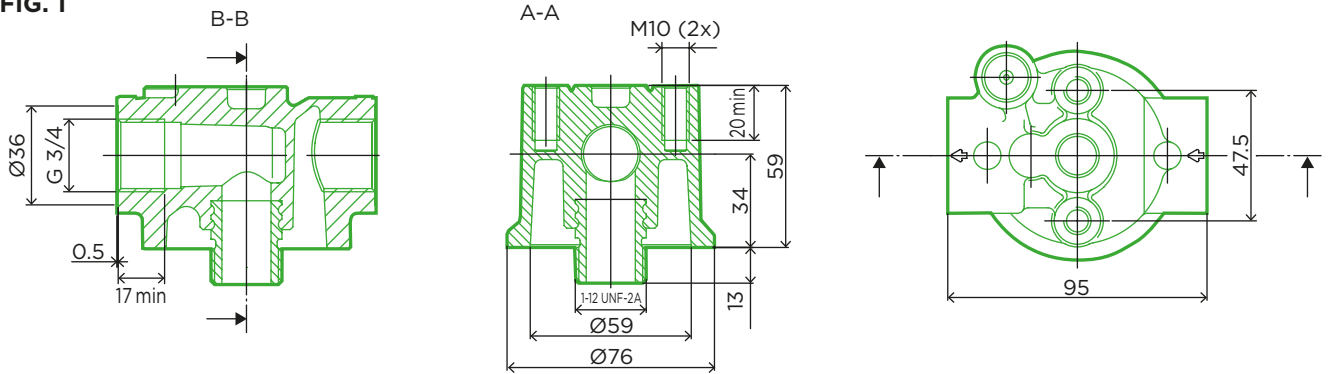
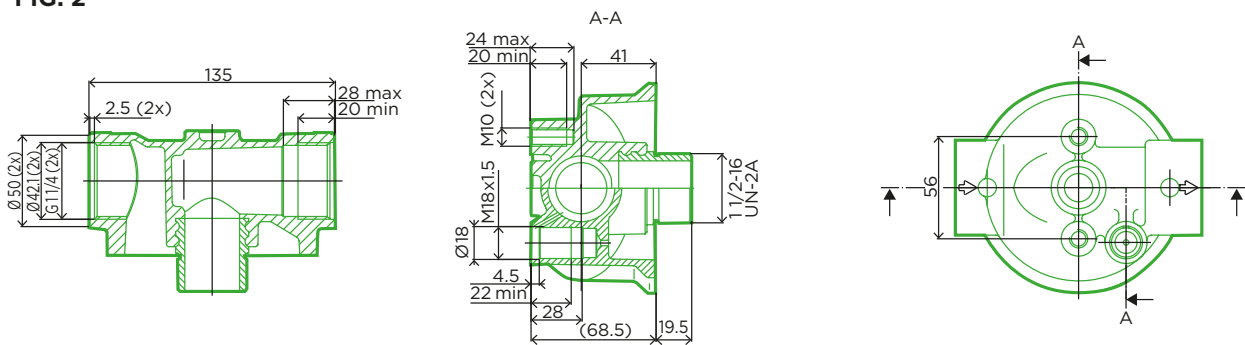


FIG. 2



### ORDER NUMBERS AND DIMENSIONS

Order No.	Name	Figure	Suitable oil filter	Max. operating overpressure		Filter thread	Line connection	Service switch
				[bar]	[MPa]			
67 506 31 143	Single	1	W / WD 7 W / WD 9	25	2.5	1-12 UNF-2A	G 1	-
67 506 31 535	Single	1	W / WD 7 W / WD 9	25	2.5	1-12 UNF-2A	G ¾	-
67 700 31 934	Single	2	W / WD 13	20	2.0	1½-16 UN-2A	G 1¼	required <sup>1)</sup>

1) Filter head can only be used with service switch.

# Accessories for oil filters

## Double filter heads

FIG. 1

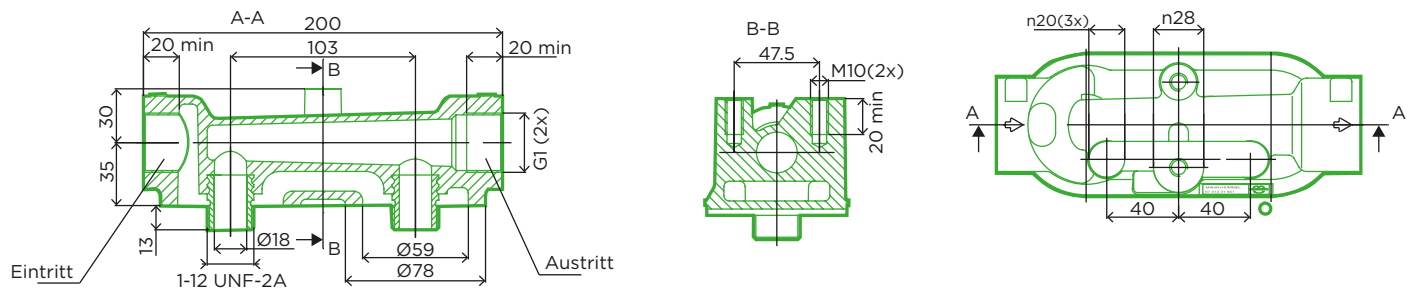
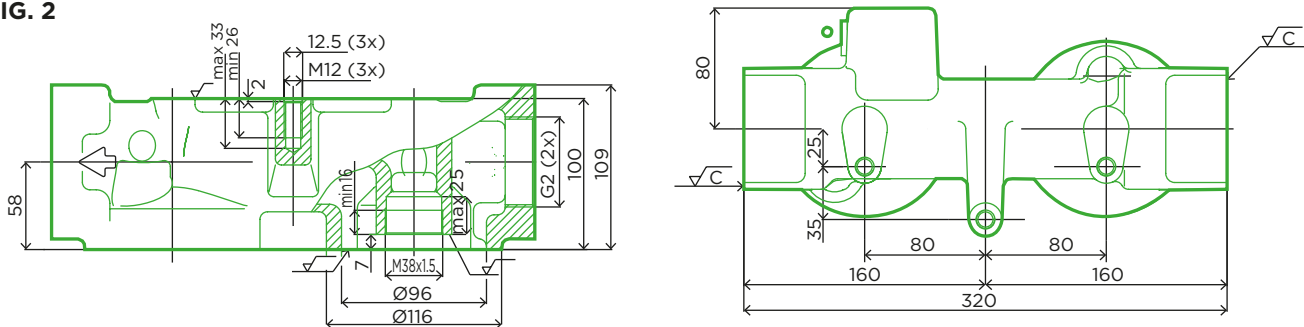


