

Climate
Control

IMI Pneumatex

Zeparo Cyclone Max



Automatic air vents and separators

Dirt and magnetite separator with Cyclonic technology
DN50 - DN 300

Zeparo Cyclone Max

Comprehensive range of products for sludge and magnetite separation in heating and cooling water systems. The number of potential applications as well as their modular construction is unique. Thanks to the cyclonic technology dirt separation efficiency is taken to the next level.

Key features

High efficiency independent of dimension

Separation efficiency increases together with flow velocity. The pressure drop remains stable regardless of the amount of dirt collected. Even higher protection for higher flows, e.g. in cooling applications. Suitable for heating and cooling installations.

Cleans and protects the installation

Protects critical investments such as boilers, pumps, valves, chillers, and calorimeters, from dirt-related malfunction and failure. No risk of clogging - the dirt collected can be easily and quickly flushed out with the help of the drain valve. Reduces maintenance and associated costs over entire system lifetime.

Magnet Accessory

Optimizes separation efficiency even further for sludge and magnetite (black iron oxide) deposits that consist of finer magnetic particles. Easy handling and cleaning.



Technical description

Application:

Closed heating and chilled water systems.

Media:

Non-aggressive and non-toxic system media.
Ethylene or propylene glycol-based antifreeze up to 50%.

Pressure:

Max. admissible pressure, PS: 10 bar
Min. admissible pressure, PSmin: 0 bar

Temperature:

Max. admissible temperature, t_{Smax} : 110 °C
Min. admissible temperature, t_{Smin} : -10 °C

Material:

Steel. Color beryllium.

Marking:

Body: flow direction arrow.
Label: DN, PN, t_{Smax} and t_{Smin} .

Connection:

Flanges PN 16 according to EN 1092-1.
Welding ends.

Transportation and storage:

In dry places.

Standard:

Constructed according to PED 2014/68/EU.

Separation principle

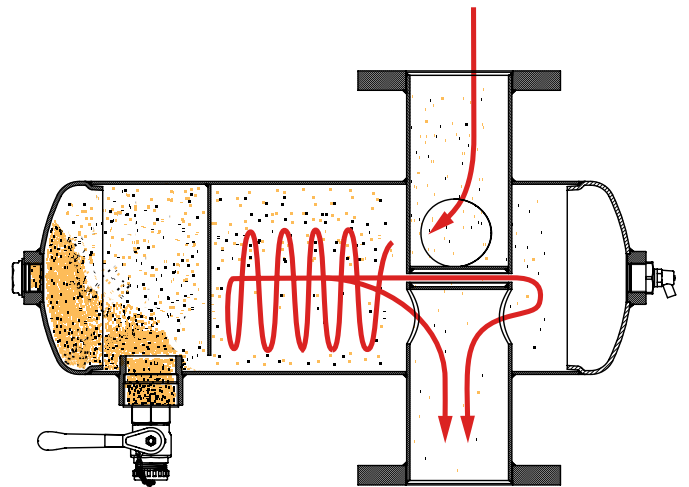
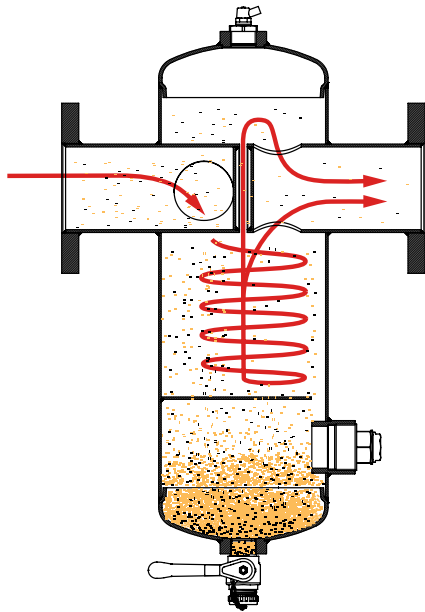
The cyclonic principle

The Zeparo Cyclone Max is based on a variety of principles that guarantee its high separation efficiency:

- Centrifugal forces - the cyclone creates a rotation within the Zeparo which results in additional forces on the dirt particles. The combination of gravitational and centrifugal forces result in high efficiency.
- Compared to the low gravity forces the centrifugal forces are significantly higher based on the speed inside the separator.
- The difference in density between the water and dirt particles

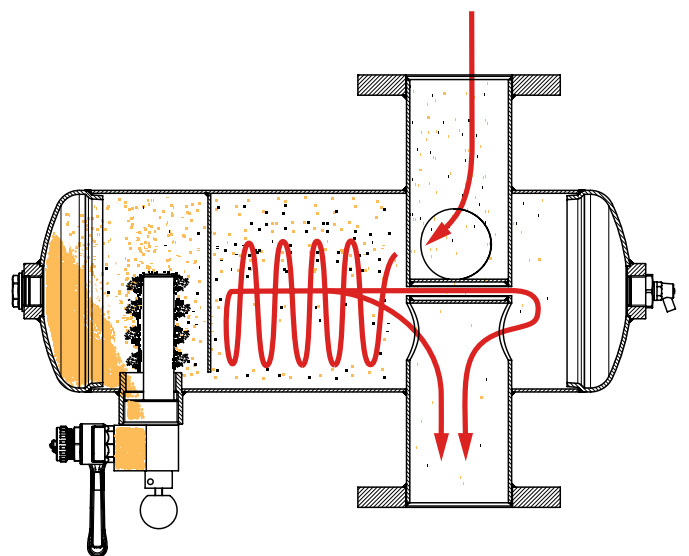
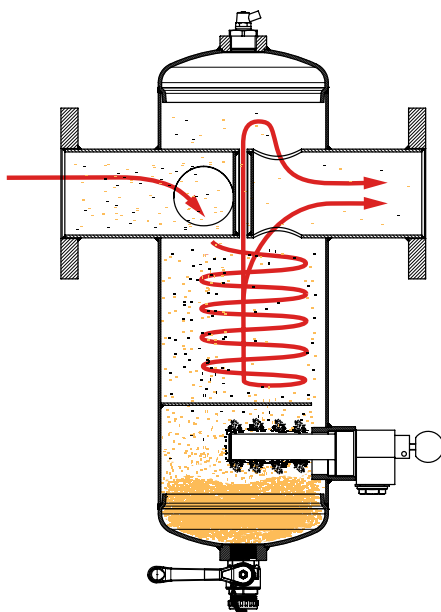
(which have higher density) pushes the dirt particles to the outer wall of the Zeparo.

- Downwards stream: the downwards movement created within the Zeparo guides the dirt particles to the bottom and finally into the dirt collection chamber to be flushed out.
- In addition the ZCXM magnetic rod will effectively increase the magnetite separation.



