

MANN Air Cleaners



Industriefilter



We know our customers' needs and speak their language

The wide range of products manufactured by MANN+HUMMEL include products and services for a variety of industrial applications.

To be able to react flexibly to the individual demands and expectations of our customers in their respective markets the MANN+HUMMEL group is divided into eight business sectors:

The business units of the automotive technology division:

- Air Filter Systems
- Intake Manifolds Systems
- Liquid Filter Systems
- Cabin Filters
- Filters (Aftermarket)

The business units of the industrial technology division:

- Industrial Filters
- ProTec
- Hydromatation

Industrial Filters Business Unit – Filter solutions for many industrial applications

The customers of the Industrial Filters Business Unit include companies from nearly every area of industry. Our aim is to offer comprehensive after-sales service to our customers within each sector and therefore the business unit is organised into four business areas, each with its own team:

- Mechanical engineering and production technology business segment
- Industrial engines, construction equipment and agricultural machinery business segment
- Pneumatics and vacuum technology segment
- Trade

In each team sales engineers and technicians work closely together – to meet your specific requirements.


And – it is very easy to find the right contact person:

To contact the respective business segment just call our central number

+49 (62 32) 319 – 0

and tell us your industrial application. We will immediately put you through to your sales engineer.

Your guide to the product line

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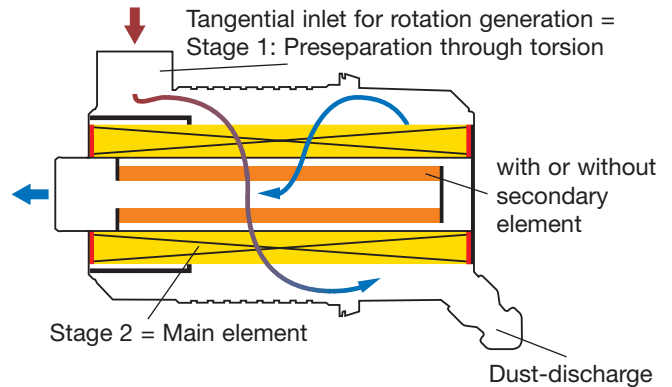
The right air cleaner ...

Europiclon

Design: Metal free **two stage air cleaner** of fully recyclable plastic

Application: Medium duty conditions, e.g. stationary engines, compressors, construction and agricultural machinery

Page: **7**

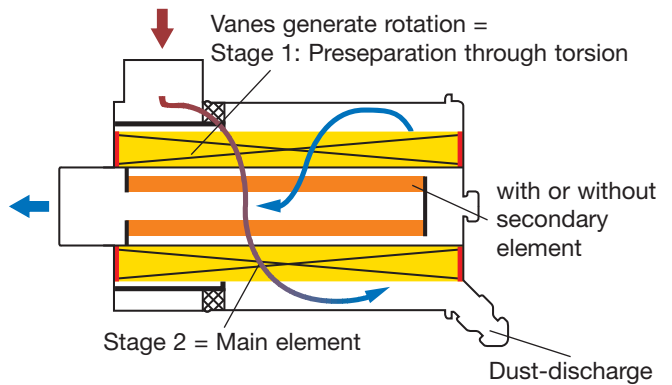


Piclon

Design: **Two stage air cleaner** of metal

Application: Heavy duty conditions – this design is also suitable for high mechanical loads, e.g. combine-harvesters, straw cutters and construction equipment

Page: **19**

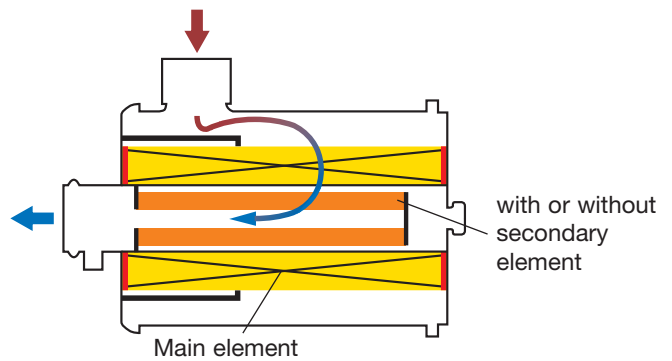


Pico

Design: **Single stage air cleaner** of metal

Application: Low to medium duty conditions, and also for heavy duty conditions when combined with a cyclone pre-cleaner, e.g. stationary engines and onroad vehicles, and with a cyclone also for construction and agricultural machinery

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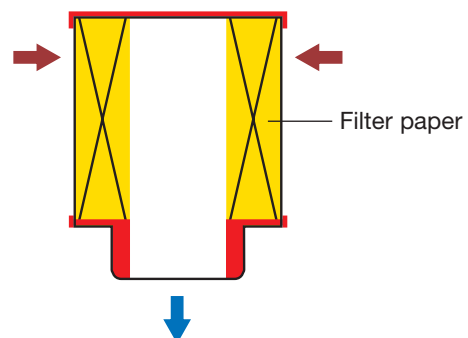


Picolight

Design: Metal free **single stage air cleaner** without filter housing

Application: Medium duty conditions, e.g. stationary engines, compressors, construction and agricultural machinery

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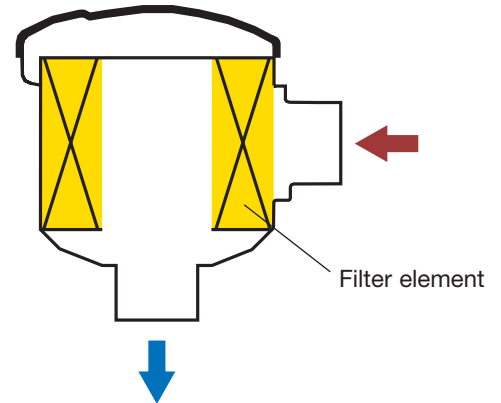
... for any application

Picolino

Design: Metal free **single stage air cleaner** in modular configuration

- Application: Light to medium duty conditions
- As two way ventilation filter for gearboxes and tanks for liquids
 - As an intake air cleaner for small engines
 - As a silencer cleaner, e.g. for small piston compressors
 - As a vacuum filter for vacuum pumps*

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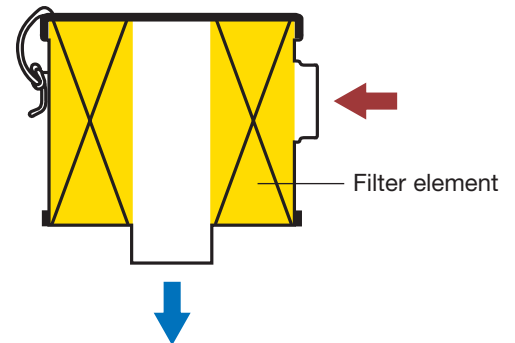


Vacuum filters

Design: **Single stage air cleaner** of metal

Application: Light to medium duty conditions, e.g. for installation in air and gas lines with vacuum

Page: 43

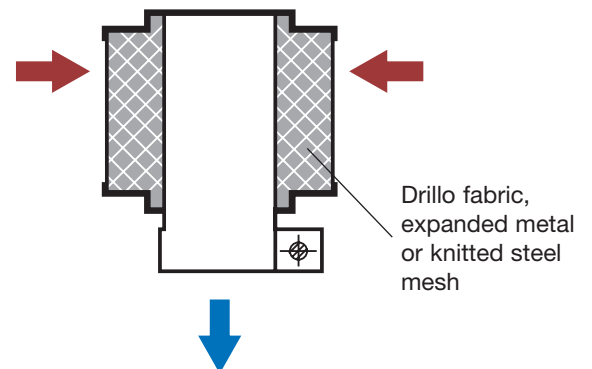


Oil wetted air cleaners

Design: **Single stage air cleaner** with knitted steel mesh wetted with oil

Application: Light duty conditions, e.g. for marine engines, stationary engines and compressors in closed rooms

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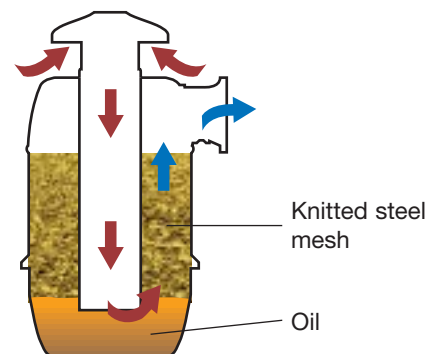


Oil-bath air cleaners

Design: **Single stage air cleaner** – no spare parts required

Application: Low to medium duty conditions. In combination with Pico **single stage air cleaner** as preseparator also applicable to extremely high duty levels, e.g. stationary engines, agricultural machinery, mining operations, track vehicles

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* on request

Configuring the size of air cleaners

Fax-No.: +49 (62 32) 319 – 370

Fax to:

**FILTERWERK
MANN+HUMMEL GMBH
Geschäftsbereich Industriefilter, Abt. IF-V/IF-VS
D-67323 Speyer**

copy, fill out and fax

Please send us information on an air cleaner for the following application:

- Application (i.e. construction machine, screw compressor): _____
- Air to be filtered (i.e. intake air, ventilation): _____
- Type of engine (manufacturer, model): _____
- Type of compressor (manufacturer, model): _____
- Number of cylinders: _____
- Displacement: _____
- Power: _____
- Air flow: _____
- Permissible differential pressure: _____
- Operating temperature: _____
- Impurities to be filtered out: _____
- Filter connection: _____
- Other: _____

Please submit an offer for the following services (tick corresponding box):

- | | |
|--|---|
| <input type="checkbox"/> Consultation at installation site | <input type="checkbox"/> Assembly inspection on site |
| <input type="checkbox"/> Series of on-site tests | <input type="checkbox"/> Drawing up or revision of operating manual |
| <input type="checkbox"/> Product-oriented training | |

Company _____

Name _____

Department _____

Street _____

Postal Code/City _____

Country _____

Telephone _____

Fax _____

MANN Europiclón

Two stage air cleaner – modular system



Industriefilter



Background picture: Claas

MANN Europiclon ...

Applications

The MANN Europiclon is the ideal intake air cleaner for construction and agricultural machinery, compressors, stationary installations, etc.

Technical advantages

MANN Europiclon cleaners offer high dust capacities and low flow resistance. These values are some of the requirements necessary to fulfill future emission regulations. Top grade filter elements guarantee the necessary functional safety and an economical service life of the unit. No tools are required for the maintenance of the air cleaner.



MANN Europiclon with bracket

Flexibility

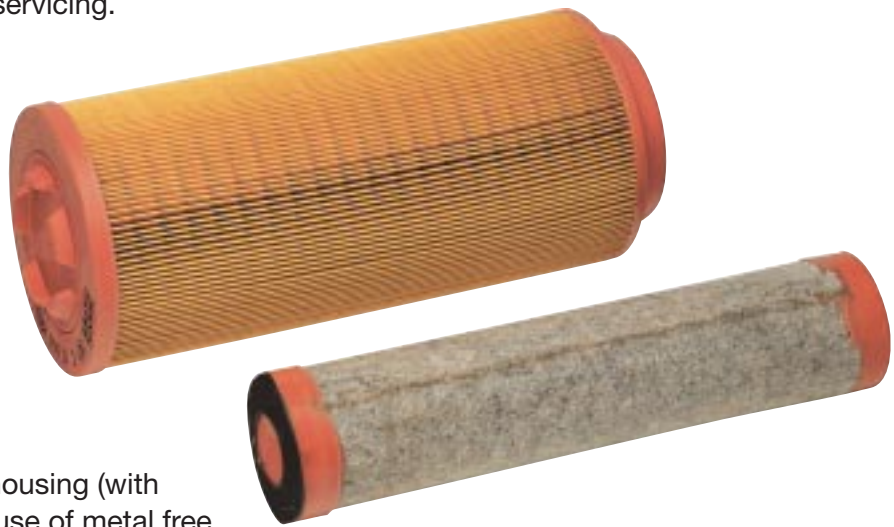
The Europiclon series is a modular system. Different housing models and dust discharge devices equipped with a flexible position locking system allow the Europiclon to adapt to practically all planned or existing assemblies. There are two different brackets specially designed for the external polygon design of the housing which respectively offer more than 40 different fitting possibilities. An extensive array of system components (see page 63 ff) completes the range.

... flexible air cleaner system

Patented filter elements

The metal free main and secondary elements of the MANN Europiclon are protected by patents and available around the world through our extensive service network.

The MANN Europiclon can be purchased or retrofitted with a secondary element. The secondary element protects the clean air side from the entrance of dust during filter servicing.



Recycling

The innovative design of the housing (with fixed centre tube), allows the use of metal free main and secondary elements. As no environmentally harmful adhesives are used, the elements are particularly easy on the environment.

Metal free main and secondary elements

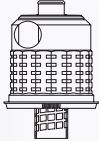
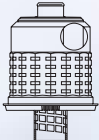
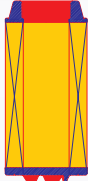
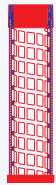
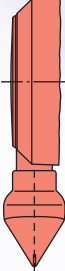
Advantages in a glance

- highly economical
- corrosion free
- easy to recycle
- flexible adaptation to existing aggregates
- extensive range of accessories
- patented technology for main and secondary elements
- accessories and spare parts available worldwide
- easy to service without tools
- naturally in the usual MANN+HUMMEL original equipment quality

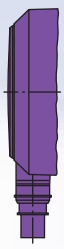

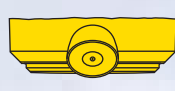

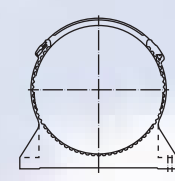






Technical specifications

- Nominal flow range 1 to 15 m³/min
- Allowed continuous running temperature: -40 °C to +80 °C, for short periods +100 °C
- Housing material: impact resistant polypropylene
- Filter elements with radial seal

Less components – many possible combinations ...

Sizes	Nominal flow rate m ³ /min	Housing  Housing – Inlet left hand side (basic model)  Housing – Inlet right hand side (on request)	Main and secondary elements  Main element  Secondary element	Small dust-discharge valve		Large dust-discharge valve 
44 100 ...	1 – 3	●	●	●		
45 200 ...	2 – 4.5	●	●		●	●
45 300 ...	3 – 6	●	●		●	●
45 400 ...	4 – 8	●	●		●	●
45 500 ...	6 – 12	●	●		●	●
45 600 ...	7.5 – 15	●	●		●	●

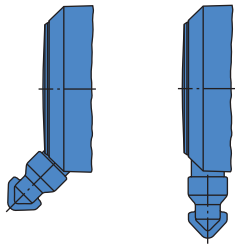
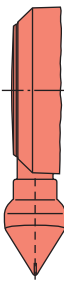

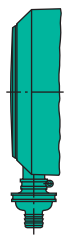
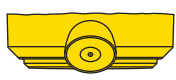

Other combinations on request.

Dust-discharge variations				Accessories	
Adapter for ejector extraction	Adapter with backpressure valve	Diaphragm valve	Vacuum filter	Bracket	Elbow adapter
				 Bracket with wide base  Bracket with narrow base	 Elbow adapter  Straight connector  Elbow adapter with M 10x1 connection  Straight connector with M 10x1 connection  Adapter for service indicators M 10x1
		●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●

... thanks to the modular system

The right type for any situation

The MANN Europiclon is available with a number of dust discharge variations:

Dust discharge		Application	End number of the part number
Small dust-discharge valve		Engines with high pulsation (usually aspirating engines up to 4 cylinders)	.. 910/.. 911
Large dust-discharge valve		Engines with low pulsation (usually aspirating engines with 5 or more cylinders, turbo-charged engines)	.. 940/.. 941
Adapter for ejector extraction		Engine with integrated ejector extraction, for extremely high dust loads	.. 980/.. 981
Adapter for ejector extraction with integrated backpressure valve		Engine with integrated ejector extraction, for extremely high dust loads	.. 970/.. 971
Diaphragm valve		Engines with high pulsation, where installation space is limited	.. 920/.. 921
Rubber plug and seal		Vacuum filter	.. 960/.. 961



MANN Europiclon

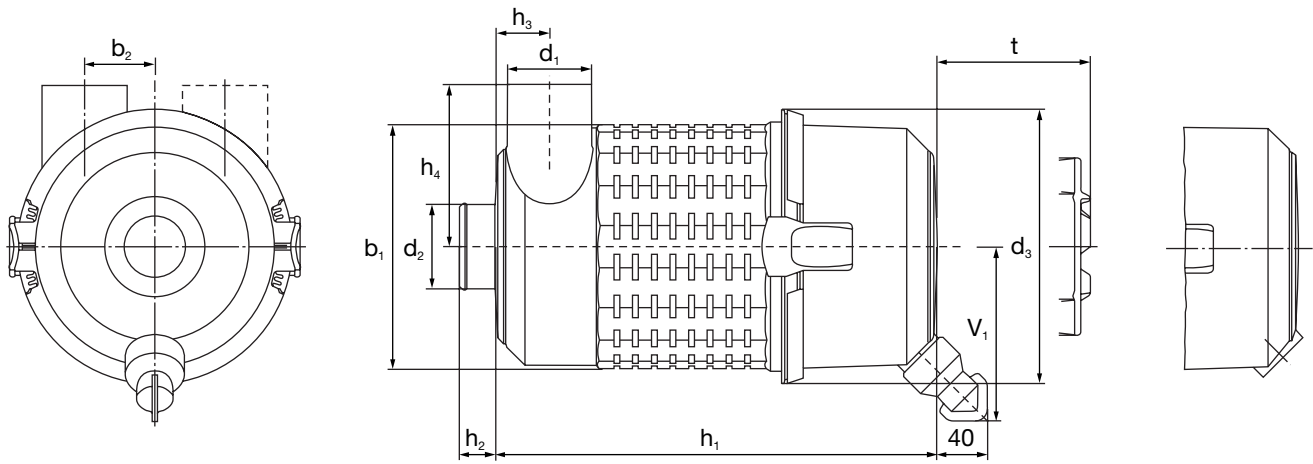


Fig. 1
Mirror image version of air inlet
on request

1a
Cover with snap fastener
1b

Part No.		Fig.	Flow rate range [m ³ /min]	Replacement filter element		Weight approx. [kg]
without secondary element	with secondary element			MANN micro-Top filter	MANN secondary element	
44 100 92 910	44 100 92 911	1a	1 - 3	C 11 100	CF 100	0.9
44 100 92 920	44 100 92 921	1b				
45 200 92 910	45 200 92 911	2a	2 - 4.5	C 14 200	CF 200	1.7
45 200 92 920	45 200 92 921	2b				
45 200 92 940	45 200 92 941	2c				
45 200 92 970	45 200 92 971	2d				
45 200 92 980	45 200 92 981	2e				
45 300 92 910	45 300 92 911	2a	3 - 6	C 15 300	CF 300	2.1
45 300 92 920	45 300 92 921	2b				
45 300 92 940	45 300 92 941	2c				
45 300 92 970	45 300 92 971	2d				
45 300 92 980	45 300 92 981	2e				
45 400 92 910	45 400 92 911	2a	4 - 8	C 16 400	CF 400	3.0
45 400 92 920	45 400 92 921	2b				
45 400 92 940	45 400 92 941	2c				
45 400 92 970	45 400 92 971	2d				
45 400 92 980	45 400 92 981	2e				
45 500 92 910	45 500 92 911	2a	6 - 12	C 20 500	CF 500	3.8
45 500 92 920	45 500 92 921	2b				
45 500 92 940	45 500 92 941	2c				
45 500 92 970	45 500 92 971	2d				
45 500 92 980	45 500 92 981	2e				
45 600 92 910	45 600 92 911	2a	7.5 - 15	C 23 610	CF 610	5.0
45 600 92 920	45 600 92 921	2b				
45 600 92 940	45 600 92 941	2c				
45 600 92 970	45 600 92 971	2d				
45 600 92 980	45 600 92 981	2e				

Dimensions and part numbers

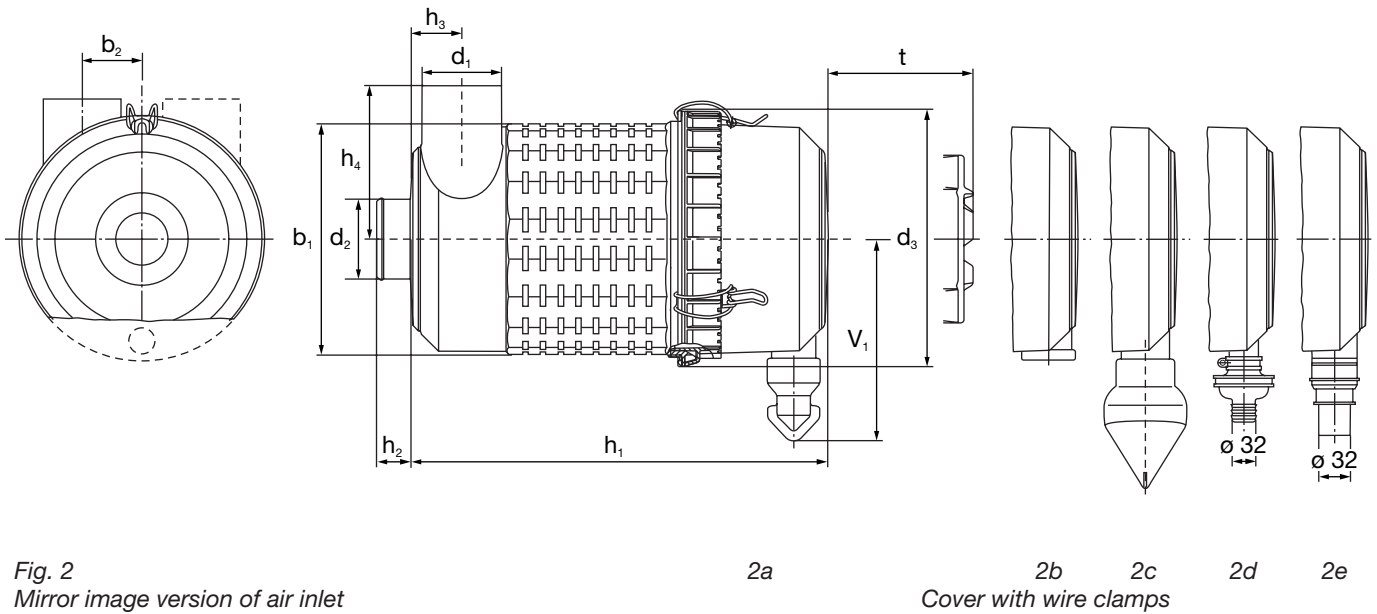


Fig. 2
Mirror image version of air inlet
on request

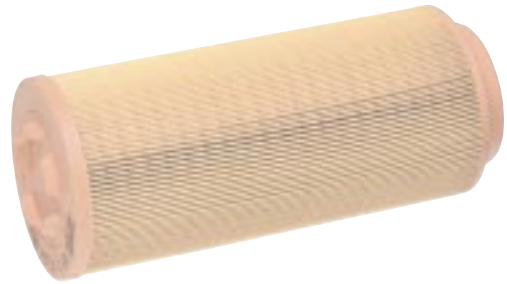
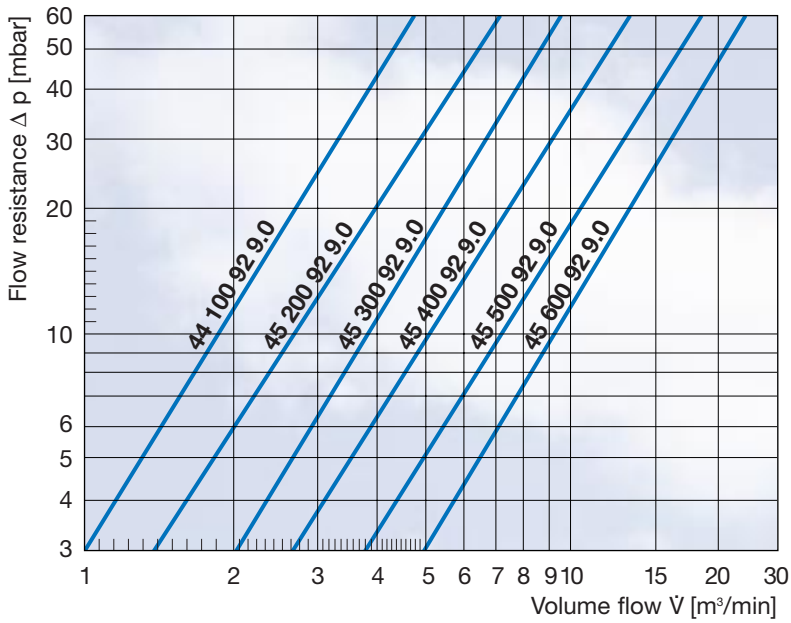
2a
2b 2c 2d 2e
Cover with wire clamps

Part No.		Fig.	Dimensions in mm										
without secondary element	with secondary element		b_1	b_2	d_1	d_2	d_3	h_1	h_2	h_3	h_4	t	V_1
44 100 92 910	44 100 92 911	1a	158	45	54	50	188	260	27	38	104	237	131
44 100 92 920	44 100 92 921	1b											76
45 200 92 910	45 200 92 911	2a											164
45 200 92 920	45 200 92 921	2b											88
45 200 92 940	45 200 92 941	2c	173	48	62	60	198	327	27	42	112	304	201
45 200 92 970	45 200 92 971	2d											184
45 200 92 980	45 200 92 981	2e											163
45 300 92 910	45 300 92 911	2a											179
45 300 92 920	45 300 92 921	2b											103
45 300 92 940	45 300 92 941	2c	203	59	70	70	228	367	30	45	135	344	216
45 300 92 970	45 300 92 971	2d											199
45 300 92 980	45 300 92 981	2e											179
45 400 92 910	45 400 92 911	2a											189
45 400 92 920	45 400 92 921	2b											113
45 400 92 940	45 400 92 941	2c	223	63	82	80	248	383	32	52	144	359	226
45 400 92 970	45 400 92 971	2d											209
45 400 92 980	45 400 92 981	2e											188
45 500 92 910	45 500 92 911	2a											209
45 500 92 920	45 500 92 921	2b											133
45 500 92 940	45 500 92 941	2c	264	73	102	100	288	408	37	62	174	384	246
45 500 92 970	45 500 92 971	2d											229
45 500 92 980	45 500 92 981	2e											208
45 600 92 910	45 600 92 911	2a											226
45 600 92 920	45 600 92 921	2b											150
45 600 92 940	45 600 92 941	2c	295	87	110	110	323	414	27	65	190	384	263
45 600 92 970	45 600 92 971	2d											246
45 600 92 980	45 600 92 981	2e											225

MANN Europiclon

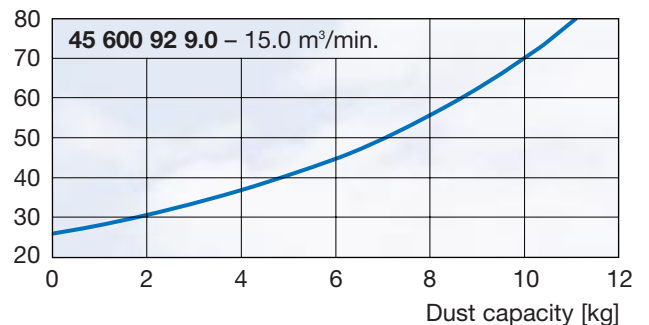
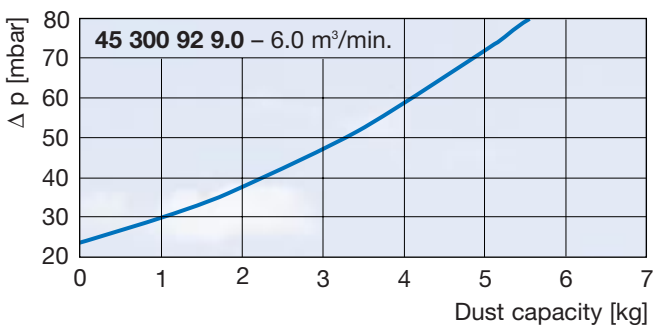
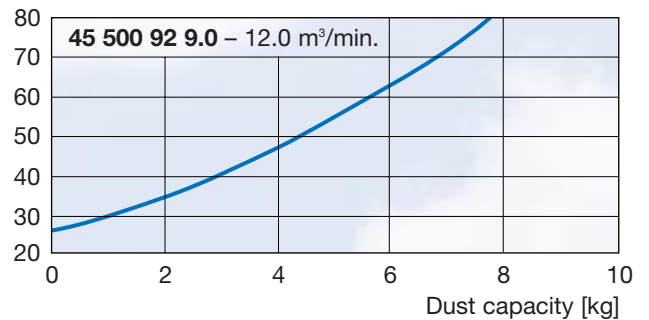
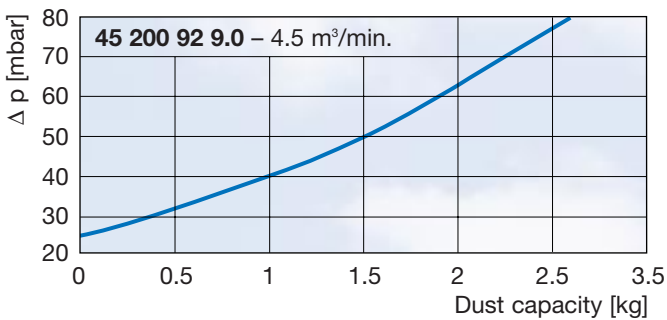
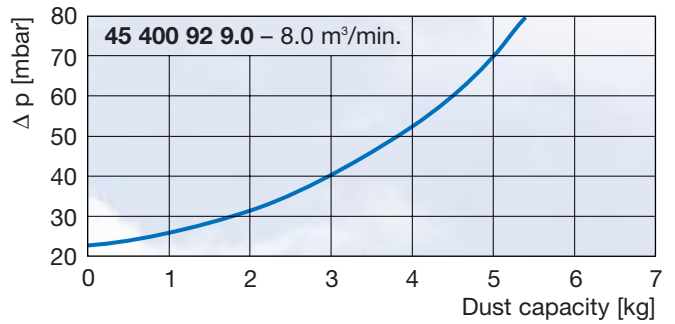
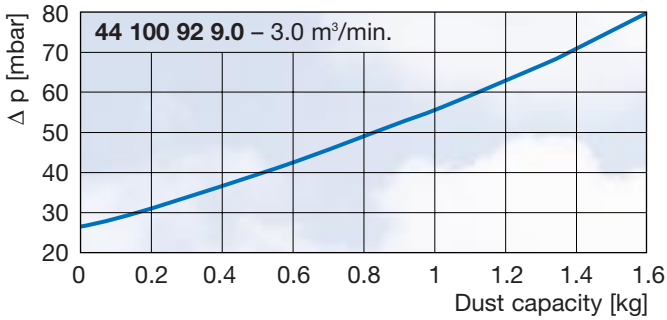
Flow characteristics without secondary element ...

