



MANN+HUMMEL Air/oil separators

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The use of compressed air is now an integral feature of every industrial firm. Compressors and vacuum pumps are used in the construction industry, mechanical engineering and in highly sensitive sectors such as the foodstuffs, pharmaceuticals and electrical engineering industries. Air/oil separators are important quality components in the compressed air processing chain.



Working principle

Air/oil separators work according to the „principle of coalescence“. Micro-glass-fibre layers separate drops of oil from the compressed air and return them in large drops to the oil circuit of the compressor. The separation process is effective right down to the submicron range. This ensures that oil consumption in the compressors

and oil entrainment into the compressed air networks are kept to a minimum. Oil-vapour is not separated. Air/oil separators can be used with all types of standard compressor lubricating oils, irrespective of whether they are mineral-based, synthetic or partially synthetic products.

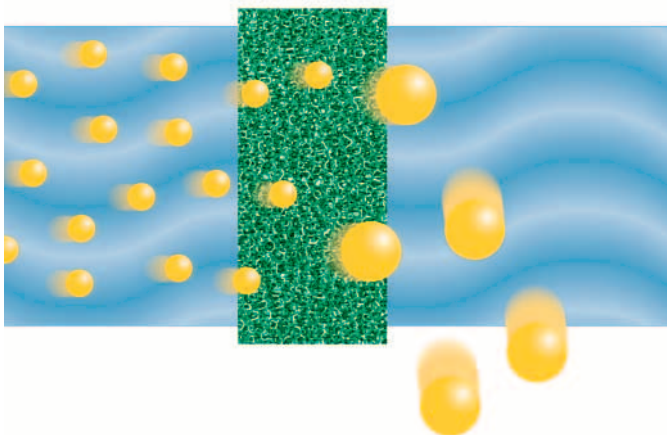
Separation of oil drops

Depending on the size of the drops, various physical separation effects result in the fine drops being adsorbed by the micro-glass fibres. The number of fibres, fibre diameter and flow velocity have a major impact on separation efficiency. If the design is modified, interaction between inertia, capillaries and diffusion effects is optimised. The fine oil droplets are pressed through the separation medium and as they pass through they come together to form larger drops. Under the effect of gravity these droplets sink down through the secondary separation medium on the clean side. The correct choice of material in combination

with low flow resistance enables an almost complete separation and redirection of the oil droplets remaining in the air flow. This also applies to load fluctuations around the nominal utilisation point.

Return of separated oil

Depending on the design of compressor, oil is returned in a number of different ways. In the standard design of air/oil separators, oil flows from the outside to the inside and the drainage oil is drawn off on the dry side through a centrally positioned pipe running from the base cup of the separator.



Oil separation according to the "principle of coalescence"

Design and working principle of air/oil separators

Design

Due to their design, air/oil separators are constructed with a number of layers. The fine separation layer made of borosilicate glass fibres with defined layer thicknesses is responsible for the coalescence effect.

These microfibre papers are almost free of binding agents and ensure stability with different lubricant types even at relatively high operating tem-

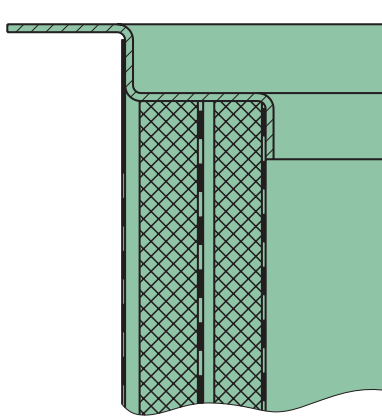
peratures. The redirection of the oil droplets is realised with a polyester fabric.

Under unfavourable pre-separation conditions in the pressure vessel a preseparator integrated in the element can protect the other two from overload. This can also lead to a longer service life of the air/oil separator. Elements with pre-separation are available on request.

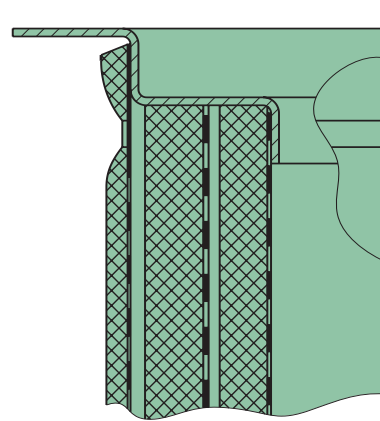
In accordance with the requirements of the trade association of the chemical industry, the metal parts of air/oil separators for compressors have an electrically conductive interconnection in order to transfer any static charges reliably. Suitably prepared mounting seals produce conductive connections to the compressor housing.