FIG. 2



### ORDER NUMBERS

Order No.	Name	Figure	Suitable oil filter	Max. operating overpressure		Filter thread	Line connection	Service switch
				[bar]	[MPa]			
67 512 31 851	Double	1	W / WD 7 W / WD 9	25	2.5	1-12 UNF-2A	G 1	-
67 730 31 129	Double	2	W / WD 13	20	2.0	M 38x1.5 (internal) <sup>1)</sup>	G 1¼	possible

<sup>1)</sup> Use with connector 21 039 15 101.



# Accessories for oil filters

## Triple and switchable filter heads

FIG. 1

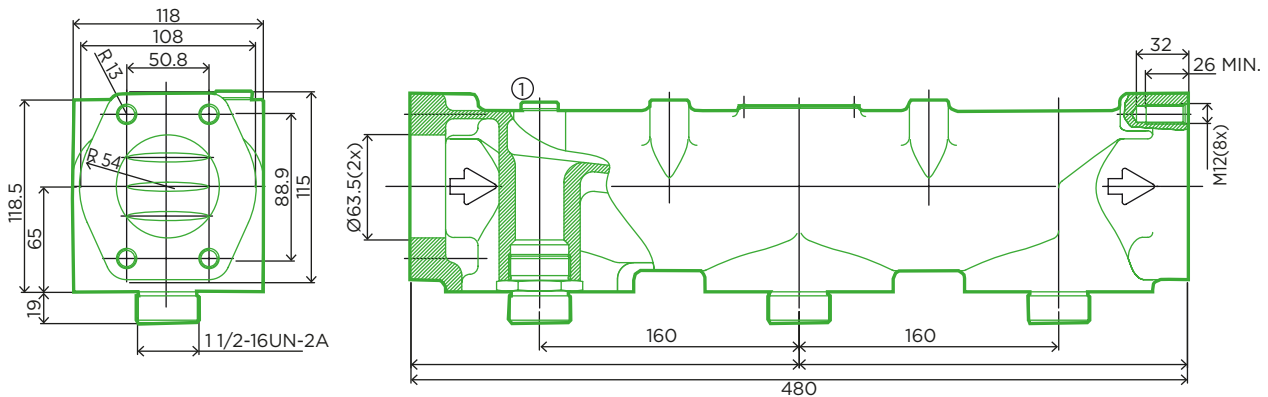
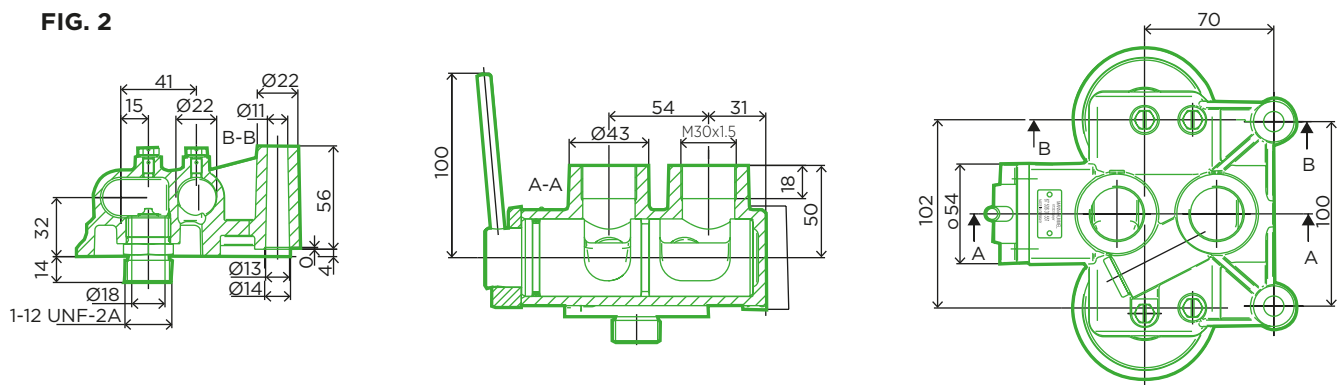


FIG. 2



### ORDER NUMBERS

Order No.	Name	Figure	Suitable oil filter	Max. operating overpressure		Filter thread	Line connection	Service switch
				[bar]	[MPa]			
67 750 31 991	Triple	1	W / WD 13	20	2.0	1½-16 UN-2A	Flange	possible
67 506 31 551	Switch	2	W / WD 7 W / WD 9	25	2.5	1-12 UNF-2A	M 30x1.5	possible