... for the flow rate as per ISO 5011



... for the dust capacity as per ISO 5011

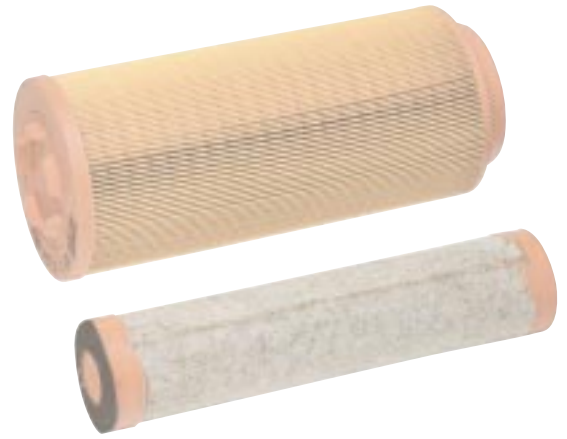
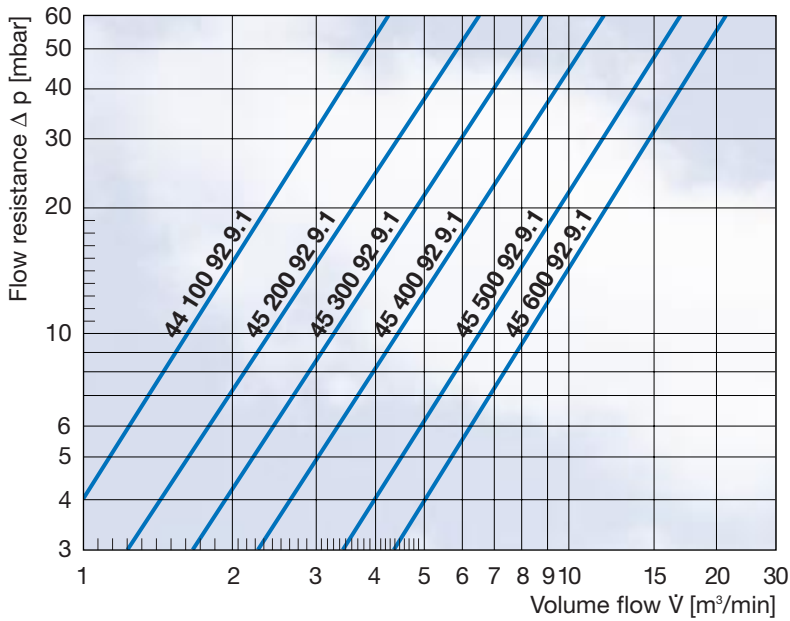
with SAE coarse test dust



MANN Europiclone

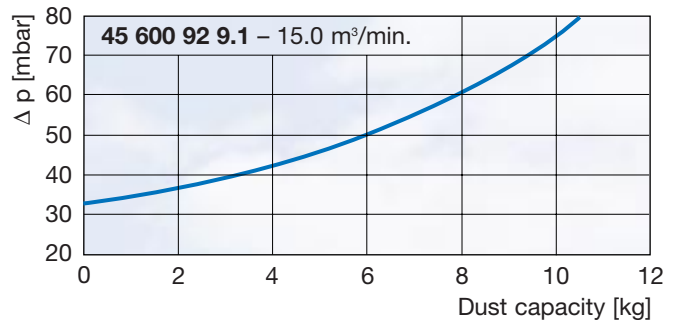
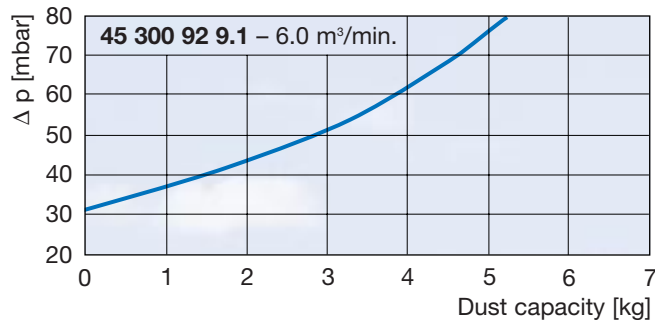
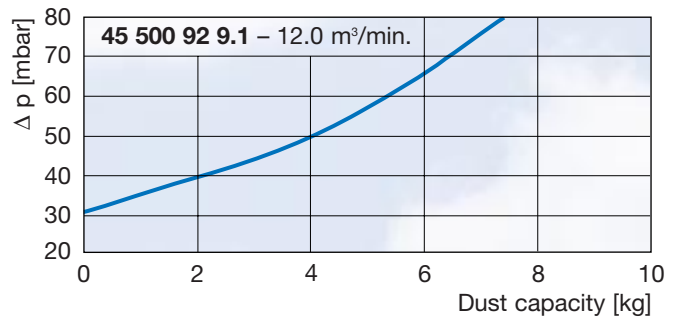
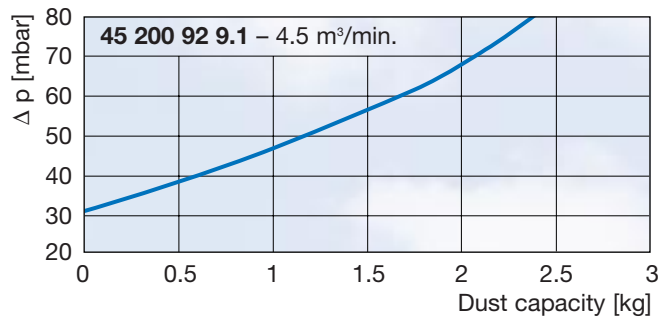
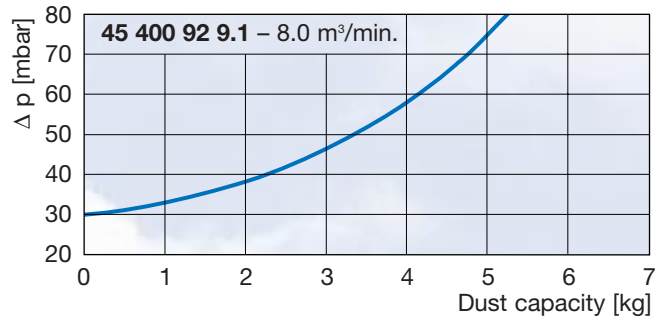
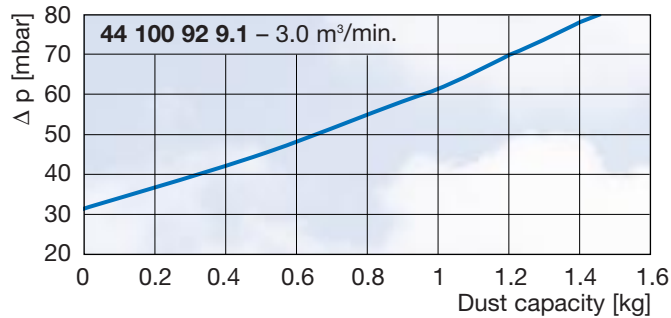
Flow characteristics with secondary element ...

... for the flow rate as per ISO 5011



... for the dust capacity as per ISO 5011

with SAE coarse test dust



MANN Europiclone for vacuum application

A vacuum filter has been developed, for use in heavy duty conditions with high dust levels and mechanical load. E.g. for construction site lorries, based on the successful Europiclone line.

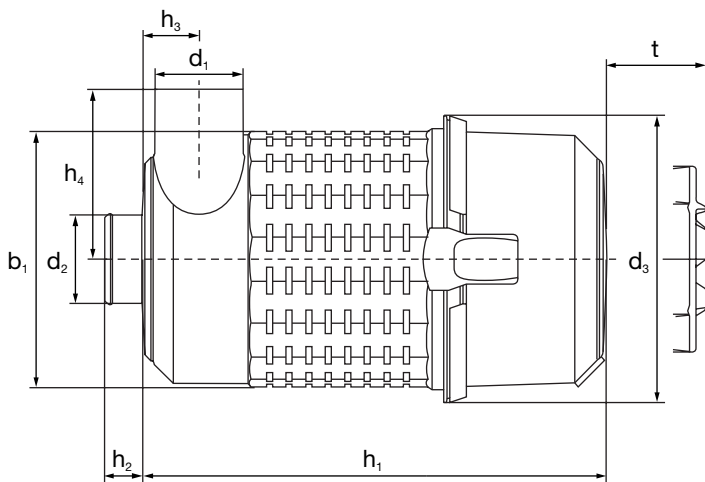
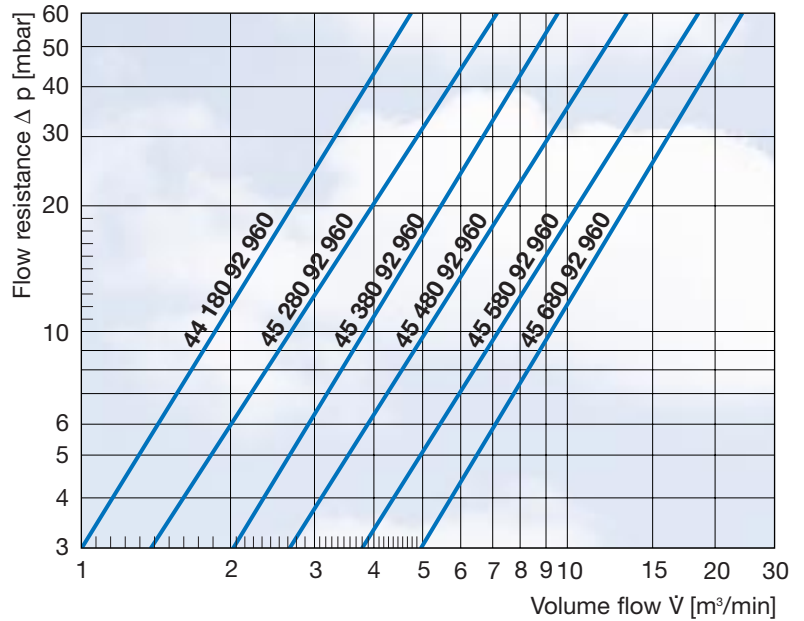


Fig. 1
Cover with snap fastener

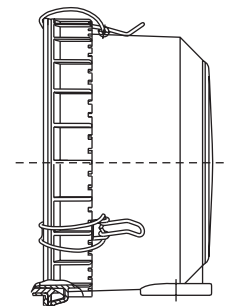


Fig. 2
Cover with wire clamps

Part No.	Fig.	Flow rate range [m³/min]	Dimensions in mm										Weight approx. [kg]
			b ₁	b ₂	d ₁	d ₂	d ₃	h ₁	h ₂	h ₃	h ₄	t	
44 180 92 960	1	1 – 3	158	45	54	50	188	260	27	38	104	237	0.9
45 280 92 960	2	2 – 4.5	173	48	62	60	198	327	27	42	112	304	1.7
45 380 92 960	2	3 – 6	203	59	70	70	228	367	30	45	135	344	2.1
45 480 92 960	2	4 – 8	223	63	82	80	253	383	32	52	144	359	3.0
45 580 92 960	2	6 – 12	264	73	102	100	293	408	37	62	174	384	3.8
45 680 92 960	2	7.5 – 15	295	87	110	110	323	414	27	65	190	384	5.0

MANN Piclon Two stage air cleaner



MANN Piclon

Application

The MANN Piclon air cleaner is a two stage air cleaner in a compact unit. The design is especially robust and is well suited for use in heavy duty applications with high dust levels and mechanical load, e.g. for construction site lorries, construction and agriculture machinery, etc.



MANN Piclon with small dust discharge valve



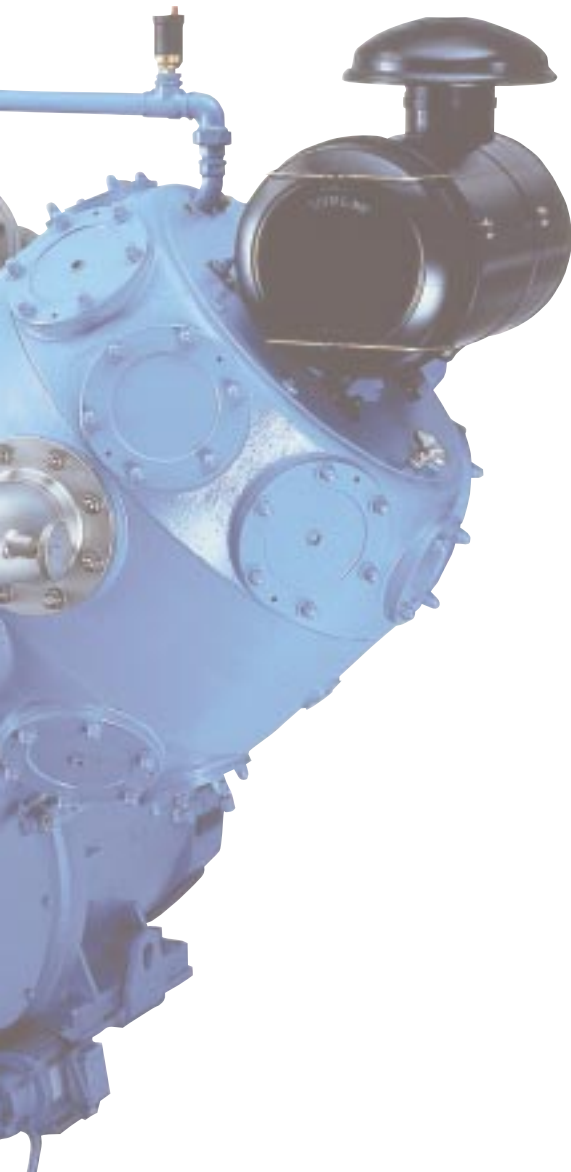
MANN Piclon

Dimensioning

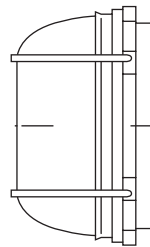
The size of the filter is based on its nominal flow rate. Select the filter size so that the nominal flow rate is the same or greater than the amount of air required by the engine. For nominal flow rates of more than 4.5 m³/min. the MANN Piclon is available with a secondary element.



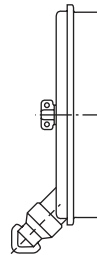
MANN Piclon with dust collector



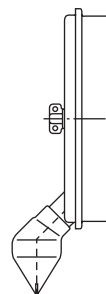
MANN Piclon is available in the following versions:



- with dust collector, end figure .. .04



- with small dust-discharge valve for strongly-pulsating intake air, end figure .. .14



- with large dust-discharge valve for non or weakly-pulsating intake air, end figure .. .44

See page 66 for brackets for MANN Piclon air cleaners.

MANN Piclon

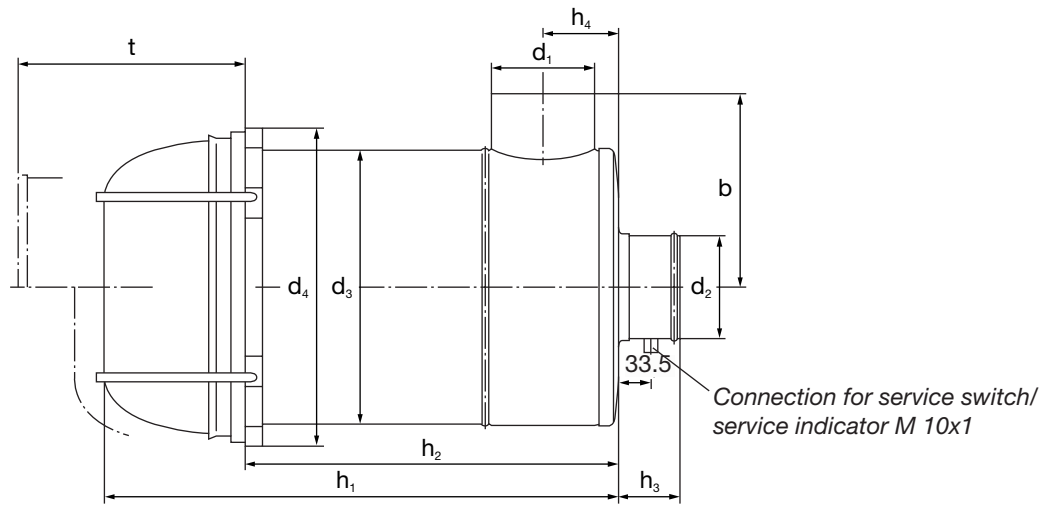


Fig. 1
MANN Piclon with dust collector

Dust collector with toggle clip on request

Part No.		Nominal flow rate ¹⁾ [m ³ /min]	Replacement filter elements		Weight ²⁾ approx. [kg]
without secondary element	with secondary element		MANN micro-Top filter ³⁾	MANN secondary element	
45 043 92 304	-	2	C 1043/1	-	1.4
45 043 92 314	-				
45 076 92 304	-	3	C 1176/3	-	2.0
45 076 92 314	-				
45 114 92 304	45 114 92 404	4.5	C 13 114/4	CF 600	3.1
45 114 92 314	45 114 92 414				
45 114 92 344	45 114 92 444				
45 165 92 304	45 165 92 404	6	C 15 165/3	CF 700	4.5
45 165 92 314	45 165 92 414				
45 165 92 344	45 165 92 444				
45 225 92 304	45 225 92 404	8	C 17 225/3	CF 800	5.4
45 225 92 314	45 225 92 414				
45 225 92 344	45 225 92 444				
45 325 92 304	45 325 92 404	12	C 20 325/2	CF 1000	7.2
45 325 92 314	45 325 92 414				
45 325 92 344	45 325 92 444				
45 440 92 304	45 440 92 404	15	C 23 440/1	CF 1200	9.4
45 440 92 314	45 440 92 414				
45 440 92 344	45 440 92 444				
45 650 92 304	45 650 92 404	21	C 24 650/1	CF 1300	13.2
45 650 92 314	45 650 92 414				
45 650 92 344	45 650 92 444				
45 880 92 304	45 880 92 404	28	C 30 850/2	CF 1600	17.5
45 880 92 314	45 880 92 414				
45 880 92 344	45 880 92 444				
45 920 92 304	45 920 92 404	40	C 33 920/3	CF 2100	26.0
45 920 92 314	45 920 92 414				
45 920 92 344	45 920 92 444				

1) The nominal flow rate is based on a flow resistance [Δp] of approx. 20 mbar (2 KPa), for filters with secondary element approx. 30 mbar (3 KPa).

Piclons with nominal flow rates of 60 or 80 m³/min can be supplied on request.

2) Weight applies for the versions with the end number ... 304, ... 314, ... 344.

3) Filter elements comply with DIN 71 459 and ISO 7750/1.

Dimensions and part numbers

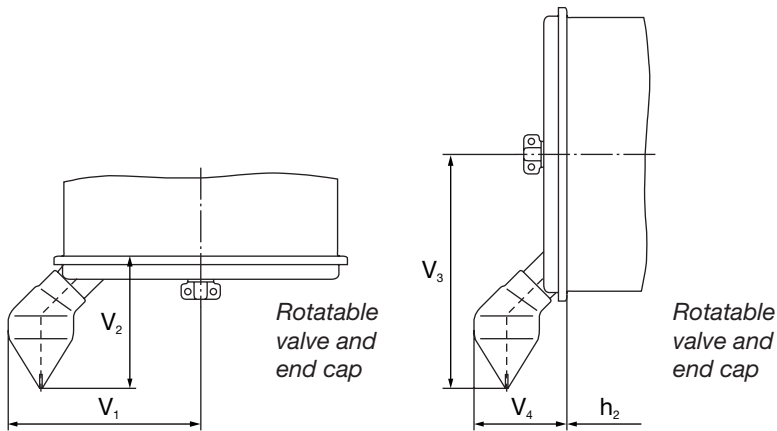


Fig. 2
MANN Piclon with big
dust-discharge valve

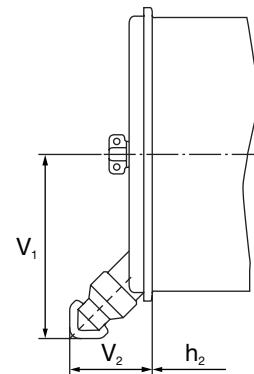


Fig. 3
MANN Piclon with small
dust-discharge valve

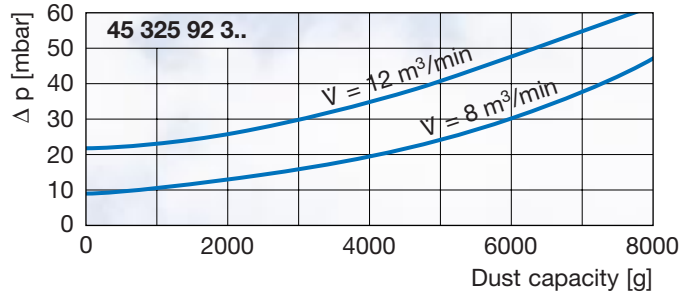
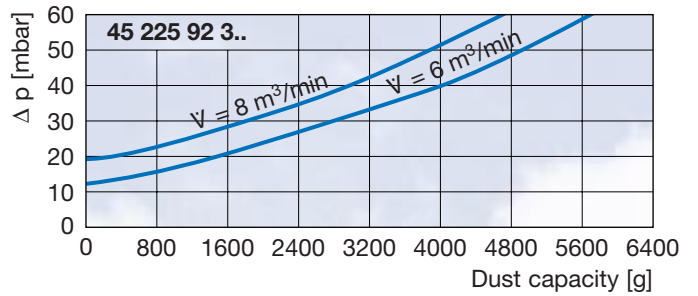
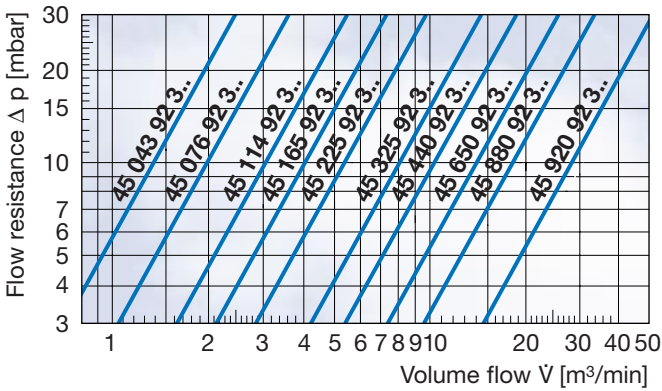
Part No.		Fig.	Dimensions in mm													
without secondary element	with secondary element		b	d ₁	d ₂	d ₃	d ₄	h ₁	h ₂	h ₃	h ₄	t ¹⁾	V ₁	V ₂	V ₃	V ₄
45 043 92 304	-	1														
45 043 92 314	-	3	90	42	40	120	137	233	172	70	35	190	-	-	-	-
45 076 92 304	-	1														
45 076 92 314	-	3	105	54	50	140	157	300	224	70	45	250	-	-	-	-
45 114 92 304	45 114 92 404	1														
45 114 92 314	45 114 92 414	3	120	62	60	165	182	360	291	70	50	305	131	85	-	-
45 114 92 344	45 114 92 444	2											142	140	186	96
45 165 92 304	45 165 92 404	1														
45 165 92 314	45 165 92 414	3	140	68	70	195	212	416	335	80	55	350	146	85	-	-
45 165 92 344	45 165 92 444	2											157	140	201	96
45 225 92 304	45 225 92 404	1														
45 225 92 314	45 225 92 414	3	155	82	80	215	232	442	350	80	65	365	156	85	-	-
45 225 92 344	45 225 92 444	2											167	140	211	96
45 325 92 304	45 325 92 404	1														
45 325 92 314	45 325 92 414	3	180	102	100	255	272	476	375	90	75	390	176.5	86	-	-
45 325 92 344	45 325 92 444	2											187.5	141	231.5	97
45 440 92 304	45 440 92 404	1														
45 440 92 314	45 440 92 414	3	205	110	110	290	312	495	380	100	80	405	194	86	-	-
45 440 92 344	45 440 92 444	2											205	141	249	97
45 650 92 304	45 650 92 404	1														
45 650 92 314	45 650 92 414	3	230	132	130	320	342	610	496	105	95	515	209	88	-	-
45 650 92 344	45 650 92 444	2											220	143	264	99
45 880 92 304	45 880 92 404	1														
45 880 92 314	45 880 92 414	3	280	150	150	385	407	597	474	105	102	495	242.5	100	-	-
45 880 92 344	45 880 92 444	2											253.5	155	297.5	111
45 920 92 304 ²⁾	45 920 92 404 ²⁾	1														
45 920 92 314	45 920 92 414	3	305	210	200	420	442	760	615	105	132	635	260	88	-	-
45 920 92 344	45 920 92 444	2											271	143	315	99

1) Removal height of the filter elements.
2) Dust collector only with toggle clip.

MANN Piclon

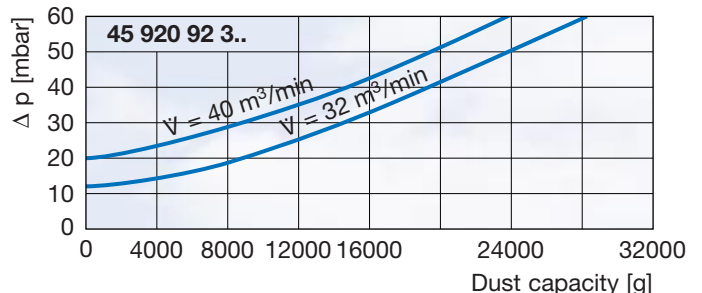
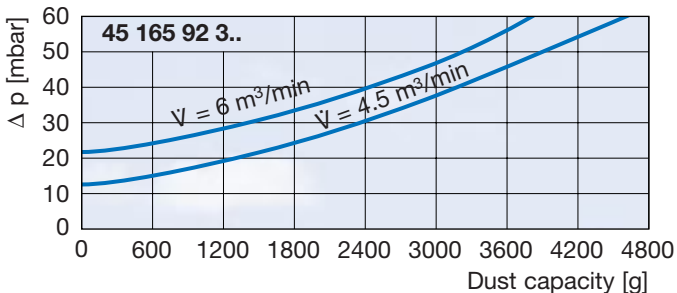
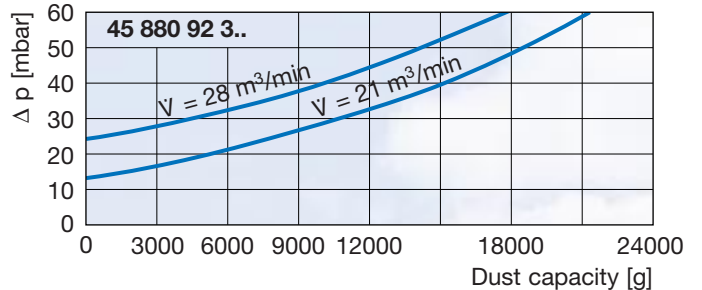
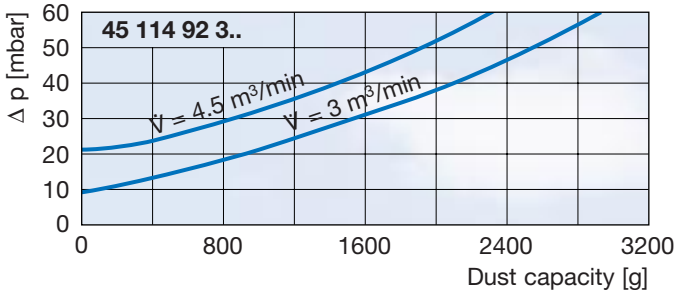
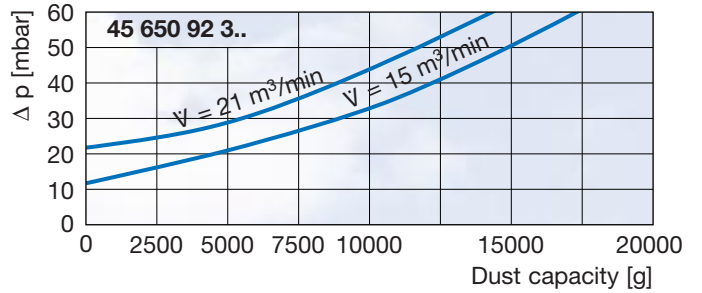
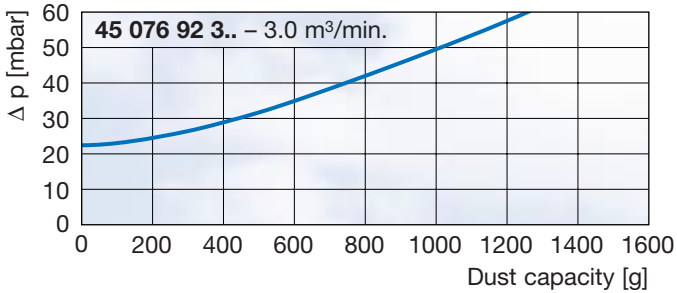
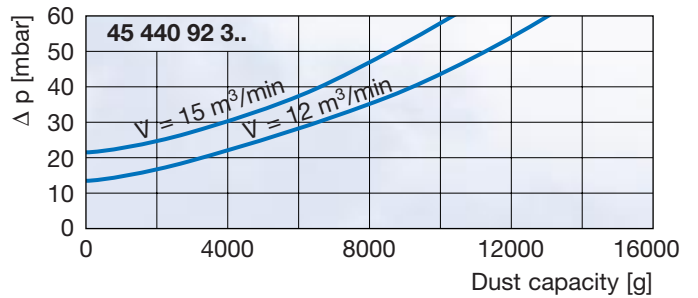
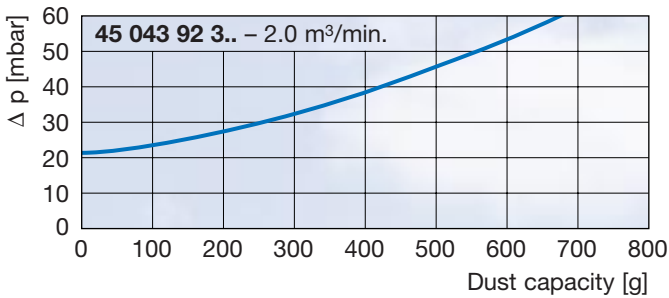
Flow characteristics without secondary element ...

... for the flow rate as per ISO 5011



... for the dust capacity as per ISO 5011

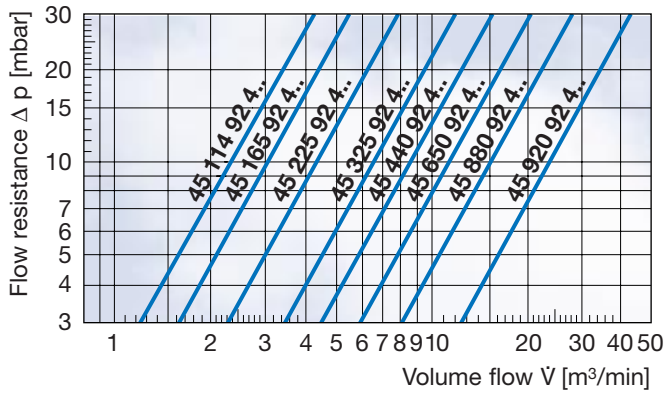
with SAE coarse test dust



MANN Piclon

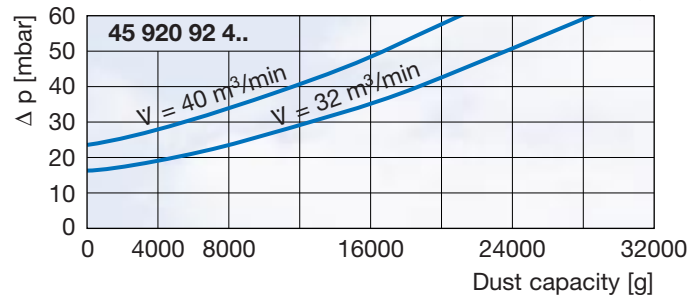
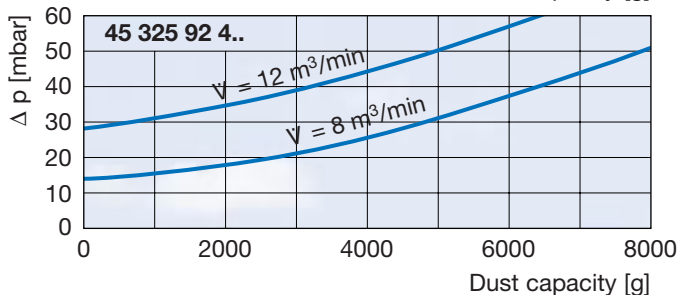
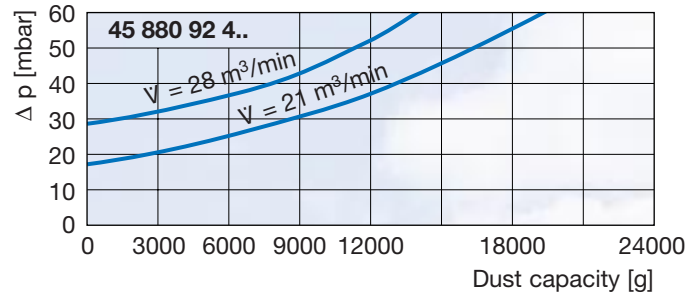
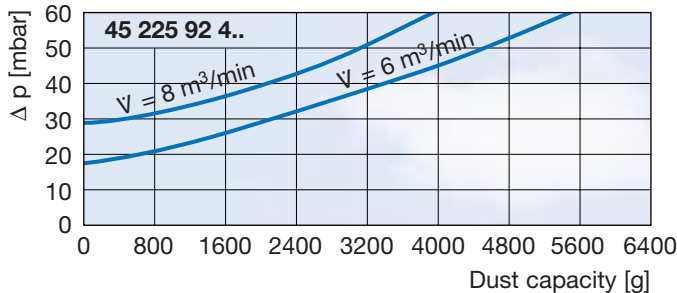
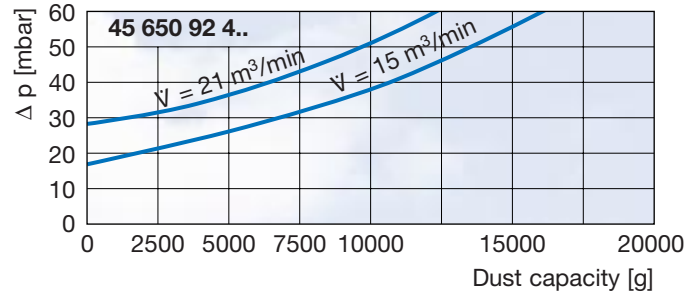
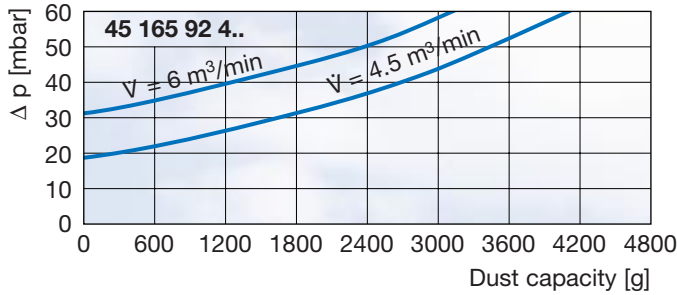
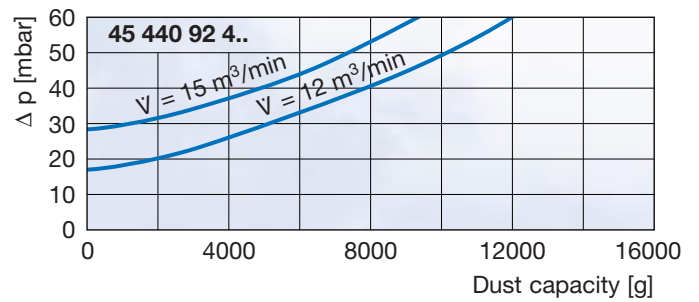
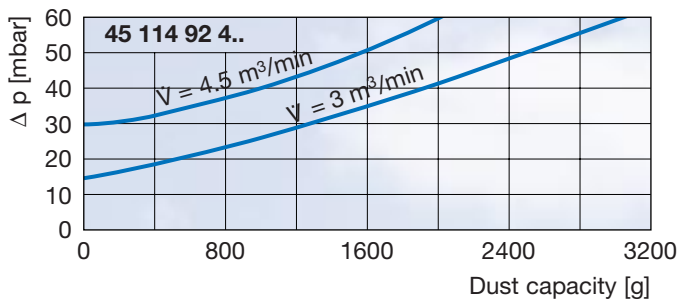
Flow characteristics with secondary element ...