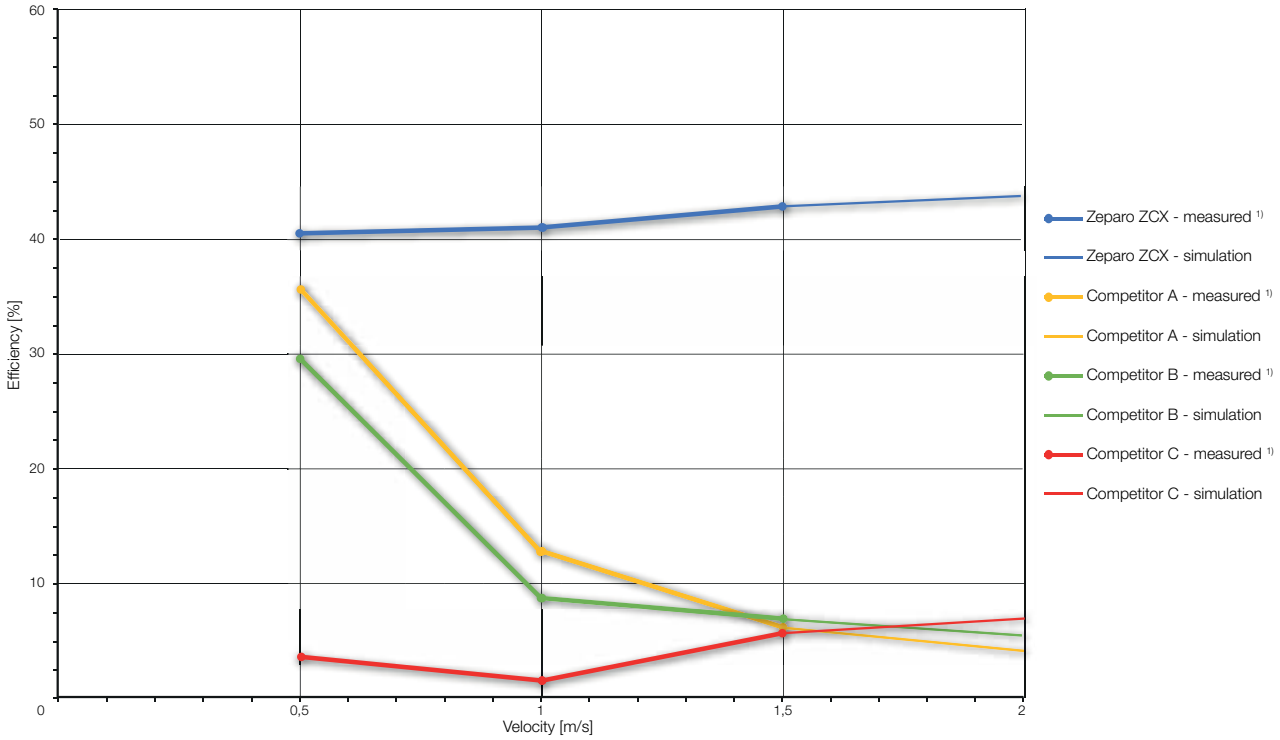
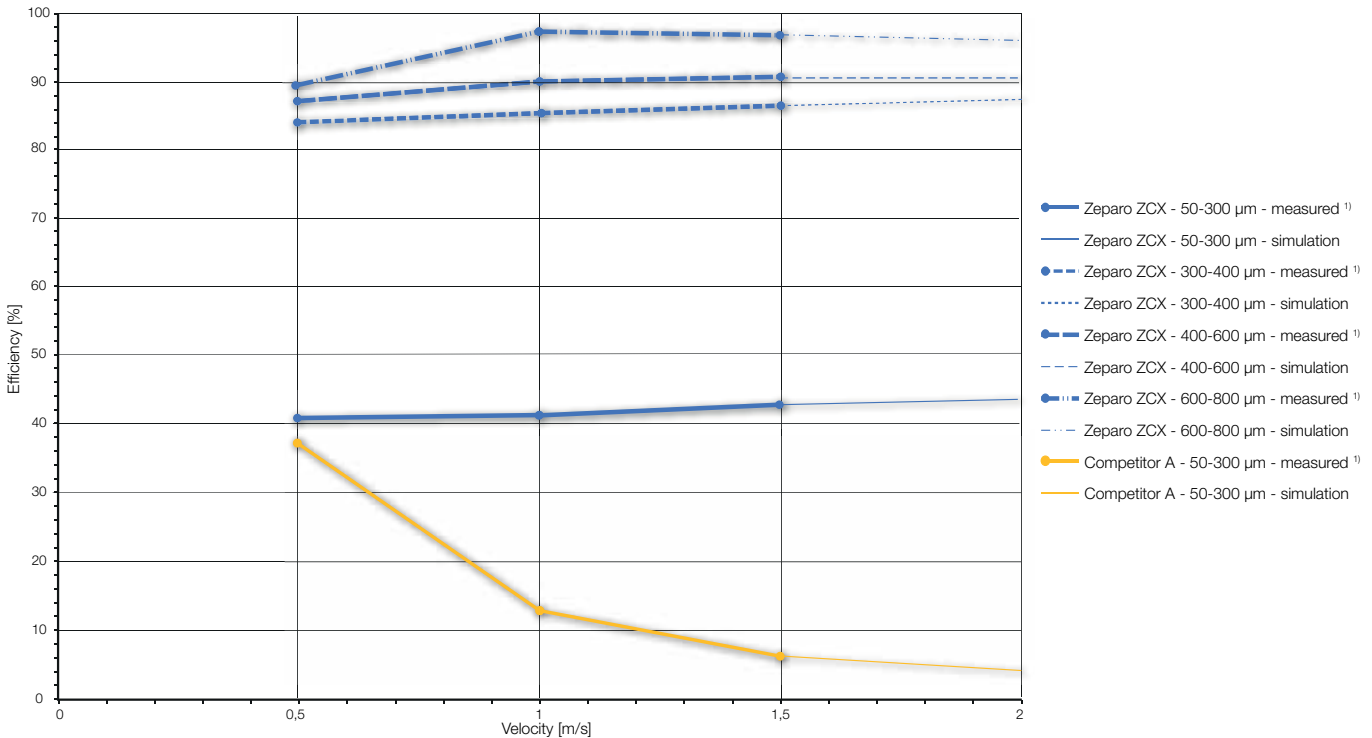
The cyclonic principle works regardless of installation, as the unit can be mounted in pipes running both horizontally, and vertically with a downward flow direction (see Page 9). The efficiency of the Zeparo Cyclone Max is highest when the separator chamber is positioned upright.

The optional ZCXM magnetic rod enhances separation performance, enabling the removal of magnetite particles down to 5 µm.



