DIRTMAG® magnetic dirt separator

5465M-NA5465M series

01137/23 NA
Replaces 01137/16 NA



Function

In heating and air conditioning control systems, the circulation of water containing impurities may result in rapid wear and damage to components such as pumps and control valves. It also causes blockages in heat exchangers, heating elements and pipes, resulting in lower thermal efficiency within the system.

The dirt separator removes these dirt particles, collecting them in a large collection chamber from which they can be flushed even while the system is in operation. This device is capable of efficiently removing even the smallest particles, with very low head loss.

The DIRTMAG® magnetic dirt separator removes both ferrous and non-ferrous impurities continuously, featuring powerful removable magnets that remove up to 100% of the ferrous impurities, including magnetite, that can form in a hydronic system. The DIRTMAG has 2 ½ times the removal performance of a standard dirt separator.

Product range

5465M series	DIRTMAG magnetic dirt separator, in steel	connections 2" to 4" ANSI flanged
NA5465M series	DIRTMAG magnetic dirt separator, in steel, ASME & CRN	connections 2" to 14" ANSI flanged

Technical specifications

Materials	- body:	epoxy resin painted steel
	- top cap:	brass
	- hydraulic seal:	non-asbestos fiber
	- drain valve:	brass
	- internal element: 5465M, NA5465M	stainless steel and HDPE
	- magnet:	neodymium rare - earth
	- magnet probe drywell:	brass

Performance

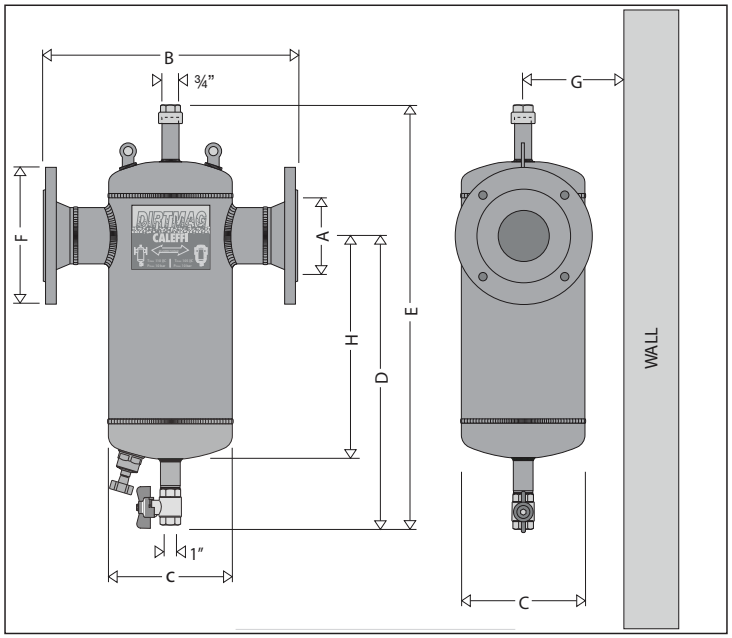
Suitable fluids:	water, glycol solution
Max. percentage of glycol:	50%
Max. working pressure:	150 psi (10 bar)
Temperature range (vessel):	32—270°F (0—132°C)
Particle separation capacity:	to 5 µm (0.2 mil)
Ferrous impurities separation efficiency:	up to 100% removal

Connections		2"– 14" ANSI B16.5 150 CLASS RF
	- top:	¾" NPT male (with cap)
	- thermo well tap (8" - 14" only): -inlet/outlet flanges:	½" NPT female
	- drain valve:	sizes 2 - 6 inch: 1" NPT sizes 8 - 14 inch: 2" NPT