# Accessories for oil filters

## Visual service indicator



### ADVANTAGES

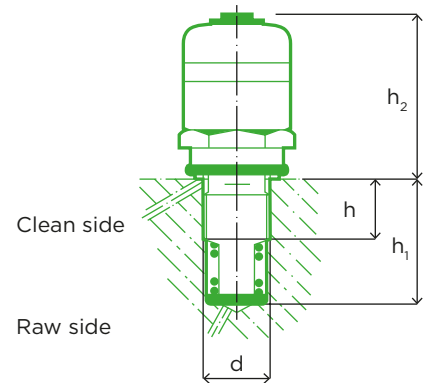
- Indicates the time for maintenance



**PERMISSIBLE OPERATING TEMPERATURE**  
120°C

### FEATURES

- Service signal as red ring in the window



### ORDER NUMBERS AND DIMENSIONS

Order No.	Dimensions in mm ( <i>dimensions in inches</i> )				Max. pressure [bar]	Switching point [bar]	Suitable for
	d	h	h <sub>1</sub>	h <sub>2</sub>			
<b>59 020 79 201</b>	M 18x1.5	22 (0.87)	36 (1.42)	46 (1.81)	25	1.0	<b>67 700 31 934</b>
<b>59 020 79 208</b>	M 18x1.5	22 (0.87)	36 (1.42)	46 (1.81)	25	1.4	<b>67 625 31 935</b> <b>67 730 31 129</b>
<b>59 020 79 202</b>	M 18x1.5	22 (0.87)	36 (1.42)	46 (1.81)	25	1.8	<b>67 750 31 991</b> <b>67 506 31 551</b>

# Accessories for oil filters

## Service switches



### ADVANTAGES

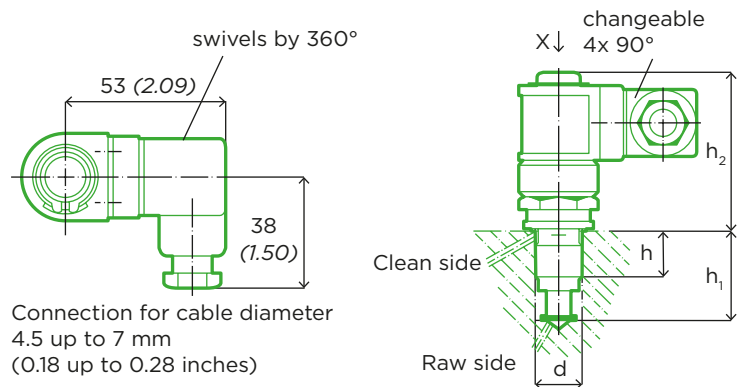
- Indicates the time for maintenance via a high-quality electromagnetic switch (reed switch)
- Service signal for indicator. e.g. light or buzzer

### TECHNICAL DATA

- Switching type preset in delivery condition (see below). Adaptable through replugging by customer.
- Switching capacity: max. 12 W / 18 VA
- Starting current: max 0.8 A
- Protection class: IP65



### VIEW X



### ORDER NUMBERS AND DIMENSIONS

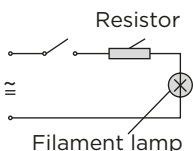
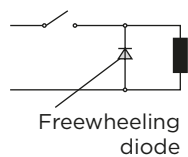
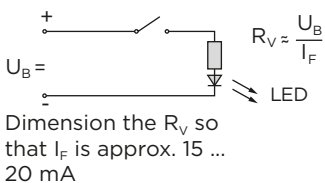
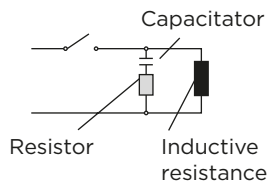
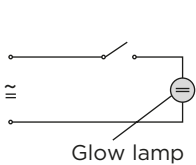
Order No.	Dimensions in mm (dimensions in inches)				Max. pressure [bar]	Switching point [bar]	Switch type	Suitable for
	d	h	h <sub>1</sub>	h <sub>2</sub>				
59 010 79 206	M 18x1.5	22 (0.87)	36 (1.42)	62.5 (2.46)	25	0.8	NC	
59 010 79 201	M 18x1.5	22 (0.87)	36 (1.42)	62.5 (2.46)	25	1.0	NO	67 700 31 934 67 625 31 935 67 730 31 129 67 750 31 991 67 506 31 551
59 010 79 208	M 18x1.5	22 (0.87)	36 (1.42)	62.5 (2.46)	25	1.4	NO	
59 010 79 202	M 18x1.5	22 (0.87)	36 (1.42)	62.5 (2.46)	25	1.8	NO	

# Accessories for oil filters

## Service switches

### INSTRUCTIONS FOR THE ELECTRICAL CONNECTION OF THE SERVICE SWITCH (WITH REED SWITCH)

- For electric/visual indicator: use of a glow lamp or LED (direct switching without spark quenching device possible)
- Adaptation of the lamp bulbs (high starting current) and series resistor to the maximum switch load during switching on.
- For full protection against overloading, observe the maximum switch load when selecting the series resistor (if the lamp bulb resistance is not taken into account, it will burn with undervoltage)
- To prevent damage due to voltage peaks (inductive loading):
  - AC current: RC combination parallel to relay or protection coil
  - DC current: Freewheeling diode (e.g. diode 1N 4007) in non-conducting direction



#### NOTE

Observe the instructions of the relevant protection device or relay manufacturer when dimensioning the spark arrester. The maximum switch load (see rating plate) must not be exceeded in either case.

# Accessories for oil filters

## Replacement seals



### ADVANTAGES

- Replacement for standard seals made from NBR
- For long-term or repeated exceeding of 100°C oil temperature

### TECHNICAL DATA

- Material: FKM
- Packaging unit of 20 replacement seals

### INSTALLATION: REPLACING THE SEAL

- Pull the existing seal out of the holder on the underside of the spin-on separator
- Replace with the replacement seal
- Note: This should fully engage in the retaining slot



#### PERMISSIBLE OPERATING TEMPERATURES<sup>1)</sup>

Long-term<sup>2)</sup>: -20°C to +100°C

Short-term<sup>2)</sup>: +120°C

Observe minimum temperature!