... for the flow rate as per ISO 5011



... for the dust capacity as per ISO 5011

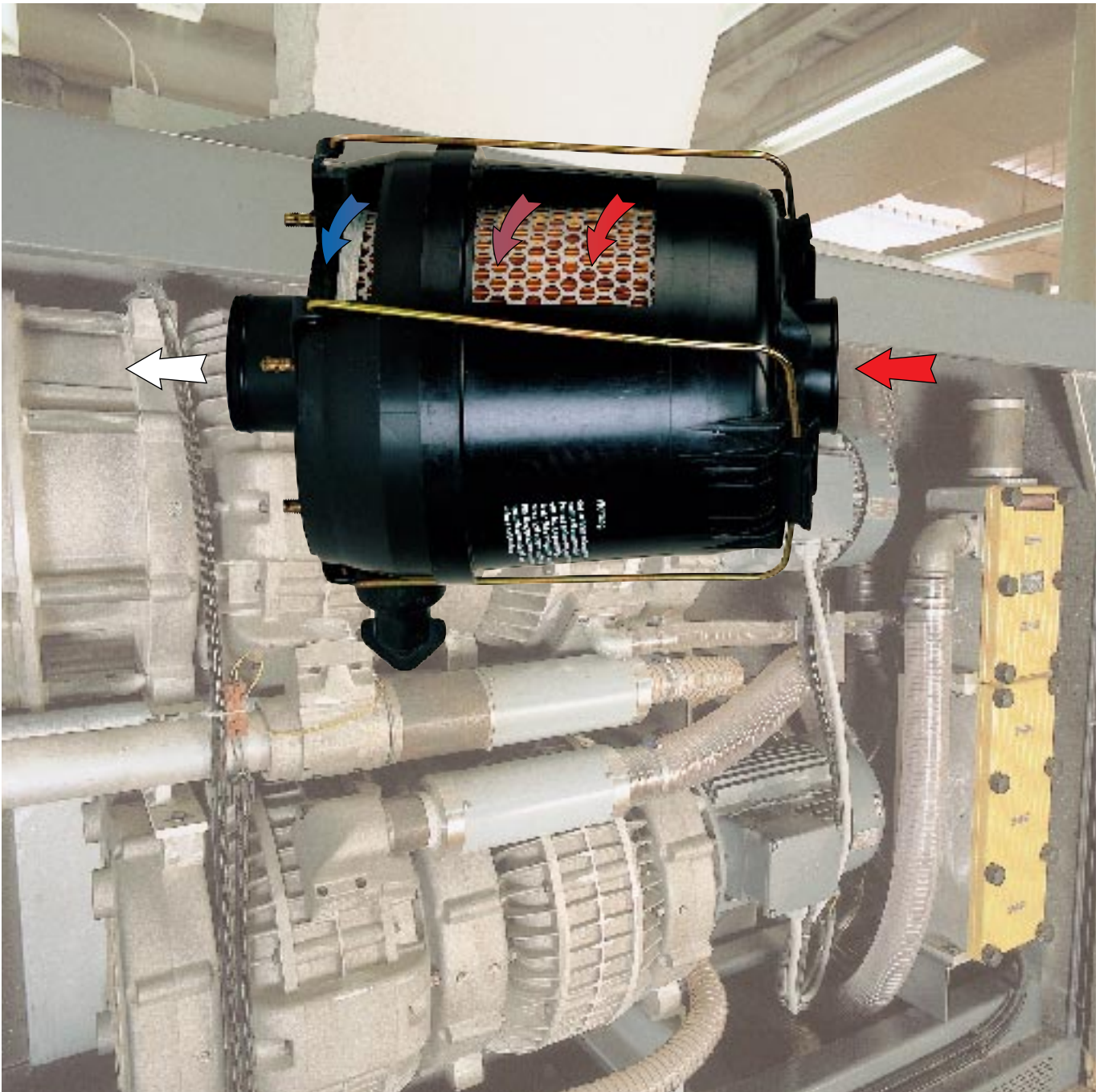
with SAE coarse test dust



MANN+HUMMEL

Industriefilter

MANN Piclon Plastic model



MANN Piclon

Plastic model

General Information

This plastic model is available in two sizes for nominal flow rates of 4.5 m³/min and 6 m³/min. This filter is especially suitable for medium dust conditions on engines and piston compressors with pulsating intake air.

The filter housing and base are made of high-quality, recyclable plastic (PP).

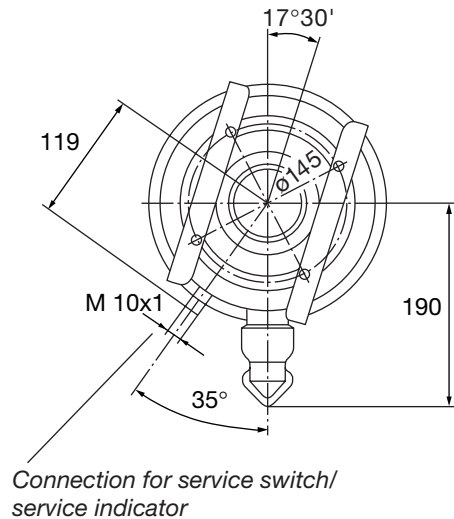
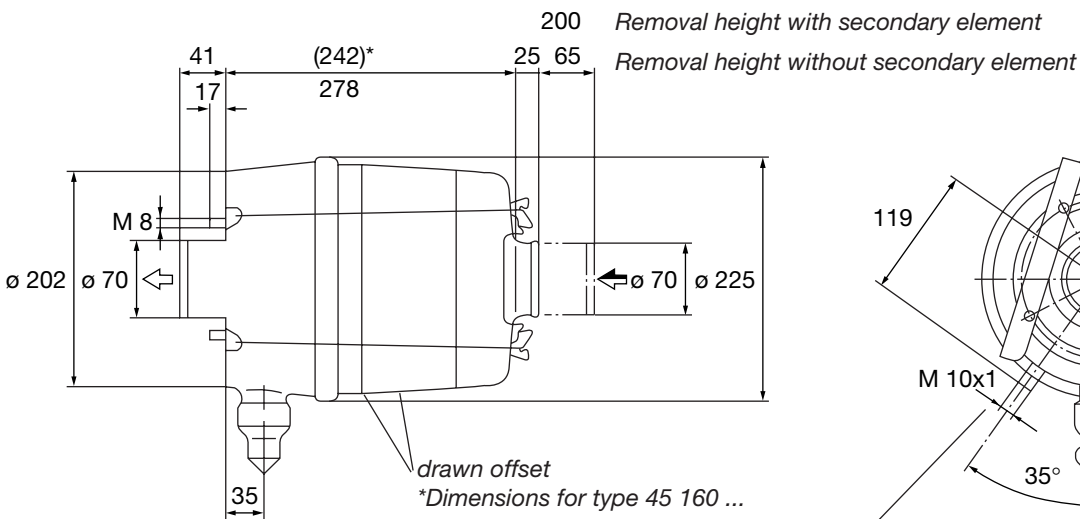
The temperature stability for the filter is -40 °C to +80 °C in continuous operation, and higher than +80 °C for short term.



Installation

Four screws on the bottom allow the filter to be fitted horizontally or vertically. If the filter is mounted vertically with the housing pointing

upwards, a secondary element must be installed. This eliminates the need for a separate bracket.

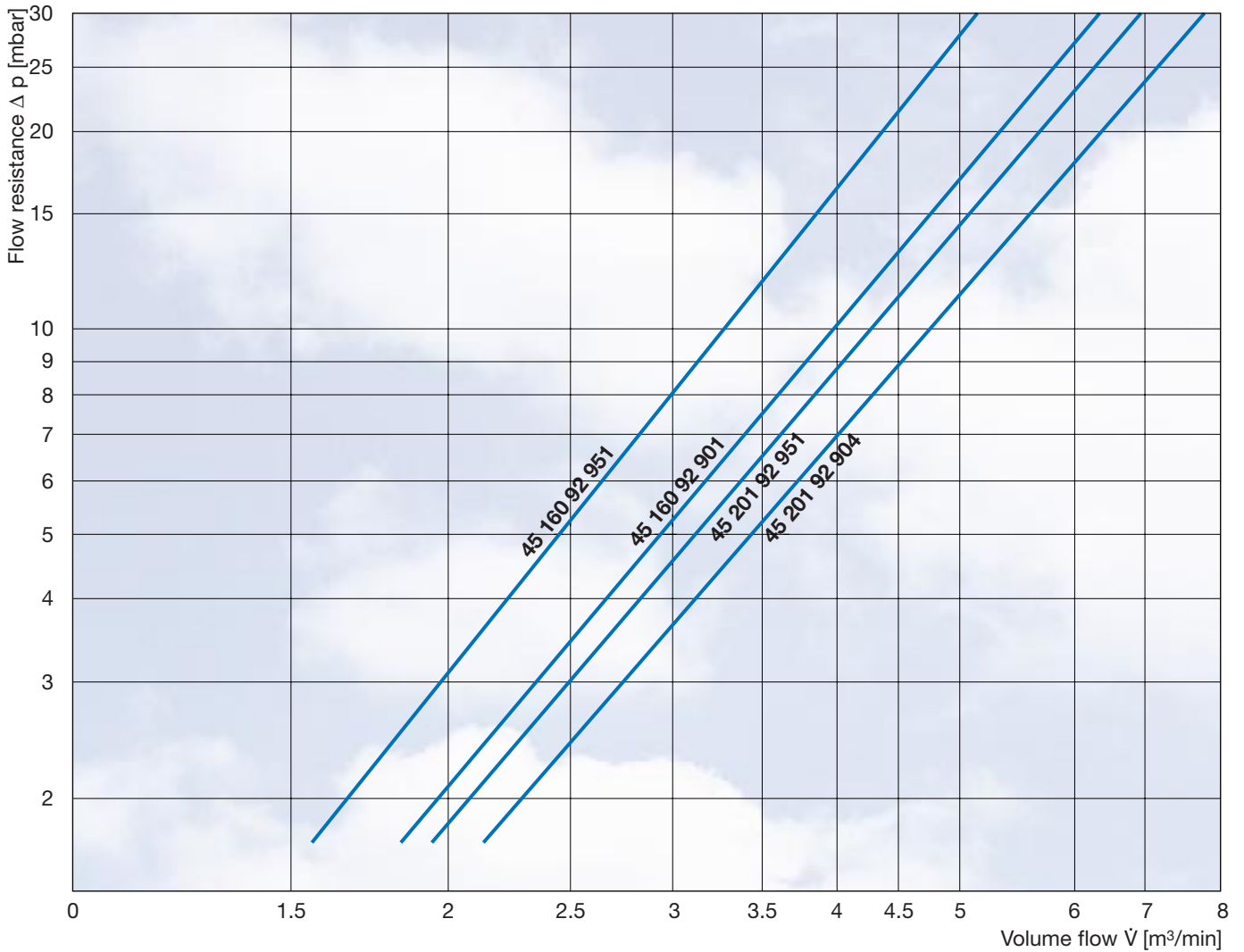


Part No.		Nominal flow rate [m ³ /min]	Replacement filter elements		Weight approx. [kg]
without secondary element	with secondary element		MANN micro-Top filter	MANN secondary element	
45 160 92 901	-	4.5	C 17 160	-	2.2
-	45 160 92 951	4.5	C 17 160	CF 820	2.5
45 201 92 904	-	6.0	C 17 201	-	2.4
-	45 201 92 951	6.0	C 17 201	CF 820	2.7

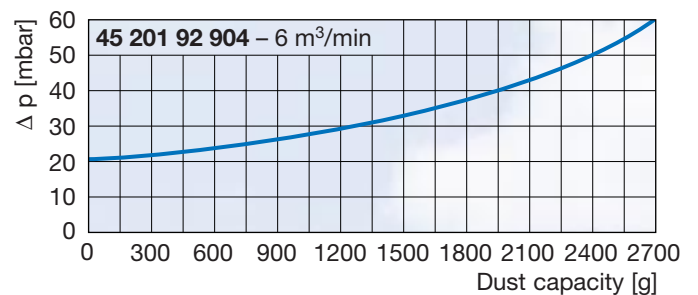
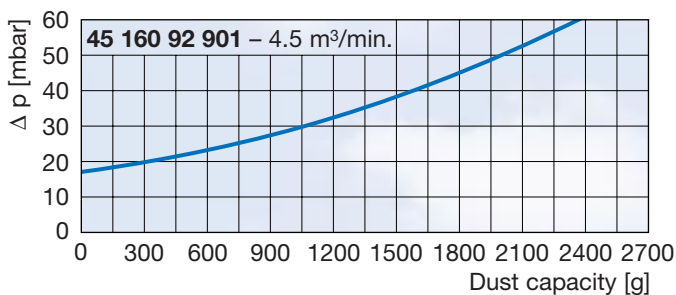
MANN Piclon

Flow characteristics ...

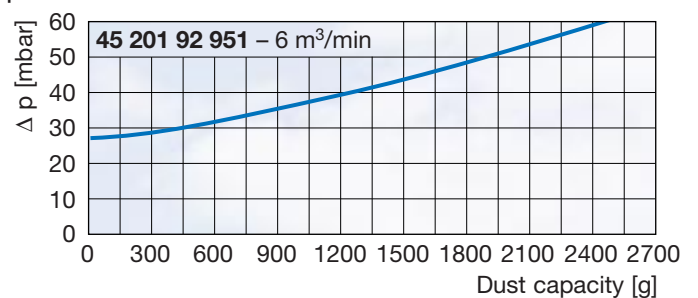
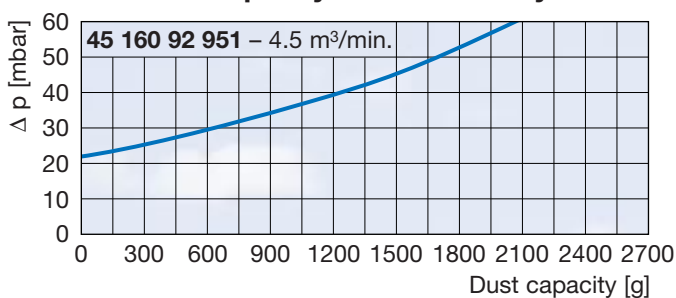
... for the flow rate as per ISO 5011



... for the dust capacity without secondary element as per ISO 5011 with SAE coarse test dust



... for the dust capacity with secondary element as per ISO 5011 with SAE coarse test dust



MANN+HUMMEL

Industriefilter

MANN Pico Single stage air cleaner



MANN Pico

The MANN Pico air cleaner is a single stage filter for light to medium dust conditions. It is, for example, suitable for on-road vehicles and engine-generator units operated in relatively clean environments.

The size of the filter is based on its nominal flow rate.

Filters with a nominal flow rate higher than 4.5 m³/min can be supplied with a secondary element. The slightly increased resistance caused by the secondary element should be taken into account when selecting a filter. It may be necessary to select the next filter size.



Positioning a MANN cyclone upstream as a precleaner will increase the filter's service interval (service life) by a factor of 2 to 3. You can find cyclone precleaners at page 72. MANN Pico air cleaners are available on request.

MANN Picolight

Single stage air cleaner without housing



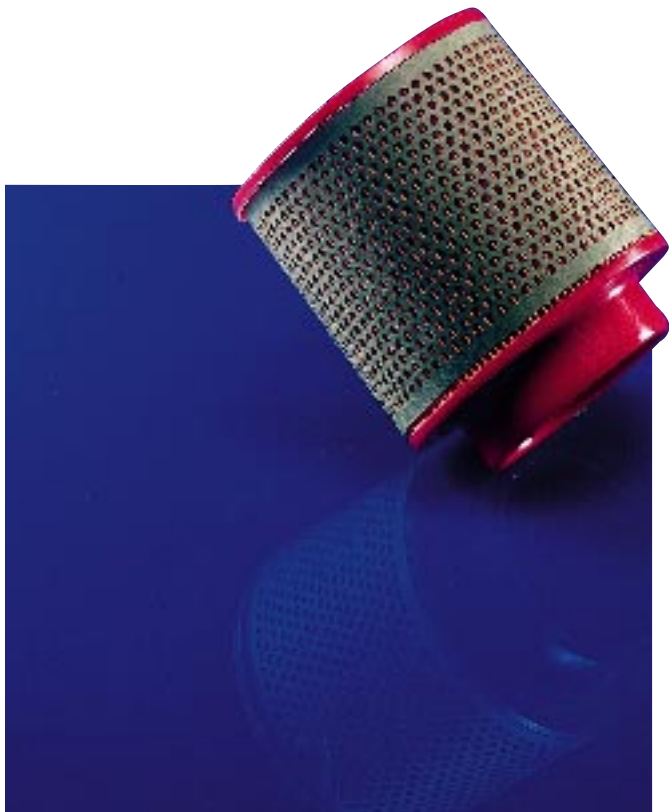
Industriefilter



Background picture: Bottarini

MANN Picolight

Due to its extraordinarily light, compact design, this new metal free filter is sturdy and vibration resistant. Therefore, it is particularly recommended for tight installation situations on stationary screw compressors. The usual MANN+HUMMEL high quality also ensures extreme filtration fineness for the Picolight. In moisture protected and encapsulated installation spaces

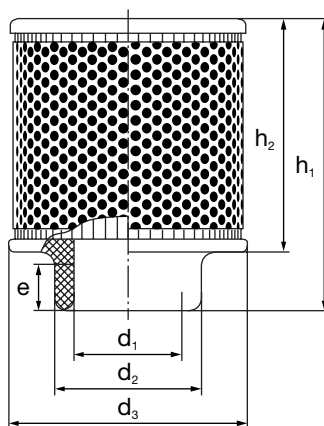
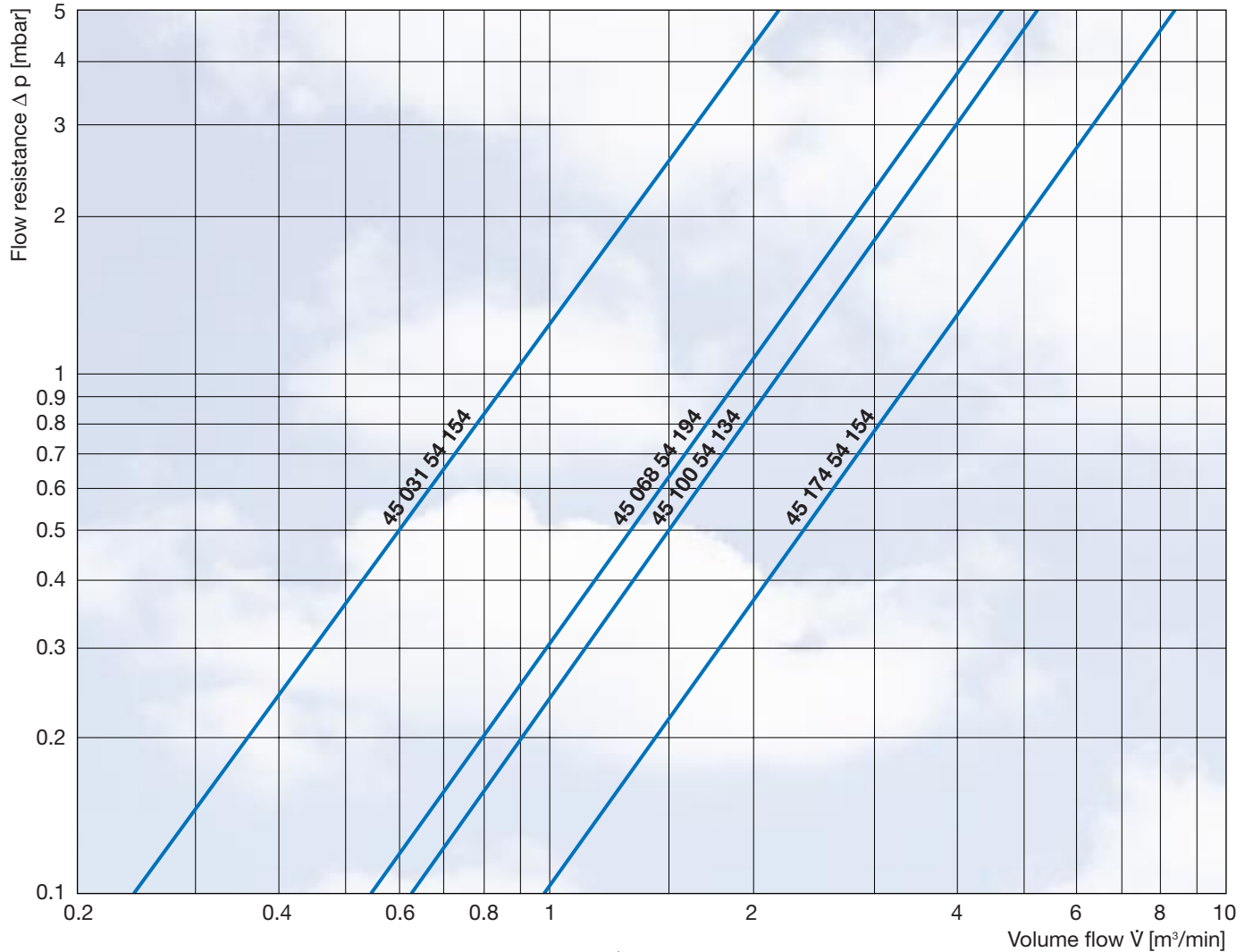


the Picolight is an interesting alternative to ordinary housing air filters for an air flow rate of 1 m³ to 6 m³. Picolight is also suitable as a ventilating filter and can, for example, provide advantages when used in place of wet air filters and ring gap air filters for tank ventilation.

A clamp is required to assemble Picolight.

Dimensions and flow characteristics

... for the flow rate as per ISO 5011



Part No.	Part No.	Nominal flow rate [m ³ /min]	Diameter [mm]					Insertion depth [mm] e	Weight approx. [g]	Clamp
			d ₁	d ₂	d ₃	h ₁	h ₂			
45 031 54 154	C 1131	1	50	65	110	120	95	20	160	02 018 01 709
45 068 54 194	C 1368	2	76	90	130	150	125	20	240	02 018 01 712
45 100 54 134	C 17 100	4	76	90	160	165	140	25	380	02 018 01 712
45 174 54 154	C 23 174	6	100	120	230	156	120	30	680	02 018 01 715

MANN+HUMMEL

Industriefilter



MANN Picolino ...

MANN Picolino. The new series of small, compact air cleaners from MANN+HUMMEL, available in four different versions:

- Picolino intake air cleaners for small engines such as lawnmowers, emergency power units, etc.
- Picolino ventilation filters for gearboxes and liquid tanks (also available with pressure regulation).
- Picolino filter silencers for noise damping air intake, on small piston compressors.
- Picolino vacuum filters for vacuum pumps on request.

Design and fields of application

This series consists of five basic housings which can be adapted to your individual requirements with the help of various adapters. Housing, adapter and filter elements are metal free design. Depending on the type, nominal flow rates of up to 3.2 m³/min can be handled.

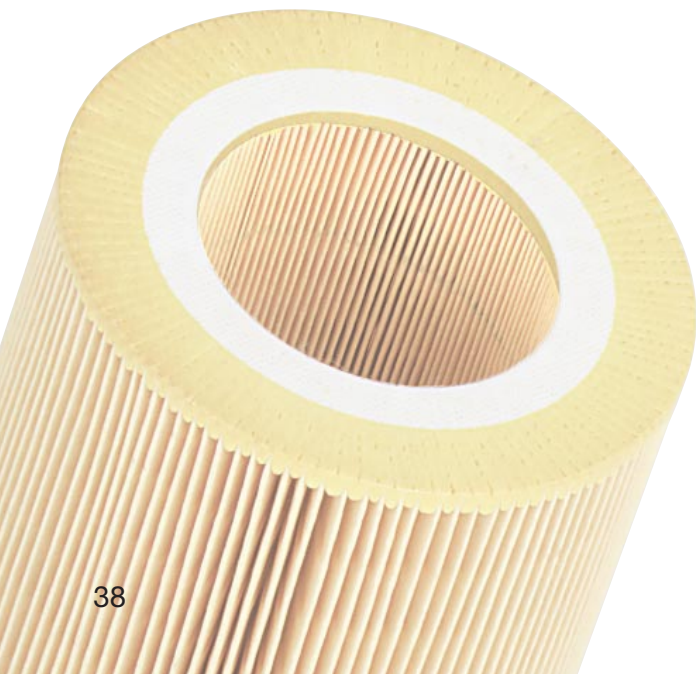
Technical specifications

- Material: impact-resistant polyamide. The permissible temperature for continuous use: -30 °C up to + 80 °C, for short term up to + 130 °C
- High temperature-resistant material for adapters on request
- Filter elements with radial seal



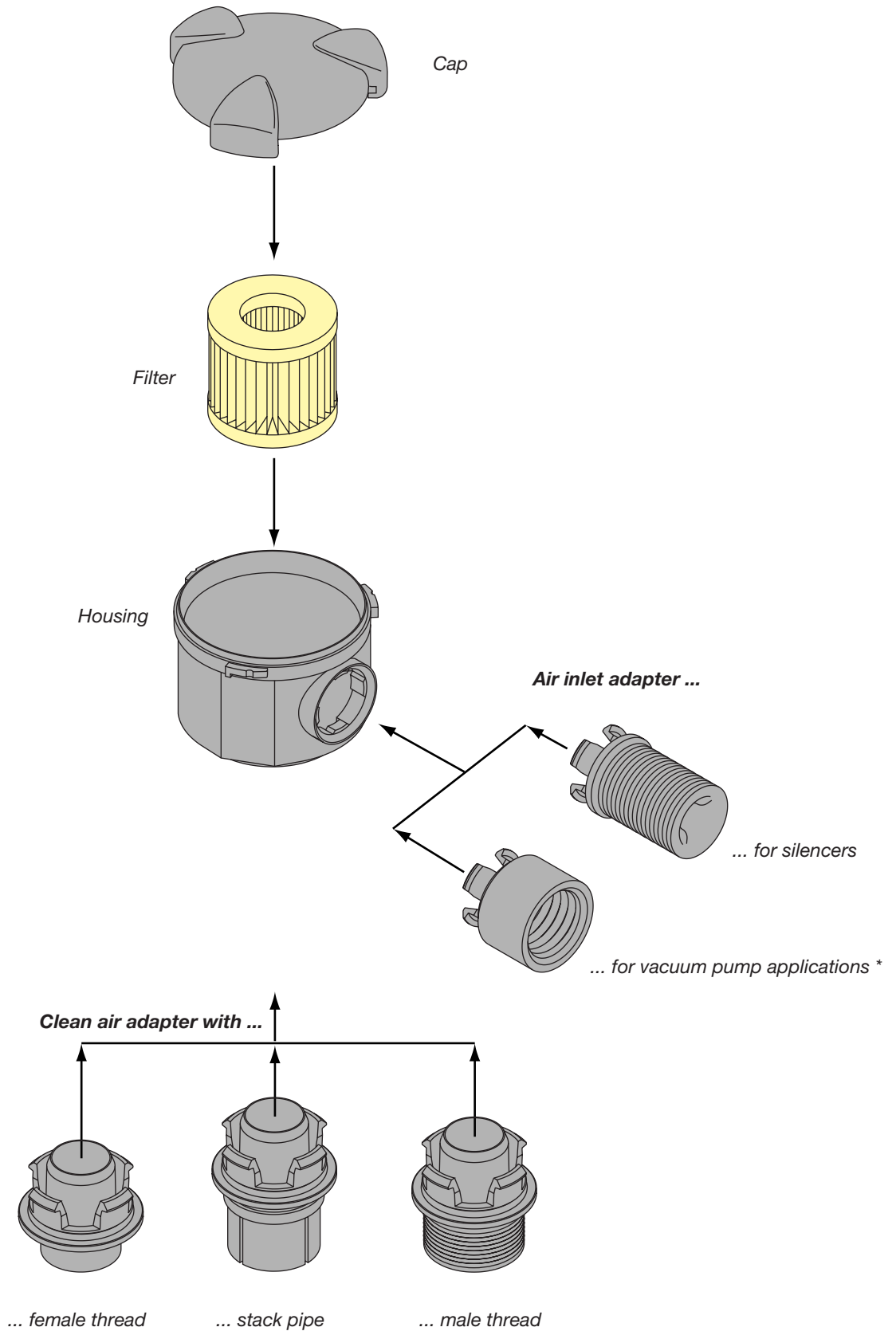
The benefits to you at a glance

- Rapid realization of individual filter solutions
- Short production period for filters bearing your logo
- Adapters can be supplied even for applications where the filter is subjected to high temperatures (e.g. right on the cylinder of piston compressors)
- Economical
- Short delivery times
- Metal free construction
- Simple recycling
- Simple installation and maintenance



... small air cleaners for high expectations

Individual solutions are feasible with the modular system



* on request

Picolino air intake cleaner (with two-way flow)

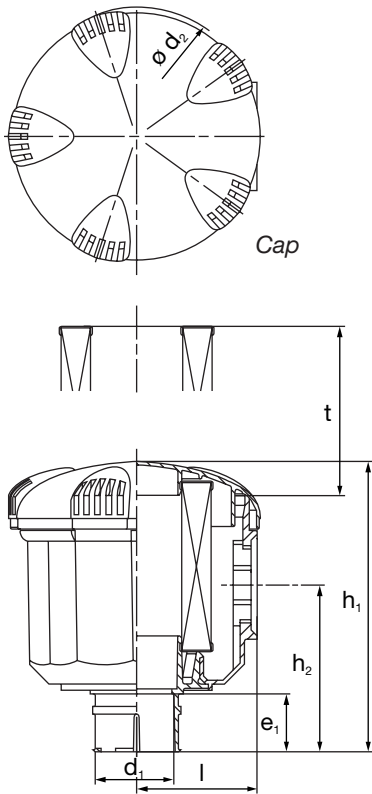


Fig. 1

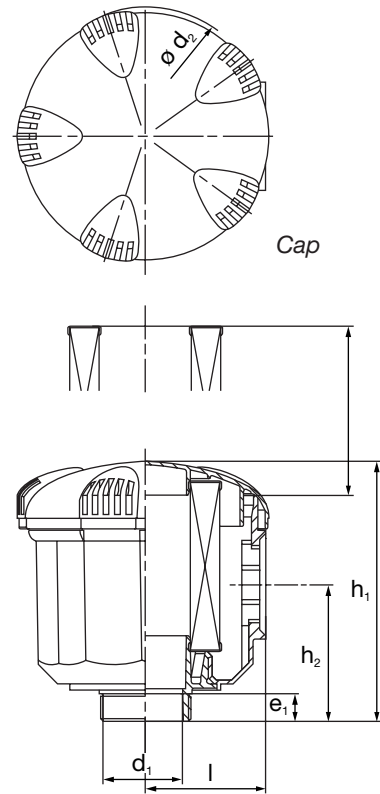


Fig. 2

Part No.	Fig.	Nominal flow rate [m ³ /min] ¹⁾	Dimensions in mm and inches							Replacement MANN micro-Top filter	Clamp (not included in supply) ³⁾
			d ₁	d ₂	e ₁	h ₁	h ₂	l	t		
44 010 72 996	2	0.15	G 1/2 ⁴⁾	58	14	61	34	27	30	C 410	-
44 010 72 997	2	0.15	G 3/8 ⁴⁾	58	11	61	34	27	30	C 410	-
44 010 72 999	2	0.2	M 18x1.5 ²⁾	58	10	61	34	27	30	C 410	-
44 010 77 999	1	0.25	35	58	23	73	64	27	30	C 410	02 018 01 192
44 020 72 996	2	0.2	G 1/2 ⁴⁾	68	14	62	34	31	30	C 420	-
44 020 72 997	2	0.2	G 3/8 ⁴⁾	68	11	62	34	31	30	C 420	-
44 020 72 999	2	0.25	M 18x1.5 ²⁾	68	10	62	34	31	30	C 420	-
44 020 77 999	1	0.3	35	68	23	74	46	31	30	C 420	02 018 01 192
44 030 72 999	2	0.7	G 3/4 ⁴⁾	102	15	94	45	48	68	C 630	-
44 030 77 997	1	1.4	40	102	25	116	67	48	68	C 630	02 018 01 194
44 030 77 998	1	1.2	30	102	23	116	67	48	68	C 630	02 018 01 192
44 030 77 999	1	0.6	20	102	23	116	67	48	68	C 630	02 018 01 190
44 040 72 999	2	2.0	G 1 1/4 ⁴⁾	145	19	131	71	69	79	C 1140	-
44 040 77 996	1	3.0	71	145	25	136	76	69	79	C 1140	02 018 01 196
44 040 77 997	1	3.0	60	145	25	136	76	69	79	C 1140	02 018 01 195
44 040 77 998	1	2.7	52	145	25	136	76	69	79	C 1140	02 018 01 194
44 040 77 999	1	2.0	40	145	25	136	76	69	79	C 1140	02 018 01 194
44 050 72 999	2	2.2	G 1 1/4 ⁴⁾	181	19	188	112	86	135	C 1250	-
44 050 77 996	1	3.2	71	181	25	193	117	86	135	C 1250	02 018 01 196
44 050 77 997	1	3.2	60	181	25	193	117	86	135	C 1250	02 018 01 195
44 050 77 998	1	3.0	52	181	25	193	117	86	135	C 1250	02 018 01 194
44 050 77 999	1	2.2	40	181	25	193	117	86	135	C 1250	02 018 01 194

1) Nominal flow rate based on 15 mbar flow resistance. Flow rate depends on cross-section of clean air adapter.

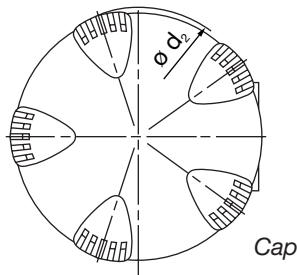
Other models available on request.

2) Male thread.

3) On request filter supplied with fitted clamp strap.

4) Female thread. Denomination of „G“: in the USA: „NP“; in the UK: „BSP“.