Separation efficiency

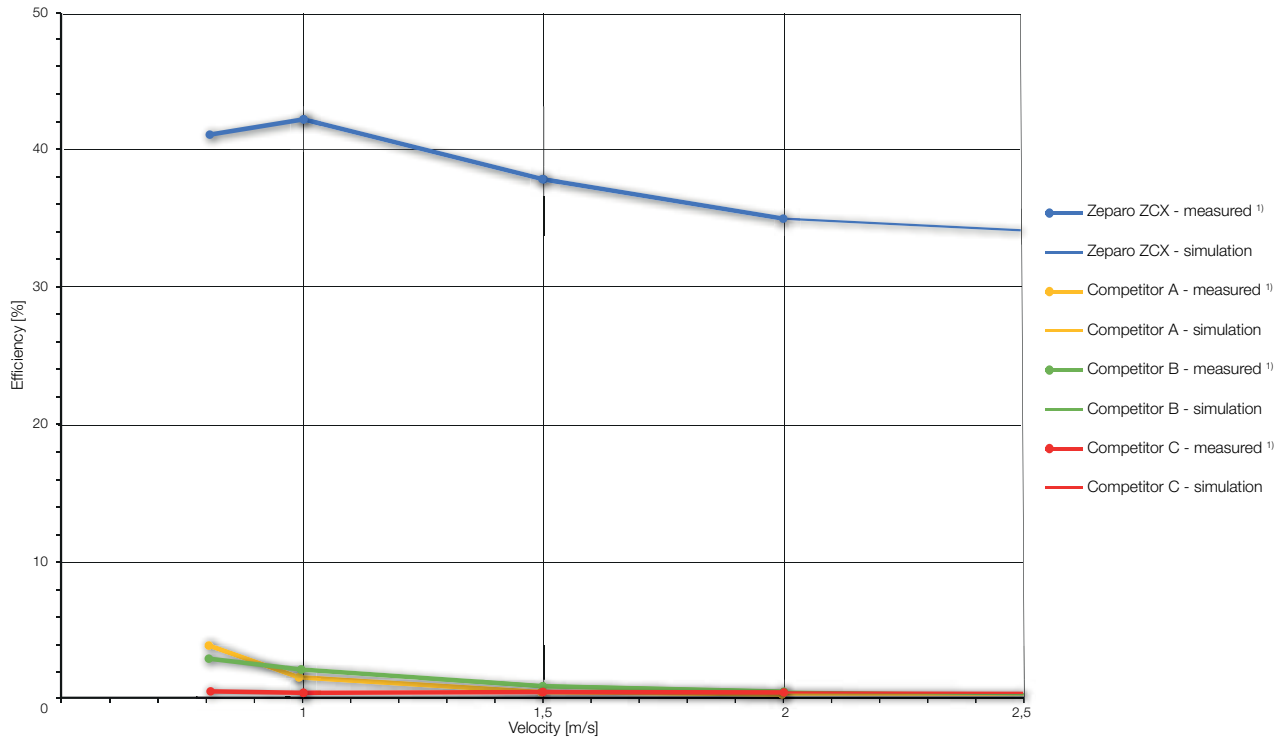
A comparison of the Zeparo Cyclone Max with separators featuring different technologies

 Separator ²⁾ DN65 - Glass particles 50-300 µm

 Separator ²⁾ DN65 - Glass particles with batch differentiation 50-800 µm


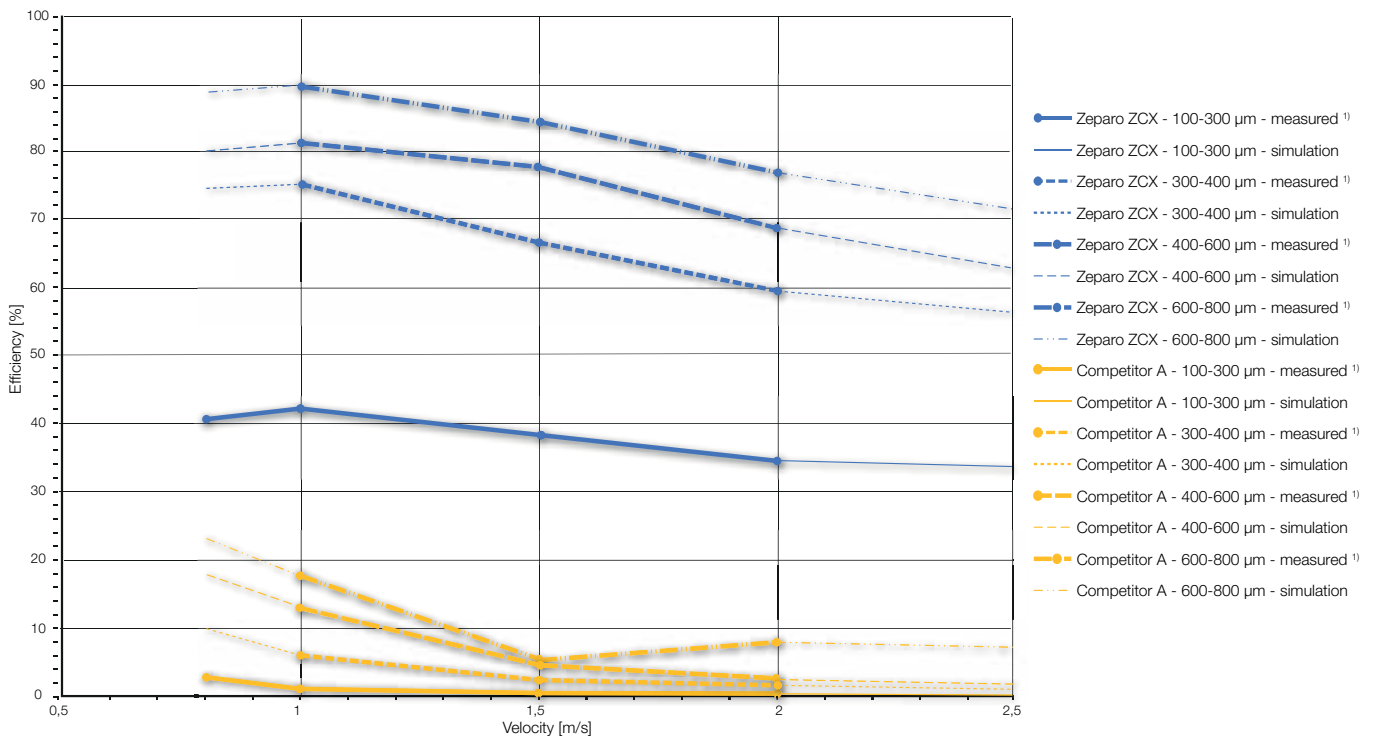
¹⁾ HLK Stuttgart GmbH, DAkkS Deutsche Akkreditierungsstelle D-PL-11026-01-00, Measured values according to test report No.: H.2412.P.817.IMI, 17th January 2025.

²⁾ Horizontal installation, with the separation chamber positioned upright.

Separator ²⁾ DN200 - Glass particles 100-300 µm



Separator ²⁾ DN200 - Glass particles with batch differentiation 100-800 µm



1) HLK Stuttgart GmbH, DAkKS Deutsche Akkreditierungsstelle D-PL-11026-01-00, Measured values according to test report No.: H.2412.P.817.IMI, 17th January 2025.

2) Horizontal installation, with the separation chamber positioned upright.