### ORDER NUMBERS

Order No.	Name	Suitable for filter type
49 999 98 013	Service kit size 7+9	W / WD 7 W / WD 9
49 999 98 014	Service kit size 13	W / WD 13

1) Operating temperatures relate to the entire spin-on separator system. 2) Short-term: Dwell time at the short-term temperature of not more than 10 min. The distance between 2 short-term peaks must be at least 0.5 h. After approx. 300 peaks have been reached, we recommend changing the seal and filter.

# Technical appendix

**FILTRATION CHAIN IN THE COMPRESSOR** page 40

**FILTER LEXICON** page 42

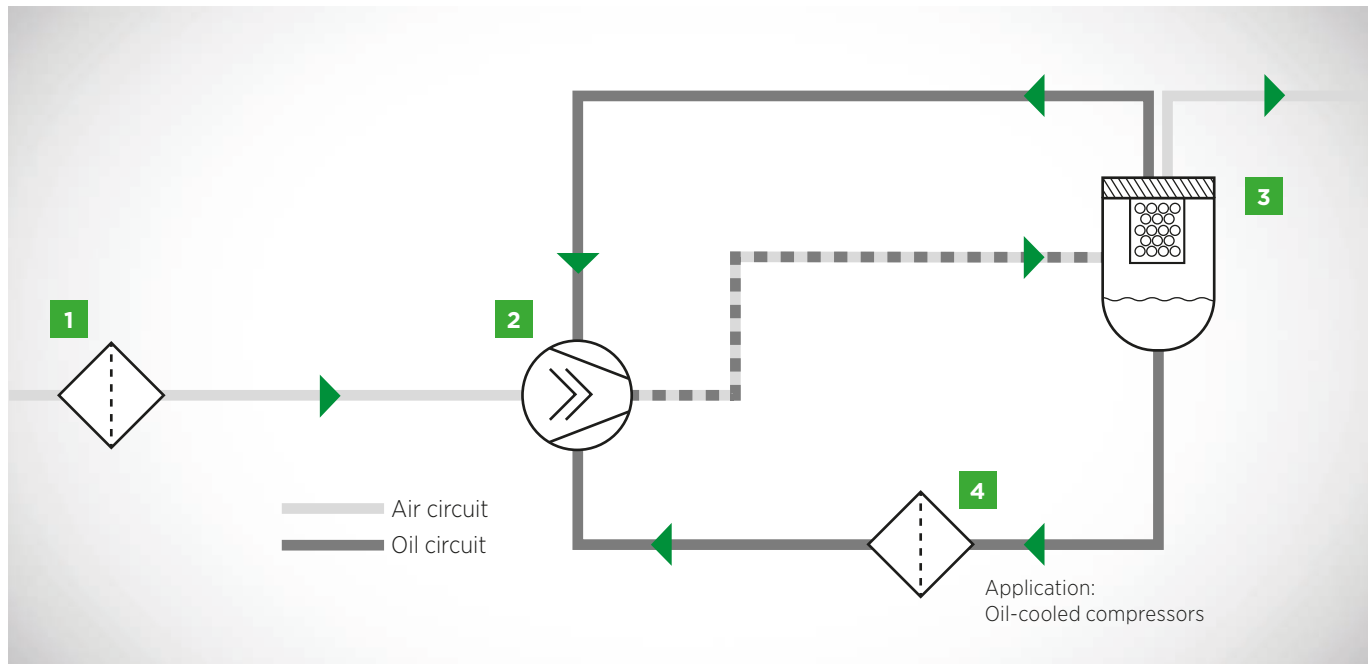
**CONVERSION TABLES** page 44





# Filtration chain in the compressor

Various filters protect the compressor against external contaminants such as dust in the ambient air. Furthermore, the filtration system supports the maintenance of the thermal balance characteristics of the oil circuit and helps prevent the leakage of oil.



## 1 AIR CLEANER

Modern air cleaner systems from MANN+HUMMEL protect compressor components downstream against the ingress of instances of dust or wear particles. Two-stage air cleaners are used in mobile compressor applications. With these air cleaners a significant part of the dust is separated in a pre-separation process before the air reaches the filter element. This considerably lengthens the service life of the element.

Various filters protect the compressor against external contaminants such as dust in the ambient air. Furthermore, the filtration system supports the maintenance of the thermal balance characteristics of the oil circuit and helps prevent the leakage of oil.

## 2 AIR/OIL SEPARATOR OR SPIN-ON SEPARATOR

The residual oil contained in the compressed air is almost completely separated by an air/oil separator within the pressure vessel or a spin-on separator outside of the pressure vessel through application of the coalescence effect. The cleaned air is then available for the compressed air network. The separated oil is conveyed through overpressure back to the oil circuit.

## 3 COMPRESSOR STAGE AND PRESSURE VESSEL

The injection of oil serves to dissipate the heat generated during the compression of gas and the compressed air containing oil is directed to a pressure vessel. When the air reaches the pressure vessel pre-separation is made via a tangential inlet which substantially reduces the oil content of the compressed air. The oil collects at the bottom of the pressure vessel and through the pressure in the vessel is directed via an oil filter and oil cooler back into the compressor stage.