Flow resistance

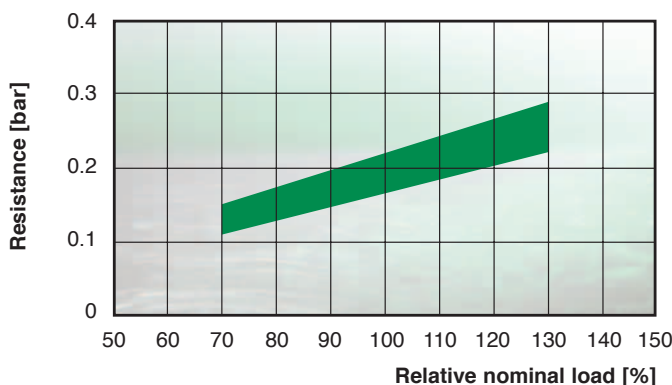
Depending on their type, air/oil separators have flow resistances of between 0.17 bar (17 KPa) and 0.22 bar (22 KPa), referred to the oil-moistened operating state at nominal volumetric flow and at operating temperature.



Air/oil separator element in the standard version



Air/oil separator element with pre-separation



Flow resistances of air/oil separator elements

Advantages at a glance:

- High resistance to differential pressure
- Operating temperature: up to 120 °C
- Residual oil content: 1 to 3 mg/m³ or ppm (at nominal load)
- Nominal flow rates: (at 7 bar/0.7 MPa)
 - Standard wrap elements: 1 to 42 m³/min
 - Depth separator elements: 1 to 46 m³/min
 - Air/oil separator boxes: 1 to 6 m³/min
 - Air/oil separator filters: 1 to 16.5 m³/min
 - Air/oil separators for vacuum pumps: 0.1 to 3.6 m³/min

MANN+HUMMEL Standard Wrap Elements



Fitting advice

Standard wrap elements are available in a variety of sizes. They will only function properly when there is no leakage between the wet and the dry sides. Air should be guided in such a way as to prevent the air oil stream impacting directly on the surface of the filter element.

Design and function

This product is suitable for flow from the outside to the inside. It can be used for the entire range of current versions of screw-type and sliding vane compressors. The standard wrap elements are particularly insensitive to design variations and achieve optimal results with regard to separation efficiency and service life.

Pressure drop

The pressure drop at nominal flow rate and at 7 bar (0.7 MPa) operating pressure with a new element is 0.17 bar (17 KPa). If a higher resistance is permitted, the volumetric flow rate can be doubled without downgrading performance.

Pressure resistance

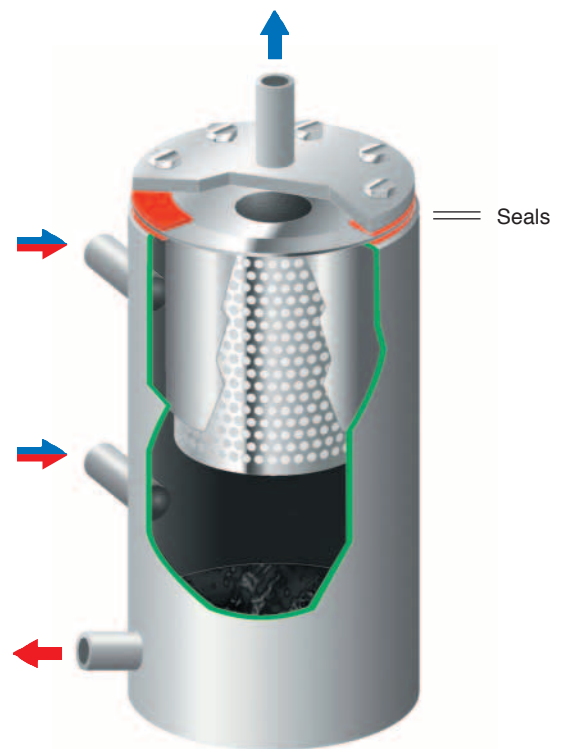
The standard wrap elements designed for pressure differences of at least 5 bar (0.5 MPa).




Separation efficiency

The residual oil content at nominal flow rate and at 7 bar (0.7 MPa) operating pressure is approximately 1 to 3 mg/m³.