Magnetic flux density and typified magnetic flux on magnetic rods

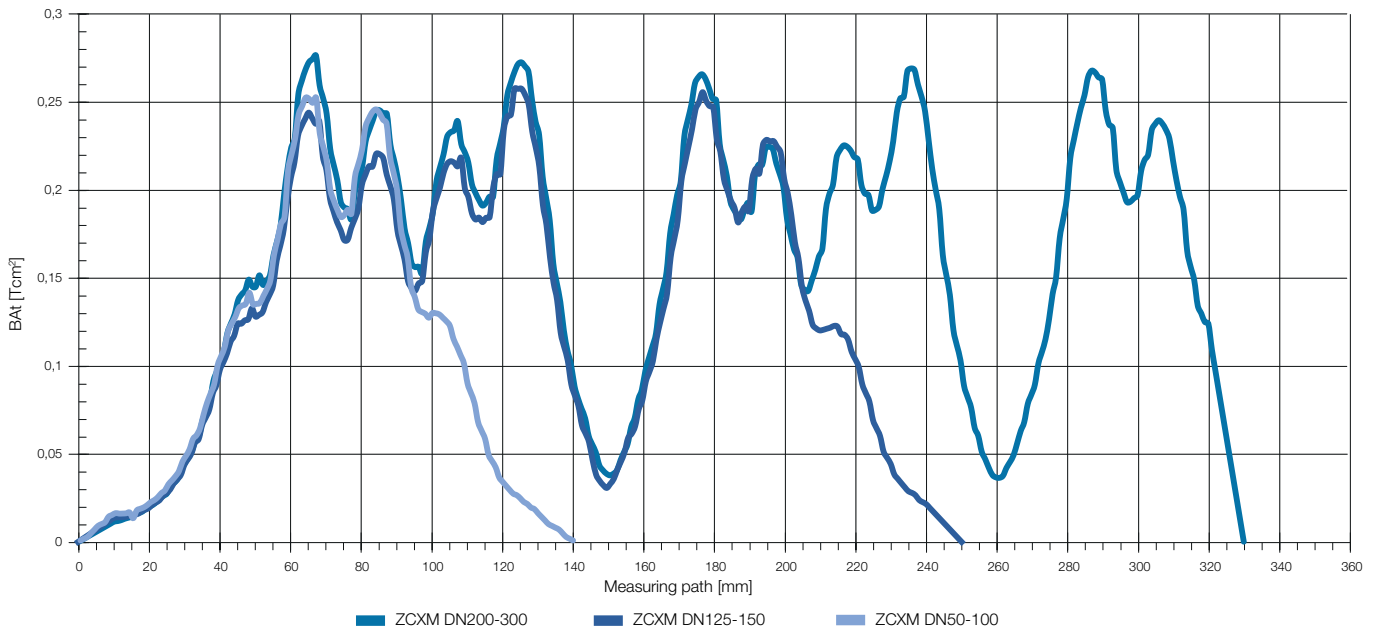
The characteristic measurable physical quantity for evaluating the separation potential of a magnetite separator is the magnetic flux density B on the magnetic rod used. Magnetic flux density is an areal density. If this is measured over the magnetically effective surface of a magnetic rod and related to the surface under consideration as a product, an individual key parameter is obtained that we refer to here as “typified magnetic flux B_{AT} ”.

The typified magnetic flux B_{AT} is therefore the relevant parameter for the magnetite absorption potential of the magnetic rod. The typed magnetic flux B_{ATcum} accumulated over the entire effective surface correlates with the maximum magnetite actually adhering to the magnetic rod and can be used as a simple and meaningful characteristic parameter for determining the quality of a magnetic rod. The mere use of a maximum value or average value for the magnetic flux density B , on the other hand, is not meaningful.

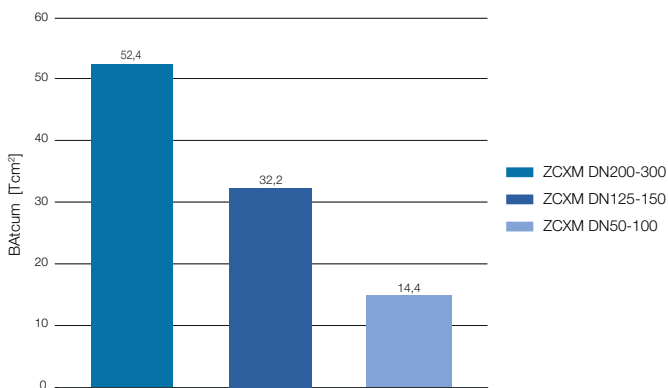
In some cases, individual magnetic rods absorb significantly more magnetite than would be expected from the values of the cumulative magnetic flux B_{ATcum} , e.g. with the ZCXM DN 125-150, with the Competitor C and also when comparing all ZCXMs with competitors. This is mainly due to the magnetic bar geometry and also to the test procedure.

An overview of Zeparo ZCXM magnetic rods

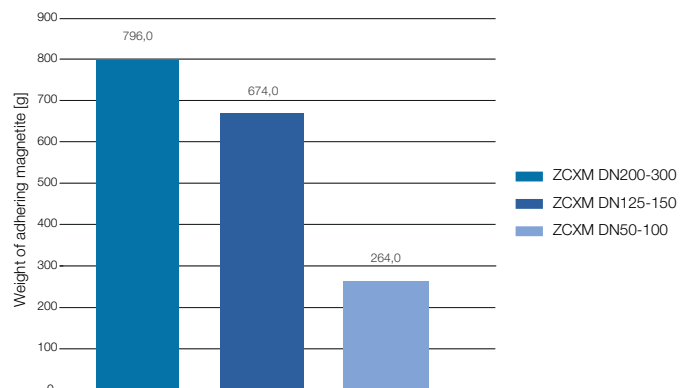
Magnetic flux distribution over effective rod surface
- application range for Zeparo ZCXM DN50-300 ²⁾



Cumulative magnetic flux over effective rod surface
- application range for Zeparo ZCXM DN50-300 ²⁾



Maximum dry absorption capacity of magnetite powder
- application range for Zeparo ZCXM DN50-300 ³⁾

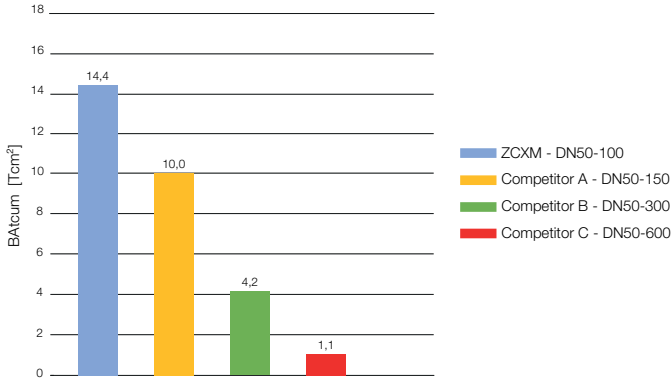


²⁾ Measured values for B_{AT} calculation taken from the investigation report: thyssenkrupp Magnettechnik - Zweigniederlassung der thyssenkrupp Schulte GmbH, M. Schlotke, Untersuchungsbericht: “Magnetische Charakterisierung von 4 Filterstäben”, 20th January 2025.

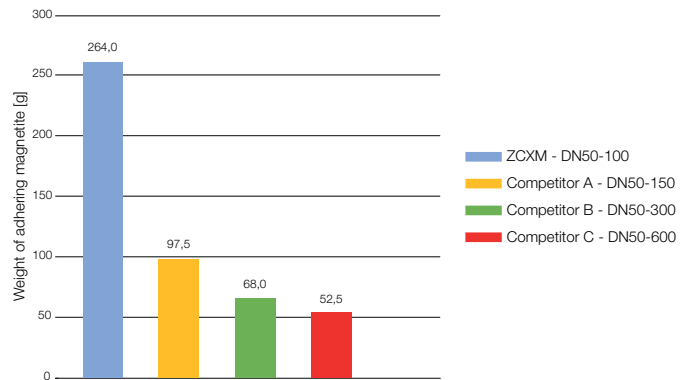
³⁾ Measured values taken from the investigation report: thyssenkrupp Magnettechnik - Zweigniederlassung der thyssenkrupp Schulte GmbH, M. Schlotke, “Untersuchung von 4 Filterstäben hinsichtlich Magnetitanhaftung”, 21st January 2025.