Picolino silencer filters



Cap

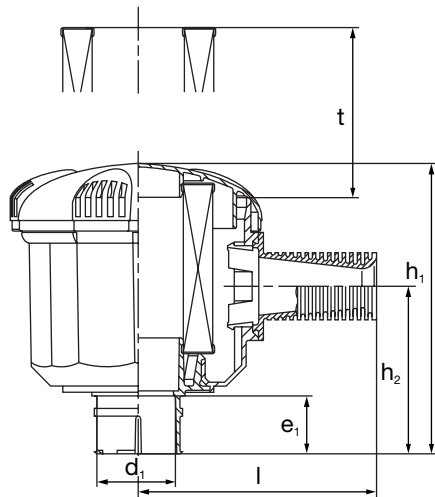
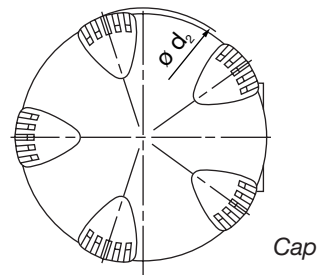


Fig. 1



Cap

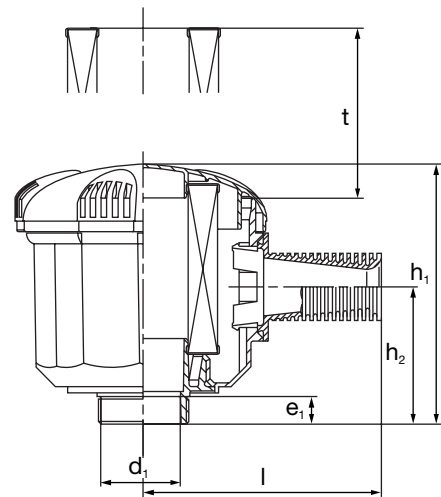


Fig. 2

Part No.	Fig.	Nominal flow rate [m ³ /min] ¹⁾	Dimensions in mm and inches								Replacement MANN micro-Top filter	Clamp (not included in supply) ³⁾
			d ₁	d ₂	e ₁	e ₂	h ₁	h ₂	l	t		
44 010 82 996	2	0.15	G 1/2 ⁴⁾	58	14	29	61	34	56	30	C 410	-
44 010 82 997	2	0.15	G 3/8 ⁴⁾	58	11	29	61	34	56	30	C 410	-
44 010 82 999	2	0.15	M 18x1.5 ²⁾	58	10	29	61	34	56	30	C 410	-
44 010 87 999	1	0.16	35	58	23	29	73	46	56	30	C 410	02 018 01 192
44 020 82 996	2	0.2	G 1/2 ⁴⁾	68	14	29	62	34	60	30	C 420	-
44 020 82 997	2	0.2	G 3/8 ⁴⁾	68	11	29	62	34	60	30	C 420	-
44 020 82 999	2	0.15	M 18x1.5 ²⁾	68	10	29	62	34	60	30	C 420	-
44 020 87 999	1	0.18	35	68	23	29	74	46	60	30	C 420	02 018 01 192
44 030 82 999	2	0.6	G 3/4 ⁴⁾	102	15	47	94	45	95	68	C 630	-
44 030 87 997	1	0.9	40	102	25	47	116	67	95	68	C 630	02 018 01 194
44 030 87 998	1	0.7	30	102	23	47	116	67	95	68	C 630	02 018 01 192
44 030 87 999	1	0.6	20	102	23	47	116	67	95	68	C 630	02 018 01 190
44 040 82 999	2	1.8	G 1 1/4 ⁴⁾	145	19	55	131	71	79	79	C 1140	-
44 040 87 996	1	2.0	71	145	25	55	136	76	79	79	C 1140	02 018 01 196
44 040 87 997	1	2.2	60	145	25	53	136	76	116	79	C 1140	02 018 01 195
44 040 87 998	1	1.9	52	145	25	53	136	76	116	79	C 1140	02 018 01 194
44 040 87 999	1	1.5	40	145	25	53	136	76	116	79	C 1140	02 018 01 194
44 050 82 999	2	2.8	G 1 1/4 ⁴⁾	181	19	55	188	112	133	135	C 1250	-
44 050 87 996	1	3.0	71	181	25	55	193	117	133	135	C 1250	02 018 01 196
44 050 87 997	1	3.0	60	181	25	59	193	117	133	135	C 1250	02 018 01 195
44 050 87 998	1	2.6	52	181	25	59	193	117	133	135	C 1250	02 018 01 194
44 050 87 999	1	2.0	40	181	25	59	193	117	133	135	C 1250	02 018 01 194

1) Nominal flow rate based on 15 mbar flow resistance. Flow rate depends on cross-section of clean air adapter.

Other models available on request.

2) Male thread.

3) On request filter supplied with fitted clamp strap.

4) Female thread. Denomination of „G“: in the USA: „NP“; in the UK: „BSP“.

MANN+HUMMEL

Industriefilter

MANN Vacuum filters



Industriefilter



Background picture: Busch

MANN Vacuum filters



Application

This filter design is intended for installation in air and gas lines with vacuum. The housing is air-tight up to -950 mbar. The MANN micro-Top element serves as the filter element. It is particularly suitable wherever filtration efficiencies hardly achievable with other filter designs are required, e.g. for fine dust or small, long-term partial loads. The extraction efficiency is nearly 100%.

Dimensioning

The filter size is to be selected so that the nominal flow rate of the filter is equal to or greater than the air requirement.

The filter can be installed vertically or horizontally, however it should not be mounted with the clean-air connection at the bottom, as otherwise dirt can enter the clean air duct during filter service.

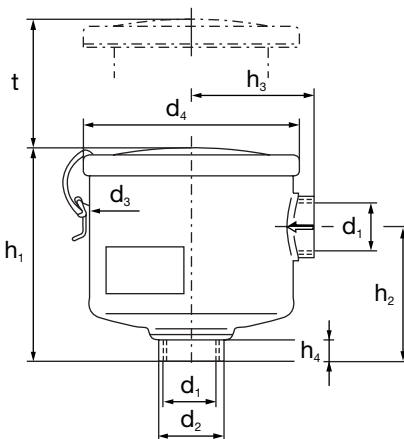
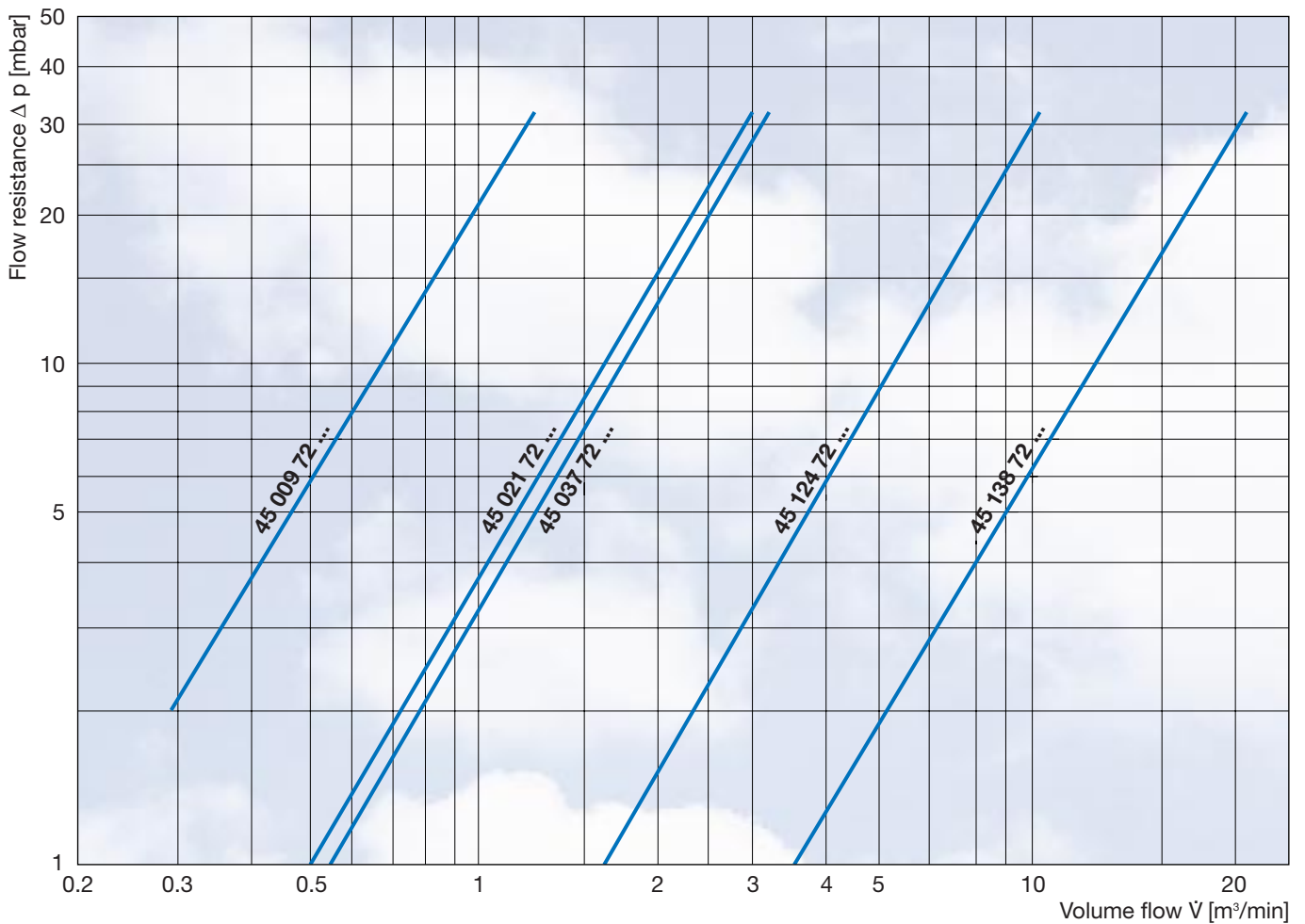
Service

Service is required when the flow resistance of the element has reached the maximum permissible value in the respective case due to dirt deposits. Service is generally limited to replacing the dirty element with a new one. The installation of a differential pressure gauge is recommended by MANN+HUMMEL for monitoring servicing intervals.

In a number of situations, as an alternative to these vacuum filters made from metal, you can also use our new metal free Picolino vacuum filter (see pages 39 to 41 – vacuum filter available on request).

MANN Vacuum filters

Dimensions, part numbers and flow characteristics



Part No.	Nominal flow rate [m ³ /min]	Dimensions in mm and inches									Replacement MANN micro-Top filter	Weight approx. [kg]
		d_1	d_2	d_3	d_4	h_1	h_2	h_3	h_4	t		
45 009 72 105	0.7	G ³ / ₄ ¹⁾	35	90	97	88.5	45	59	5.5	70	C 75	0.53
45 021 72 105	1.6	G 1 ¹ / ₄ ¹⁾	50	125	136	116	68	81	17	75	C 1112	0.95
45 037 72 105	1.8	G 1 ¹ / ₄ ¹⁾	50	162	172	170	108	98	17	130	C 1337	1.45
45 124 72 104	6.0	G 2 ¹ / ₂ ¹⁾	86	194	200	250	131	123	12	240	C 15 124/1	4.3
45 138 72 105	12.0	G 4 ¹⁾	123	268	272	263	147	197	74	165	C 21 138/1	14.5

Other connection threads available on request.

¹⁾ Denomination of „G“: in the USA: „NP“; in the UK: „BSP“.

MANN+HUMMEL

Industriefilter

MANN Filters for two-way ventilation for crankcases, gearboxes and hydraulic tanks



Industriefilter



Background pictures: Linde

MANN Filters for two-way ventilation (Dry air cleaners)

The MANN Pico air cleaners are one stage air cleaners, used mainly as ventilation filters for tanks for liquids and gearboxes.

These filters can be supplied with an integrated pressure regulating valve. Provided that the configuration is correct, air exchange in the tank can be almost completely avoided and air carrying oil will not escape.

As an alternative to the Pico metal cleaner you can also install our new metal-free MANN Picolino air cleaner (see page 40).

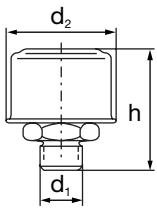


Fig. 1

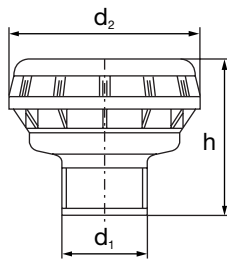


Fig. 2

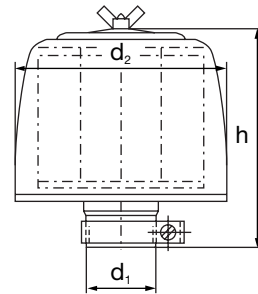


Fig. 3

Part No.	Fig.	Nominal flow rate [m ³ /min] approx.	Opening pressure		Dimensions in mm and inches			Weight approx. [kg]	Replacement MANN micro-Top filter
			[bar]	[KPa]	d ₁	d ₂	h		
45 001 62 155	1	–	–	–	M 14x1.5	45	47	0.05	– ¹⁾
45 001 62 185	1	–	–	–	M 18x1.5	45	47	0.08	– ¹⁾
45 003 65 900	2	–	–	–	35	80	65	0.06	– ¹⁾
45 003 62 902	2	–	–	–	G 3/4 ³⁾	80	73.5	0.08	– ¹⁾
45 003 62 900 ²⁾	2	0.2	0.85	85	G 3/4 ³⁾	80	73.5	0.1	– ¹⁾
45 003 62 901 ²⁾	2	0.2	0.35	35	G 3/4 ³⁾	80	73.5	0.1	– ¹⁾
45 009 72 146	3	0.5	–	–	M 26x1.5	98	110	0.3	C 75/4
45 009 77 106	3	0.5	–	–	20	98	110	0.3	C 75/4
45 021 77 125	3	2.0	–	–	40	132	120	0.5	C 1112
45 032 77 105	3	3.5	–	–	52	132	152	0.65	C 1132
45 037 77 015	3	4.5	–	–	60	170	175	1.1	C 1337
45 074 77 115	3	8.0	–	–	80	208	185	1.3	C 1574
45 138 77 126	3	15.0	–	–	100	283	200	7.0	C 21 138/1
45 240 77 104	3	23.0	–	–	140	318	302	9.0	C 26 240
45 375 77 104	3	32.0	–	–	180	396	285	11.0	C 30 375

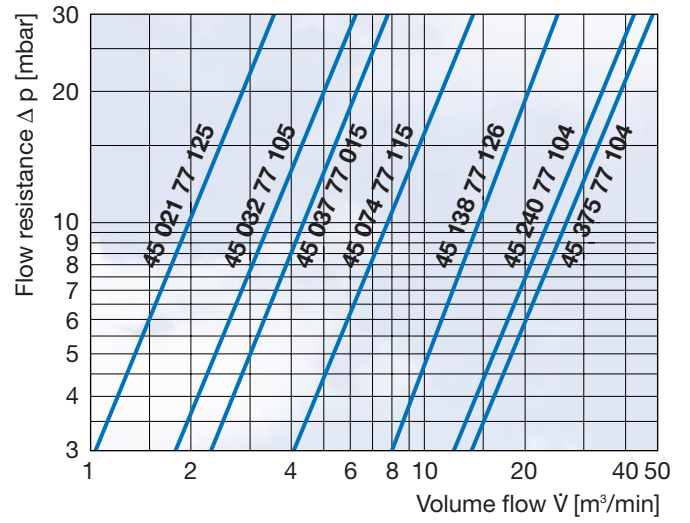
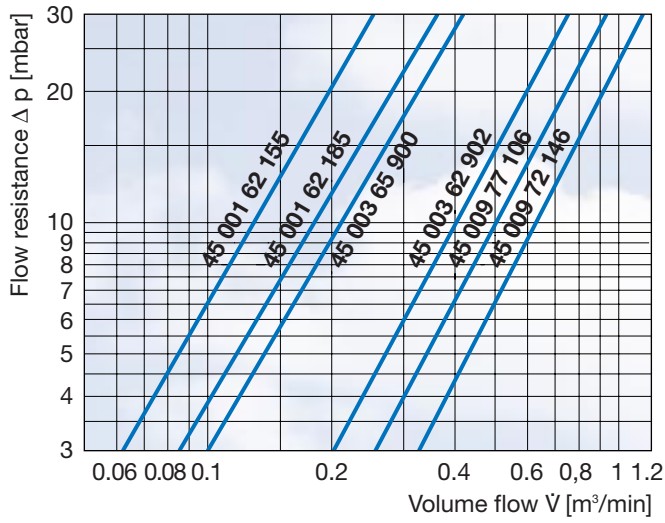
1) The entire filter is exchanged for a new one when it becomes dirty.

2) With integrated pressure regulating valve.

3) Denomination of „G“: in the USA: „NP“; in the UK: „BSP“.

MANN Filters for two-way ventilation (Dry air cleaners)

Flow characteristics



MANN Filters for two-way ventilation

(Oil wetted air cleaners)

The filter elements of the MANN wet air cleaners consist of oil wetted knitted wire mesh or Drillo fabric. A typical application is the aeration of gears, containers and tanks in hydraulic systems.

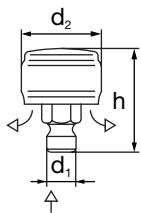


Fig. 1

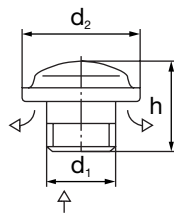


Fig. 2

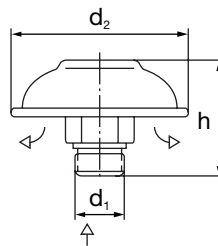


Fig. 3

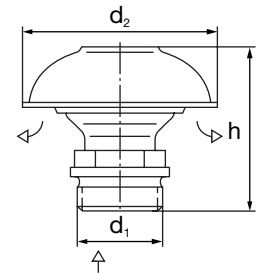


Fig. 4

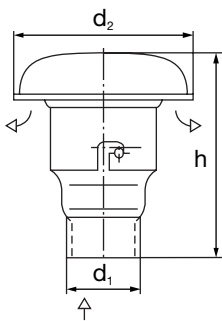


Fig. 5

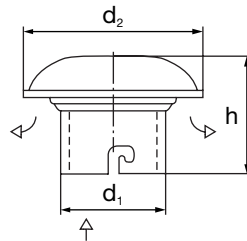


Fig. 6

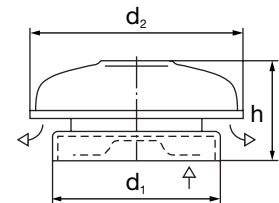


Fig. 7

Part No.	Fig.	Nominal flow rate [m ³ /min] approx.	Dimensions in mm			Weight approx. [kg]
			d ₁	d ₂	h	
42 001 62 103	1	0.1	M 12x1.5	30	37	0.04
42 001 62 203	2	0.1	M 12x1.5	21	16	0.02
42 001 62 253	1	0.1	M 14x1.5	30	37	0.05
41 004 62 102	3	0.4	M 16x1.5	76	62	0.15
42 002 62 112	2	0.2	M 18x1.5	50	27	0.03
42 001 62 142	3	0.1	M 20x1.5	50	42	0.03
41 002 62 102	4	0.2	M 26x1.5	60	50	0.09
41 001 62 112	4	0.1	M 30x1.5	60	42	0.06
41 004 62 112	5	0.4	M 33x1.5	76	81	0.22
41 004 60 172	6	0.4	45	76	50	0.12
41 004 60 212	6	0.4	48.5	86	56	0.14
41 004 60 122 ²⁾	7	0.4	59	76	37	0.11

1) Given a flow resistance of the wet air filter of $\Delta p = 10$ mbar (1 KPa).

2) For bayonet connection to DIN 73400.

MANN Oil wetted air cleaners



Industriefilter



MANN Oil wetted air cleaners

Applications

MANN Oil wetted air cleaners are suitable for filtering intake air for machinery operated in relatively clean air, e.g. stationary engines and compressors in closed rooms, on marine engines etc.

Design and principle of operation

The air drawn in through an oil wetted air cleaner flows through a packing wetted with oil and made of expanded metal or knitted steel mesh. Dust particles are deposited on the oil-wetted surface of the filter packing.

MANN Oil wetted air cleaners for stack connections are available in cylindrical shapes for mounting vertically (page 53).

The silencer version is especially suitable for compressors in closed rooms (Fig. 1 and 2/page 54).

Dimensioning and installation

Filters must be positioned in such a way that extracted dust cannot be shaken back onto their clean side.

Silencers may be installed horizontally to vertically face down. A deviation of 15° is permissible. Filters must be adequately shielded from rain and any water spray.

The filter size is determined by its nominal flow rate. If a larger filter can be installed (one with a normal flow rate larger than the amount of air required), it improves the filter effectiveness, increases the dust capacity and extends the filter's service life.

Service

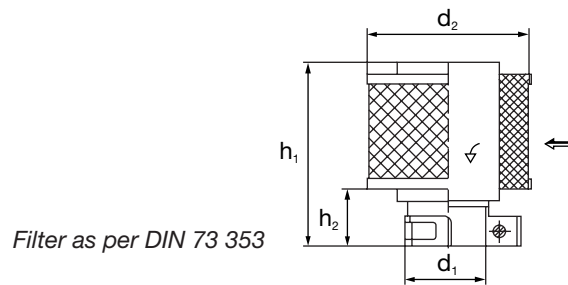
When dust becomes clearly visible on the filter, wash it out with diesel fuel. After washing, shake off the excess fuel well. Oil wetted air cleaners may also be cleaned with a steam jet cleaner.

After cleaning, apply an even, thin layer of engine oil to the filter packing (if dipped in an oil bath, shake off the excess oil afterwards).

Neglected filter service leads to a definite impairment of the filter action, and thus to premature wear of the assemblies connected downstream from the filter.



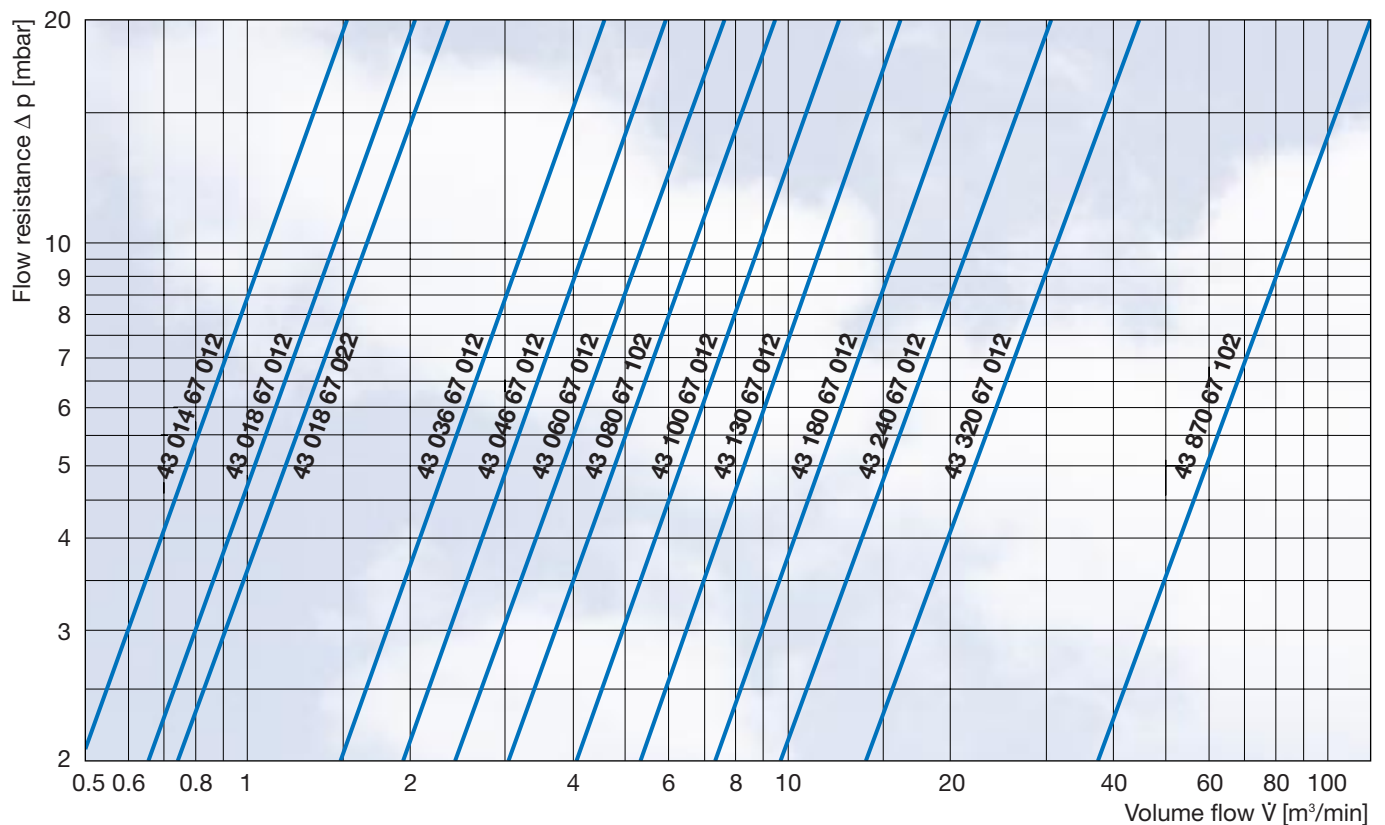
Dimensions, part numbers and flow characteristics



Part No.	Nominal flow rate ¹⁾ [m ³ /min]	Dimensions in mm				Weight approx. [kg]
		d ₁	d ₂	h ₁	h ₂	
43 014 67 012	1.4	30	80	78	32	0.25
43 018 67 012	1.8	35	80	90	32	0.4
43 018 67 022	1.8	40	80	90	32	0.3
43 036 67 012	3.6	52	107	110	32	0.6
43 046 67 012	4.6	60	107	128	34	0.8
43 060 67 012	6	66	120	140	35	1.0
43 080 67 102	8	70	120	175	35	1.2
43 100 67 012	10	80	147	180	38	1.5
43 130 67 012	13	100	147	215	38	1.8
43 180 67 012	18	120	166	250	38	2.5
43 240 67 012	24	150	196	285	50	3.3
43 320 67 012	32	200	232	330	45	5.4
43 870 67 102	87	300	340	640	95	16.0

¹⁾ Nominal flow rate based on approx. 15 mbar.

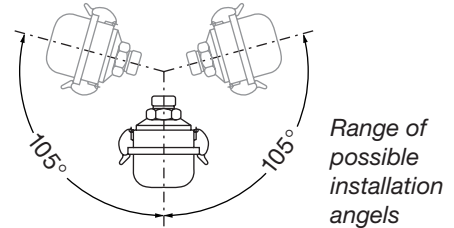
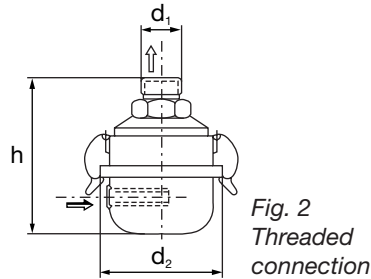
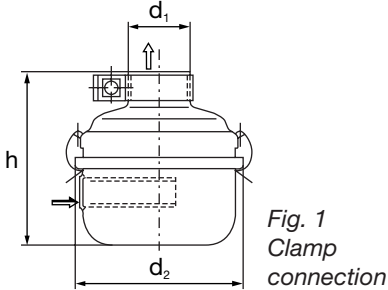
Flow characteristics for the flow rate as per ISO 5011



MANN Silencer filters

As an alternative to this silencer filter made from metal you can also use our new metal free

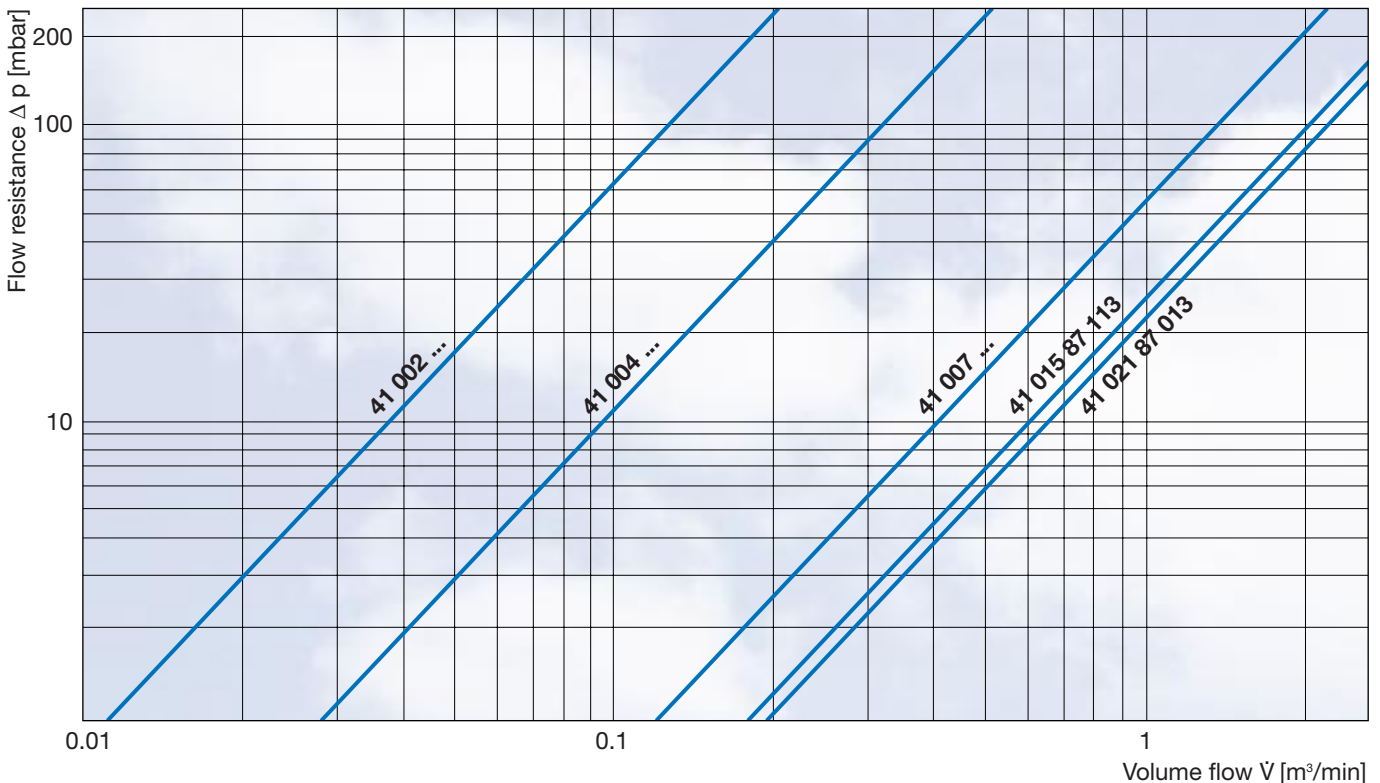
Picolino silencer filter (see page 41).



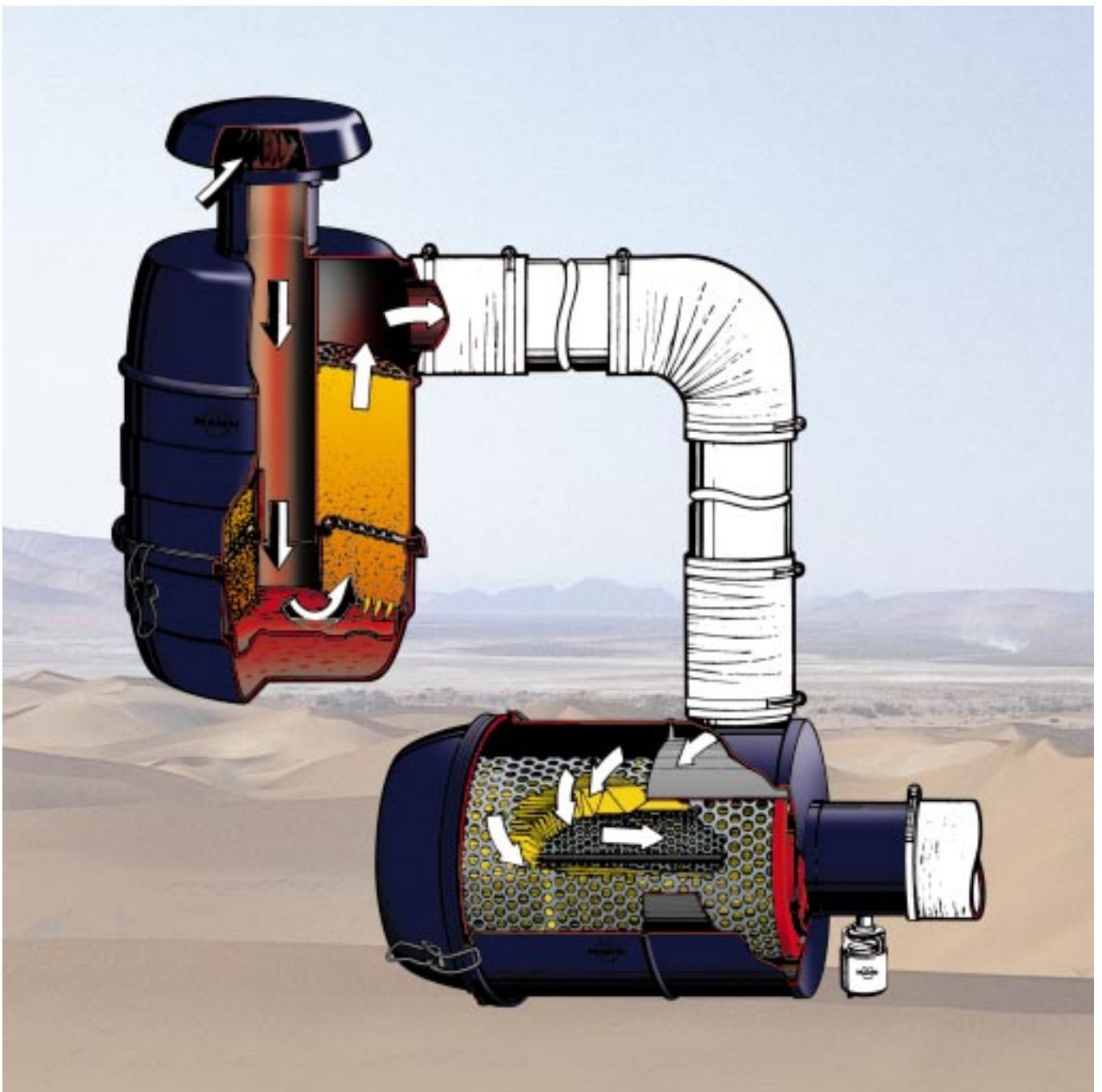
Part No.	Fig.	Nominal flow rate ¹⁾ [m ³ /min]	Dimensions in mm			Weight approx. [kg]	
			Silence piper	d ₁	d ₂		h
41 002 87 103	1	0.14	without	20	48	77	0.1
41 004 87 103	1	0.33	without	20	66	72	0.2
41 007 87 103	1	0.8	with	25	82	88	0.2
41 007 87 113	1	0.8	with	30	82	85	0.2
41 010 87 113	1	1.3	with	35	98	97	0.3
41 015 87 113	1	2.0	with	40	118	120	0.5
41 021 87 013	1	2.2	with	52	138	130	0.5
41 002 82 133	2	0.14	without	M 16x1.5	46	76	0.1
41 004 82 123	2	0.33	without	M 22x1.5	66	74	0.2
41 002 82 113	2	0.14	without	G 3/8	46	81	0.1
41 004 82 183	2	0.33	with	G 1/2	66	84	0.2

¹⁾ At 100 mbar flow resistance

Flow characteristics for the flow rate as per ISO 5011



MANN Pico air cleaner for oil-bath/dry air cleaner combination



MANN Pico air cleaner

for oil-bath/dry air cleaner combination

This MANN Pico air cleaner is a special version of the well known MANN Pico air cleaner series. For use in the so called oil-bath/dry air cleaner combination, the filter housing is welded air tight.