Service life

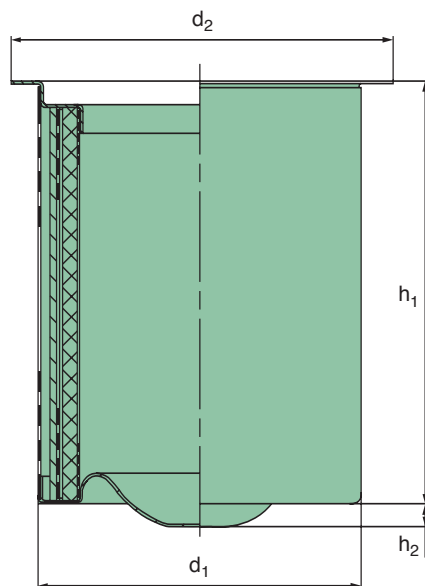
The rise in flow resistance and thus service life primarily depend on the cleanness of the oil and the quality of the air filter. A service life of several thousand hours can be achieved with a well-functioning system.



-  Compressed air inlets for oil saturated air (2 inlet alternatives)
-  to oil injection
-  oil-free compressed air

Installation of Standard Wrap Element in pressure reservoir

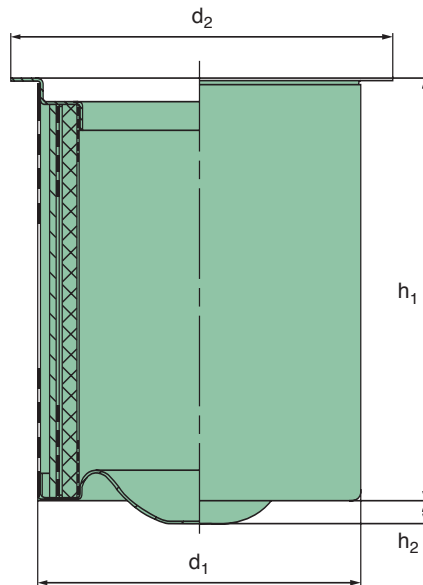
Dimensions and order numbers



Order No.	Nominal flow rate ¹⁾ [m ³ /min] [cfm]	Dimensions in mm [<i>dimensions in inches</i>]				with seals
		d ₁	d ₂	h ₁	h ₂	
49 000 55 291	1.0 [35.31]	125 [4.92]	165 [6.50]	110 [4.33]	12 [0.47]	x
49 000 53 112	1.5 [52.97]	135 [5.31]	165 [6.50]	140 [5.51]	12 [0.47]	–
49 001 53 105	1.8 [63.57]	135 [5.31]	205 [8.07]	165 [6.50]	12 [0.47]	–
49 001 53 161	2.0 [70.63]	110 [4.33]	154 [6.06]	230 [9.06]	–	–
49 000 51 531	2.2 [77.69]	135 [5.31]	170 [6.69]	200 [7.87]	–	–
49 000 51 491	2.3 [81.22]	170 [6.69]	200 [7.87]	160 [6.30]	12 [0.47]	–
49 000 51 311	2.6 [91.82]	170 [6.69]	250 [9.84]	180 [7.09]	12 [0.47]	–
49 001 53 361	2.9 [102.41]	135 [5.31]	178 [7.01]	250 [9.84]	12 [0.47]	–
49 000 51 201	3.4 [120.07]	170 [6.69]	200 [7.87]	230 [9.06]	12 [0.47]	–
49 002 53 281	3.4 [120.07]	170 [6.69]	220 [8.66]	230 [9.06]	12 [0.47]	–
49 002 53 481	3.4 [120.07]	170 [6.69]	250 [9.84]	230 [9.06]	12 [0.47]	–
49 000 51 851	3.4 [120.07]	220 [8.66]	300 [11.81]	180 [7.09]	12 [0.47]	–

¹⁾ Flow rate according to DIN 1945 at 7 bar (0.7 MPa) operating pressure.
Specially adapted sizes are available on request.