A comparison of the Zeparo ZCXM with other magnetic rod designs

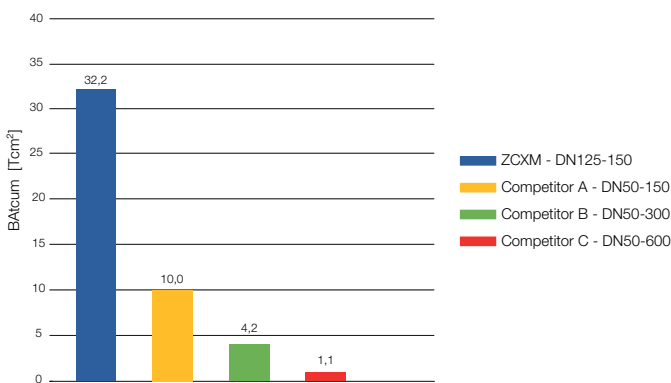
Cumulative magnetic flux over effective rod surface
- application range DN50-100 ²⁾



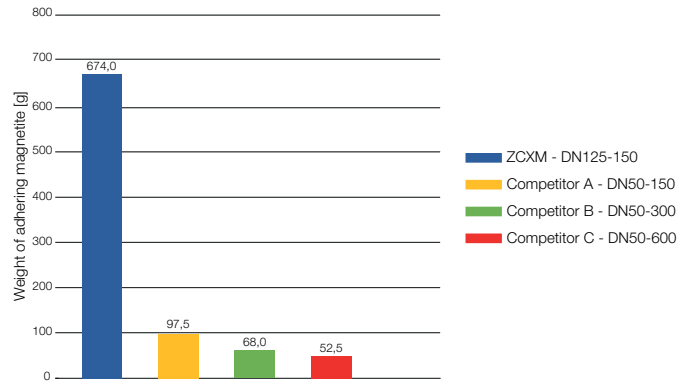
Maximum dry absorption capacity of magnetite powder
- application range DN50-100 ³⁾



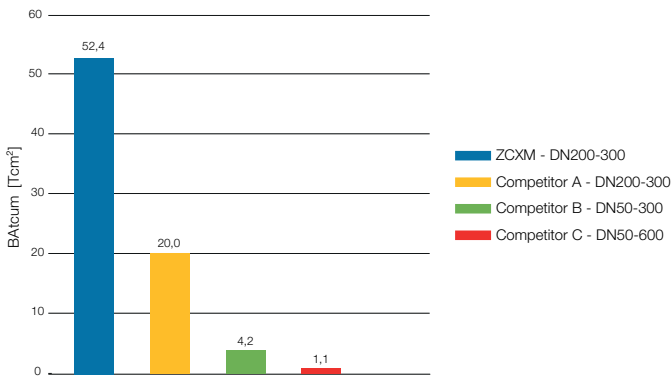
Cumulative magnetic flux over effective rod surface
- application range DN125-150 ²⁾



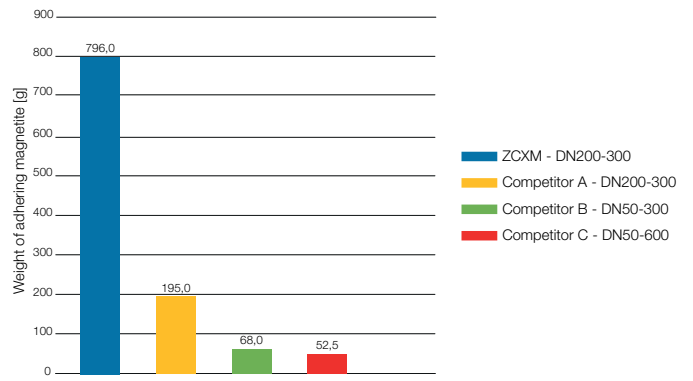
Maximum dry absorption capacity of magnetite powder
- application range DN125-150 ³⁾



Cumulative magnetic flux over effective rod surface
- application range DN200-300 ²⁾



Maximum dry absorption capacity of magnetite powder
- application range DN200-300 ³⁾

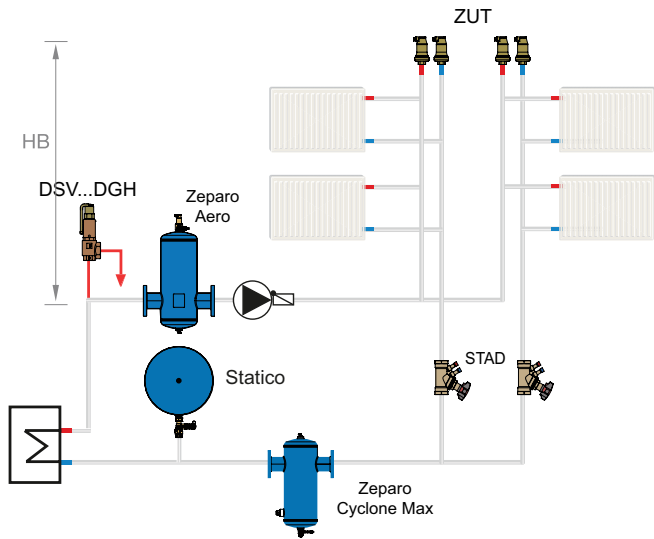


2) Measured values for BA_t calculation taken from the investigation report: thyssenkrupp Magnettechnik - Zweigniederlassung der thyssenkrupp Schulte GmbH, M. Schlottke, Untersuchungsbericht: "Magnetische Charakterisierung von 4 Filterstäben", 20th January 2025.

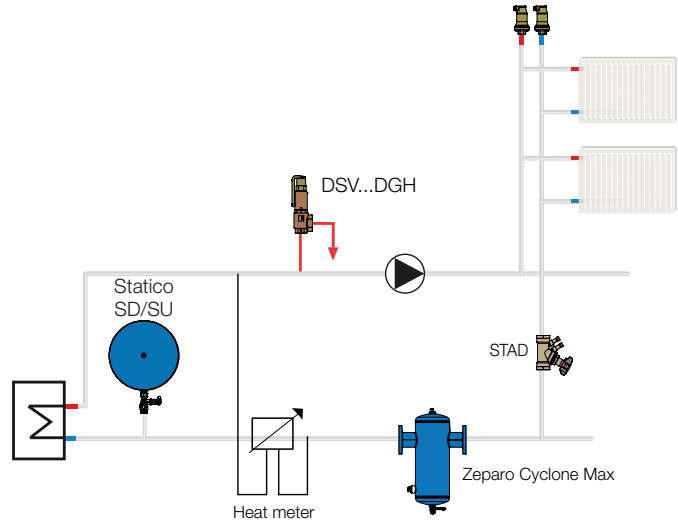
3) Measured values taken from the investigation report: thyssenkrupp Magnettechnik - Zweigniederlassung der thyssenkrupp Schulte GmbH, M. Schlottke, "Untersuchung von 4 Filterstäben hinsichtlich Magnetitanhaftung", 21st January 2025.