Application

MANN oil-bath/dry air cleaner combinations are suitable for use under the heaviest dust conditions.

Design and principle of operation

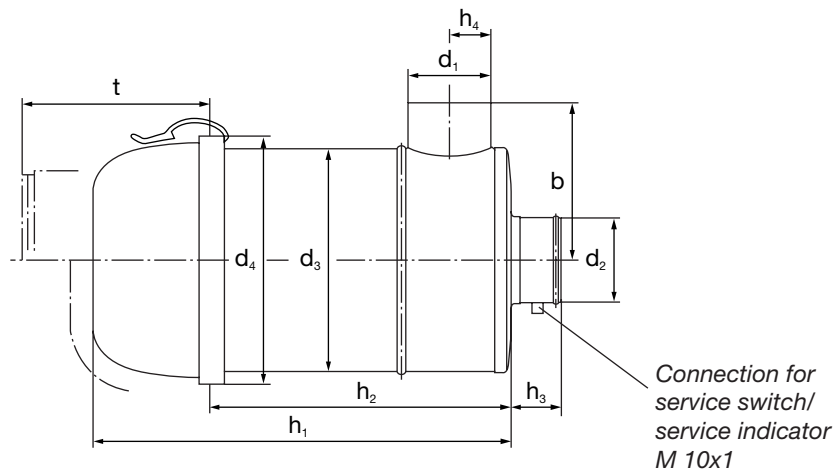
The oil-bath air cleaner installed upstream acts as a highly effective precleaner. Its effectiveness is vastly superior to that of the normal precleaner designs. This results in a significantly longer service interval for the dry air filter. The dry air filter provides the necessary high extraction efficiency.

Dimensioning and installation

The major installation dimensions correspond to the dimensions of the MANN Piclon with the same performance. This simplifies any later refitting of the air cleaner system. The selection of the filter size is based on its nominal flow rate (see table). If a larger filter (with a nominal flow rate larger than the engine air requirement) can be fitted, it increases the dust capacity, and thus results in a lengthening of the service interval. The oil-bath air cleaner should be dimensioned with respect to the engine's air requirement in the usual way.

Service

A detailed maintenance manual is available.



Part No.	Nominal flow rate [m ³ /min]	Dimensions in mm										Replacement MANN micro-Top filter
		b	d ₁	d ₂	d ₃	d ₄	h ₁	h ₂	h ₃	h ₄	t	
45 114 75 304	4.5	120	62	60	165	182	305	236	70	50	360	C 13 114/4
45 165 75 304	6	140	68	70	195	212	346	265	80	55	420	C 15 165/3
45 225 75 304	8	155	82	80	215	232	364	272	80	65	435	C 17 225/3
45 325 75 304	12	180	102	100	255	272	388	287	90	75	475	C 20 325/2
45 440 75 304	15	205	110	110	290	312	395	280	100	80	500	C 23 440/1
45 650 75 304	21	230	132	130	320	342	505	391	105	95	600	C 24 650/1
45 880 75 304	28	280	150	150	385	407	494	372	105	102	590	C 30 850/2

MANN Oil-bath air cleaner



MANN Oil-bath air cleaner

Application

The MANN oil-bath air cleaner is suitable for light to medium dust conditions. For heavy dust conditions we recommend connecting a MANN Cyclone upstream of it as a precleaner (see page 72 and 73).

MANN oil-bath air cleaners are used for aspirated machinery, e.g. engines, construction and agricultural machinery etc.

Design and principle of operation

Intake air is routed through the oil bath. There the coarse dust particles are removed from the air and then redirected upward. The upward stream wets the filter's packing with oil from the oil bath and the dirt in the intake air is deposited there. This oil flows back into the bath and the dirt it contains is deposited there.

Service

Service can be carried out without spare parts with just motor oil and diesel fuel in accordance with the service instructions. The oil reservoir with the oil bath is mounted at the bottom on the housing and can be removed.



Model for bracket mounting

Servicing without spare parts



Model with mounting flange

Dimensioning and installation

When selecting sizes care should be taken that the nominal flow rate of the filter is as close as possible to, but not more than, the maximum air requirement. If an oil-bath air cleaner is specified too large, its extraction efficiency is decreased. If the filter is too small, oil containing dirt may be drawn out through it, resulting in premature engine wear.

When MANN oil-bath air cleaners are used on engines and compressors with 1 – 4 cylinders, dimensions must be corrected using pulsation factors for the pulsations in flow that occur there.

Oil-bath air cleaners must be installed vertically.

MANN Oil-bath air cleaners

Flange connection:
Intake from above.

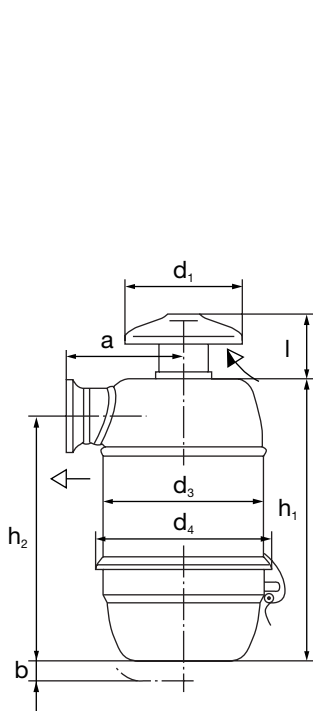


Fig. 1
Fixed raincap;
oval flange

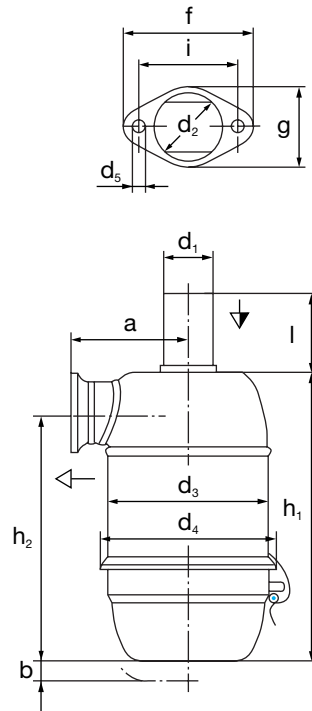


Fig. 2
Plain intake pipe;
oval flange

Part No.	Nominal flow rate [m ³ /min]	Fig.	Dimensions in mm													Weight of filter without oil [kg]	Oil filling [ltr.]
			Cleaner									Flange					
			a	b	d ₁	d ₂	d ₃	d ₄	h ₁	h ₂	l	d ₅	f	g	i		
31 007 63 013	0.7	1	65	40	70	30	85	93	164	144	38	9	76	48	58	0.7	0.16
31 010 63 013	1.0	1	75	40	82	40	100	110	184	160	42	11	90	56	68	1.0	0.21
31 014 74 013	1.4	2	85	20	42	40	120	137	220	193	32	11	90	56	68	1.5	0.36
31 017 74 013	1.7	2	85	20	42	40	120	137	242	218	28	11	90	56	68	1.7	0.36
31 020 74 023	2.0	2	100	25	54	52	140	158	253	222	55	11	105	70	82	2.0	0.50
31 024 74 023	2.4	2	100	25	54	52	140	158	283	252	55	11	105	70	82	2.2	0.50
31 028 74 023	2.8	2	110	20	62	60	173	190	267	232	60	13	122	78	94	2.8	0.75
31 034 74 023	3.4	2	110	20	62	60	173	190	302	266	60	13	122	78	94	3.1	0.75

Dimensions and part numbers

Separate brackets for these cleaners
see page 66.

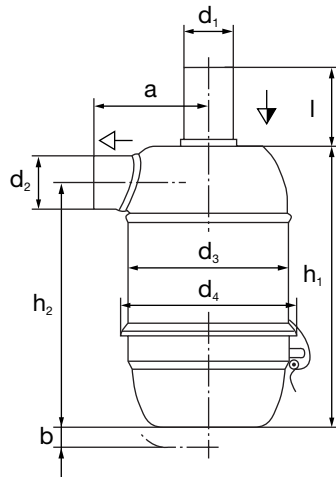


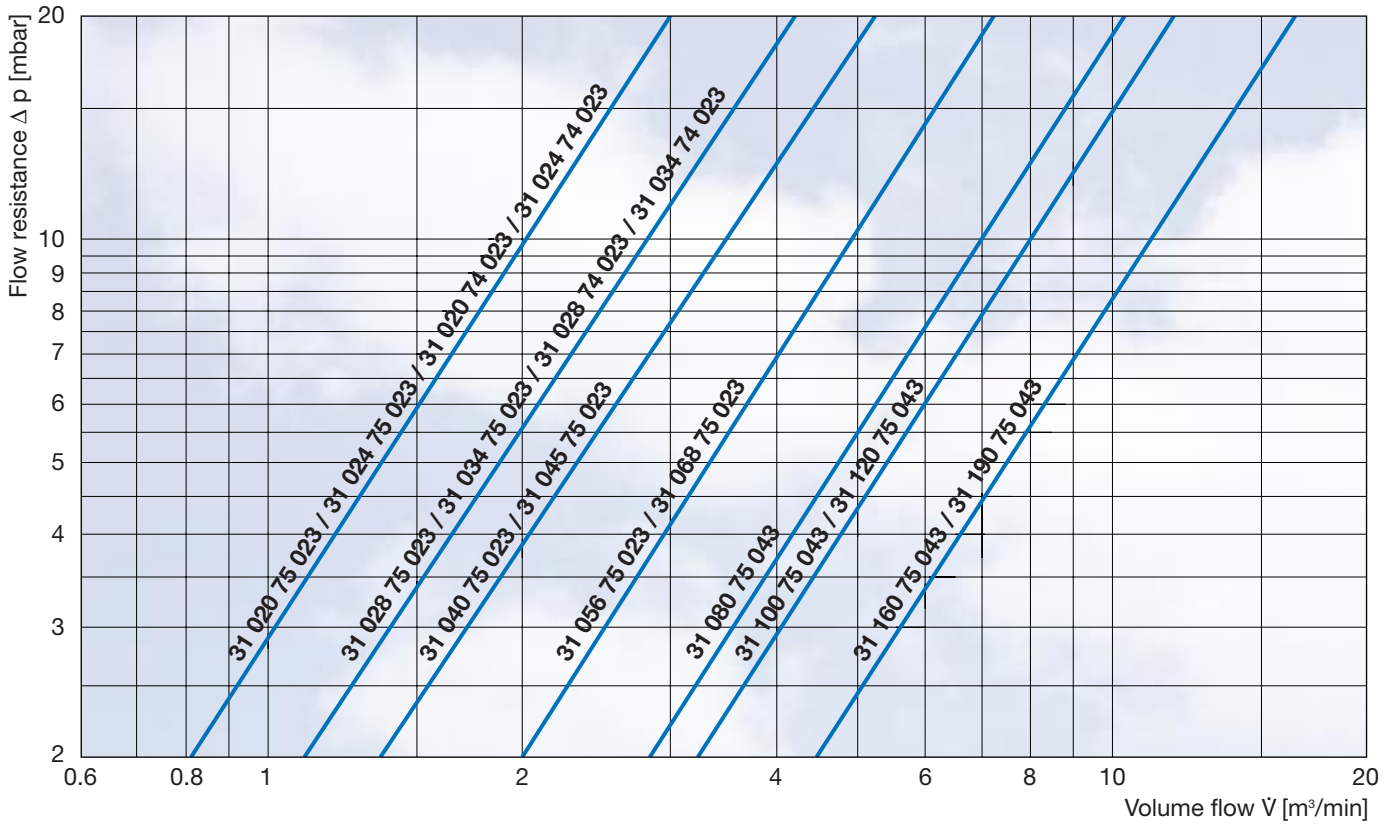
Fig. 1
Vertical air inlet

Part No.	Nominal flow rate [m ³ /min]	Fig.	Dimensions in mm									Weight of filter without oil [kg]	Oil filling [ltr]
			a	b	d ₁	d ₂	d ₃	d ₄	h ₁	h ₂	l		
31 020 75 023	2.0	1	110	25	54	54	140	158	253	222	55	2.1	0.50
31 024 75 023	2.4	1	110	25	54	54	140	158	283	252	55	2.3	0.50
31 028 75 023	2.8	1	125	20	62	62	173	190	267	232	60	3.0	0.75
31 034 75 023	3.4	1	125	20	62	62	173	190	302	266	60	3.3	0.75
31 040 75 023	4.0	1	140	20	68	70	200	220	297	255	75	3.7	1.00
31 045 75 023	4.5	1	140	20	68	70	200	220	327	285	75	4.3	1.00
31 056 75 023	5.6	1	160	25	82	82	240	260	322	276	85	5.6	1.70
31 068 75 023	6.8	1	160	25	82	82	240	260	362	316	85	6.4	1.70
31 080 75 043	8.0	1	185	20	102	102	280	300	367	304	135	7.8	2.50
31 100 75 043	10.0	1	210	35	110	110	320	344	395	325	140	10.7	3.00
31 120 75 043	12.0	1	210	35	110	110	320	344	425	355	110	11.2	3.00
31 160 75 043	16.0	1	260	45	132	132	400	422	445	365	165	18.0	5.50
31 190 75 043	19.0	1	260	45	132	132	400	422	495	410	120	20.0	5.50

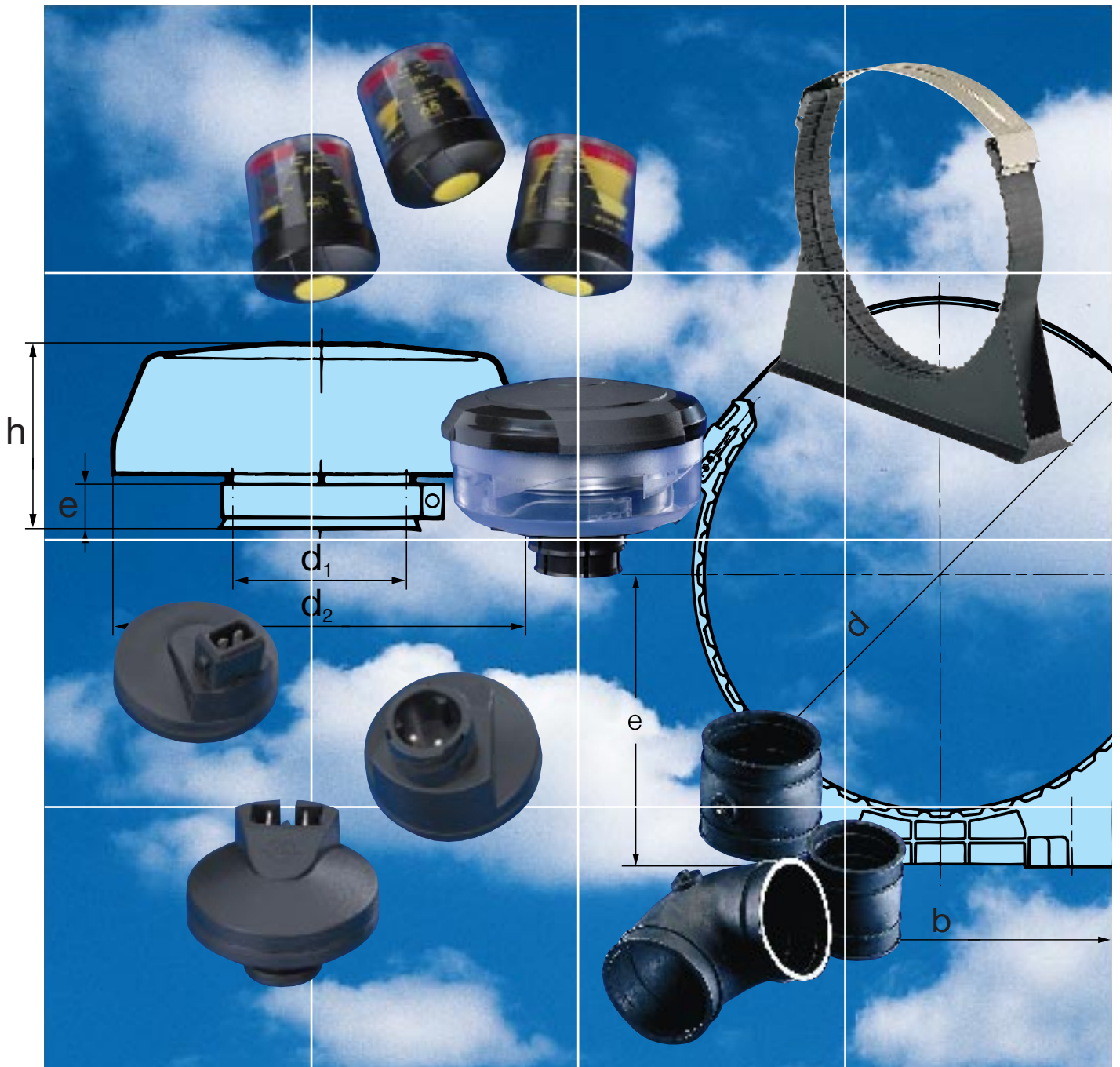
MANN Oil-bath air cleaners

Flow characteristics ...

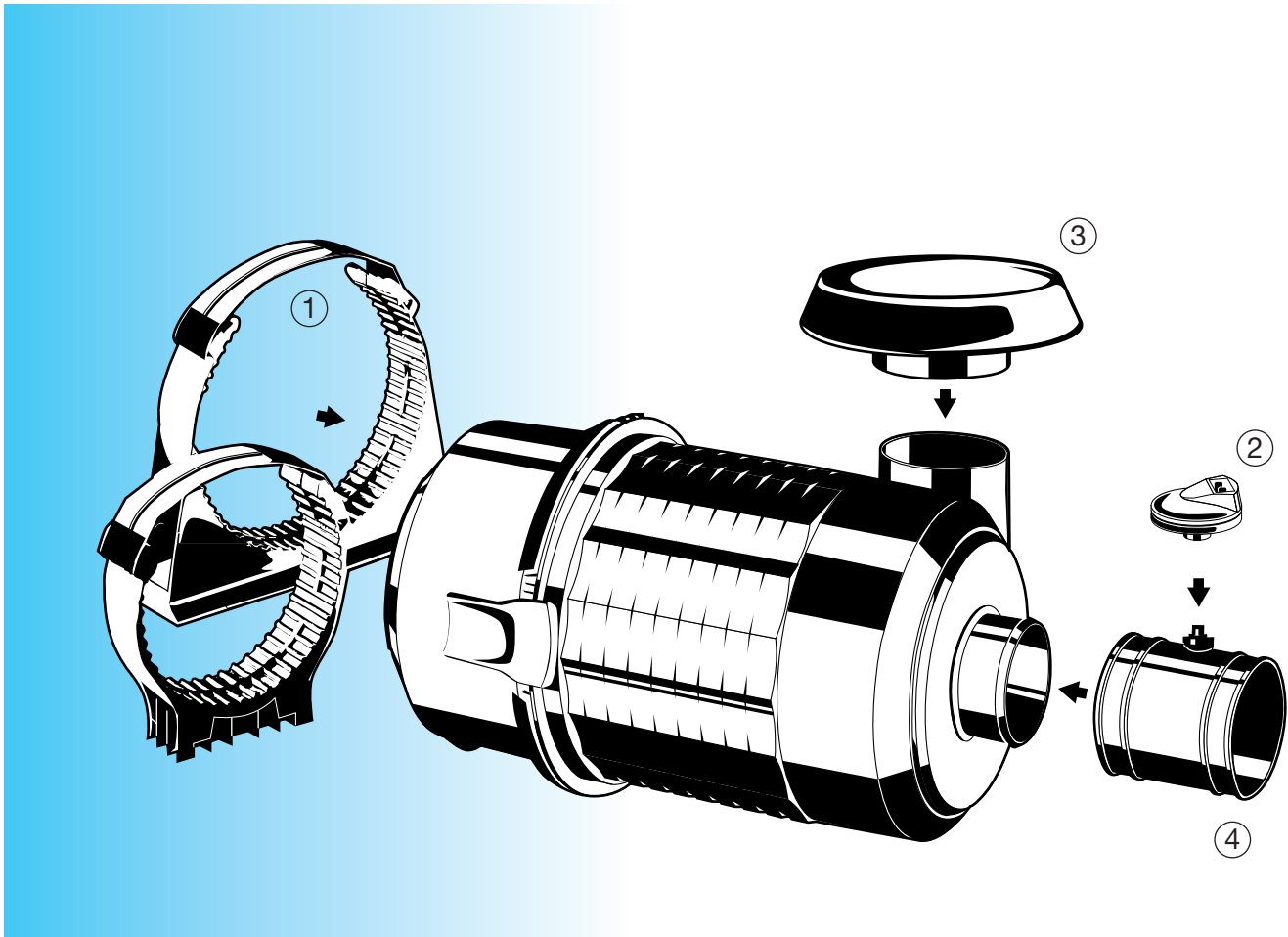
... for the flow rate as per ISO 5011



MANN System components for air cleaners



The matching system components for any filter



The functional reliability of the intake air cleaner for internal combustion engines and compressors must also be ensured when little space is available or operating conditions are difficult.

To achieve the best possible configuration of the filter, MANN+HUMMEL offers a large range of system components:

Brackets (1) from page 65
for vibration-proof mounting

**Service switch/
service indicator (2)** from page 67
indicates necessary maintenance of the filter

Cyclones from page 72
prolong the service life of one stage air cleaners,
by operating as precleaners

Rain caps (3) page 74
protect from water and coarse impurities

Ejectors page 75
for maintenance-free extraction of precleaned
dust

Air conduction parts (4) from page 76
conduct the air from the intake parts through the
air cleaner to the consumer

Silencer pipes (on request)
reduce the air intake noise of the engine

Brackets for MANN Europiclon

Special designed brackets for vibration free mounting of the air cleaners.

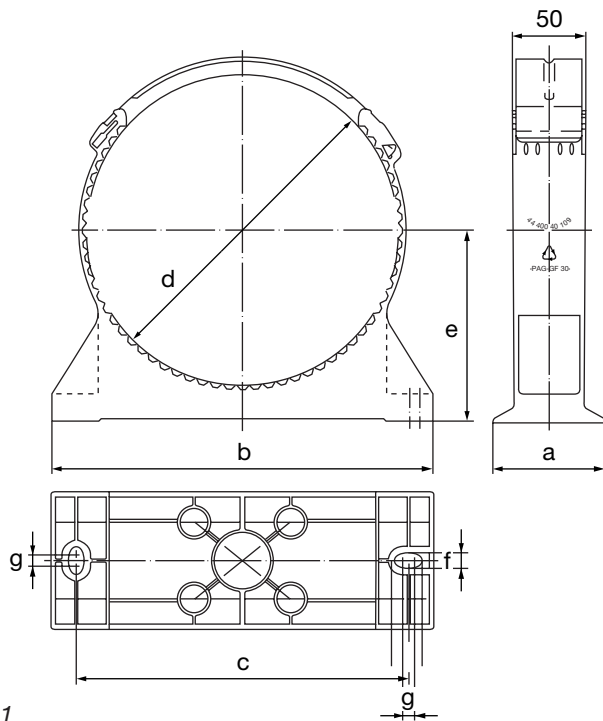


Fig. 1

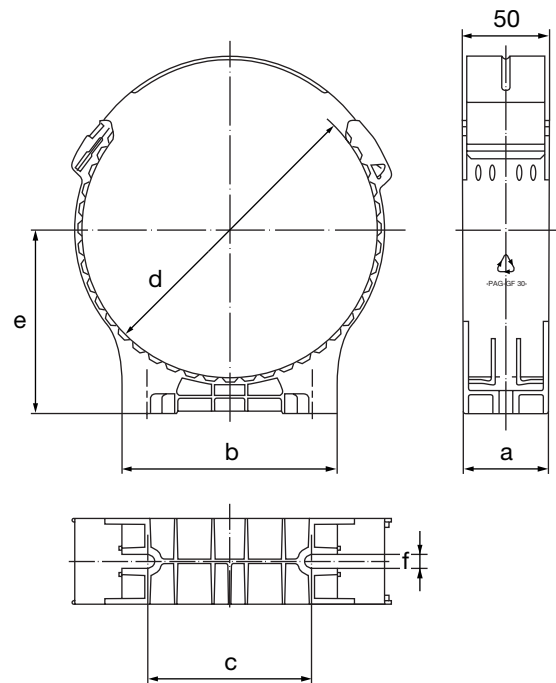


Fig. 2

Part No.	matches Europiclon	Fig.	Dimensions in mm						
			a	b	c	d	e	f	g
39 100 40 999	44 10. 92 ...	1	60	205	175	156	105	8.5	15.5
39 200 40 999	45 20. 92 ...	1	80	220	190	171	110	8.5	15.5
39 300 40 999	45 30. 92 ...	1	80	250	220	201	125	8.5	15.5
39 400 40 999	45 40. 92 ...	1	80	270	240	221	135	8.5	15.5
39 500 40 999	45 50. 92 ...	1	80	310	280	262	155	8.5	15.5
39 600 40 999	45 60. 92 ...	1	80	345	315	296	173	8.5	15.5
39 100 40 989	44 10. 92 ...	2	50	110	80	156	100	8.5	-
39 200 40 989	45 20. 92 ...	2	50	125	95	171	106	8.5	-
39 300 40 989	45 30. 92 ...	2	50	140	110	201	121	8.5	-
39 400 40 989	45 40. 92 ...	2	50	157	127	221	132	8.5	-
39 500 40 989	45 50. 92 ...	2	50	182	152	262	153	8.5	-
39 600 40 989	45 60. 92 ...	2	50	182	152	296	173	8.5	-

Brackets for piclon, pico and oil-bath air cleaners

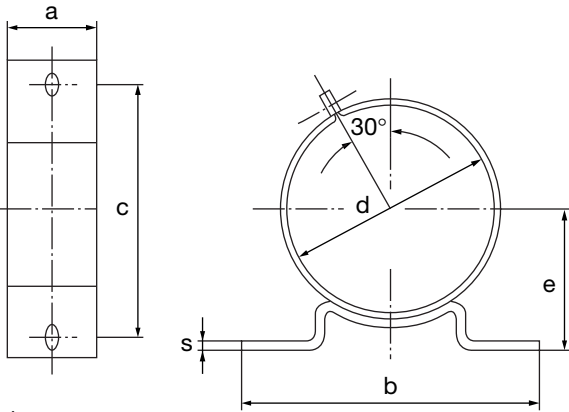


Fig. 1

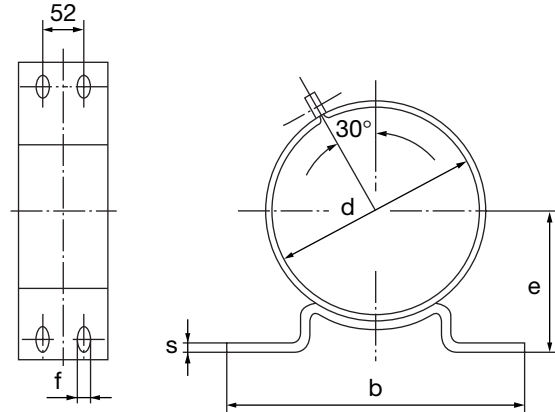


Fig. 2

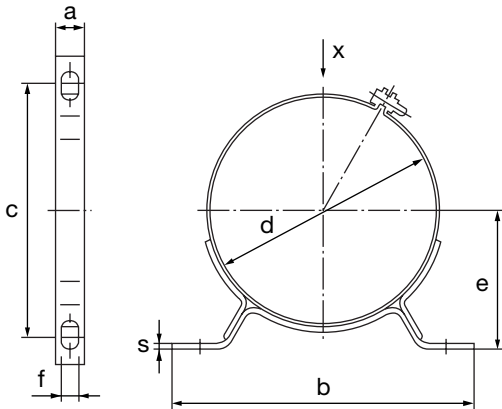


Fig. 3

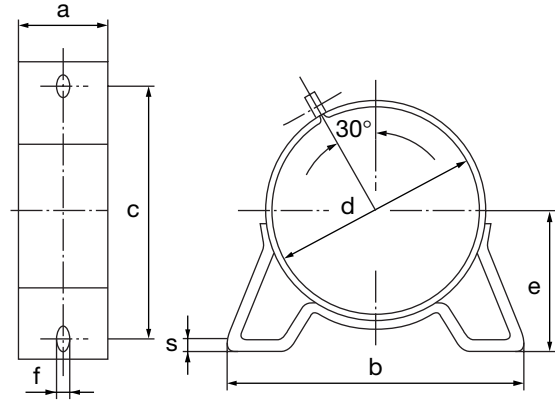


Fig. 4

Part No.	matches Piclon	Fig.	Dimensions in mm							Weight approx. [kg]
			a	b	c	d	e	f	s	
39 014 38 990	45 043 92...	1	40	170	130	120	70	10	2.5	0.6
39 076 38 970	45 076 92...	1	20	190	150	140	80	10	3	0.3
39 114 38 970	45 114 92...	1	20	220	180	165	100	10	3	0.3
39 114 38 871 ¹⁾	45 114 92...	3	20	220	180	165	100	10	3	0.35
39 165 38 970	45 165 92...	1	40	240	200	195	125	10	3	0.6
39 165 38 960	45 165 92...	4	40	250	200	195	125	10	3	0.7
39 225 38 970	45 225 92...	1	40	240	200	215	130	10	3	0.6
39 325 38 970	45 325 92...	1	40	280	240	255	145	12	3	0.8
39 440 38 970	45 440 92...	1	40	310	270	290	165	12	3	0.9
39 440 38 941	45 440 92...	4	40	322	270	290	165	12	3	1.0
39 120 38 980	45 650 92...	1	40	310	270	320	185	12	3	1.0
45 650 38 761	45 650 92...	4	40	322	270	320	185	12	3	1.1
39 880 38 990	45 880 92...	4	40	340	270	385	220	12	3	1.0
45 920 38 990	45 920 92...	2	80	420	380	420	235	12	3	2.3
	matches oil-bath air filter									
39 020 38 981 ²⁾	31 020.. ..und 31 024.. ...	1	60	190	150	140	80	12	3	0.7
39 028 38 981 ²⁾	31 028.. ..und 31 034.. ...	1	60	220	180	173	110	12	3	0.8
39 040 38 981 ²⁾	31 040.. ..und 31 045.. ...	1	80	240	200	200	130	12	3	1.4
39 056 38 981 ²⁾	31 056.. ..und 31 068.. ...	1	80	280	240	240	130	14	3	1.5
39 080 38 991 ²⁾	31 080..	2	80	310	270	280	160	14	3	1.7
39 100 38 991 ²⁾	31 100.. ..und 31 120.. ...	2	80	310	270	320	185	14	3	1.9
39 120 38 981	31 100.. ..und 31 120.. ...	1	40	310	270	320	185	14	3	0.95
39 160 38 991 ²⁾	31 160.. ..und 31 190.. ...	2	80	310	270	400	225	14	3	2.2
39 190 38 981	31 160.. ..und 31 190.. ...	1	40	310	270	400	225	14	3	1.1

1) Reinforced, suitable for hanging installation. 2) One bracket per filter, otherwise two brackets required.

MANN Service indicators

To check the filter contamination at any time



The yellow indicating piston catches on a scale of 12 snap-in positions. In the triangular display, the remaining service life of the filter is displayed, in relation to the increased clogging of the filter element. The service indicator is insensitive to the intake air pulsations of the engine, excluding the possibility of a false indication.

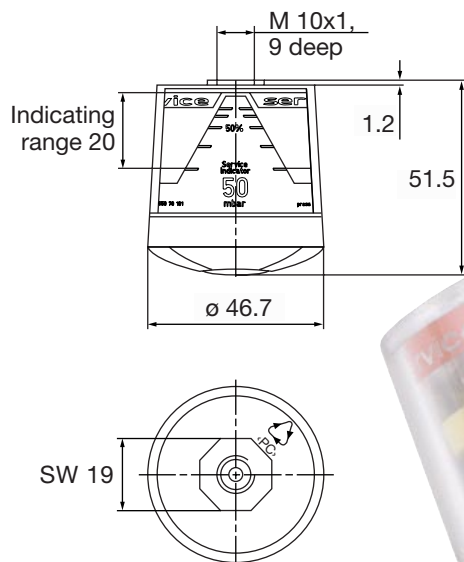
Maintenance is necessary when the yellow piston reaches the service inscription on the red background. After maintenance has been carried out, the indicator is re-adjusted to „zero“ (no contamination) by means of the reset button.