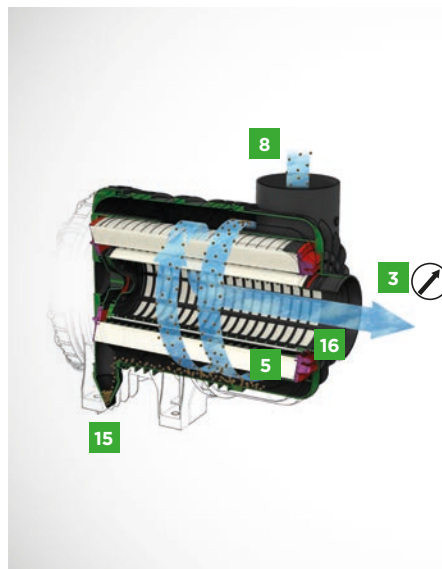
## 4 OIL FILTER

The oil filter which removes wear particles from the oil is equipped with a bypass valve to prevent the accumulation of excess pressure.

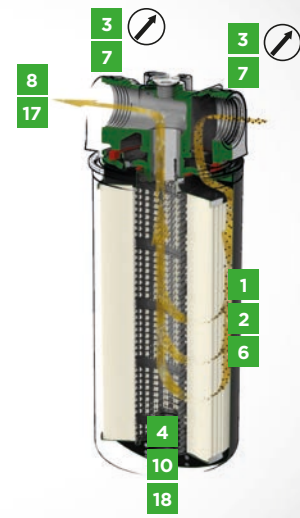




# Filter lexicon



Air cleaner



Oil filter

## SEPARATION EFFICIENCY $\eta$ [%] (OIL FILTER)

Ratio between the dirt retained by the filter and the added dirt.

## ABSOLUTE SEPARATION EFFICIENCY (OIL FILTER)

99 % of particles of the specified size are separated during a single filter pass. Example: 15  $\mu\text{m}$  absolute: 99 % of size 15  $\mu\text{m}$  particles are separated during a single filter pass ( $\Rightarrow \beta_{15}=100$ ).

## NOMINAL SEPARATION EFFICIENCY (OIL FILTER)

50 % of particles of the specified size are separated during a single filter pass. Example: 15  $\mu\text{m}$  nominal: 50 % of size 15  $\mu\text{m}$  particles are separated during a single filter pass ( $\Rightarrow \beta_{15}=2$ ).

## SEPARATION EFFICIENCY $H$ [%] (AIR CLEANER)

Measurement and definition as per ISO 5011: Dust with a defined particle spectrum and defined concentration in the air is fed to the filter via a metering device. By far the largest part of this dust is separated by the filter. The separation efficiency of the filter is derived from the ratio between the separated mass of dust and the metered mass of dust. In the case of dry air cleaners, the separation efficiencies are generally above 99.95 %

## $\beta_x$ value

The beta value defines the ratio between the number of particles of a particular size

X upstream of the filter to the number of the particles of that size downstream of the filter. Conversion into separation efficiency:  $\eta = (1-1/\beta) \times 100$ .

### 1 BURST PRESSURE [bar]

Pressure at which failure of the filter structure can be expected.

### 2 OPERATING PRESSURE [bar]

Pressure for which the filter has been designed during continuous operation.

### 3 FLOW RESISTANCE $\Delta p$ [mbar]

Measured variable as per ISO 5011 for the pressure drop of a filter. In the catalog, the underpressure downstream of the filter is always specified. (Significantly reduced pressure drop in the case of the StarBox and StarBox<sup>2</sup> series.)

### 4 BYPASS VALVE

Valve which, after reaching the opening pressure, enables the flow of oil to bypass the filter medium. It prevents impermissibly high pressure in the system and via the filter medium (e.g. in the case of pressure surges, start-up with cold oil or blockage of the filter medium).

### SINGLE-STAGE FILTER

Features one main separation step and is ideal for low-dust operating conditions.

## ELECTRICAL CONDUCTIVITY [S, 1/ $\Omega$ ]

In MANN+HUMMEL air/oil separators, all the metallic parts are electrically connected to one another. This prevents

and dissipates electrostatic charging caused by air friction.

## FLANGE SEALS

Critical area of electrical discharge capacity, which can have an insulating effect. Please note: Electrical contact to the pressure vessel and from there to the electrical system is present, e.g. through metal staples in the seals or electrically conductive seals.

### 5 MAIN ELEMENT

Air cleaner element made from pleated filter medium, via which filtration takes place. Its filter surface area determines the service life.

### 6 COLLAPSE PRESSURE [bar]

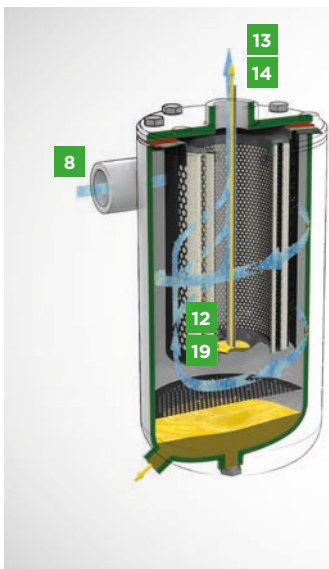
Failure of a filter element resulting from an excessive pressure difference across the element.

## LABORATORY SERVICE LIFE [h]

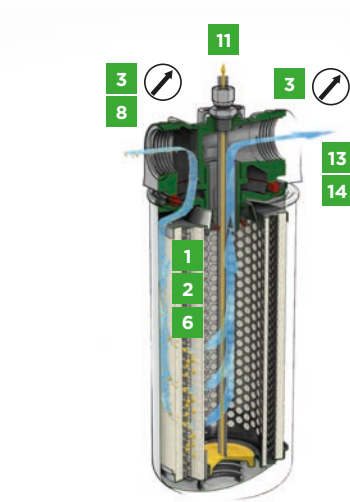
The time, determined during laboratory measurements (ISO 5011), within which an air cleaner loaded with dust and subjected to an air flow reaches a specified flow resistance. The test dust, dust concentration and volumetric flow must be defined.