Dimensions and order numbers



Order No.	Nominal flow rate ¹⁾ [m ³ /min] [cfm]	Dimensions in mm [<i>dimensions in inches</i>]				with seals
		d ₁	d ₂	h ₁	h ₂	
49 002 55 171	3.0 [123.60]	135 [5.31]	178 [7.01]	305 [12.01]	–	x
49 000 51 411	3.6 [127.13]	135 [5.31]	170 [6.69]	305 [12.01]	–	–
49 002 53 491	3.7 [130.66]	170 [6.69]	200 [7.87]	250 [9.84]	12 [0.47]	–
49 002 53 121	4.2 [148.32]	275 [10.83]	375 [14.76]	180 [7.09]	12 [0.47]	–
49 002 53 371	4.3 [151.85]	170 [6.69]	192 [7.56]	288 [11.34]	12 [0.47]	–
49 002 53 331	4.4 [155.38]	220 [8.66]	300 [11.81]	230 [9.06]	12 [0.47]	–
49 000 51 121	4.6 [162.45]	170 [6.69]	200 [7.87]	305 [12.01]	12 [0.47]	–
49 000 51 231	4.6 [162.45]	170 [6.69]	250 [9.84]	305 [12.01]	12 [0.47]	–
49 002 53 512	4.6 [162.45]	170 [6.69]	220 [8.66]	305 [12.01]	12 [0.47]	–
49 002 53 301	4.9 [173.04]	220 [8.66]	290 [11.42]	250 [9.84]	12 [0.47]	–
49 002 53 351	5.5 [194.23]	170 [6.69]	275 [10.83]	360 [14.17]	12 [0.47]	–
49 000 51 771	6.3 [222.48]	220 [8.66]	274 [10.79]	320 [12.60]	12 [0.47]	–
49 000 51 111	6.7 [236.61]	170 [6.69]	200 [7.87]	435 [17.13]	12 [0.47]	–
49 000 51 241	6.7 [236.61]	170 [6.69]	232 [9.13]	435 [17.13]	12 [0.47]	–
49 003 53 122	7.6 [268.39]	170 [6.69]	200 [7.87]	485 [19.09]	12 [0.47]	–

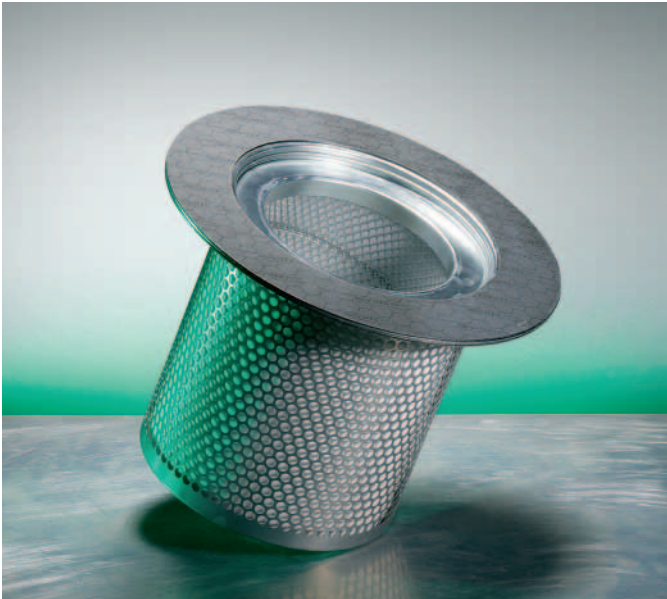
¹⁾ Flow rate according to DIN 1945 at 7 bar (0.7 MPa) operating pressure.
Specially adapted sizes are available on request.