MANN Service indicator

The new MANN service indicator allows the user to check the air filter contamination even when the motor is switched off or idle.

Technical data

- Material: PC
- Permissible operating temperature: -30 °C to +100 °C
- Pressure range (negative pressure): 35 to 80 mbar (3.5 to 8 KPa)



Part No.	snaps into place at gauge pressure	
	[mbar]	[KPa]
39 035 70 911	35±3	3.5±0.3
39 050 70 911	50±4	5.0±0.4
39 060 70 911	60±4	6.0±0.4
39 065 70 911	65±5	6.5±0.5
39 080 70 911	80±5	8.0±0.5



MANN Service indicators

MANN Service indicator with 90° flange

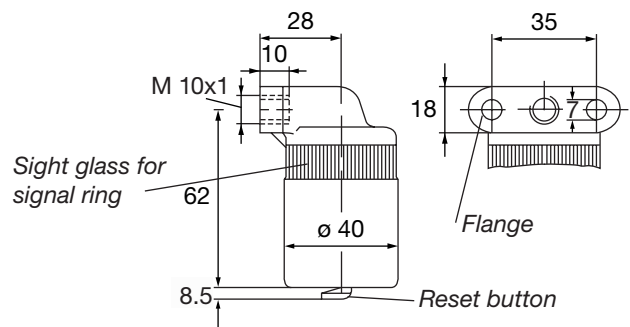
The 90° connecting flange allows nearly any fitting position. The red indicating piston snaps into position upon reaching the maximum value possible, signalling that maintenance is needed. After maintenance has been carried out, the indicating piston is readjusted to the start position by means of the reset button.

Technical data

- Material: PA
- Permissible operating temperature:
-40 °C to +100 °C
- Pressure range (negative pressure):
35 to 80 mbar (3.5 to 8 KPa)



Part No.	snaps into place at gauge pressure	
	[mbar]	[KPa]
39 000 62 924	35±3	3.5±0.3
39 000 62 925	50±6	5.0±0.6
39 000 62 926	65±7	6.5±0.7
39 000 62 927	80±8	8.0±0.8



MANN Service switch



The heart of the system is a kick-over spring that makes a readjustment of the switching point unnecessary. The spring contacts are not affected by contact erosion. As a result of the hysteresis between the points for switching and switching back, contact fluttering is reduced to a minimum.

The MANN service switch can be supplied in three plug connector versions with different threads respectively:

- Standard version for flat plug connection (IP 21)
- Water-tight version with two different connectors for difficult applications (IP 65):
- AMP plug connector or
- Bayonet plug connector to DIN

MANN Service switch

The electrical service switch controls the degree of contamination of air cleaners, giving an electrical signal when maintenance is required. Thanks to the completely insulated and fully enclosed contact insert, the switch is insensitive to dust or humidity. The system is not mechanical but pressure-dependent so that possible tolerances of the components do not affect the switch accuracy.

Technical data

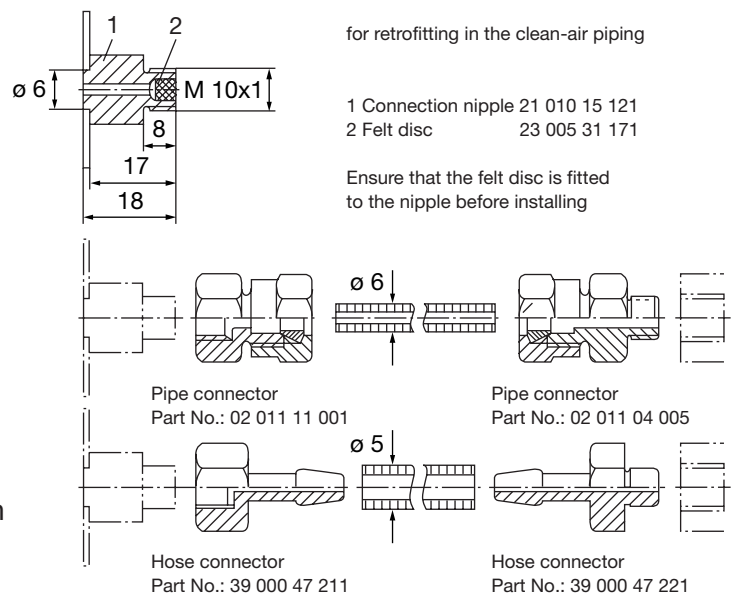
- Material: PA6 GF30
- Permissible operating temperature: -30 °C to +120 °C
- Pressure range (negative pressure): 35 to 80 mbar (3.5 to 8 KPa)
- Max. switching capacity: 6W/24 Volt DC (Ohmnic load, $U_{max} = 24 \text{ V}$, $I_{max} = 0.25 \text{ A}$)

Accessories for external mounting

Installation examples: Connection on filter (generally existing)

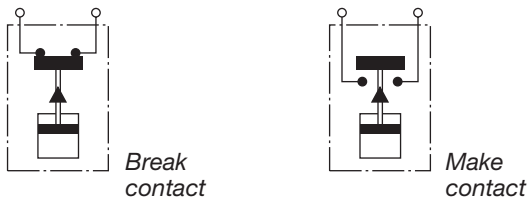
Parts for pipe connection

Parts for hose connection



MANN Service switch

with connection for flat plug

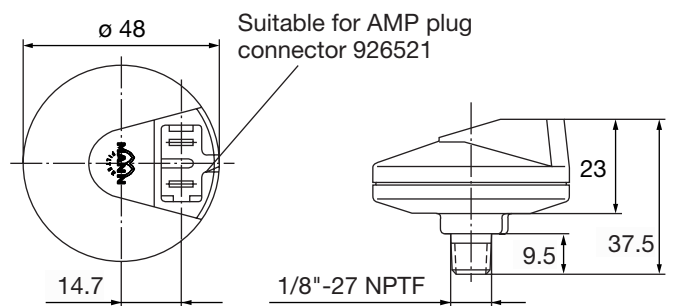
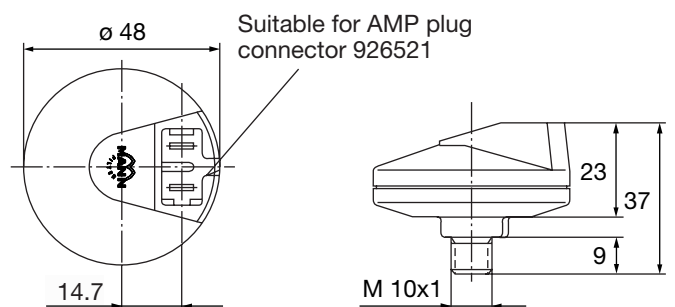
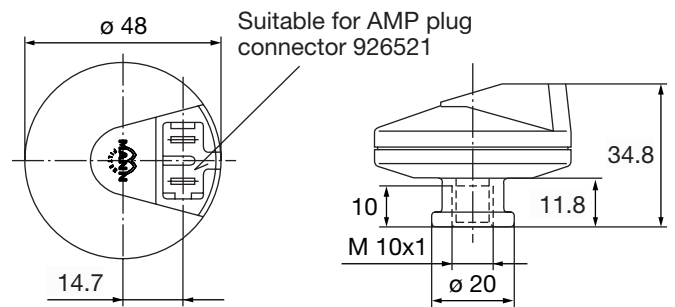


Service switch inside thread M 10x1 ¹⁾			
Break-contact element	Make-contact element	switches at gauge pressure	
		[mbar]	[KPa]
39 035 70 901	39 035 70 902	35±3	3.5±0.3
39 050 70 901	39 050 70 902	50±3	5.0±0.3
39 055 70 901	39 055 70 902	55±3	5.5±0.3
39 060 70 901	39 060 70 902	60±3	6.0±0.3
39 065 70 901	39 065 70 902	65±3	6.5±0.3
39 070 70 901	39 070 70 902	70±4	7.0±0.4
39 080 70 901	39 080 70 902	80±4	8.0±0.4

¹⁾ Suitable for all MANN air filters

Service switch outside thread M 10x1			
Break-contact element	Make-contact element	switches at gauge pressure	
		[mbar]	[KPa]
39 035 70 951	39 035 70 952	35±3	3.5±0.3
39 050 70 951	39 050 70 952	50±3	5.0±0.3
39 055 70 951	39 055 70 952	55±3	5.5±0.3
39 060 70 951	39 060 70 952	60±3	6.0±0.3
39 065 70 951	39 065 70 952	65±3	6.5±0.3
39 070 70 951	39 070 70 952	70±4	7.0±0.4
39 080 70 951	39 080 70 952	80±4	8.0±0.4

Service switch outside thread 1/8"-27 NPTF			
Break-contact element	Make-contact element	switches at gauge pressure	
		[mbar]	[KPa]
39 035 70 961	39 035 70 962	35±3	3.5±0.3
39 050 70 961	39 050 70 962	50±3	5.0±0.3
39 055 70 961	39 055 70 962	55±3	5.5±0.3
39 060 70 961	39 060 70 962	60±3	6.0±0.3
39 065 70 961	39 065 70 962	65±3	6.5±0.3
39 070 70 961	-	70±4	7.0±0.4
39 080 70 961	39 080 70 962	80±4	8.0±0.4



MANN Service switch

for water-tight electrical connections

Service switch inside thread M 10x1 ¹⁾			
Break-contact element	Make-contact element	switches at gauge pressure	
		[mbar]	[KPa]
-	39 035 70 702	35±3	3.5±0.3
-	39 050 70 702	50±3	5.0±0.3
-	39 055 70 702	55±3	5.5±0.3
-	39 060 70 702	60±3	6.0±0.3
-	39 065 70 702	65±3	6.5±0.3
-	39 070 70 702	70±4	7.0±0.4
-	39 080 70 702	80±4	8.0±0.4

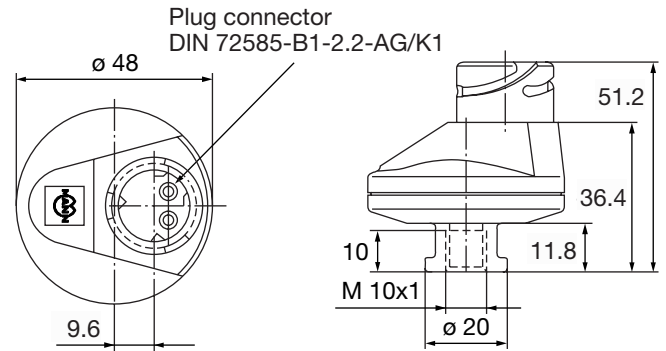
¹⁾ Suitable for all MANN air filters

Service switch inside thread M 10x1 ¹⁾			
Break-contact element	Make-contact element	switches at gauge pressure	
		[mbar]	[KPa]
39 035 70 801	39 035 70 802	35±3	3.5±0.3
39 050 70 801	39 050 70 802	50±3	5.0±0.3
39 055 70 801	39 055 70 802	55±3	5.5±0.3
39 060 70 801	39 060 70 802	60±3	6.0±0.3
39 065 70 801	39 065 70 802	65±3	6.5±0.3
-	39 070 70 802	70±4	7.0±0.4
39 080 70 801	39 080 70 802	80±4	8.0±0.4

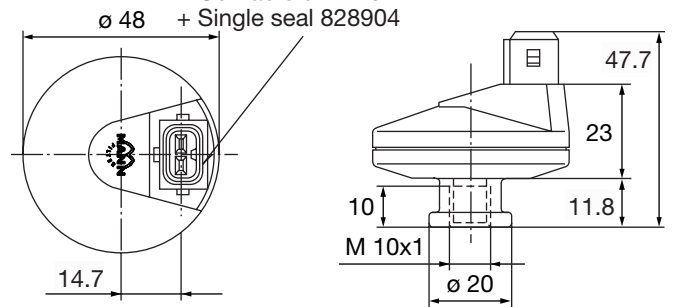
¹⁾ Suitable for all MANN air filters

Service switch outside thread M 10x1			
Break-contact element	Make-contact element	switches at gauge pressure	
		[mbar]	[KPa]
39 035 70 851	39 035 70 852	35±3	3.5±0.3
39 050 70 851	39 050 70 852	50±3	5.0±0.3
39 055 70 851	39 055 70 852	55±3	5.5±0.3
39 060 70 851	39 060 70 852	60±3	6.0±0.3
39 065 70 851	39 065 70 852	65±3	6.5±0.3
39 070 70 851	39 070 70 852	70±4	7.0±0.4
39 080 70 851	39 080 70 852	80±4	8.0±0.4

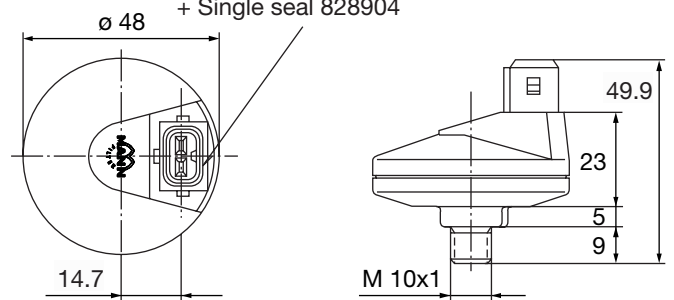
Service switch outside thread 1/8"-27 NPTF			
Break-contact element	Make-contact element	switches at gauge pressure	
		[mbar]	[KPa]
39 035 70 861	39 035 70 862	35±3	3.5±0.3
39 050 70 861	39 050 70 862	50±3	5.0±0.3
39 055 70 861	39 055 70 862	55±3	5.5±0.3
39 060 70 861	39 060 70 862	60±3	6.0±0.3
39 065 70 861	39 065 70 862	65±3	6.5±0.3
39 070 70 861	39 070 70 862	70±4	7.0±0.4
39 080 70 861	39 080 70 862	80±4	8.0±0.4



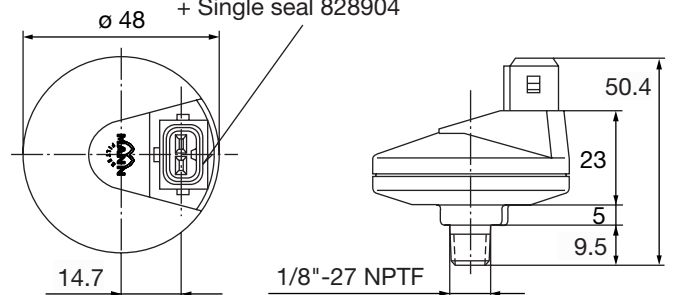
Suitable for AMP plug connector 963040-3
+ Contacts 927770
+ Single seal 828904



Suitable for AMP plug connector 963040-3
+ Contacts 927770
+ Single seal 828904



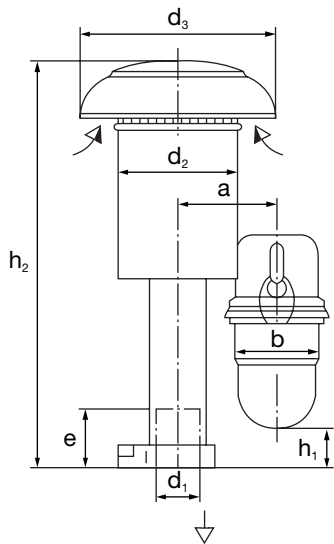
Suitable for AMP plug connector 963040-3
+ Contacts 927770
+ Single seal 828904



MANN Cyclone ...

MANN Cyclone

When using a single stage air cleaner under heavy dust conditions, e.g. on building sites and in agriculture, MANN+HUMMEL recommends using a cyclone. Cyclones are precleaners which increase the service interval of the single stage air cleaners. Pico air cleaners, oil-bath air cleaners or other single stage air cleaners can all be fitted upstream.



$e = \text{Insertion depth}$

Fig. 1
Vertical installation
Extraction efficiency
approx. 78 – 82%

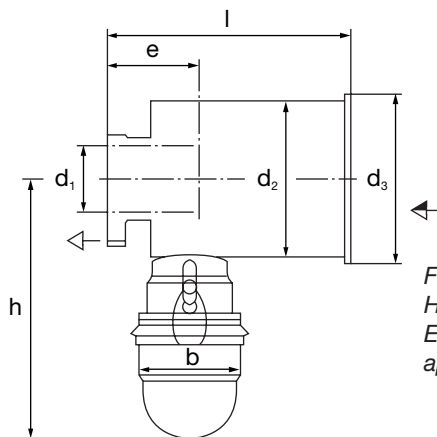


Fig. 2
Horizontal installation
Extraction efficiency
approx. 78 – 82%

Part No.	Application		Fig.	Dimensions in mm											Weight approx. [kg]
	Nominal flow rate [m³/min]	at Δp^1 [mbar]		a	b	d ₁	d ₂	d ₃	e ²⁾	h	h ₁	h ₂	l		
48 024 67 020	2 ... 2.8	7 ... 13.5	1	84	85	54.2	100	155	60	–	10	300	–	1.0	
48 024 67 030	2.8 ... 3.4	8.5 ... 12.5	1	84	85	62.2	100	155	60	–	40	330	–	1.0	
48 036 67 110	3.6 ... 4.5	11 ... 18	1	90	85	68.2	114	180	70	–	25	350	–	1.4	
48 048 67 020	5.6 ... 6.8	14 ... 20.5	1	100	85	82.2	136	215	80	–	40	400	–	2.0	
48 066 67 110	7.3 ... 9.6	14 ... 24.5	1	113	85	102.2	159	258	100	–	15	418	–	2.5	
48 096 67 140	10 ... 13	14 ... 23.5	1	113	85	110.2	158	255	110	–	30	433	–	3.5	
48 132 67 020	16 ... 19	13.5 ... 19	1	164	125	132.2	230	368	130	–	35	615	–	5.9	
48 024 67 140	2 ... 2.8	7 ... 13.5	2	–	85	54.2	100	107	60	191	–	–	144	0.9	
48 024 67 180	2.8 ... 3.4	8.5 ... 12.5	2	–	85	62.2	100	107	60	191	–	–	144	0.7	
48 036 67 160	3.6 ... 4.5	11 ... 18	2	–	85	68.2	114	120	70	198	–	–	162	1.0	
48 048 67 220	5.6 ... 6.8	14 ... 20.5	2	–	85	82.2	136	145	80	210	–	–	203	1.2	
48 066 67 090	7.3 ... 9.6	14 ... 24.5	2	–	85	102.2	158	166	100	224	–	–	232	1.6	
48 096 67 200	10 ... 13	14 ... 23.5	2	–	85	110.2	158	166	110	220	–	–	245	1.7	
48 132 67 120	16 ... 19	13.5 ... 19	2	–	125	132.2	230	240	130	336	–	–	370	3.9	

1) Δp = Flow resistance. When cyclones are used as precleaners, 70 % of the quoted flow resistance should be added to the resistance of the downstream filter.

2) e = Insertion depth

... prolong service life of air cleaners

MANN Flat cyclone

The integration of two guide wheel steps allows the new MANN+HUMMEL flat cyclone to achieve the highest separation efficiency simultaneously with minimum pressure loss. No tools are required for the maintenance of the filter. Depending on the model the cyclone can be installed using one of up to three different connection diameters.

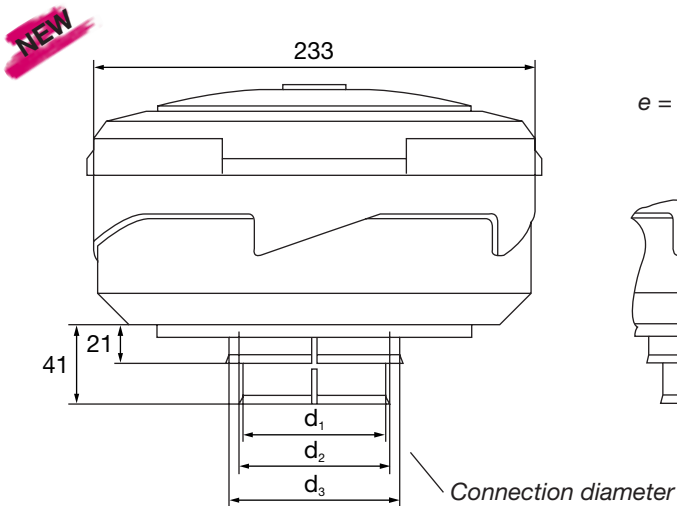


Fig. 1
Flat cyclone
Vertical installation
Extraction efficiency
approx. 83 – 86%

$e = \text{Insertion depth}$

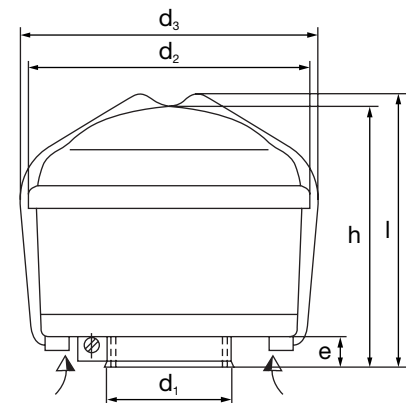
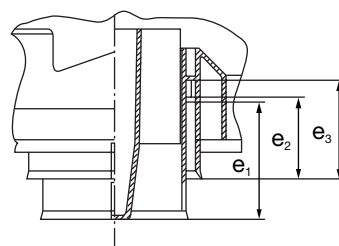


Fig. 2
Vertical installation
Extraction efficiency
approx. 78 – 82%

Part No.	Application		Fig.	Dimensions in mm								Weight approx. [kg]
	Nominal flow rate [m³/min]	at Δp^1 [mbar]		d1	d2	d3	e1	e2	e3	h	l	
48 034 67 910	2 ... 4	3 ... 12	1	61	62.2	–	70/60	–	–	162	–	0.6
48 056 67 910	3 ... 5	6 ... 16.5	1	68.2	76.5	82.2	70	45	57	162	–	0.6
48 017 67 900	1.4 ... 1.7	7 ... 10.5	2	42.2	164	175	52	–	–	140	150	0.4
48 024 67 900	2 ... 2.4	8.5 ... 12	2	54.2	164	175	52	–	–	140	150	0.4
48 030 67 900	2.8 ... 3.4	9 ... 13	2	62.2	164	175	52	–	–	140	150	0.4
48 034 67 900 ²⁾	2.8 ... 3.4	6 ... 9	2	62.2	219	236	62	–	–	167	180	1.0
48 048 67 900 ³⁾	4 ... 4.5	10 ... 12.5	2	68.2	219	236	62	–	–	167	180	1.0
48 056 67 900	5.6 ... 6.8	12 ... 17.5	2	82.2	219	236	62	–	–	167	180	1.0
48 068 67 900	5.6 ... 6.8	7 ... 10.5	2	82.2	303	315	84	–	–	208	217	1.3
48 096 67 900	8 ... 9.6	8.5 ... 12	2	102.2	303	315	84	–	–	208	217	1.3
48 120 67 900	10 ... 12	11 ... 16	2	110.2	303	315	84	–	–	208	217	1.3

1) Δp = Flow resistance. When cyclones are used as precleaners, 70 % of the quoted flow resistance should be added to the resistance of the downstream filter.

2) Cyclone can be replaced by flat cyclone 48 034 67 910.

3) Cyclone can be replaced by flat cyclone 48 056 67 910.

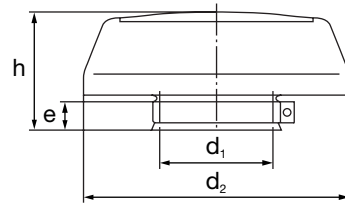
MANN Rain caps

made from plastic



MANN Rain caps

To prevent precipitation from entering into the filter, e.g. through rain, snow and splash water, MANN+HUMMEL recommends adding a rain cap to the air cleaner. As coarse debris is also kept out of the filter, the main element is protected and the servicing interval increased. The rain caps are simply fitted on the air inlet.



e = Insertion depth

Part No.	suitable for		Dimensions in mm				Weight approx. [kg]
	Piclon Europiclon	Oil-bath air cleaners	d_1	d_2	e	h	
39 014 67 910	45 043 ..	31 014.. 31 077..	42.2	150	22	63	0.11
39 020 67 910	45 076 .. 44 100 ..	31 020.. 31 024..	54.2	150	22	63	0.11
39 028 67 910	45 114 .. 45 200 ..	31 028.. 31 034..	62.2	150	22	63	0.11
39 040 67 910	45 165 .. 45 300 ..	31 040.. 31 045..	68.2	200	30	85	0.23
39 056 67 910	45 225 .. 45 400 ..	31 056.. 31 068..	82.2	200	30	85	0.23
39 080 67 910	45 325 .. 45 500 ..	31 080..	102.2	270	40	115	0.44
39 100 67 910	45 440 .. 45 600 ..	31 100.. 31 120..	110.2	270	40	115	0.44
39 160 67 910	45 650 ..	31 160.. 31 190..	132.2	360	50	150	0.90
39 190 67 910	45 880 ..	-	150.2	360	50	150	0.90
39 320 67 100 ¹⁾	45 920 ..	-	210.2	455	88.5	223	4.80

¹⁾ In sheet metal

MANN Ejectors



Ejectors for dust extraction with two stage air cleaners

MANN ejectors are used for service free removal of dust extracted in the precleaning stages of two stage filters. Along with the absence of any servicing, they also offer improved extraction of certain light dusts, e.g. those occurring in the agricultural sector. They are primarily used on construction and agricultural machines, as well as on utility vehicles operated under extremely dusty conditions. The application range is from 50 to 300 kW.

Configuration and principle of operation

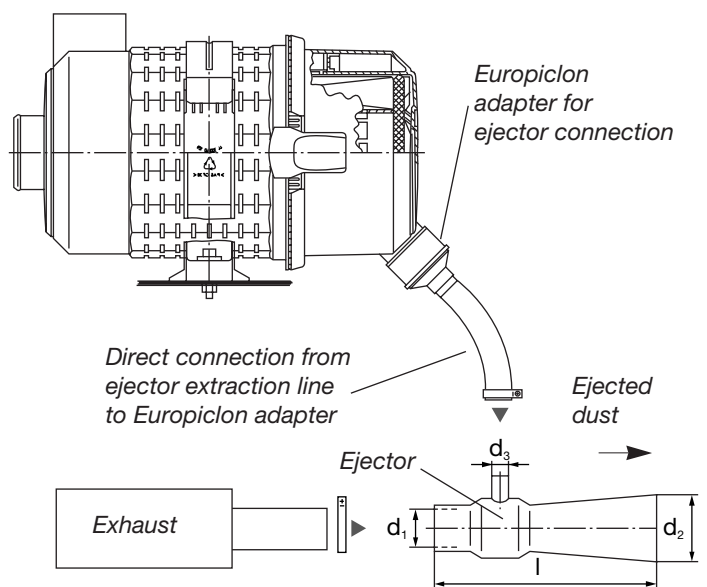
The ejector is mounted on the exhaust pipe downstream from the silencer. In the ejector, the jet-stream energy of the exhaust gases produces a partial vacuum. The pre-separated dust is sucked by this vacuum into the ejector and blown out along with the exhaust gases.

Information on installation

The ejector can be installed in any position. If the ejector's exhaust points upward, it can be fitted with a cap that prevents rainwater from entering when the engine is switched off.

The connecting line between the ejector and the filter should be as short as possible and, to avoid increasing the flow resistance, without any tight bends.

Coarse particles or material in the intake air (e.g. fibres, gluma, stalks or leaves) can block the filter. If the air intake is not in an area free of such material (cooling air shaft), a basket sieve fitted over the intake can prevent blockage. A sieve with undersized holes will increase the vacuum in the entire filter system, which, in the case of a severe blockage, can cause exhaust gas to be sucked into the air cleaning system and result in premature wear of the filter element. MANN ejectors are available on request. Your MANN+HUMMEL contact partner will be happy to advise you on the ideal ejector configuration.



MANN Air conducting parts



Straight elbow couplings (TPO)

Temperature stability -40 °C to +120 °C.

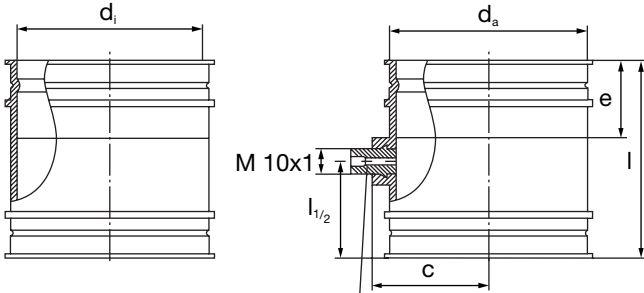


Fig. 1

Fig. 2

Connection for service switch/service indicator

Part No.	Fig.	Dimensions in mm					Connection for
		c	d _i	d _a	e	l	
39 100 27 999	1	–	50	55	25	68	–
39 100 27 979	2	33	50	55	25	68	M 10x1
39 200 27 999	1	–	60	65	25	68	–
39 200 27 979	2	38	60	65	25	68	M 10x1
39 300 27 999	1	–	70	75	28	75	–
39 300 27 979	2	43	70	75	28	75	M 10x1
39 400 27 999	1	–	80	85	30	78	–
39 400 27 979	2	48	80	85	30	78	M 10x1
39 500 27 999	1	–	100	105	35	88	–
39 500 27 979	2	58	100	105	35	88	M 10x1
39 600 27 999	1	–	110	119	27	72	–
39 600 27 979	2	63	110	119	27	72	M 10x1

90° Elbow couplings (TPO)

Temperature stability -40 °C to +120 °C.

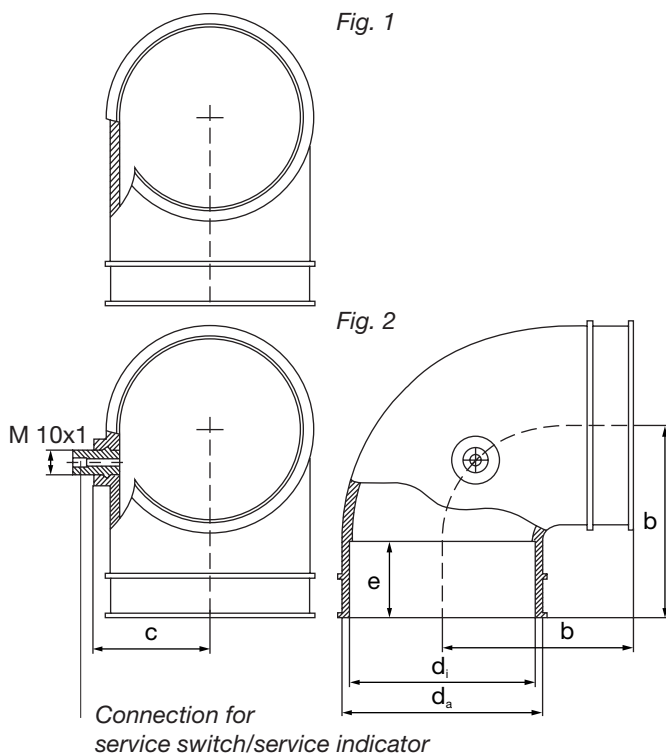


Fig. 1

Fig. 2

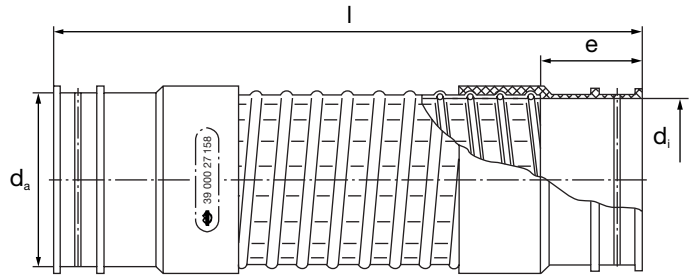
Connection for service switch/service indicator

Part No.	Fig.	Dimensions in mm					Connection for
		b	c	d _i	d _a	e	
39 100 25 999	1	–	–	50	55	25	–
39 100 25 979	2	57	33	50	55	25	M 10x1
39 200 25 999	1	–	–	60	65	25	–
39 200 25 979	2	62	38	60	65	25	M 10x1
39 300 25 999	1	–	–	70	75	29	–
39 300 25 979	2	72	43	70	75	29	M 10x1
39 400 25 999	1	–	–	80	85	30	–
39 400 25 979	2	77	48	80	85	30	M 10x1
39 500 25 999	1	–	–	100	105	35	–
39 500 25 979	2	92	58	100	105	35	M 10x1
39 600 25 999	1	–	–	110	119	26.5	–
39 600 25 979	2	89	63	110	119	26.5	M 10x1

MANN Air conducting parts

Accordion hoses (TPO) with moulded-on end sleeves

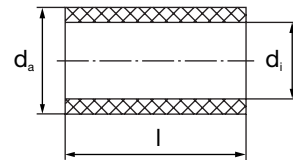
Depending on the vibration load up to 90° elbows are permissible.
Temperature stability -30 °C to +100 °C.



Part No.	Dimensions in mm				
	di	da	e	l _{min.}	l _{max.}
39 000 27 164	40	51	30+5	180	250
39 000 27 161	50	62	30+5	190	285
39 000 27 140	60	70	30+5	190	285
39 000 27 139	70	80	30+5	195	310
39 000 27 138	80	90	30+5	205	340
39 000 27 158	100	112	40+5	230	395
39 000 27 152	110	118	35+5	240	425
39 000 27 151	130	138	45+5	280	500
39 000 27 150	150	165	45+5	300	545

Straight couplings (rubber) with fabric insert

Temperature stability -30 °C to +100 °C.