Agency approval

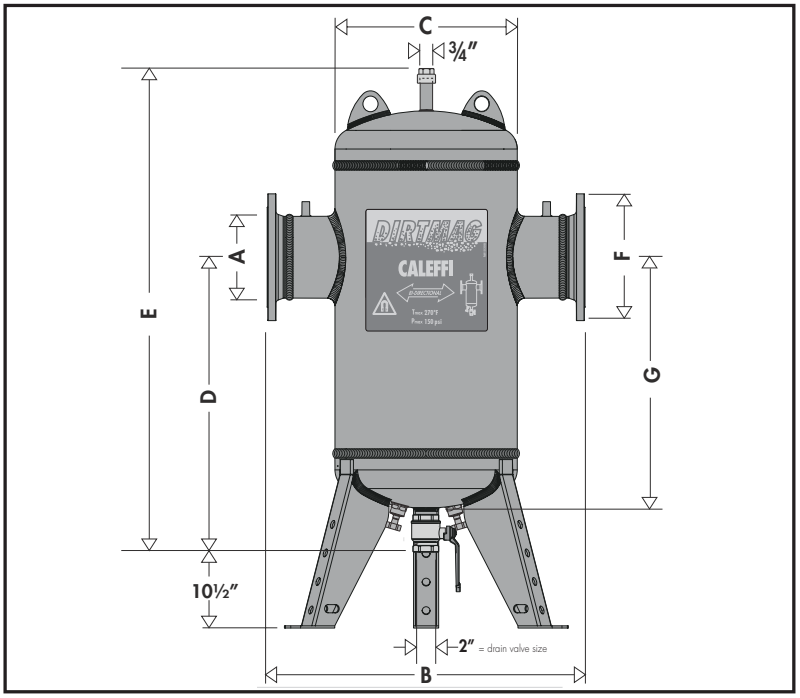
- series NA5465M is designed and built in accordance with Section VIII, Div. 1 of the ASME Boiler and Pressure Vessel Code and tagged and registered with the National Board of Boiler and Pressure Vessel Inspectors, stamped for 150 psi (10 bar) working pressure with ASME U-Stamp.
- 2 - 12 inch series NA5465A and AM are CRN Registered. Consult factory for 14 inch size.

Dimensions



Code	A	B	C	D	E	F	G*	H	Capacity (gal)	Wt. lb (kg)
546550AM	2"	13¾"	6 5/8"	16 5/16"	23 7/8"	6"	6 5/16"	12"	1.8	41 (20)
546560AM	2½"	13¾"	6 5/8"	16 5/16"	23 7/8"	7"	6 5/16"	12"	1.8	41 (20)
546580AM	3"	18 3/8"	8 5/8"	20 11/16"	30 5/8"	7½"	7 5/16"	13 3/8"	4.8	58 (26)
546510AM	4"	18 3/8"	8 5/8"	20 11/16"	30 5/8"	9"	7 5/16"	13 3/8"	4.8	58 (26)
NA546550AM	2"	13¾"	6 5/8"	16 5/16"	23 7/8"	6"	6 5/16"	12"	1.8	41 (20)
NA546560AM	2½"	13¾"	6 5/8"	16 5/16"	23 7/8"	7"	6 5/16"	12"	1.8	41 (20)
NA546580AM	3"	18 3/8"	8 5/8"	20 11/16"	30 5/8"	7½"	7 5/16"	13 3/8"	4.8	58 (26)
NA546510AM	4"	18 3/8"	8 5/8"	20 11/16"	30 5/8"	9"	7 5/16"	13 3/8"	4.8	58 (26)
NA546512AM	5"	25"	12¾"	23 3/16"	34 15/16"	10"	9 3/8"	17 3/16"	13.7	141 (65)
NA546515AM	6"	25"	12¾"	23 3/16"	34 15/16"	11"	9 3/8"	17 3/16"	13.7	151 (70)

*This dimension allows for a minimum of 3" wall clearance to accommodate insulation if used.



Code	A	B	C	D	E	F	G	Capacity (gal)	Wt. lb (kg)
NA546520AM	8"	35½"	20"	34½"	53"	13½"	28¾"	56	345(156)
NA546525AM	10"	41¾"	26"	40"	59"	16"	34½"	110	630 (286)
NA546530AM	12"	46½"	30"	45⅛"	66⅞"	19"	39⅜"	170	880 (400)
NA546535AM	14"	48"	36"	57½"	82¾"	21"	51¾"	305	1010 (458)