Dimensions and order numbers

Order No.	Nominal flow rate ¹⁾ [m ³ /min] [cfm]	Dimensions in mm [<i>dimensions in inches</i>]				with seals
		d ₁	d ₂	h ₁	h ₂	
49 000 51 101	7.6 [268.39]	275 [10.83]	328 [12.91]	305 [12.01]	12 [0.47]	–
49 003 53 100	7.6 [268.39]	275 [10.83]	375 [14.76]	305 [12.01]	12 [0.47]	–
49 003 53 131	7.6 [268.39]	275 [10.83]	324 [12.76]	305 [12.01]	12 [0.47]	–
49 000 51 171	8.8 [310.77]	220 [8.66]	274 [10.79]	435 [17.13]	12 [0.47]	–
49 003 53 332	8.8 [310.77]	220 [8.66]	380 [14.96]	435 [17.13]	12 [0.47]	–
49 004 53 111	10.6 [374.34]	475 [18.70]	590 [23.23]	250 [9.84]	12 [0.47]	–
49 000 51 441	11.2 [395.52]	275 [10.83]	328 [12.91]	400 [15.75]	12 [0.47]	–
49 000 51 321	11.5 [406.12]	275 [10.83]	328 [12.91]	450 [17.72]	12 [0.47]	–
49 000 51 131	12.3 [434.37]	220 [8.66]	274 [10.79]	600 [23.62]	12 [0.47]	–
49 004 53 151	12.3 [434.37]	220 [8.66]	262 [10.31]	600 [23.62]	12 [0.47]	–
49 000 51 331	12.6 [444.96]	300 [11.81]	348 [13.70]	450 [17.72]	12 [0.47]	–
49 000 51 191	14.1 [497.94]	300 [11.81]	355 [13.98]	500 [19.69]	12 [0.47]	–
49 005 53 101	14.1 [497.94]	300 [11.81]	328 [12.91]	500 [19.69]	12 [0.47]	–
49 000 51 181	17.1 [603.88]	300 [11.81]	355 [13.98]	600 [23.62]	12 [0.47]	–
49 000 51 221	18.9 [667.45]	300 [11.81]	355 [13.98]	660 [25.98]	12 [0.47]	–
49 006 53 100	18.9 [667.45]	300 [11.81]	353 [13.90]	660 [25.98]	12 [0.47]	–
49 006 53 261	18.9 [667.45]	300 [11.81]	400 [15.75]	660 [25.98]	12 [0.47]	–
49 000 51 521	19.6 [692.17]	275 [10.83]	324 [12.76]	750 [29.53]	12 [0.47]	–
49 007 53 102	21.5 [759.27]	300 [11.81]	328 [12.91]	750 [29.53]	12 [0.47]	–
49 007 53 121	21.5 [759.27]	300 [11.81]	348 [13.70]	750 [29.53]	12 [0.47]	–
49 000 51 481	23.6 [833.43]	300 [11.81]	355 [13.98]	820 [32.28]	12 [0.47]	–
49 000 51 541	28.9 [1020.59]	300 [11.81]	355 [13.98]	1000 [39.37]	12 [0.47]	–
49 000 51 251	41.7 [1472.62]	475 [18.70]	740 [29.13]	900 [35.43]	20 [0.79]	–
49 000 51 581	41.7 [1472.62]	475 [18.70]	570 [22.44]	900 [35.43]	20 [0.79]	–
49 013 53 111	41.7 [1472.62]	475 [18.70]	590 [23.23]	900 [35.43]	20 [0.79]	–

¹⁾ Flow rate according to DIN 1945 at 7 bar (0.7 MPa) operating pressure.
Specially adapted sizes are available on request.

MANN+HUMMEL Depth Separator Elements



Fitting advice

Depth Separator Elements are available in a variety of sizes. They will only function properly when there is no leakage between the wet and the dry sides. Air should be guided in such a way as to prevent the air oil stream impacting directly on the surface of the filter element.

Design and function

This product takes up very little space and is suitable for the entire range of current versions of screw-type and sliding vane compressors. In the depth separator element, oil flows from the outside to the inside.

Pressure drop

The pressure drop at nominal flow rate and at 7 bar (0.7 MPa) operating pressure with a new element is approx. 0.2 bar (20 KPa). If a higher resistance is permitted, the volumetric flow rate can be increased to 1.5 times the nominal flow rate without downgrading performance.

Pressure resistance

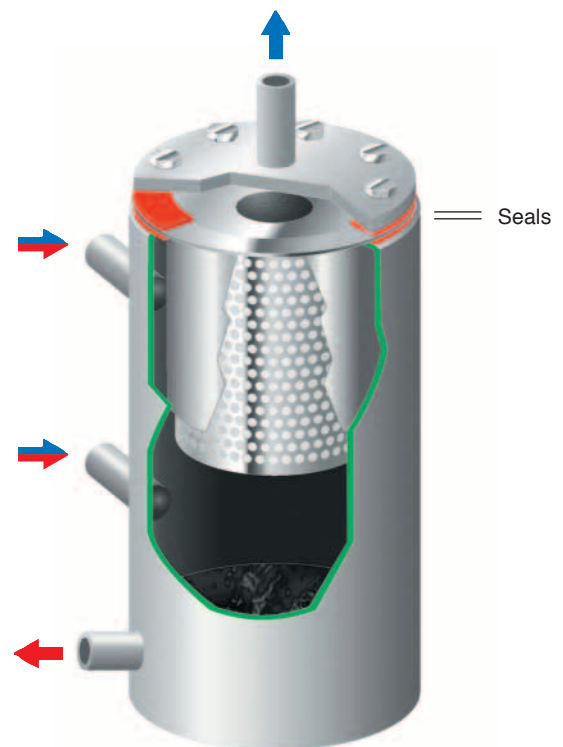
Depth separator elements are designed for pressure differences of at least 5 bar (0.5 MPa).