Application examples

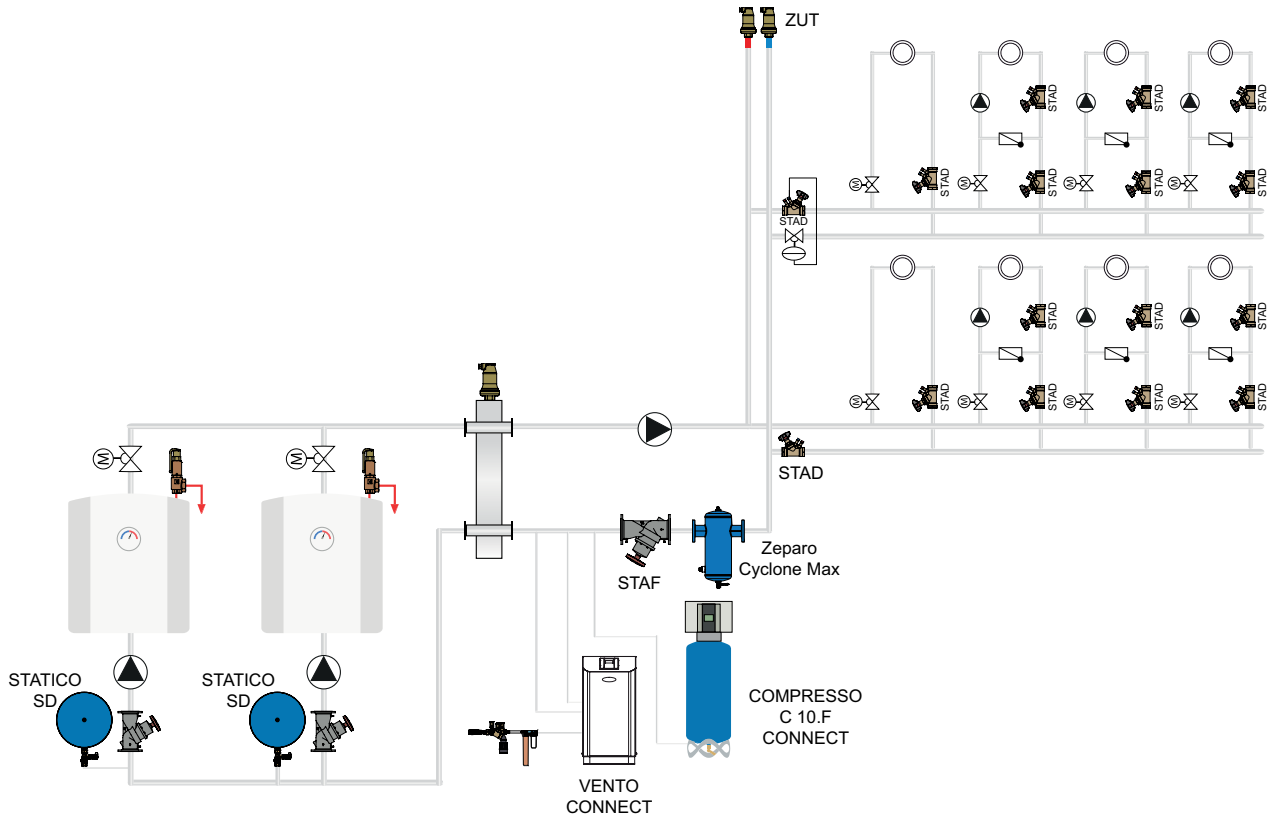
System with boiler



System with heat exchanger

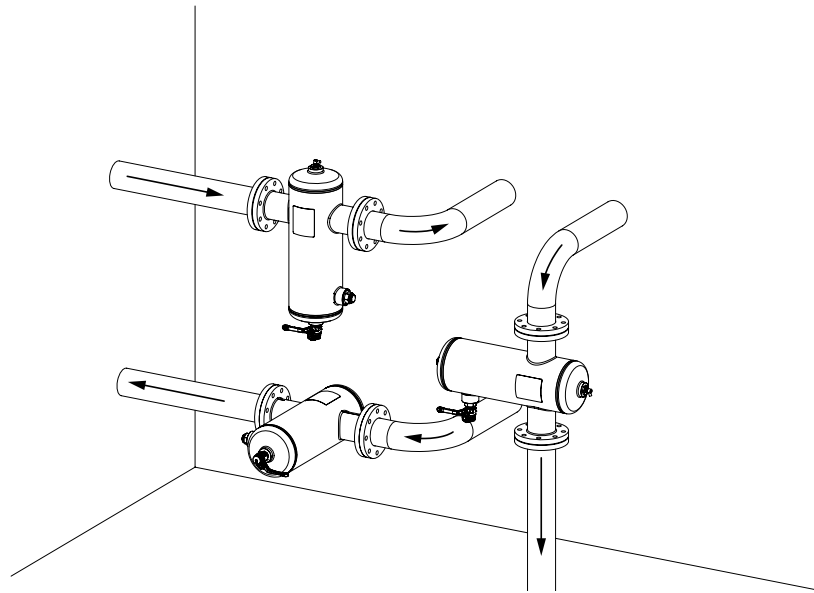


System with boiler



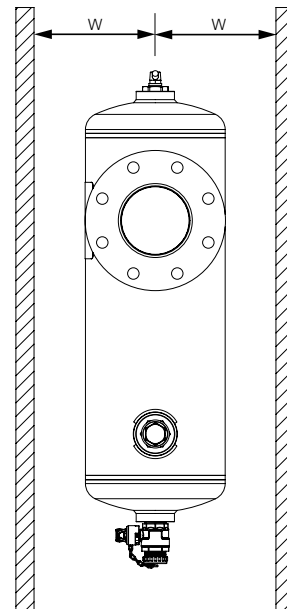
The Zeparo Cyclone Max should be mounted either on the return in front of the unit to be protected or directly in front of the energy source. There is no minimum distance required to pipe bends etc. before or after the Zeparo Cyclone Max.

Installation



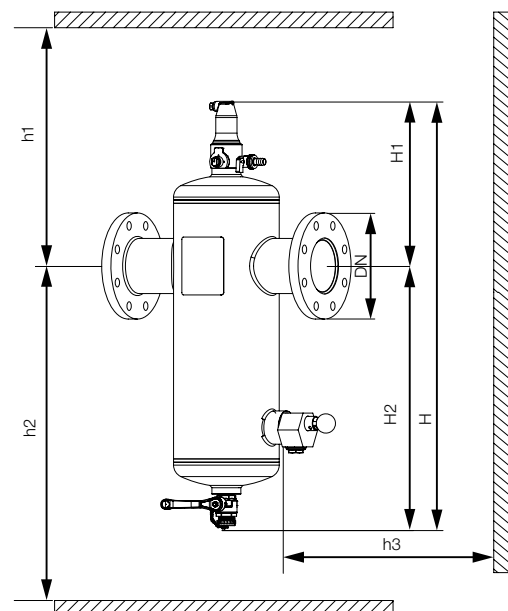
Wall distance (all versions)

Type	W	with insulation
ZCX 50	134	175
ZCX 65	134	175
ZCX 80	160	200
ZCX 100	160	200
ZCX 125	212	250
ZCX 150	212	250
ZCX 200	279	320
ZCX 250	355	395
ZCX 300	355	395



Wall-ceiling-floor clearances (with ZUTX installed)

Type	DN	H	H1	H2	h1	h2	h3
ZCX 50	50	770	325	445	575	695	377
ZCX 65	65	770	325	445	575	695	377
ZCX 80	80	910	355	555	605	805	377
ZCX 100	100	910	355	555	605	805	377
ZCX 125	125	1130	415	715	665	965	487
ZCX 150	150	1130	415	715	665	965	487
ZCX 200	200	1440	490	950	740	1200	600
ZCX 250	250	1680	545	1135	795	1385	600
ZCX 300	300	1830	585	1245	835	1495	600



For other dimensions, refer to section Articles.