Part No.	Dimensions in mm		
	di	da	l
39 000 27 203	40	52	100
39 000 27 202	50	63	100
39 000 27 198	60	74	150
39 000 27 197	70	84	150
39 000 27 196	80	96	150
39 000 27 194	100	118	150
39 000 27 193	110	128	150
39 000 27 192	130	148	150
39 000 27 183	150	168	150
39 000 27 182	180	198	150
39 000 27 345	200	218	200
39 000 27 306	210	228	200

MANN Air conducting parts

90° Elbow pipes (rubber)

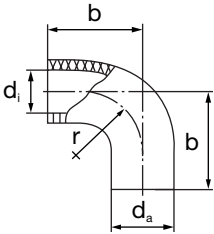


Fig. 1

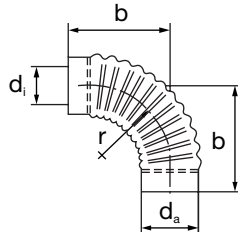
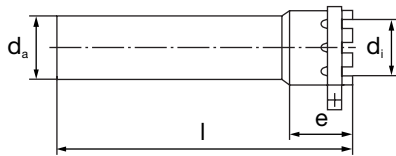


Fig. 2

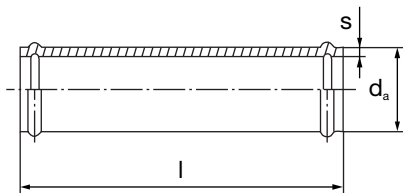
Part No.	Fig.	Dimensions in mm			
		b	d _i	d _a	r
39 000 25 280	1	115	52	60	75
39 000 25 264	1	115	60	68	75
39 000 25 263	1	140	70	79	90
39 000 25 262	1	140	80	90	95
39 000 25 258	2	205	100	110	155
39 000 25 265	2	215	110	120	165
39 000 25 266	2	265	130	140	210
39 000 25 267	2	300	150	160	245
39 000 25 270	2	355	200	210	300

Intermediate pipes (black painted metal) only for unfiltered-air intake



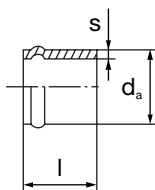
Part No.	Dimensions in mm			
	d _i	d _a	e	l
31 028 25 831	62.2	62	60	225
31 056 25 821	82.2	82	80	245
31 080 25 731	102.2	102	80	250
39 100 25 991	110.2	110	110	200
31 100 25 983	110.2	110	110	400
31 160 25 771	132.2	132	110	400

Pipe (black painted metal)



Part No.	Dimensions in mm		
	d _a	l	s
39 000 25 172	42	500	0.75
39 000 25 182	52	500	0.75
39 000 25 162	62	500	0.75
39 000 25 163	70	500	0.75
39 000 25 173	82	500	0.75
39 000 25 158	92	500	0.75
39 000 25 183	102	500	0.75
39 000 25 166	110	500	0.75
39 000 25 157	132	500	0.75
39 000 25 155	150	500	0.75

Couplings (black painted metal)

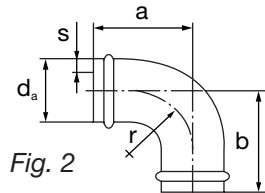
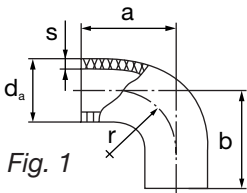


Part No.	Dimensions in mm		
	d _a	l	s
39 000 25 178	42	40	0.75
39 000 25 177	52	50	0.75
39 000 25 167	62	65	1.0
39 000 25 164	70	50	1.0
39 000 25 168	82	50	1.0
39 000 25 165	92	50	1.0
39 000 25 175	102	50	1.0
39 000 25 176	110	50	1.0
39 000 25 174	132	50	1.0
39 000 25 184	150	90	1.0
39 000 25 185	180	90	1.0

MANN Air conducting parts

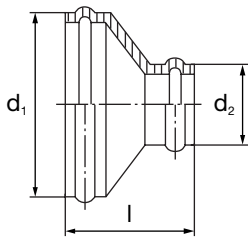


Metal elbow pipes (black painted metal)



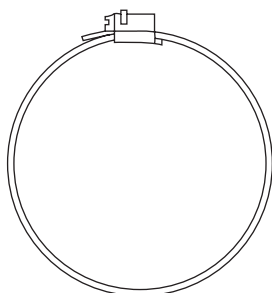
Part No.	Fig.	Dimensions in mm				
		a	b	d _a	r	s
39 000 25 188	1	60	60	52	40	0.75
31 034 25 442	1	95	95	62	60	0.75
39 000 25 152	1	70	70	70	60	1.0
39 000 25 207	2	100	100	70	60	1.0
39 000 25 956	2	110	110	80	55	1.0
39 000 25 148	1	61	61	82	55	1.0
39 000 25 153	1	80	67	90	60	1.0
39 000 25 273	1	80	80	100	65	1.0
39 000 25 124	2	110	110	100	65	1.0
39 000 25 146	1	90	90	110	85	1.0
39 000 25 192	2	110	110	110	85	1.0
39 000 25 198	2	125	125	110	85	1.0
39 000 25 147	1	120	120	130	95	1.0
39 000 25 224	2	140	140	130	95	1.0
39 000 25 142	1	180	180	150	110	1.0
39 000 25 333	2	180	180	150	110	1.0

Adapter pieces (black painted metal)



Part No.	Dimensions in mm		
	d ₁	d ₂	l
39 000 25 621	70	40	65
39 000 25 622	70	60	56
39 000 25 631	80	50	65
39 000 25 431	82	70	56
39 000 25 461	100	70	75
31 080 25 511	102	80	76
39 000 25 295	110	80	75
39 000 25 193	110	100	70
39 000 25 105	132	102	71
39 000 25 253	132	110	76
39 000 25 325	150	130	86
39 000 25 145	180	150	95
39 000 25 327	200	150	105

Hose clips



Part No.	Clamping range (Diameter) [mm]	Part No.	Clamping range (Diameter) [mm]
02 018 01 707	32 – 50	02 018 01 717	130 – 150
02 018 01 708	40 – 60	02 018 01 718	140 – 160
02 018 01 709	50 – 70	02 018 01 719	150 – 170
02 018 01 710	60 – 80	02 018 01 720	160 – 180
02 018 01 711	70 – 90	02 018 01 721	170 – 190
02 018 01 712	80 – 100	02 018 01 722	180 – 200
02 018 01 713	90 – 110	02 018 01 723	190 – 210
02 018 01 714	100 – 120	02 018 01 724	200 – 220
02 018 01 715	110 – 130	02 018 01 725	210 – 230
02 018 01 716	120 – 140		

Air cleaners for a multitude of industrial applications

Modern, high-performance vehicles, machines, equipment and engines require high-performance filters and components. This documentation offers a performance overview for air cleaners and system components – naturally, in the famous MANN+HUMMEL original-equipment quality.

As our customers come from a wide range of industries, such as:

- Machines for the construction industry
- EDM, electrical discharge machinery
- Compressors
- Agricultural machinery
- Construction equipment
- Engine design
- On and off-road trucks, etc.

it is natural for MANN+HUMMEL to develop individual tailor-made concepts for your special field of application.

Contact in your area

Production sites and sales offices in a number of European locations as well as in Asia, the USA, and South America enable on-site clarification of all technical questions. And also one of our representatives is sure to be located near you so that we are always within reach.



Quality does not happen by chance

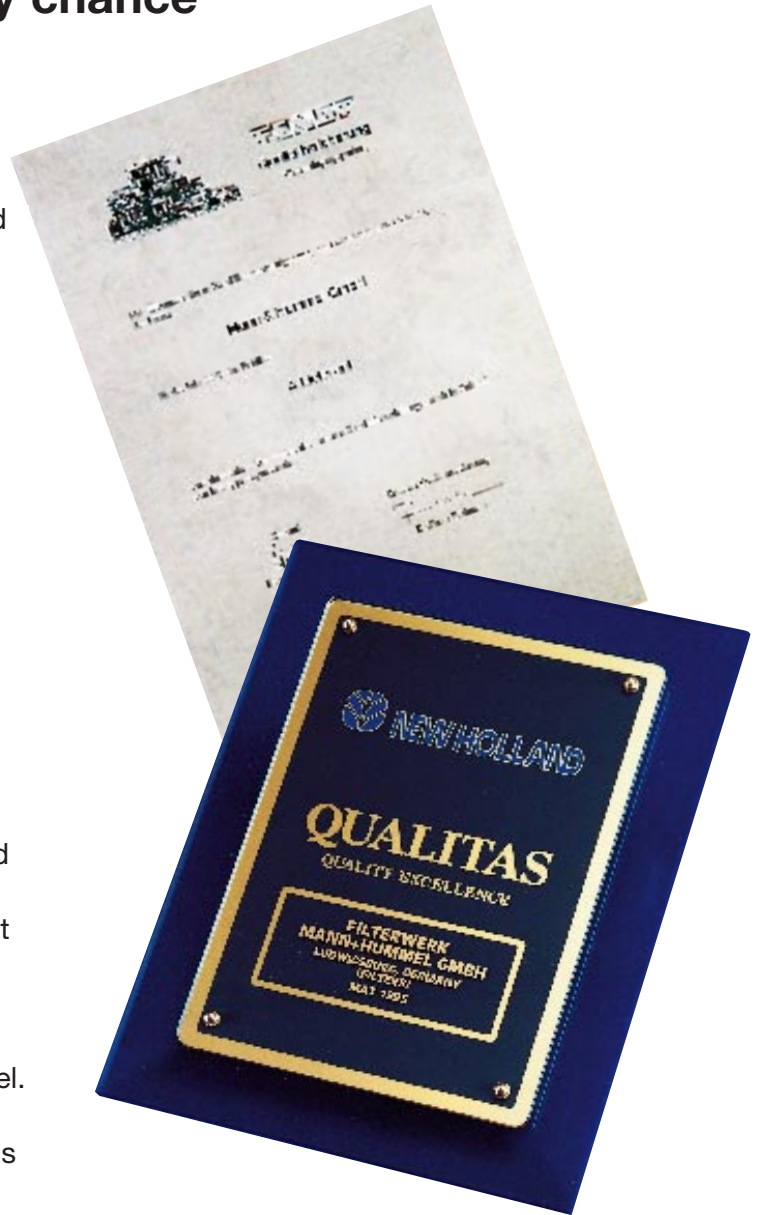
It is often difficult to recognise the qualities and advantages of filters and filtering elements at a single glance. Service life, extraction efficiency and special design features are the characteristics that deserve comparison.

Our products undergo quality planning and control from the development phase all the way to series production.

Our quality control system fulfills DIN/ISO 9001 requirements. Quality is an integral part of all technical and organisational processes.

Zero-defect production through FMEA

The prerequisite for the prevention of faults and zero-defect production is the design FMEA (Failure Mode and Effects Analysis). Carried out when a new product is developed, it reveals possible weak points of the design and helps in defining future quality standards. The same procedure has been adopted at production level. Here it is referred to as process FMEA and is used for the establishment of test specifications and methods.



MANN+HUMMEL employees independently assume quality control and responsibility for their products. Essential process parameters and test specs are documented to monitor and control the production. The awards granted to us by our customers confirm the high level of quality in MANN+HUMMEL products.

This is an ideal basis for co-operation.

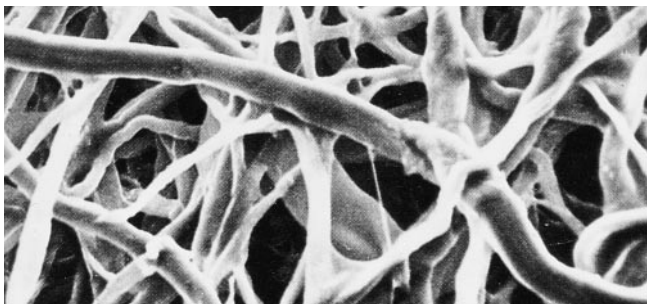


Reliable filtration ...

MANN air cleaners perform a function which, through often unnoticed, is in fact indispensable. They keep away damaging impurities from engines and aggregates and prevent early engine wear. The basic material for the fine filter medium in the MANN filter elements is the special technically prepared paper which has an exactly defined composition. Special applications also use other mediums such as, for example, synthetic fabric.

Filter paper

MANN+HUMMEL only uses special technically prepared paper which has to fulfill the highest quality requirements in the stages of production, processing, and finally the installation. The structure of the fibres and pores as well as the filter fineness are exactly defined. With these filter papers only 10% of the paper volume is actually made of fibres. The remaining 90% consist of many equally large in between spaces (paper pores), which guarantee a high degree of dirt separation and a high dirt holding capacity, and therefore a long service life.

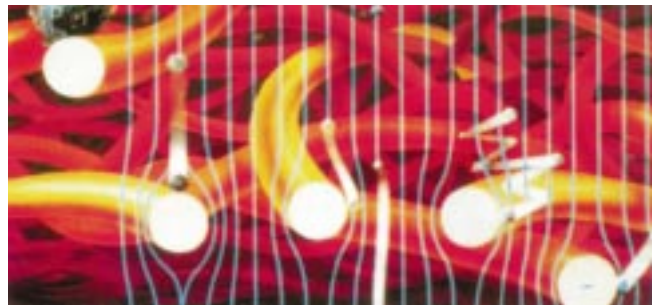


Filter paper under the microscope

Such filter papers are able to hold back particles far smaller than 1 micron (1/1000 mm). Due to the structure of the paper, which has a broken up inflow side surface and a smooth surface on the outflow side, dirt holding capacity is increased and also the amount of filter surface area available in the filter element is larger.

The basic material we get from our supplier only becomes highly effective filter paper after a

special processing treatment based on MANN+HUMMEL know-how.



Graphic representation of a cross-section of a filter paper

Impregnating

In order to ensure sufficient stability against mechanical, thermal and climatic influences and resistance to fuels, nearly all our filter papers are impregnated. Modern synthetic resins in a soluble state perfuse – either as an aqueous, alcohol based or acetone solution – the filter paper. The resins cover the fibres of the filter papers and »knot« them together at the crossing points. Using a specific heat treatment condensation of the resins is achieved and thereby the final characteristics of the paper. It is important that impregnated and thermally hardened papers do not change their critical characteristics – volume of pores, size of pores, and structure of fibres – in relation to their basic structure. The main task of impregnation is to increase the stability of the filter paper for its use in the field.

Geometry of the pleats

Even before the impregnated paper finally stiffens during hardening, it is formed and pleated. The fact that before hardening impregnated filter paper acts thermoplastically at temperatures between 20 and 100 °C, i.e. the outside form can be created easily and this form remains after hardening. In order to guarantee the effectiveness of the whole filter paper surface and to increase the service life under the mechanical influences of the engine operation caused by

... thanks to high quality filtering media

pulsation and vibrations, raised parts acting as special distance holders are pressed into the paper. Also serving as distance holders are so-called creases, whereby one paper pleat is folded all the way along.

The combination of the distance holder and optimised pleat geometry make it possible to achieve a large filter surface within a relatively small space. The filter elements can be adapted to almost any housing design giving flexibility. Since there is no possibility of »packeting« of the filter pleats (i.e. when the pleats are pressed together), all the filter surface is active.

Advantages of the special paper

- Consistent pore distribution guarantees high dirt separation at low pressure resistance levels
- Reliable function during the whole operation time
- Damaging dirt particles with dimensions of a few thousandths of a millimetre are reliably filtered
- Unimpaired function at high temperatures
- Highly developed pleat geometry allows large filter surface areas in small spaces
- Long service intervals thanks to large dirt holding capacity
- Beads and groves make the filter paper fully effective
- Operational reliability even in extreme conditions
- Not sensitive to mechanical, climatic or thermal influences

Secondary elements made from synthetic fabric

Backflash from the combustion chamber can lead to burning in the air cleaner housing. To avoid fire in air cleaner secondary elements the synthetic fabrics used as a filter medium have a high flame resistance.

Highest quality for your safety

The development and production of suitable filter mediums is of the greatest importance for a product with high quality standards. Therefore the way leading up to series production is long, hard, dusty, and at times icy. Many trials, tests and studies have to convince us that a filter is reliable and will fulfill its task. All materials and product developments are thoroughly tested in our laboratories. The following test stands are available in our company plants :

- test riggs for materials
- test riggs for engines
- measuring equipment for dust (examination of capacity and flow resistance)
- sound measurement rooms with roller type test riggs
- climatic simulation

On top of the tests carried out in laboratories and in measuring and testing rooms, we also test our products at the site where the future application will take place. Ambient temperatures with either extreme cold or extreme heat may be found where our customers use the aggregates and are natural test conditions. On-site testing with permanent field checking together with research work contributes indispensably towards an optimum product design. And this means you can always depend on filters which have our brand name!



Technical service

Tailor-made services

MANN+HUMMEL not only provides you with a first-class product line but also with a customer-oriented range of services:

Consultation at the installation site

The best way to determine the filter most suited to your needs is by analysing and evaluating the operating conditions on site. For preliminary consultation, assistance is available from one of our experienced engineers.

Product oriented training

This service is geared towards maintenance personnel and technical designers. Our experts will provide your employees with in-depth individual training, either on site or at MANN+HUMMEL. We will prepare the training programme with you in advance to ensure that the available time is used efficiently.

Samples and trials

If required, MANN+HUMMEL samples and prototypes can be tested on your installations. We will follow and supervise this "field work" continuously.

Operating and maintenance manuals

We can prepare and supply operating and maintenance manuals for MANN filters that your company integrates in its own products.

Installations

Our service engineers can install the filters in your systems. After the filters have been successfully commissioned, our engineers can also train your personnel.

Inspection and maintenance

Individually tailored service and maintenance agreements will give you the necessary operational reliability.

Repair

On request, we will repair large-size filter systems on your premises. Smaller, transportable filters can be repaired in our workshops.

Please ask for more details and the currently valid service price list.

Call us at +49 (62 32) 319 – 483 or
send a fax to +49 (62 32) 319 – 370



Criteria for dimensioning the size of air cleaners

Extraction efficiency

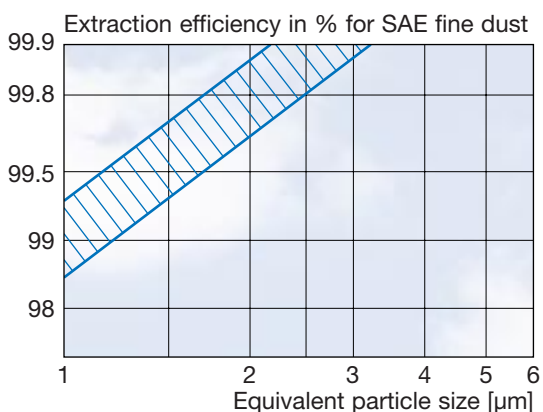
The most important task of a dry air cleaner is to ensure sufficient protection of the engine against wear under all imaginable dust conditions, i.e., the **extraction efficiency** of the filter must be of such a high standard that an engine fitted with it will demonstrate a wear pattern in dusty conditions similar to that of an engine running on completely particle-free intake air. The specification of an air cleaner's quality with respect to quantity transmittance is indicated with the so-called **overall extraction efficiency** η , which is the ratio of all particles separated to the total quantity of particles fed to the filter. MANN dry air cleaners offer the following values for this characteristic when internationally recognised SAE-coarse and SAE-fine test dusts are used:

- η SAE-coarse $\geq 99.9\%$
- η SAE-fine $\geq 99.5\%$

The correct definition of air cleaner quality with respect to the size of the largest particle allowed to pass through is provided by **fractional extraction efficiencies**; these indicate a filter's extraction performance in relation to the particle size. The values shown in Fig. 1 apply to MANN dry air cleaners and were obtained on test rigs using SAE test dusts. Note the high probability of extraction found even for 1 μm particles, and the virtually certain extraction of particles larger than 3 μm in size.

The values given above are valid for the entire design range under test rig conditions.

Fig. 1



Service life

Another important requirement for dry air cleaners is, in addition to specified extraction efficiencies, a high dust-holding capacity.

This quality feature – in filter terminology also referred to as **service life** – can be defined in terms of the quantity of dust taken up by the filter within a given increase in air-flow resistance.

In order to ensure a high dust-holding capacity, the paper folds are provided with surface contours that maintain clearance, guarantee an unhindered flow of dust-laden air into the folds and simultaneously prevent the folds from contacting each other.

Specification of filter size

The size of the air cleaner depends primarily on the maximum air requirement (V) of the engine. Please ask your equipment and engine manufacturers.

The air requirement can also be determined from the engine data, i.e. swept volume, rotational speed, number of cylinders and volumetric efficiency, by using the following equation (1):

Equation 1: Air requirement (V)

4-stroke engines:

$$(V) = \frac{\text{Swept volume} \cdot \text{Rotational speed} \cdot \text{Volumetric efficiency}}{2 \cdot 1000} \left[\frac{\text{m}^3}{\text{min}} \right]$$

2-stroke engines:

$$(V) = \frac{\text{Swept volume} \cdot \text{Rotational speed} \cdot \text{Volumetric efficiency}}{1 \cdot 1000} \left[\frac{\text{m}^3}{\text{min}} \right]$$

with swept volume in [dm^3], rotational speed in [min^{-1}].

Use a factor of 0.9 for the volumetric efficiency of 4-stroke and 0.7 for 2-stroke S.I. engines. For turbocharged engines, please consult the manufacturer for the volumetric efficiency.

However, with a small number of cylinders, flow pulsations occur in the intake system. The corresponding varying velocities must be taken into account when determining the size of the filter.

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However, with a small number of cylinders, flow pulsations occur in the intake system. The corresponding varying velocities must be taken into account when determining the size of the filter. The use of so-called pulsation factors (Fig. 2) can be used to overcome this problem

Fig. 2: Pulsation factors

No. of cylinders	Pulsation factors for dry air cleaners (S.I. engines)		
	4-stroke engines	2-stroke engines	Piston-compressors ¹⁾
1	2	1.5	1.5
2	1.4	1.2	1.2
3	1.3	1.1	1.1
4	1.1	1	1
5 and more	1	1	1

¹⁾ The pulsation factor is 2.0 for all grab-controlled compressors

No. of cylinders	Pulsation factors for oil-bath air cleaners	
	4-stroke engines	2-stroke engines
1	3	2
2	2	1.4
3	1.4	1.2
4	1.2	1.1
5 and more	1	1

With 1-4 cylinders, the air requirement obtained above must be multiplied with the corresponding pulsation factor to determine the filter size. This results in the following equation (2)

Equation 2: Design flow rate

$$\text{Design flow rate} = \text{Air requirement} \cdot \text{Pulsation factor} \left[\frac{\text{m}^3}{\text{min}} \right]$$

with air requirement in [m³/min].

For naturally aspirated engines with 5 or more cylinders, and for all turbocharged engines, the air requirement corresponds to the design flow rate of the filter, i.e., the filter size is specified directly with the determined design flow rate (m³/min). The **nominal flow rate of the filter** (m³/min) is decisive for the air cleaner size. If the required data are not available, the following practical values can be used:

Diesel engines

1 kW approx. 0.08 m³/min
(1 PS approx. 0.06 m³/min)

Turbocharged diesel engines

1 kW approx. 0.09 m³/min
(1 PS approx. 0.065 m³/min)

Petrol engines

1 kW approx. 0.07 m³/min
(1 PS approx. 0.05 m³/min)

Compressors

Supply air quantity = Required air quantity

Rotary Screw compressors

Intake air quantity = Supply air quantity
By DIN 1954 ISO

Piston compressors

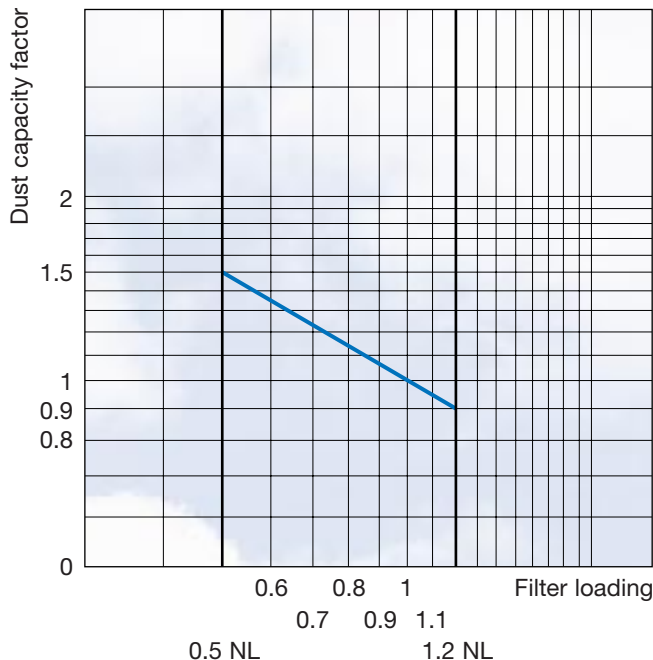
Pulsation factors acc. table (Fig. 2)

Laboratory dust capacity

Test rig data were determined for all MANN dry air cleaners with the goal of obtaining a uniform basis for comparison for the **dust capacity** of the various filter types and sizes. They offer true comparison possibilities for filters from different sources and allow a service life estimate for practical use. On the following pages the mean value curves of the effective dust-holding capacity for the described filters are illustrated based on the nominal volume flow (V). If a **service life estimate for other air quantities** is to be carried out, application of the values in the following »**correction curve**« (Fig. 3) leads to this goal:

Criteria for dimensioning the size of air cleaners

Fig. 3: Correction curve



Curve for correcting laboratory dust capacity in the case of deviations of the air flow rate from the filter's nominal flow rate.

The dust capacity factor is plotted with the filter loading, which is designated with »1« for the nominal flow rate. The correction curve corresponds to the values for a flow rate resistance of 60 mbar illustrated in the individual dust capacity curves. If the engine air requirement deviates from the nominal flow rate of the filter, the effective dust capacity increases or decreases in accordance with this curve. In the downward direction, a maximum limit is reached at approx. 1/2 the nominal flow rate for **filters with pre-cleaners**. Although the degree of pre-separation is only slightly lower for this quantity, it does drop in the lower partial-load range to the point of ineffectiveness. For an air quantity which deviates from the nominal flow rate, the altered initial resistance from the flow rate characteristics must also be taken into consideration.

Dust conditions met in practise

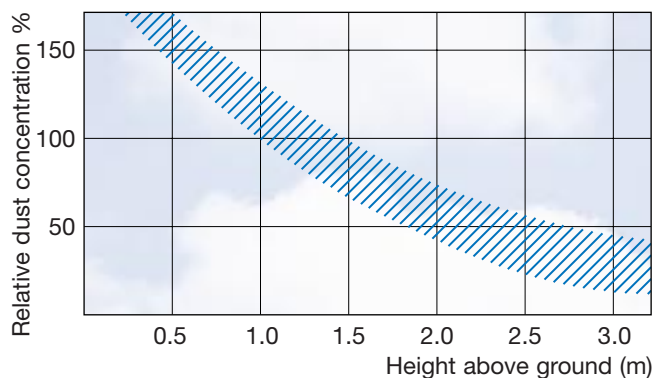
In order to be able to convert the dust-holding capacities obtained on a test rig into hours of operation or kilometres of driving, it is necessary to know the dust concentrations resulting there. The following summary is the result of many years of data accumulation:

Fig. 4: Dust concentration

mean dust concentration in	[mg/m ³]
Lorries in normal European road traffic:	0.6
Lorries in non-European road traffic:	3
Off-road lorries (construction sites):	8
Buses with rear aspiration in normal European road traffic:	5
Buses with rear aspiration in non-European road traffic:	30
Construction machinery (... , mobile compressors):	35
Power sweepers:	8
Agricultural machines in Central Europe (agriculture without specific dry periods):	5
Agricultural machines in non-European areas, working individually:	15
Agricultural machines working in line:	50
Fast tracked vehicles:	100

These dust concentrations are mean values obtained through intake ducts 1 to 1.5 m above the ground. During comparative analysis of the particle size of dust composition, particle-size distributions became finer as the height above the ground increased. This should be considered when, for example, pre-cleaners are to be installed. The quality of these pre-cleaners determines the optimum performance of the entire filter system.

Fig. 5: Dust concentration dependent on height above ground



Criteria for dimensioning the size of air cleaners

In order to calculate the working service life in hours from the laboratory dust-capacity data for a given dry air cleaner and the dust concentration prevailing in practice, use equation (3):

Equation 3: Hours of operation

$$\text{Hours of operation} = \frac{\text{Laboratory dust capacity} \cdot 1,000}{\text{Dust concentration} \cdot \text{Air flow rate} \cdot 60}$$

with dust capacity in [g]
dust concentration in [mg/m³]
air flow rate in [m³/min]

The conversion of hours of operation into kilometres of driving is carried out by means of equation (4):

Equation 4: Kilometers of driving

$$\text{Kilometers of driving} = \text{Hours of operation} \cdot \text{Speed}$$

with speed in km/h

The above calculation of the hours of operation is only a rough approximation, which, particularly in the case of on-road vehicles, may lead to considerable deviations.

Application example

A filter specification is required for a tractor engine; 4-stroke diesel, 3 cylinders, 2.8 dm³ swept volume, 2 · 300 min⁻¹. The expected service life in hours of operation at Δp_{max} of 50 mbar (5 KPa) must be estimated.

According to equation (1), the air requirement is:

$$\text{Air requirement}(V) = \frac{2.8 \cdot 2,300 \cdot 0.9}{2 \cdot 1,000} = 2.9 \text{ m}^3/\text{min}$$

Determination of the filter size

In accordance with equation (2), multiply the air requirement by the pulsation factor (Fig. 2). This results in the

$$\text{Design flow rate} = 2.9 \cdot 1.3 \approx 3.8 \text{ m}^3/\text{min}$$

If the tractor is also to be used in non-European countries, i.e. with a mean dust concentration of 15 mg/m³ intake air in accordance with Fig. (4), then a MANN Europiclone with a dust-discharge valve is recommended. This results in a filter type with a nominal flow rate of 4.5 m³/min as the filter size for 3.8 m³/min. We recommend MANN Europiclone with a small dust-discharge valve and secondary element: 45 200 92 911.



Criteria for dimensioning the size of air cleaners

Laboratory dust capacity

The flow resistance for 3.8 m³/min is approx. 22 mbar (2.2 KPa) (see characteristic on page 17 f.); 28 mbar (2.8 KPa) are therefore available as an increase up to a Δp_{\max} of 50 mbar (5 KPa). The extrapolated characteristic für the Europiclone 45 200 92 911 (see on page 17) results in a dust capacity of 1,680 g.

An air requirement of 2.9 m³/min and a nominal filter flow rate of 4.5 m³/min results in filter loading of

$$\frac{2.9}{4.5} = 0.64 \text{ NL}$$

According to the correction curve in Fig. 3, a dust capacity factor of 1.3 results from a NL of 0.64. This results in a

Laboratory dust capacity = 1,680 g · 1.3 = 2,184 g.

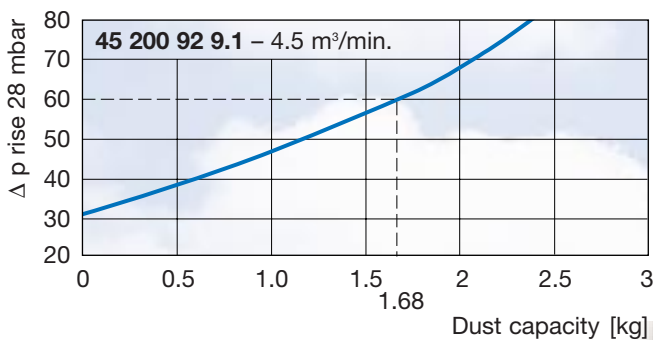
Hours of operation

For an air requirement of 2.9 m³/min (the pulsation factor is disregarded for the calculation of the hours of operation), equation 3 results in a dust concentration of 15 mg/m³ (see Fig. 4: Agricultural machines in non-European areas)

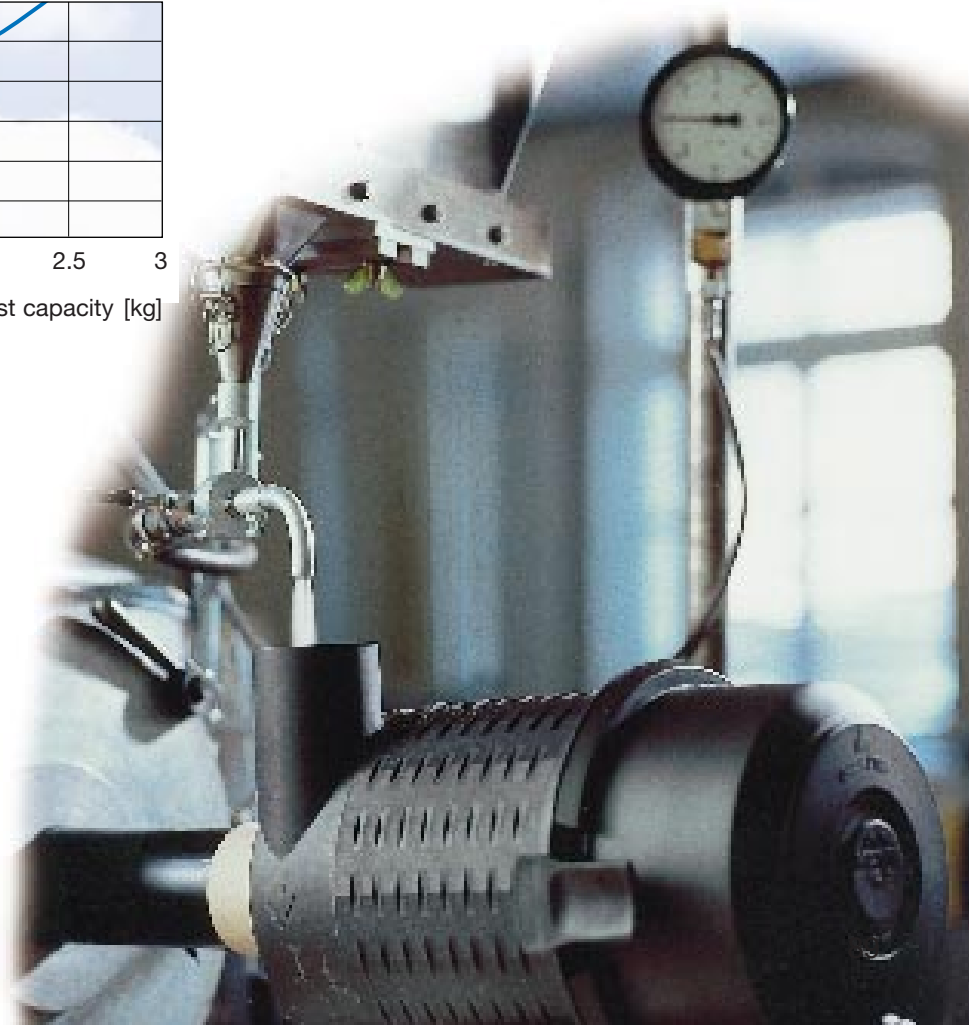
$$\frac{2,184 \cdot 1,000}{15 \cdot 2.9 \cdot 60} = \text{approx. } 837 \text{ hours of operation.}$$

For the use of tractors in Central European agriculture (Fig. 4), a dust concentration of 5 mg/m³ results:

$$\frac{2,184 \cdot 1,000}{5 \cdot 2.9 \cdot 60} = \text{approx. } 2,510 \text{ hours of operation.}$$



Addition of dust for filter tests



General installation instructions/service

Filter installation

There are a number of important points to be observed when installing dry air cleaners:

- The temperature stability of MANN micro-Top filter elements covers -40 °C to $+80\text{ °C}$ in continuous operation with short peaks of up to $+100\text{ °C}$ (e.g. due to heating up from the switched-off engine).
- The filters should be fitted as close to the engine as possible and should be easily accessible for servicing.
- Enough room must be left for filter element removal.
- Service indicators should be clearly visible, and in some cases service switches are recommended with external service displays.
- The filter should be installed in such a way that the air outline ducts (the connection between filter and engine) does not need to be removed during filter or engine servicing.
- Avoid positioning the filter in an area where water is splashed or a lot of dust is raised (e.g. in areas where the wheels spray).