## LABORATORY DUST CAPACITY [g]

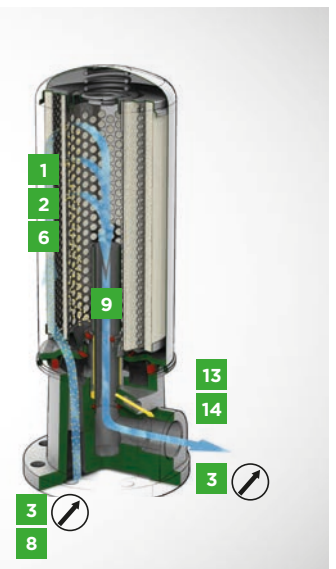
The determined added quantity of a defined test dust required to reach the service deadline during laboratory measurements.



Air/Oil separator



Spin-on filter with thread on the top



Spin-on filter with thread on the bottom

## 7 MULTIPASS TEST FOR OIL FILTERS

As per ISO 4548-12 or ISO 16 889: addition of defined dirt until the specified differential pressure across the filter element is reached. The result is the time characteristic of the separation efficiency per particle size.

## 8 NOMINAL FLOW RATE / FAD $\dot{V}$ [m<sup>3</sup>/min]

Nominal point for an air cleaner and the volumetric flow FAD (Free Air Delivery) aspirated via the air cleaner. There is a close correlation between this value and the geometric filter design data (nominal connection diameter, filter fineness) and the physical properties of the liquid being filtered (density, viscosity). Following compression, the relevant operating parameters (pressure and temperature) must also be specified.

## 9 CONNECTOR

Element via which the filtered air and the separated oil are removed, reliably and hermetically separated from one another.

## 10 OPENING PRESSURE [bar]

Pressure difference across the filter element at which the bypass valve opens. The valve opens proportionally to the pressure difference, normally 1.5 – 3.5 bar. (Compressor)

## 11 OIL RETURN LINE (SCAVENGE LINE)

Returns the separated oil back into the compressor oil circuit. This is connected to the intake side of the compressor screw

and it must be designed with sufficiently large dimensions because blockage or excessively small dimensions can lead to separator malfunctions.

## 12 Baffle Plate (Shield)

A high cylinder, which is positioned concentrically between the intake connection and the air/oil separator of the pressure vessel.

## 13 CLEAN AIR

Air flow downstream of the separator.

## 14 RESIDUAL OIL CONTENT [mg/m<sup>3</sup>]

Residual oil remaining in the clean air, normally approx. 3 mg/m<sup>3</sup>. (Significantly lower values in the case of the StarBox and StarBox<sup>2</sup> series.)

## SERVICE LIFE [h]

The service life of a filter until the service deadline is reached in practical application.

## 15 DUST-DISCHARGE VALVE

A valve on the housing of two-stage oil filters, via which the pre-separated dust is removed from the filter housing.

## 16 SECONDARY ELEMENT

Additional air cleaner element downstream of the main element, which prevents the ingress of dust into the clean air line in the event of replacement or a defective main element.

## TANGENTIAL INLET

Achieves precleaning via the cyclone effect.

## 17 VISCOSITY, DYNAMIC $\eta$ [Pa·s]

Measure of the resistance to flow of the medium being filtered.

## 18 VISCOSITY, KINEMATIC $\nu$ [St]

Ratio between the dynamic viscosity of the medium and its density.

## 19 PRECLEANING

Important element for the functionality of the separator. Precleaning is usually achieved via turbulence generated with the aid of a tangential inlet and a baffle plate (shield). The oil content following precleaning should not exceed 5 g/m<sup>3</sup>. A different type of precleaning is possible in principle, provided the prerequisites are met. MANN+HUMMEL two-stage filters feature an integrated precleaning system (cyclone effect through tangential inlet on EUROPICLON or ENTARON XD) or cyclone cells (IQORON-V). The separation efficiency of the entire filter is determined in the same manner as with the single-stage filter. The higher the precleaning efficiency, the lower the dust concentration reaching the actual filter element. A higher precleaning efficiency enables a longer filter service life.

## TWO-STAGE FILTER

Ideal for medium to high dust loads as this filter type also features a high performance precleaning system. Thanks to the performance of the precleaner, the main element is subjected to lower loads, increasing its service life.

# Conversion tables

## VOLUMETRIC FLOW m<sup>3</sup>/min → cfm

1 m <sup>3</sup> /min	=	35.3 cfm
1.7 m <sup>3</sup> /min	=	60.0 cfm
2 m <sup>3</sup> /min	=	70.6 cfm
3 m <sup>3</sup> /min	=	105.9 cfm
4 m <sup>3</sup> /min	=	141.3 cfm
4.5 m <sup>3</sup> /min	=	158.9 cfm
6 m <sup>3</sup> /min	=	211.9 cfm
8 m <sup>3</sup> /min	=	282.5 cfm
10 m <sup>3</sup> /min	=	353.1 cfm
12 m <sup>3</sup> /min	=	423.8 cfm
15 m <sup>3</sup> /min	=	529.7 cfm
18 m <sup>3</sup> /min	=	635.7 cfm
20 m <sup>3</sup> /min	=	706.3 cfm
21 m <sup>3</sup> /min	=	741.6 cfm
24 m <sup>3</sup> /min	=	847.6 cfm
25 m <sup>3</sup> /min	=	882.9 cfm
28 m <sup>3</sup> /min	=	988.8 cfm
32 m <sup>3</sup> /min	=	1130.1 cfm
37 m <sup>3</sup> /min	=	1306.6 cfm
40 m <sup>3</sup> /min	=	1412.6 cfm
42 m <sup>3</sup> /min	=	1483.2 cfm
50 m <sup>3</sup> /min	=	1765.7 cfm
60 m <sup>3</sup> /min	=	2118.9 cfm
80 m <sup>3</sup> /min	=	2825.2 cfm
100 m <sup>3</sup> /min	=	3531.5 cfm