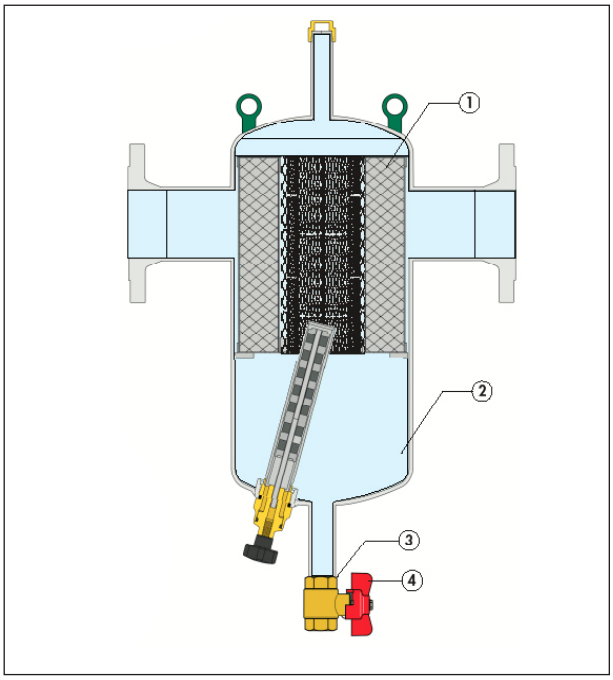
Hydraulic characteristics

		DIRTMAG® steel body									
	Size	**2"**	**2½"**	**3"**	**4"**	**5"**	**6"**	**8"**	**10"**	**12"**	**14"**
Max. Flow Rate	GPM	89	150	227	355	816	904	1,570	2,450	3,525	4,800
	l/s	5.6	9.5	14.3	22.4	51.5	57	99	155	222	303
	Cv	88	176	211	328	520	842	1,055	1,400	1,755	2,075

Construction details

Low head losses and performance maintained over time

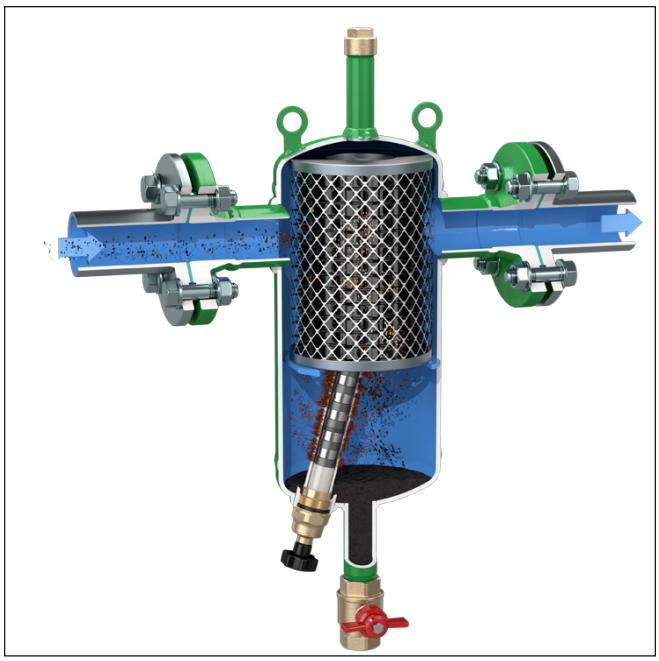
The dirt separating action performed by the dirt separator is based on using the internal element (1) with concentric diamond pattern mesh surfaces instead of an ordinary filter. The element offers little resistance to the medium flow while ensuring dirt separation. This occurs due to the particles colliding with the concentric diamond pattern mesh surfaces and then settling to the bottom, and not by filtration; which, over time, gets progressively clogged. By contrast, the DIRTMAG low velocity- zone magnetic dirt separator efficiently removes the particles to as small as 5 µm (0.2 mil) with very low head loss. The dirt collection chamber (2) at the bottom of the DIRTMAG is at the right distance from the inlet and outlet connections that the collected dirt particles are not affected by the swirling flow through the bottom drain port, even with the system running, by opening the drain valve (3) with the handle (4).



Operating principle DIRTMAG

Ferrous and non-ferrous impurities in hydronic systems can deposit onto heat exchanger surfaces and accumulate in pump cavities causing reduced thermal efficiency and premature wear. The small and often microscopic magnetic particles, called magnetite, form when iron or steel corrodes. Highly abrasive, the extremely fine particles are difficult to remove by traditional means. DIRTMAG® separators offer highly efficient separation of typical dirt as well as magnetite. The magnetite is captured by a concentrated magnetic field created by a stack of neodymium rare-earth magnets positioned inside a brass dry-well which is below the flow stream. Non-magnetic dirt particles are separated by colliding with an internal element in the flow stream, settling to the bottom. The deep collection chamber keeps the dirt from re-entering the flow stream.