- The filter should be mounted on the vehicle frame or some sturdy body component. The matching brackets shown at page 65 and 66 are recommended for this purpose.

If the filter is subjected to heavy impacts, it should be installed on an elastic mounting.

- The filter should be protected against drive start-up damage (taking the slope angle into account). This is especially true for off-road vehicles.

Air intake point

- The air intake point should be located in a low-dust area. This generally means as high as possible and, for on-road vehicles, as far forward as possible. The air intake should not be where the wheels spray or under the floor.
- Screening against the entrance of water (e.g. while the vehicle is being washed) and rainfall is required. Rain caps are recommended.
- The intake of hot air (e.g. radiator cooling air) and exhaust gases should be avoided. Intake of exhaust soot drastically shortens the filter service intervals.
- The intake openings should be as large as possible. Intake-flow velocities should not exceed 3 m/sec .

Air ducts

- Use only suitable material for these ducts. This applies in particular to the air outline duct. MANN accessories fulfil these requirements.
- The line cross sections should not be selected smaller than the connection cross sections on the filter.
- Due to their being attached to different parts of the vehicle (engine, chassis, driver's cab), the connecting ducts in the air intake system are subject to relative movement. This should be compensated by fitting flexible intermediate links in the air intake ducts.



General installation instructions/service

Spiral and rubber accordion hoses are recommended for this purpose. The ducts are not to be welded to the connecting sleeves. Rubber hoses are also recommended for these connections.

- Ducts should be routed to avoid damage from scuffing, melting of rubber hoses on hot exhaust components or damage through other causes, such as stones thrown up from vehicle wheels.
- When routing these crude air lines care should be taken to ensure that water pockets cannot form. Drain points must be provided if necessary.

Air outline ducts

The air outline ducts must be air tight. Leaky air outline ducts allow dirt to bypass the filter and enter the engine, causing premature wear. Therefore, particular attention should be paid to the air outline ducts.

The following points should be observed:

- The air outline ducts should be as short as possible and include a minimum of joints.
- The material used for the duct must retain its shape and remain air tight during operation (it is a vacuum system). This applies in particular to all flexible connections. Fabric-ply rubber hoses retain their shape well and are also sufficiently resistant to oil, fuel, ozone and weather and are adequately temperature-resistant.
- Hose clamps for securing the connecting elements must be sufficiently wide and strong, and must not cut into the hoses. In the closing area they should be designed so that no folding of the hose is possible.

- Ducts and connecting sleeves must not have any rough welding or casting seams, or overlapping metal. Connecting sleeves for mounting rubber hoses or elbows should be provided with a sealing bead. The length of overlap must be sufficient (at least 30 mm).
- Self-made air outline ducts should be descaled and varnished on the inside before being fitted.
- Air outline ducts must be checked for leaks at regular intervals. Faulty connection components must be replaced.

Service

Filter service becomes necessary when the MANN micro-Top filter element is »exhausted«. It then needs to be replaced with a new filter element or cleaned. Determining when service is required is best done using MANN service indicators or electrical service switches.

Detailed service instructions are available for the various dry air filter types.



Listing according to order numbers

Part No.	Product	Page	Part No.	Product	Page	Part No.	Product	Page	Part No.	Product	Page
02 018 01 707	Hose clip	79	39 000 25 192	Metal elbow pipe	79	39 050 70 861	Service switch	71	39 080 70 961	Service switch	70
02 018 01 708	Hose clip	79	39 000 25 193	Adapter piece	79	39 050 70 862	Service switch	71	39 080 70 962	Service switch	70
02 018 01 709	Hose clip	79	39 000 25 198	Metal elbow pipe	79	39 050 70 901	Service switch	70	39 100 25 979	Elbow pipe	76
02 018 01 710	Hose clip	79	39 000 25 207	Metal elbow pipe	79	39 050 70 902	Service switch	70	39 100 25 991	Intermediate pipe	78
02 018 01 711	Hose clip	79	39 000 25 224	Metal elbow pipe	79	39 050 70 911	Service indicator	67	39 100 25 999	Elbow pipe	76
02 018 01 712	Hose clip	79	39 000 25 253	Adapter piece	79	39 050 70 951	Service switch	70	39 100 27 979	Coupling	76
02 018 01 713	Hose clip	79	39 000 25 258	Elbow pipe	78	39 050 70 952	Service switch	70	39 100 27 999	Coupling	76
02 018 01 714	Hose clip	79	39 000 25 262	Elbow pipe	78	39 050 70 961	Service switch	70	39 100 38 991	Bracket	66
02 018 01 715	Hose clip	79	39 000 25 263	Elbow pipe	78	39 050 70 962	Service switch	70	39 100 40 989	Bracket	65
02 018 01 716	Hose clip	79	39 000 25 264	Elbow pipe	78	39 055 70 702	Service switch	71	39 100 40 999	Bracket	65
02 018 01 717	Hose clip	79	39 000 25 265	Elbow pipe	78	39 055 70 801	Service switch	71	39 100 67 910	Rain cap	74
02 018 01 718	Hose clip	79	39 000 25 266	Elbow pipe	78	39 055 70 802	Service switch	71	39 114 38 871	Bracket	66
02 018 01 719	Hose clip	79	39 000 25 267	Elbow pipe	78	39 055 70 851	Service switch	71	39 114 38 970	Bracket	66
02 018 01 720	Hose clip	79	39 000 25 270	Elbow pipe	78	39 055 70 852	Service switch	71	39 120 38 981	Bracket	66
02 018 01 721	Hose clip	79	39 000 25 273	Metal elbow pipe	79	39 055 70 861	Service switch	71	39 160 38 991	Bracket	66
02 018 01 722	Hose clip	79	39 000 25 280	Elbow pipe	78	39 055 70 862	Service switch	71	39 160 67 910	Rain cap	74
02 018 01 723	Hose clip	79	39 000 25 295	Adapter piece	79	39 055 70 901	Service switch	70	39 165 38 960	Bracket	66
02 018 01 724	Hose clip	79	39 000 25 325	Adapter piece	79	39 055 70 902	Service switch	70	39 165 38 970	Bracket	66
02 018 01 725	Hose clip	79	39 000 25 327	Adapter piece	79	39 055 70 951	Service switch	70	39 190 38 981	Bracket	66
31 007 63 013	Oil-bath air cleaner	60	39 000 25 333	Metal elbow pipe	79	39 055 70 952	Service switch	70	39 190 67 910	Rain cap	74
31 010 63 013	Oil-bath air cleaner	60	39 000 25 431	Adapter piece	79	39 055 70 961	Service switch	70	39 200 25 979	Elbow pipe	76
31 014 74 013	Oil-bath air cleaner	60	39 000 25 461	Adapter piece	79	39 055 70 962	Service switch	70	39 200 25 999	Elbow pipe	76
31 017 74 013	Oil-bath air cleaner	60	39 000 25 621	Adapter piece	79	39 056 38 981	Bracket	66	39 200 27 979	Coupling	76
31 020 74 023	Oil-bath air cleaner	60	39 000 25 622	Adapter piece	79	39 056 67 910	Rain cap	74	39 200 27 999	Coupling	76
31 020 75 023	Oil-bath air cleaner	61	39 000 25 631	Adapter piece	79	39 060 70 702	Service switch	71	39 200 40 989	Bracket	65
31 024 74 023	Oil-bath air cleaner	60	39 000 25 956	Metal elbow pipe	79	39 060 70 801	Service switch	71	39 200 40 999	Bracket	65
31 024 75 023	Oil-bath air cleaner	61	39 000 27 138	Accordion hose	77	39 060 70 802	Service switch	71	39 220 67 210	Rain cap	74
31 028 25 831	Intermediate pipe	78	39 000 27 139	Accordion hose	77	39 060 70 851	Service switch	71	39 225 38 970	Bracket	66
31 028 74 023	Oil-bath air cleaner	60	39 000 27 140	Accordion hose	77	39 060 70 852	Service switch	71	39 300 25 979	Elbow pipe	76
31 028 75 023	Oil-bath air cleaner	61	39 000 27 150	Accordion hose	77	39 065 70 851	Service switch	71	39 300 25 999	Elbow pipe	76
31 034 25 442	Metal elbow pipe	79	39 000 27 151	Accordion hose	77	39 065 70 852	Service switch	71	39 300 27 979	Coupling	76
31 034 74 023	Oil-bath air cleaner	60	39 000 27 152	Accordion hose	77	39 080 70 851	Service switch	71	39 300 27 999	Coupling	76
31 034 75 023	Oil-bath air cleaner	61	39 000 27 158	Accordion hose	77	39 080 70 852	Service switch	71	39 300 40 989	Bracket	65
31 040 75 023	Oil-bath air cleaner	61	39 000 27 161	Accordion hose	77	39 060 70 861	Service switch	71	39 300 40 999	Bracket	65
31 045 75 023	Oil-bath air cleaner	61	39 000 27 164	Accordion hose	77	39 060 70 862	Service switch	71	39 320 67 210	Rain cap	74
31 056 25 821	Intermediate pipe	78	39 000 27 182	Coupling	77	39 060 70 901	Service switch	70	39 325 38 970	Bracket	66
31 056 75 023	Oil-bath air cleaner	61	39 000 27 183	Coupling	77	39 060 70 902	Service switch	70	39 400 25 979	Elbow pipe	76
31 068 75 023	Oil-bath air cleaner	61	39 000 27 192	Coupling	77	39 060 70 911	Service indicator	67	39 400 25 999	Elbow pipe	76
31 080 25 511	Adapter piece	79	39 000 27 193	Coupling	77	39 060 70 951	Service switch	70	39 400 27 979	Coupling	76
31 080 25 731	Intermediate pipe	78	39 000 27 194	Coupling	77	39 060 70 952	Service switch	70	39 400 27 999	Coupling	76
31 080 75 043	Oil-bath air cleaner	61	39 000 27 196	Coupling	77	39 060 70 961	Service switch	70	39 400 40 989	Bracket	65
31 100 25 983	Intermediate pipe	78	39 000 27 197	Coupling	77	39 060 70 962	Service switch	70	39 400 40 999	Bracket	65
31 100 75 043	Oil-bath air cleaner	61	39 000 27 198	Coupling	77	39 065 70 702	Service switch	71	39 440 38 941	Bracket	66
31 120 75 043	Oil-bath air cleaner	61	39 000 27 202	Coupling	77	39 065 70 801	Service switch	71	39 440 38 970	Bracket	66
31 160 25 771	Intermediate pipe	78	39 000 27 203	Coupling	77	39 065 70 802	Service switch	71	39 500 25 979	Elbow pipe	76
31 160 75 043	Oil-bath air cleaner	61	39 000 27 306	Coupling	77	39 065 70 861	Service switch	71	39 500 25 999	Elbow pipe	76
31 190 75 043	Oil-bath air cleaner	61	39 000 27 345	Coupling	77	39 065 70 862	Service switch	71	39 500 27 979	Coupling	76
39 000 25 105	Adapter piece	79	39 000 62 924	Service indicator	68	39 065 70 901	Service switch	70	39 500 27 999	Coupling	76
39 000 25 124	Metal elbow pipe	79	39 000 62 925	Service indicator	68	39 065 70 902	Service switch	70	39 500 40 989	Bracket	65
39 000 25 142	Metal elbow pipe	79	39 000 62 926	Service indicator	68	39 065 70 911	Service switch	67	39 500 40 999	Bracket	65
39 000 25 145	Adapter piece	79	39 000 62 927	Service indicator	68	39 065 70 951	Service switch	70	39 600 25 979	Elbow pipe	76
39 000 25 146	Metal elbow pipe	79	39 014 38 990	Bracket	66	39 065 70 952	Service switch	70	39 600 25 999	Elbow pipe	76
39 000 25 147	Metal elbow pipe	79	39 014 67 910	Rain cap	74	39 065 70 961	Service switch	70	39 600 27 979	Coupling	76
39 000 25 148	Metal elbow pipe	79	39 020 38 981	Bracket	66	39 065 70 962	Service switch	70	39 600 27 999	Coupling	76
39 000 25 152	Metal elbow pipe	79	39 020 67 910	Rain cap	74	39 070 70 702	Service switch	71	39 600 40 989	Bracket	65
39 000 25 153	Metal elbow pipe	79	39 028 38 981	Bracket	66	39 070 70 802	Service switch	71	39 600 40 999	Bracket	65
39 000 25 155	Pipe	78	39 028 67 910	Rain cap	74	39 070 70 851	Service switch	71	39 880 38 990	Bracket	66
39 000 25 157	Pipe	78	39 035 70 702	Service switch	71	39 070 70 852	Service switch	71	41 001 62 112	Filter for two-way ventilation	50
39 000 25 158	Pipe	78	39 035 70 801	Service switch	71	39 070 70 861	Service switch	71			
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39 000 25 164	Coupling	78	39 035 70 852	Service switch	71	39 070 70 902	Service switch	70	41 002 82 113	Silencer	54
39 000 25 165	Coupling	78	39 035 70 861	Service switch	71	39 070 70 951	Service switch	70	41 002 82 133	Silencer	54
39 000 25 166	Pipe	78	39 035 70 862	Service switch	71	39 070 70 961	Service switch	70	41 002 87 103	Silencer	54
39 000 25 167	Coupling	78	39 035 70 901	Service switch	70	39 076 38 970	Bracket	66	41 004 60 122	Filter for two-way ventilation	50
39 000 25 168	Coupling	78	39 035 70 902	Service switch	70	39 120 38 980	Bracket	66			
39 000 25 172	Pipe	78	39 035 70 911	Service indicator	67	39 080 38 991	Bracket	66	41 004 60 172	Filter for two-way ventilation	50
39 000 25 173	Pipe	78	39 035 70 951	Service switch	70	39 080 67 910	Rain cap	74			
39 000 25 174	Coupling	78	39 035 70 952	Service switch	70	39 080 70 702	Service switch	71	41 004 60 212	Filter for two-way ventilation	50
39 000 25 175	Coupling	78	39 035 70 961	Service switch	70	39 080 70 801	Service switch	71			
39 000 25 176	Coupling	78	39 035 70 962	Service switch	70	39 080 70 802	Service switch	71	41 004 62 102	Filter for two-way ventilation	50
39 000 25 177	Coupling	78	39 040 38 981	Bracket	66	39 080 70 861	Service switch	71			
39 000 25 178	Coupling	78	39 040 67 910	Rain cap	74	39 080 70 862	Service switch	71	41 004 62 112	Filter for two-way ventilation	50
39 000 25 182	Pipe	78	39 050 70 702	Service switch	71	39 080 70 901	Service switch	70			
39 000 25 183	Pipe	78	39 050 70 801	Service switch	71	39 080 70 902	Service switch	70	41 004 82 123	Silencer	54
39 000 25 184	Coupling	78	39 050 70 802	Service switch	71	39 080 70 911	Service indicator	67	41 004 82 183	Silencer	54
39 000 25 185	Coupling	78	39 050 70 851	Service switch	71	39 080 70 951	Service switch	70	41 004 87 103	Silencer	54
39 000 25 188	Metal elbow pipe	79	39 050 70 852	Service switch	71	39 080 70 952	Service switch	70	41 007 87 103	Silencer	54

Listing according to order numbers

Part No.	Product	Page	Part No.	Product	Page	Part No.	Product	Page	Part No.	Product	Page
41 007 87 113	Silencer	54	45 300 92 971	Europiclone	14	45 124 72 104	Vacuum filter	45	48 066 67 090	Cyclone	72
41 010 87 113	Silencer	54	45 300 92 980	Europiclone	14	45 138 72 105	Vacuum filter	45	48 066 67 110	Cyclone	72
41 015 87 113	Silencer	54	45 300 92 981	Europiclone	14	45 138 77 126	Filter for two-way ventilation	48	48 068 67 900	Cyclone	73
41 021 87 013	Silencer	54	45 380 92 960	Europiclone	18				48 096 67 140	Cyclone	72
42 001 62 103	Filter for two-way ventilation	50	45 400 92 910	Europiclone	14	45 160 92 901	Piclone	28	48 096 67 200	Cyclone	72
			45 400 92 911	Europiclone	14	45 160 92 951	Piclone	28	48 096 67 900	Cyclone	73
42 001 62 142	Filter for two-way ventilation	50	45 400 92 920	Europiclone	14	45 165 75 304	Pico	56	48 120 67 900	Cyclone	73
			45 400 92 921	Europiclone	14	45 165 92 304	Piclone	22	48 132 67 020	Cyclone	72
42 001 62 203	Filter for two-way ventilation	50	45 400 92 940	Europiclone	14	45 165 92 314	Piclone	22	48 132 67 120	Cyclone	72
			45 400 92 941	Europiclone	14	45 165 92 344	Piclone	22	48 017 67 900	Cyclone	73
42 001 62 253	Filter for two-way ventilation	50	45 400 92 970	Europiclone	14	45 165 92 404	Piclone	22			
			45 400 92 971	Europiclone	14	45 165 92 414	Piclone	22			
42 002 62 112	Filter for two-way ventilation	50	45 400 92 980	Europiclone	14	45 165 92 444	Piclone	22			
			45 400 92 981	Europiclone	14	45 174 54 154	Picolight	35			
43 014 67 012	Oil wetted air cleaner	53	45 480 92 960	Europiclone	18	45 201 92 904	Piclone	28			
43 018 67 012	Oil wetted air cleaner	53	45 500 92 910	Europiclone	14	45 201 92 951	Piclone	28			
43 018 67 022	Oil wetted air cleaner	53	45 500 92 911	Europiclone	14	45 225 75 304	Pico	56			
43 036 67 012	Oil wetted air cleaner	53	45 500 92 920	Europiclone	14	45 225 92 304	Piclone	22			
43 046 67 012	Oil wetted air cleaner	53	45 500 92 921	Europiclone	14	45 225 92 314	Piclone	22			
43 060 67 012	Oil wetted air cleaner	53	45 500 92 940	Europiclone	14	45 225 92 344	Piclone	22			
43 080 67 102	Oil wetted air cleaner	53	45 500 92 941	Europiclone	14	45 225 92 404	Piclone	22			
43 100 67 012	Oil wetted air cleaner	53	45 500 92 970	Europiclone	14	45 225 92 414	Piclone	22			
43 130 67 012	Oil wetted air cleaner	53	45 500 92 971	Europiclone	14	45 225 92 444	Piclone	22			
43 180 67 012	Oil wetted air cleaner	53	45 500 92 980	Europiclone	14	45 240 77 104	Filter for two-way ventilation	48			
43 240 67 012	Oil wetted air cleaner	53	45 500 92 981	Europiclone	14						
43 320 67 012	Oil wetted air cleaner	53	45 580 92 960	Europiclone	18	45 325 75 304	Pico	56			
43 870 67 102	Oil wetted air cleaner	53	45 600 92 910	Europiclone	14	45 325 92 304	Piclone	22			
44 010 72 999	Picolino	40	45 600 92 911	Europiclone	14	45 325 92 314	Piclone	22			
44 010 77 999	Picolino	40	45 600 92 920	Europiclone	14	45 325 92 344	Piclone	22			
44 010 82 998	Picolino	41	45 600 92 921	Europiclone	14	45 325 92 404	Piclone	22			
44 010 82 999	Picolino	41	45 600 92 940	Europiclone	14	45 325 92 414	Piclone	22			
44 010 87 999	Picolino	41	45 600 92 941	Europiclone	14	45 325 92 444	Piclone	22			
44 020 72 999	Picolino	40	45 600 92 970	Europiclone	14	45 375 77 104	Filter for two-way ventilation	48			
44 020 77 999	Picolino	40	45 600 92 971	Europiclone	14						
44 020 82 998	Picolino	41	45 600 92 980	Europiclone	14	45 440 75 304	Pico	56			
44 020 82 999	Picolino	41	45 600 92 981	Europiclone	14	45 440 92 304	Piclone	22			
44 020 87 999	Picolino	41	45 680 92 960	Europiclone	18	45 440 92 314	Piclone	22			
44 030 77 997	Picolino	40	45 001 62 155	Filter for two-way ventilation	48	45 440 92 344	Piclone	22			
44 030 77 998	Picolino	40				45 440 92 404	Piclone	22			
44 030 77 999	Picolino	40	45 001 62 185	Filter for two-way ventilation	48	45 440 92 414	Piclone	22			
44 030 87 997	Picolino	41				45 440 92 444	Piclone	22			
44 030 87 998	Picolino	41	45 003 62 900	Filter for two-way ventilation	48	45 650 38 761	Bracket	66			
44 030 87 999	Picolino	41				45 650 75 304	Pico	56			
44 040 77 997	Picolino	40	45 003 62 901	Filter for two-way ventilation	48	45 650 92 304	Piclone	22			
44 040 77 998	Picolino	40				45 650 92 314	Piclone	22			
44 040 77 999	Picolino	40	45 003 62 902	Filter for two-way ventilation	48	45 650 92 344	Piclone	22			
44 040 87 997	Picolino	41				45 650 92 404	Piclone	22			
44 040 87 998	Picolino	41	45 003 65 900	Filter for two-way ventilation	48	45 650 92 414	Piclone	22			
44 040 87 999	Picolino	41				45 650 92 444	Piclone	22			
44 050 77 997	Picolino	40	45 009 72 105	Vacuum filter	45	45 880 75 304	Pico	56			
44 050 77 998	Picolino	40	45 009 72 146	Filter for two-way ventilation	48	45 880 92 304	Piclone	22			
44 050 77 999	Picolino	40				45 880 92 314	Piclone	22			
44 050 87 997	Picolino	41	45 009 77 106	Filter for two-way ventilation	48	45 880 92 344	Piclone	22			
44 050 87 998	Picolino	41				45 880 92 404	Piclone	22			
44 050 87 999	Picolino	41	45 021 72 105	Vacuum filter	45	45 880 92 414	Piclone	22			
44 100 92 910	Europiclone	14	45 021 77 125	Filter for two-way ventilation	48	45 880 92 444	Piclone	22			
44 100 92 911	Europiclone	14				45 920 38 990	Bracket	66			
44 100 92 920	Europiclone	14	45 031 54 154	Picolight	35	45 920 92 304	Piclone	22			
44 100 92 921	Europiclone	14	45 032 77 105	Filter for two-way ventilation	48	45 920 92 314	Piclone	22			
44 180 92 960	Europiclone	18				45 920 92 344	Piclone	22			
45 200 92 910	Europiclone	14	45 037 72 105	Vacuum filter	45	45 920 92 404	Piclone	22			
45 200 92 911	Europiclone	14	45 037 77 015	Filter for two-way ventilation	48	45 920 92 414	Piclone	22			
45 200 92 920	Europiclone	14				45 920 92 444	Piclone	22			
45 200 92 921	Europiclone	14	45 043 92 304	Piclone	22	48 024 67 020	Cyclone	72			
45 200 92 940	Europiclone	14	45 043 92 314	Piclone	22	48 024 67 030	Cyclone	72			
45 200 92 941	Europiclone	14	45 068 54 194	Picolight	35	48 024 67 140	Cyclone	72			
45 200 92 970	Europiclone	14	45 074 77 115	Filter for two-way ventilation	48	48 024 67 180	Cyclone	72			
45 200 92 971	Europiclone	14				48 024 67 900	Cyclone	73			
45 200 92 980	Europiclone	14	45 076 92 304	Piclone	22	48 030 67 900	Cyclone	73			
45 200 92 981	Europiclone	14	45 076 92 314	Piclone	22	48 034 67 900	Cyclone	73			
45 280 92 960	Europiclone	18	45 100 54 134	Picolight	35	48 034 67 910	Flat cyclone	73			
45 300 92 910	Europiclone	14	45 114 75 304	Pico	56	48 036 67 110	Cyclone	72			
45 300 92 911	Europiclone	14	45 114 92 304	Piclone	22	48 036 67 160	Cyclone	72			
45 300 92 920	Europiclone	14	45 114 92 314	Piclone	22	48 048 67 020	Cyclone	72			
45 300 92 921	Europiclone	14	45 114 92 344	Piclone	22	48 048 67 220	Cyclone	72			
45 300 92 940	Europiclone	14	45 114 92 404	Piclone	22	48 048 67 900	Cyclone	73			
45 300 92 941	Europiclone	14	45 114 92 414	Piclone	22	48 056 67 900	Cyclone	73			
45 300 92 970	Europiclone	14	45 114 92 444	Piclone	22	48 056 67 910	Flat cyclone	73			

Determining the ideal dry air cleaner

Selection criteria

1. In which environment will the cleaner be used?

Tips on how to select the ideal cleaner model can be found in the summary on pages 4 and 5. In the respective chapter there is more detailed information and technical specifications on the cleaner you select.

2. Configuration flow

Please calculate the flow V_A for the configuration using the equations 1 and 2 on pages 85 and 86.

Result: $V_A = \dots\dots m^3/min.$

Specifying the cleaner size

Relevant here: V of the cleaner \geq outlet flow V_A .

The ideal cleaner size can now be found in the table in the respective chapter. When changing a filter in a dusty environment MANN+HUMMEL always recommends using a secondary element. The secondary element protects the clean air side against the entrance of dust during the service.

Glossary

Definition of expressions used in filter engineering

Air inlet – Intake air duct before the air cleaner through which ambient air (unfiltered) is sucked in.

Clean air duct – Pipe after air cleaner through which cleaned air is fed to the aggregate.

Cyclone – Centrifugal force separator to separate coarse solid particles from gaseous or liquid media through rotation and displacement of media.

Dust discharge valve – Valve on the air cleaner housing for discharging the separated dust. Only with → two stage air cleaner.

Europiclone – MANN+HUMMEL brand name for air cleaner series made from plastic → two stage air cleaner).

Ejector – Dust extraction; dust discharge for an air cleaner series /precleaner is achieved with the help of negative pressure.

Flow resistance Δp [mbar] – Measured variable for the pressure loss of a filter.

Laboratory dust capacity [g] – Measured quantity of a defined test dust which is added to a filter under laboratory conditions until the service point is reached.

Main element – Filter insert made from paper which carries out the filtration process.

Nominal flow rate V_{nom} [m^3/min] – Design consideration for a part, through which a medium to be filtered flows.

Piclone – MANN+HUMMEL brand name for air cleaner series made from metal → two stage air cleaner).

Pico – MANN+HUMMEL brand name for air cleaner series made from metal → single stage air cleaner).

Picolight – MANN+HUMMEL brand name for air cleaner series without housing → single stage air cleaner).

Picolino – MANN+HUMMEL brand name for air cleaner series made from plastic → single stage air cleaner).

Preseparation efficiency [%] – Amount of dust separated in the first stage of a → two stage air cleaner.

Preseparator – First filtration stage of a → two stage air cleaner.

Pulsation – Pressure oscillations in the intake channel of an aggregate.

Secondary element – Additional air filter insert fitted downstream of the → main element and which, during servicing, protects the entrance of dust into the → clean air line.

Service indicator – Mounted device which indicates the time when to service.

Service interval [h] – Life of filter determined in the field before the filter needs servicing.

Service switch – Mounted device which triggers an electric signal when the time for a service is reached and this in turn sets off an audio or visual warning signal.

Single stage air cleaner – Air cleaner without a ± precleaner (with or without a ± secondary element).

Two stage air cleaner – Cleaner working in two stages to clean air, e.g. preseparation with subsequent fine filtration.

Volume metric flow V [m^3/min] – Quantity which flows through filter per unit of time.

Further information

Further catalogues are available on request from your contact partner:



MANN Filters for liquids

- Spin-on filters
 - Fuel filters
 - Elements for EDM machines
 - High-pressure filters
 - In-line filters
 - Gap-type filters
- Order no. 19 942 10 101



MANN Air oil separators for compressors and vacuum pumps

- Air oil separators
 - Air oil separator filters
 - Air oil separator boxes
- Order no. 19 943 10 101

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INC.
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MANN+HUMMEL ADVANCED
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Louisville/Kentucky

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FILTERWERK MANN+HUMMEL
GMBH
Shanghai/China

MANN+HUMMEL PTE LTD
Singapore

MANN+HUMMEL FILTER
TECHNOLOGY (S.E.A.) PTE LTD
Singapore

Licensees

J. Riveros S.A.I.C.
Chile

Alborz-Filter MFG. Co.
Iran

G.U.D. Filters Pty. Ltd.
South Africa

Conversion factors

$$400 \text{ KW} \times 1,341 = 536,4 \text{ HP}$$

Temperature

°F	=	(°C x 9/5) + 32
°C	=	(°F - 32) x 5/9

Flow rates

Power

HP	=	KW x 1.341
KW	=	HP x 0.746

1 litre/min	=	0.0353	cfm
1 m ³ /min	=	35.3140	cfm
1 m ³ /h	=	0.5886	cfm
1 Engl. gallon/min	=	0.1605	cfm

Length

1 m	=	1000 mm	=	39.38 inch	=	3.281 ft.
1 inch	=	25.4 mm	=	0.0254 m	=	0.08333 ft.
1 ft.	=	304.8 mm	=	0.3048 m	=	12 inch

Volume

1 m ³	=	1000 litres	=	35.31 ft. ³	=	61020 inch ³
1 ft. ³	=	28.32 litres	=	0.02832 m ³	=	1728 inch ³
1 litre	=	0.2642 US gallon	=	0.2201 Engl. gallon		
1 US gallon	=	3.785 litres	=	231 inch ³		
1 Engl. gallon	=	4.544 litres	=	277 inch ³		

Weight

1 kg	=	2.205 lb	=	35.27 Oz
1 lb	=	0.4536 kg	=	16 Oz
1 Oz	=	0.02835 kg	=	0.0625 lb

Pressure

1 bar	=	100 KPa	=	14,5 psi	=	401.5 IN. H ₂ O
10 mbar	=	1 KPa	=	0.145 psi	=	4.015 IN. H ₂ O
10 psi	=	68.95 KPa	=	0.6895 bar	=	27.68 IN. H ₂ O
1 IN. H ₂ O	=	0.2491 KPa	=	2.491 mbar	=	0.03613 psi

The company

The place where the company was founded and the head office of the MANN+HUMMEL group of companies is in Ludwigsburg in the German state of Baden-Württemberg close to the state capital of Stuttgart.

The plants at

- Ludwigsburg/Baden-Württemberg,
 - Marklkofen/Bavaria,
 - Speyer/Rhineland-Palatinate,
 - Sonneberg/Thuringia
 - Weiterstadt/Hesse
 - Königswinter/Northrhine-Westfalia and
 - Erkrath/Northrhine-Westf.
- employ approximately 5,000 workers.
More than 3,000 employees work in other countries.

Our subsidiary companies are based in Belgium, France, Great Britain, Spain, the Czech Republic, Argentina, Brazil, Mexico, USA, China and Singapore.

Important licencing companies in Chile, Iran, South Africa and Turkey – to name but a few – as well as a comprehensive MANN+HUMMEL service on all continents ensure the supply of filter and spare parts tailored to the needs of the world market.

AUTOMOTIVE TECHNOLOGY (OE AND AM)

Air Filter Systems Business Unit



- Air cleaners and -systems for passenger cars and commercial vehicles
- Crankcase ventilation systems for cars and commercial vehicles
- Components such as oil-aerosol separators, crankcase pressure control units, silencers, carburetors, heating pipes, control valves

Intake Manifold Systems Business Unit



- Plastic and metal intake manifolds, modules and systems for passenger cars
- Components for passenger cars and commercial vehicles such as fuel supply rails, cylinder head covers

Liquid Filter Systems Business Unit



- Plastic and aluminium liquid filters and systems for passenger cars and commercial vehicles
- Components such as oil pumps, integrated oil-water exchangers
- Oil pumps, valves

Cabin Filter Business Unit



- Cabin filters for particle filtration and gas adsorption, combined cabin filters for passenger cars and commercial vehicles

Filters Business Unit



- Filter elements for air and liquids and cabin filters (MANN-FILTER)
- Air-drying boxes
- Cooling-water filters
- Spin-on oil filters and fuel filters
- Elements for oil-aerosol separators

INDUSTRIAL TECHNOLOGY DIVISION

Industrial Filters Business Unit



- Filter elements and modules for industrial engines, construction and agricultural machinery, compressors, vacuum pumps and mechanical engineering
- System components
- Air-oil separators

ProTec Business Unit



- Plants, machines, and systems for material handling and materials processing in the plastic, rubber, recycling and chemical industries

Hydromation Business Unit



- Systems and equipment, e.g. chip handling systems and chip transport systems for filtering machining liquids in mechanical production
- Oil extraction devices

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