## VOLUMETRIC FLOW cfm → m<sup>3</sup>/min

25 cfm	=	0.7 m <sup>3</sup> /min
50 cfm	=	1.4 m <sup>3</sup> /min
75 cfm	=	2.1 m <sup>3</sup> /min
100 cfm	=	2.8 m <sup>3</sup> /min
150 cfm	=	4.2 m <sup>3</sup> /min
200 cfm	=	5.7 m <sup>3</sup> /min
250 cfm	=	7.1 m <sup>3</sup> /min
300 cfm	=	8.5 m <sup>3</sup> /min
350 cfm	=	9.9 m <sup>3</sup> /min
400 cfm	=	11.3 m <sup>3</sup> /min
450 cfm	=	12.7 m <sup>3</sup> /min
500 cfm	=	14.2 m <sup>3</sup> /min
550 cfm	=	15.6 m <sup>3</sup> /min
600 cfm	=	17.0 m <sup>3</sup> /min
650 cfm	=	18.4 m <sup>3</sup> /min
700 cfm	=	19.8 m <sup>3</sup> /min
750 cfm	=	21.2 m <sup>3</sup> /min
800 cfm	=	22.7 m <sup>3</sup> /min
850 cfm	=	24.1 m <sup>3</sup> /min
900 cfm	=	25.5 m <sup>3</sup> /min
950 cfm	=	26.9 m <sup>3</sup> /min
1000 cfm	=	28.3 m <sup>3</sup> /min
1500 cfm	=	42.5 m <sup>3</sup> /min
2000 cfm	=	56.6 m <sup>3</sup> /min
3000 cfm	=	85.0 m <sup>3</sup> /min

## PRESSURE bar → psi

0.1 bar	=	1.45 psi
0.12 bar	=	1.74 psi
0.5 bar	=	7.25 psi
1 bar	=	14.5 psi
2 bar	=	29 psi
2.5 bar	=	36.25 psi
3 bar	=	43.5 psi
5 bar	=	72.5 psi
10 bar	=	145 psi
14 bar	=	203 psi
20 bar	=	290 psi
25 bar	=	362.5 psi
30 bar	=	435 psi
35 bar	=	507.5 psi
40 bar	=	580 psi
100 bar	=	1450 psi
200 bar	=	2900 psi
300 bar	=	4350 psi
400 bar	=	5800 psi

## LENGTH mm → inch

10 mm	=	0.39 inch
20 mm	=	0.79 inch
30 mm	=	1.18 inch
40 mm	=	1.57 inch
50 mm	=	1.97 inch
60 mm	=	2.36 inch
70 mm	=	2.76 inch
80 mm	=	3.15 inch
90 mm	=	3.54 inch
100 mm	=	3.94 inch
150 mm	=	5.91 inch
200 mm	=	7.87 inch
250 mm	=	9.84 inch
300 mm	=	11.81 inch
350 mm	=	13.78 inch
400 mm	=	15.75 inch
450 mm	=	17.72 inch
500 mm	=	19.69 inch