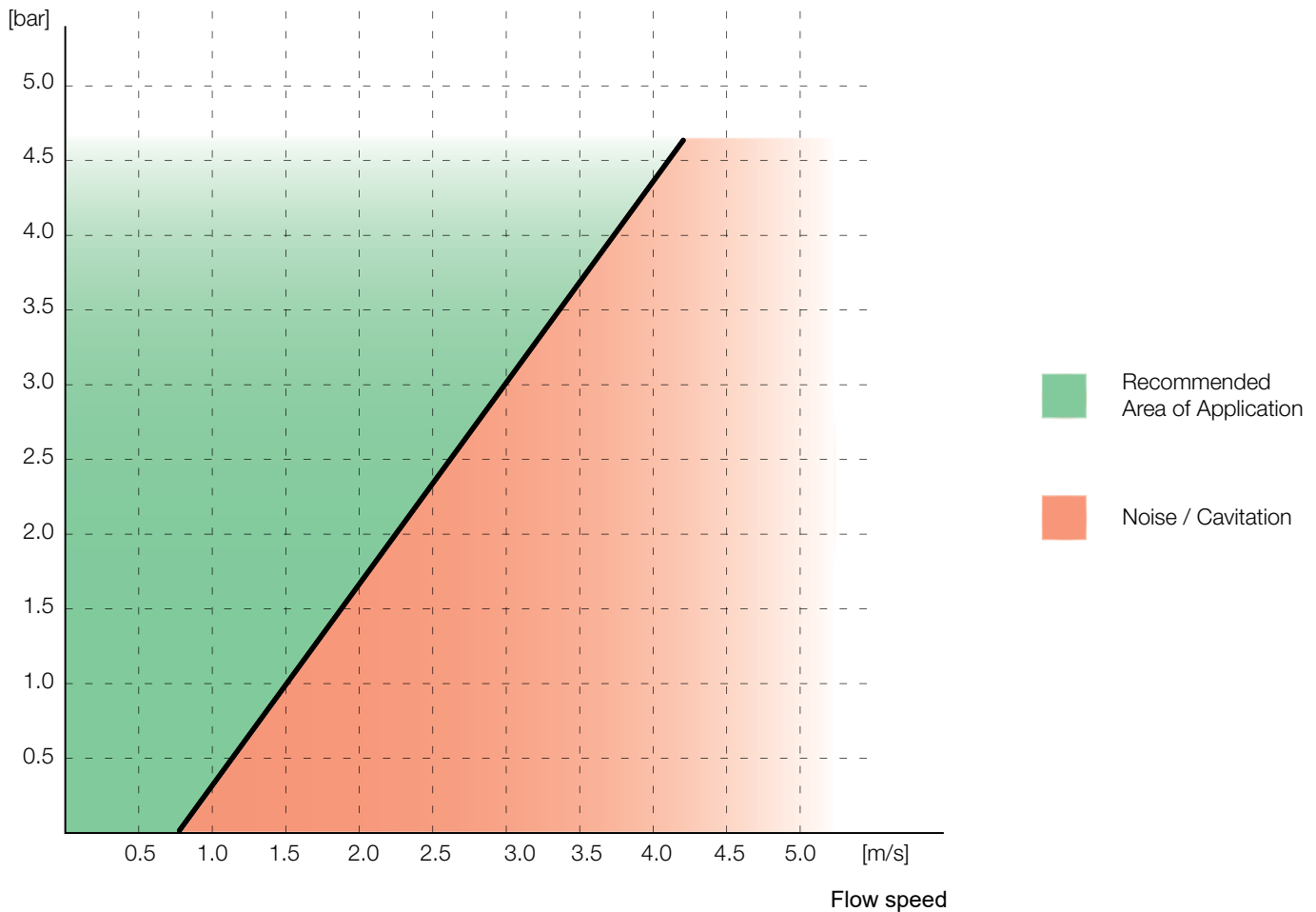
Volumes and Flows

DN	VN [l]	qN [m ³ /h]	q _{max} [m ³ /h]
50	11	6	24
65	11	11	40
80	23	18	56
100	24	33	95
125	70	58	148
150	73	93	216
200	175	184	375
250	370	336	575
300	430	535	815

VN = Nominal volume
 qN = Nominal flow/flow rate
 qN_{max} = Maximum flow

Minimum System Pressure

System Pressure



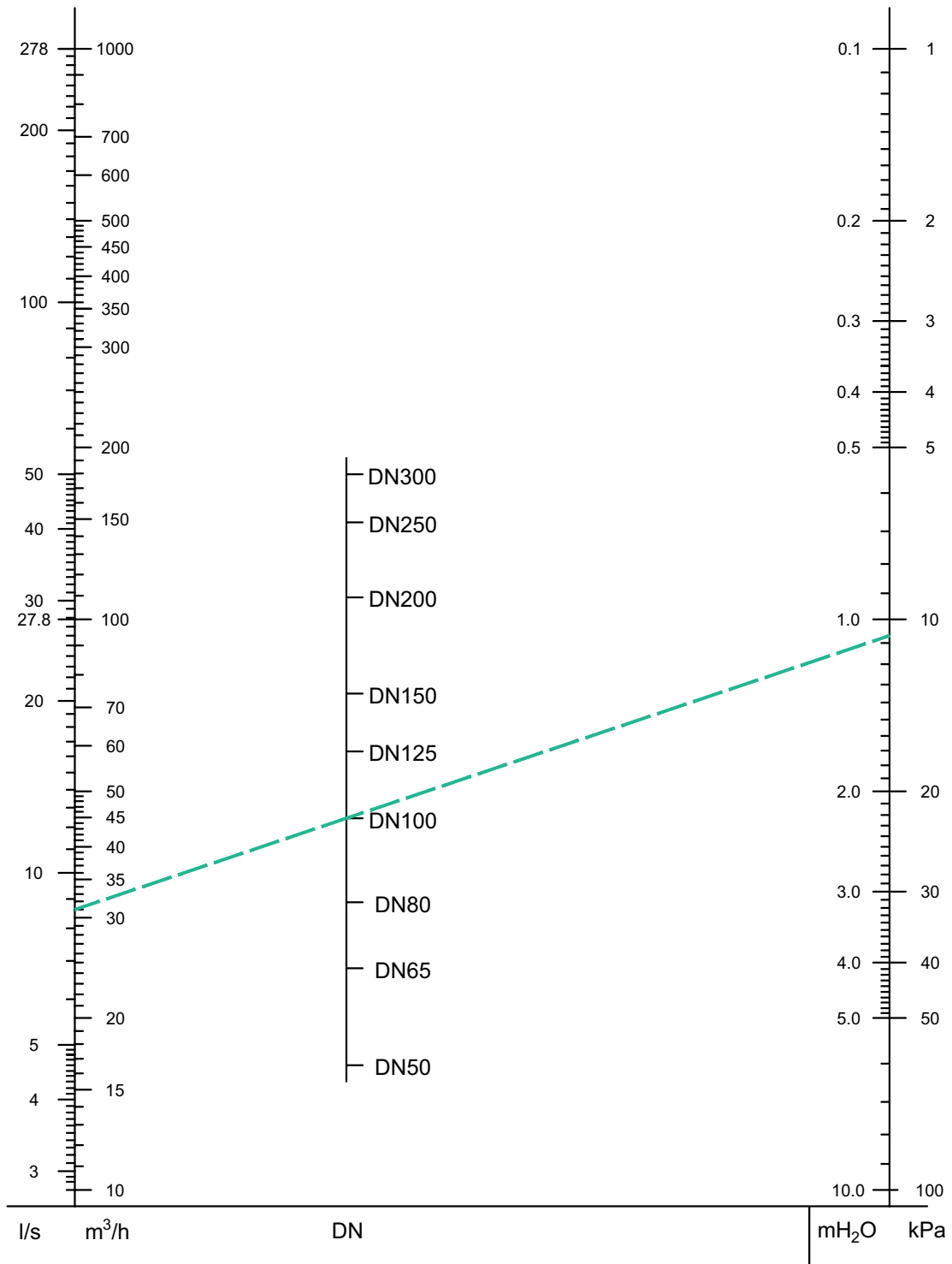
As seen in the above graph, at a flow speed of 2 m/s a minimum static+dynamic pressure of 1.7 bar must be maintained at the inlet of the Cyclone Max in order to avoid cavitation.