Separation efficiency

The residual oil content at nominal flow rate and at 7 bar (0.7 MPa) operating pressure is approx. 1 to 3 mg/m³.

Service life

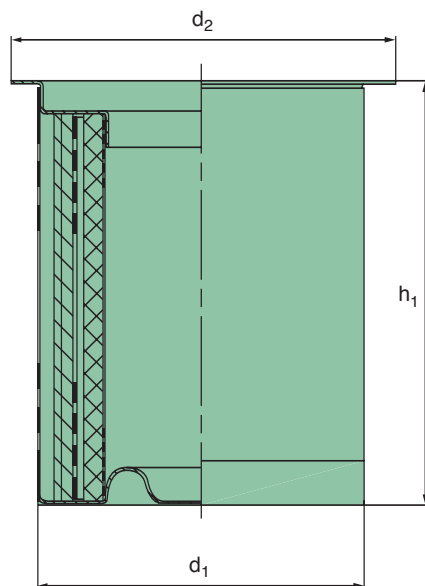
The rise in flow resistance and thus service life primarily depend on the cleanness of the oil and the quality of the air filter. A service life of several thousand hours can be achieved with a well-functioning system.



-  Compressed air inlets for oil saturated air (2 inlet alternatives)
-  to oil injection
-  oil-free compressed air

Installation of Standard Wrap Element in pressure reservoir

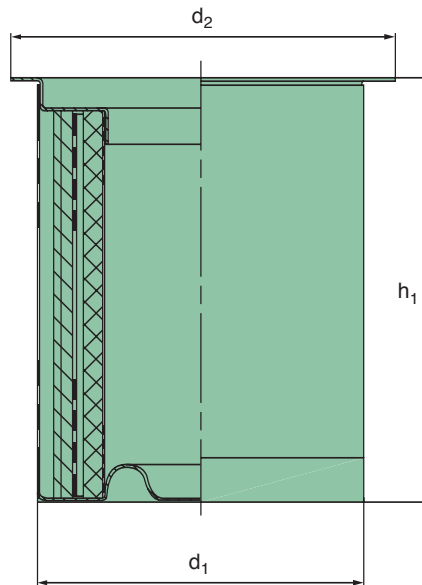
Dimensions and order numbers



Order No.	Nominal flow rate ¹⁾ [m ³ /min] [cfm]	Dimensions in mm [<i>dimensions in inches</i>]			with seals
		d ₁	d ₂	h ₁	
49 401 53 102	1.3 [45.91]	135 [5.31]	160 [6.30]	65 [2.56]	–
49 300 55 171	1.8 [63.57]	110 [4.33]	165 [6.50]	100 [3.94]	x
49 300 53 222	2.2 [77.69]	100 [3.94]	175 [6.89]	150 [5.91]	–
49 301 53 401	3.3 [116.54]	135 [5.31]	170 [6.69]	160 [6.30]	–
49 301 53 141	3.7 [130.66]	135 [5.31]	220 [8.66]	175 [6.89]	–
49 301 53 131	4.3 [151.85]	135 [5.31]	170 [6.69]	200 [7.87]	–
49 301 55 151	4.3 [151.85]	135 [5.31]	215 [8.46]	200 [7.87]	x
49 301 53 532	5.2 [183.64]	170 [6.69]	220 [8.66]	160 [6.30]	–
49 301 55 361	5.2 [183.64]	110 [4.33]	165 [6.50]	250 [9.84]	x
49 403 53 121	5.3 [187.17]	170 [6.69]	200 [7.87]	180 [7.09]	–
49 404 53 111	5.7 [201.29]	220 [8.66]	274 [10.79]	160 [6.30]	–
49 301 53 151	5.8 [204.83]	220 [8.66]	274 [10.79]	160 [6.30]	–

¹⁾ Flow rate according to DIN 1945 at 7 bar (0.7 MPa) operating pressure.
Specially adapted sizes are available on request.