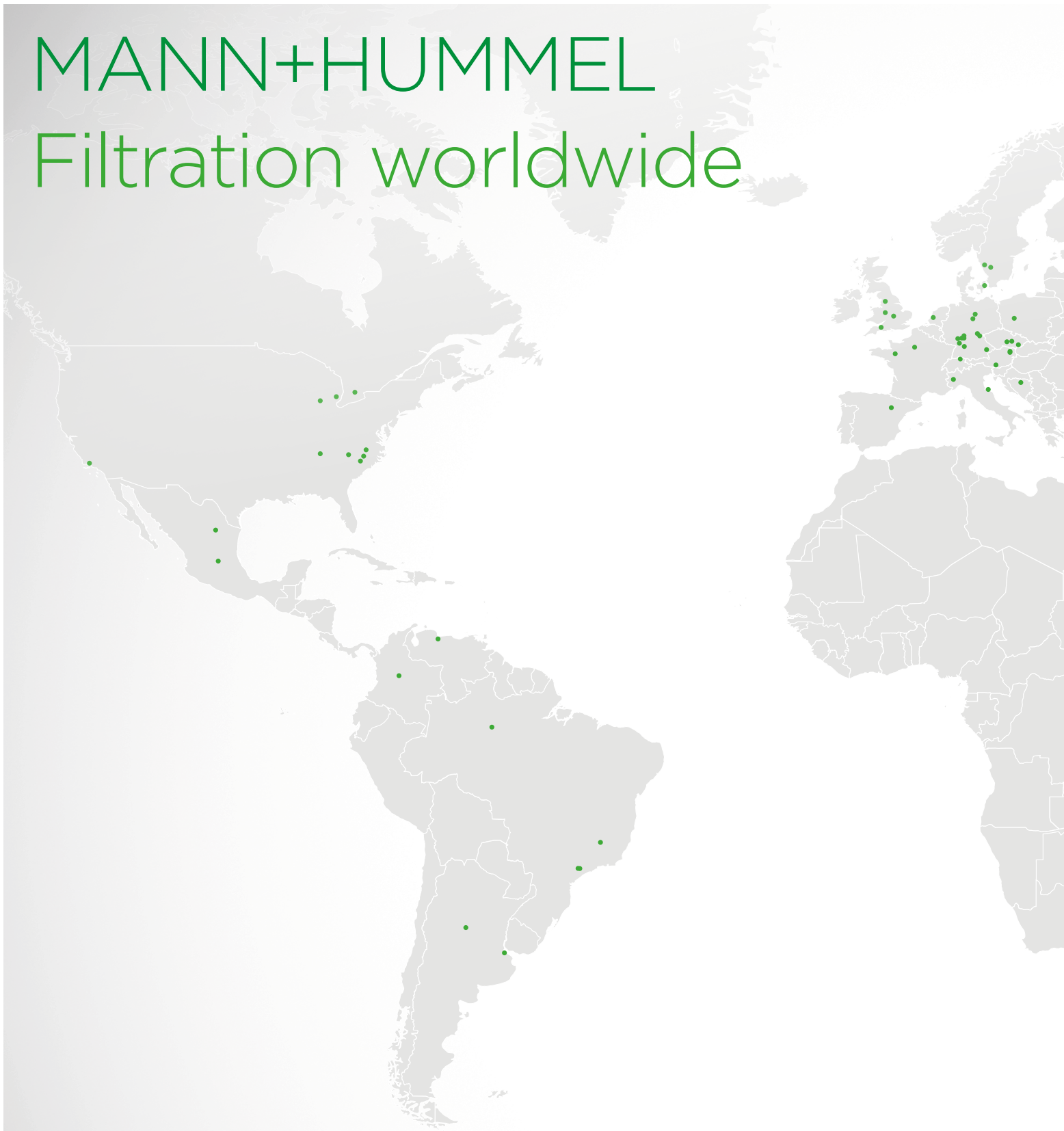
## TEMPERATURE °C → °F

-30°C	=	-22.0°F
-10°C	=	14.0°F
0°C	=	32.0°F
10°C	=	50.0°F
30°C	=	86.0°F
50°C	=	122.0°F
80°C	=	176.0°F
100°C	=	212.0°F
120°C	=	248.0°F



# MANN+HUMMEL

## Filtration worldwide



**In order to be optimally accessible for you, one of our subsidiaries or a representative is also located near you. Please contact your MANN+HUMMEL contact person or our headquarters if you have any questions or if you require further information.**

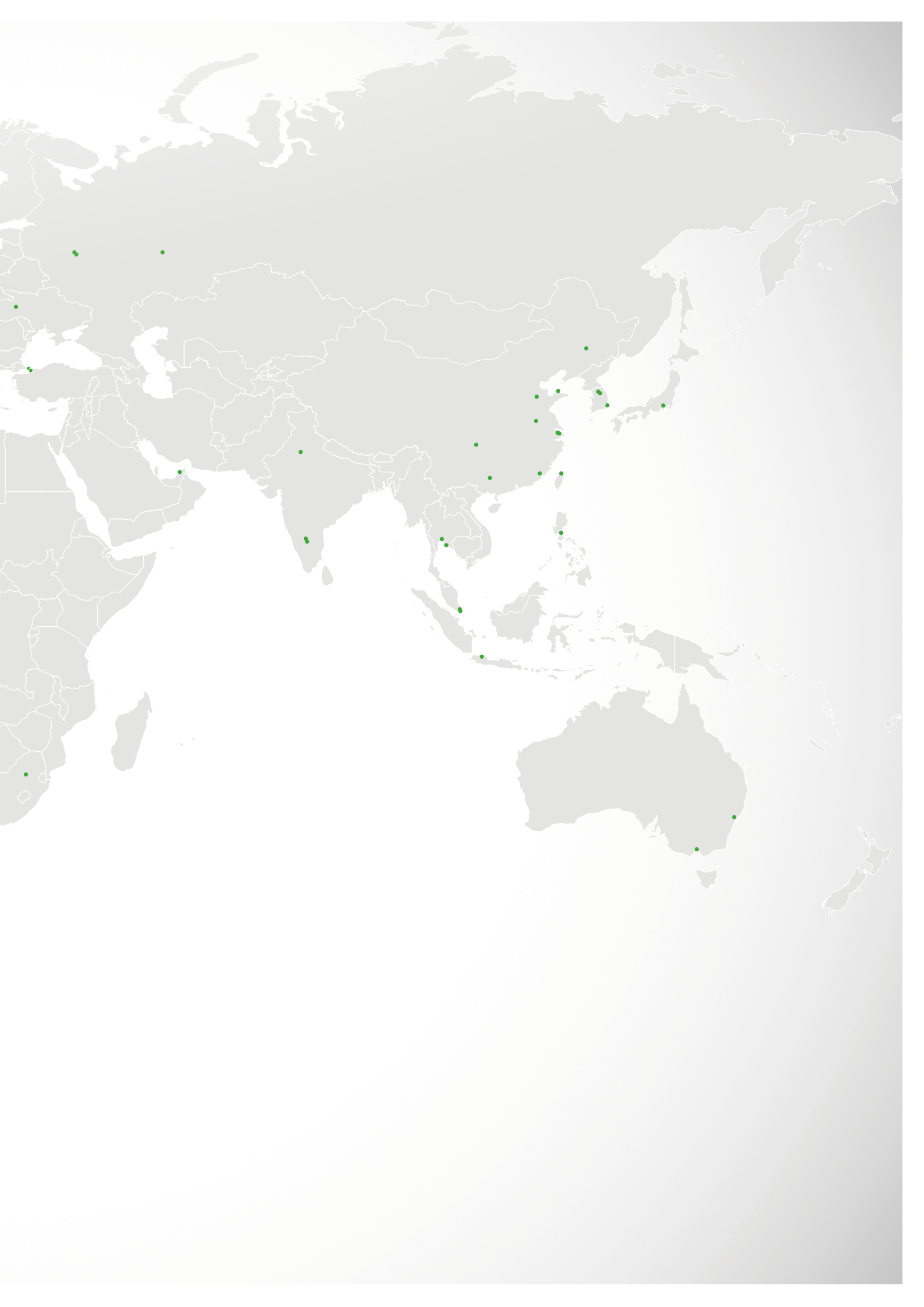
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