Quick selection

Heating

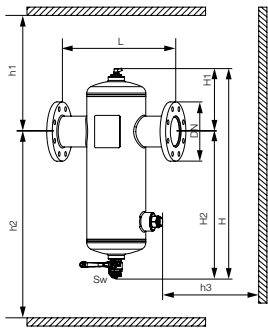
Example:

Heating system with a pipe DN 100 and 31 m³/h flow. Draw a line from the point 31 m³/h to required dimension DN 100 and read on the line for pressure drop 10,08 kPa.



Flow rate must not exceed the max flow rates of the relevant dimension.
For exact calculations please use HySelect software.

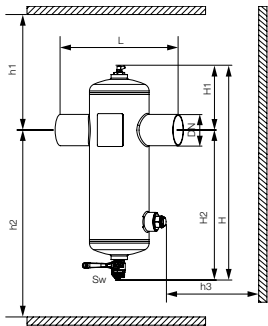
Articles



Flanged connection

Installation: horizontal, vertical (downward flow direction).

Type	DN*	Sw	H	H1	H2	h1**	h2	h3	L	q_N [m ³ /h]	q_{max} [m ³ /h]	Weight [kg]	Kvs [m ³ /h]	EAN	Article No
ZCX 50	50	G1	655	210	445	460	695	377	350	6	24	19	21,3	7640161645868	303041-10900
ZCX 65	65	G1	655	210	445	460	695	377	350	11	40	21	38,5	7640161645875	303041-11001
ZCX 80	80	G1	795	240	555	490	805	377	470	18	56	29	57,1	7640161645882	303041-11101
ZCX 100	100	G1	795	240	555	490	805	377	470	33	95	33	94,9	7640161645899	303041-11201
ZCX 125	125	G1	1015	300	715	550	965	487	635	58	148	59	142,0	7640161645905	303041-11301
ZCX 150	150	G1	1015	300	715	550	965	487	635	93	216	63	201,5	7640161645912	303041-11401
ZCX 200	200	G2	1325	375	950	625	1200	600	755	184	375	167	361,0	7640161645929	303041-11501
ZCX 250	250	G2	1565	430	1135	680	1385	600	890	336	575	242	570,0	7640161645936	303041-11601
ZCX 300	300	G2	1715	470	1245	720	1495	600	1005	535	815	277	731,8	7640161645943	303041-11701



Welded connection

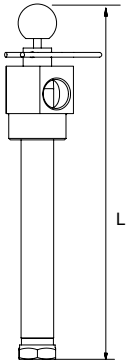
Installation: horizontal, vertical (downward flow direction).

Type	DN	Sw	H	H1	H2	h1**	h2	h3	L	q_N [m ³ /h]	q_{max} [m ³ /h]	Weight [kg]	Kvs [m ³ /h]	EAN	Article No
ZCX 50 W	50	G1	655	210	445	460	695	377	340	6	24	15	21,3	7640161645950	303041-20900
ZCX 65 W	65	G1	655	210	445	460	695	377	340	11	40	17	38,5	7640161645967	303041-21002
ZCX 80 W	80	G1	795	240	555	490	805	377	460	18	56	22	57,1	7640161645974	303041-21102
ZCX 100 W	100	G1	795	240	555	490	805	377	460	33	95	24	94,9	7640161645981	303041-21202
ZCX 125 W	125	G1	1015	300	715	550	965	487	625	58	148	48	142,0	7640161645998	303041-21302
ZCX 150 W	150	G1	1015	300	715	550	965	487	625	93	216	50	201,5	7640161646001	303041-21402
ZCX 200 W	200	G2	1325	375	950	625	1200	600	755	184	375	125	361,0	7640161646018	303041-21502
ZCX 250 W	250	G2	1565	430	1135	680	1385	600	870	336	575	202	570,0	7640161646025	303041-21602
ZCX 300 W	300	G2	1715	470	1245	720	1495	600	985	535	815	237	731,8	7640161646032	303041-21702

*) Flanges PN16

**) +115 when ZUTX is used

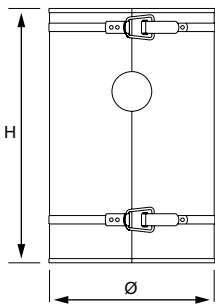
Accessories



Zeparo Magnet ZCXM

Magnet Attachment. For retrofitting to mounting on site in the range Zeparo Cyclone Max. T-branch with magnetic rod and pocket. To increase the magnetite capture. Ethylene or propylene glycol-based antifreeze up to 50%.

Type	PS [bar]	ts [°C]	Weight [kg]	L	EAN	Article No
ZCXM 50-100	10	110	3,6	277	7640161646179	303051-10004
ZCXM 125-150	10	110	4,0	387	7640161646186	303051-10005
ZCXM 200-300	10	110	4,5	500	7640161646193	303051-10006

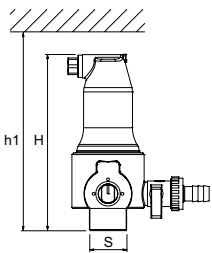


Zeparo ZCXAI

Thermal insulation for Zeparo Cyclone Max and Zeparo Aero. Heating water systems.

Type	DN	Ø	H	S*	Weight [kg]	EAN	Article No
ZCXAI 50/65	50/60	250	540	40	3,7	7640161646131	303040-70000
ZCXAI 80/100	80/100	300	680	40	7,3	7640161646148	303040-70001
ZCXAI 125/150	125/150	400	900	40	14,4	7640161646155	303040-70002
ZCXAI 200	200	535	1135	40	22,3	7640161646162	303040-70003
ZCXAI 250	250	690	1380	40	38,0	7640161646223	303040-70004
ZCXAI 300	300	690	1530	40	41,5	7640161646230	303040-70005

*) Insulation thickness
Additional dimensions available upon request.



Zeparo ZUTX eXtra-lockable

Male thread. Vertical installation.

Type	H	h1	Weight [kg]	D	PS [bar]	EAN	Article No
ZUTX 25	159	184	1,3	R1	10	7640148632485	789 1325

dpu = Working pressure range



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