Dimensions and order numbers



Order No.	Nominal flow rate ¹⁾ [m ³ /min] [cfm]	Dimensions in mm [<i>dimensions in inches</i>]			with seals
		d ₁	d ₂	h ₁	
49 301 53 101	6.5 [229.55]	170 [6.69]	200 [7.87]	230 [9.06]	–
49 302 55 151	6.8 [240.14]	135 [5.31]	178 [7.01]	305 [12.01]	x
49 406 55 101	8.6 [303.71]	220 [8.66]	274 [10.79]	230 [9.06]	x
49 302 53 131	8.9 [314.30]	170 [6.69]	200 [7.87]	305 [12.01]	–
49 302 55 581	8.9 [314.30]	275 [10.83]	296 [11.65]	190 [7.48]	x
49 302 53 451	9.0 [317.83]	220 [8.66]	274 [10.79]	240 [9.45]	–
49 406 55 111	9.5 [335.49]	220 [8.66]	328 [12.91]	250 [9.84]	x
49 407 53 101	11.0 [388.46]	275 [10.83]	328 [12.91]	230 [9.06]	–
49 302 53 321	11.2 [395.52]	170 [6.69]	200 [7.87]	380 [14.96]	–
49 302 55 131	11.8 [416.71]	220 [8.66]	290 [11.42]	305 [12.01]	x
49 408 53 101	12.1 [427.31]	275 [10.83]	328 [12.91]	250 [9.84]	–
49 302 53 171	12.5 [441.43]	170 [6.69]	245 [9.65]	420 [16.54]	–

¹⁾ Flow rate according to DIN 1945 at 7 bar (0.7 MPa) operating pressure.
Specially adapted sizes are available on request.

Dimensions and order numbers

Order No.	Nominal flow rate ¹⁾ [m ³ /min] [cfm]	Dimensions in mm [<i>dimensions in inches</i>]			with seals
		d ₁	d ₂	h ₁	
49 302 55 491	14.6 [515.59]	275 [10.83]	296 [11.65]	250 [9.84]	x
49 303 55 171	15.0 [529.72]	275 [10.83]	328 [12.91]	305 [12.01]	x
49 303 55 351	15.0 [529.72]	275 [10.83]	260 [14.17]	305 [12.01]	x
49 303 55 121	15.7 [554.44]	220 [8.66]	290 [11.42]	400 [15.75]	x
49 409 53 101	15.7 [554.44]	220 [8.66]	362 [14.25]	400 [15.75]	–
49 303 53 121	16.4 [579.16]	300 [11.81]	355 [13.98]	305 [12.01]	–
49 412 53 111	17.3 [610.94]	275 [10.83]	328 [12.91]	350 [13.78]	–
49 303 53 261	19.0 [670.98]	300 [11.81]	355 [13.98]	350 [13.78]	–
49 412 55 101	19.6 [692.17]	300 [11.81]	355 [13.98]	360 [14.17]	x
49 303 53 111	20.0 [706.29]	275 [10.83]	328 [12.91]	400 [15.75]	–
49 304 53 101	22.0 [776.92]	300 [11.81]	355 [13.98]	400 [15.75]	–
49 304 55 241	25.3 [893.46]	275 [10.83]	360 [14.17]	500 [19.69]	x
49 414 53 111	25.3 [893.46]	275 [10.83]	328 [12.91]	500 [19.69]	–
49 305 53 111	27.7 [978.22]	300 [11.81]	355 [13.98]	500 [19.69]	–
49 305 55 121	30.0 [1059.44]	300 [11.81]	355 [13.98]	540 [21.26]	x
49 418 53 111	33.5 [1183.04]	300 [11.81]	355 [13.98]	600 [23.62]	–
49 305 55 181	34.0 [1200.70]	350 [13.78]	430 [16.93]	440 [17.32]	x
49 306 55 131	38.6 [1363.15]	400 [15.75]	434 [17.09]	520 [20.47]	x
49 306 53 102	39.3 [1387.87]	300 [11.81]	355 [13.98]	700 [27.56]	–
49 306 53 181	43.0 [1518.53]	350 [13.78]	430 [16.93]	550 [21.65]	–
49 307 53 102	45.1 [1592.69]	300 [11.81]	355 [13.98]	800 [31.50]	–
49 307 55 111	46.4 [1638.60]	400 [15.75]	434 [17.09]	620 [24.41]	x

¹⁾ Flow rate according to DIN 1945 at 7 bar (0.7 MPa) operating pressure.
Specially adapted sizes are available on request.

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