For the steel DIRTMAG, the ferrous impurities are captured by a concentrated magnetic field created by a stack of neodymium rare-earth magnets positioned inside a brass dry-well below the flow stream.



Draining off dirt and ferrous impurities

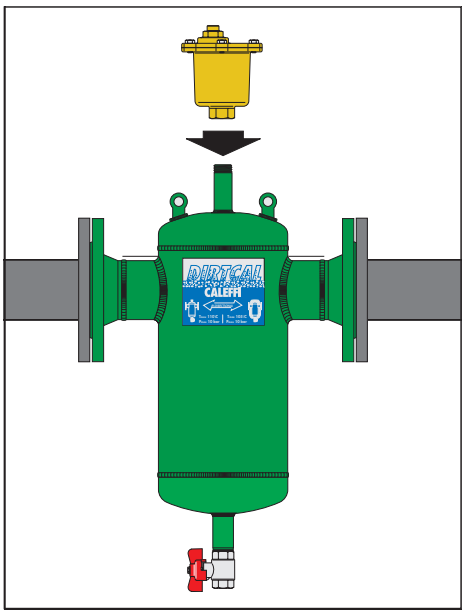
The dirt separator collection chamber has a drain valve. Using the handle provided it is possible to drain off the accumulated dirt particles even with the system in operation.

To purge the ferrous impurities in the steel DIRTMAG®, the flexible magnetic stack is removed from the brass dry-well and, with the system still running, the drain valve is opened. Aided by the system pressure, the dirt and ferrous impurities, including magnetite, flushes out quickly and effectively.

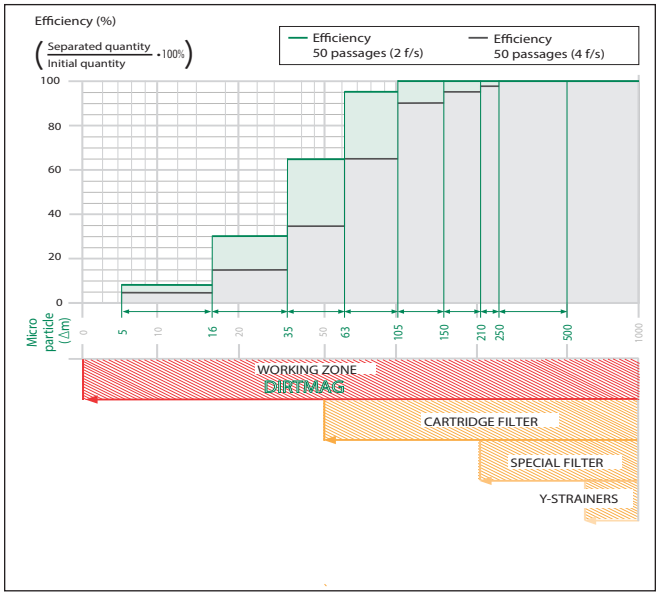


Use of top connector

The connector on top of the dirt separator can be used for optional installation of an automatic air vent valve, Use Caleffi code 501502A for the flanged version 5465M and NA5465M series, replacing the standard 3/4" NPT End Cap (code 41525).



Particle separation capacity — dirt separator efficiency



Separation efficiency

The capacity for separating the dirt in the medium circulating in the closed circuits of the hydronic systems depends on three factors:

1. It increases as the size and mass of the dirt particle increases. The larger and heavier dirt particles drop before the lighter ones.
2. It increases as the fluid velocity decreases. When the velocity decreases, there is a low-velocity-zone inside the dirt separator and the dirt particles separate more easily.
3. It increases as the number of recirculations increases. The medium in the circuit, flowing through the dirt separator a number of times during operation, is subjected to a continuous separation, until the dirt particles are completely removed.

The special design of the internal mesh element in the Caleffi magnetic dirt separator, is able to completely separate the dirt particles in the circuit down to a minimum particle size of 5 µm (0.2 mil), including 100% ferrous impurities. The adjacent graph illustrates how these separators quickly remove nearly all the dirt particles. After only 50 recirculations, approximately one day of operation, up to 100% is effectively removed from the circuit for particles of diameter greater than 100 µm (3.9 mil) and on average up to 80% taking account of the smallest particles. The continual passing of the medium during normal operation of the system gradually leads to complete dirt removal.

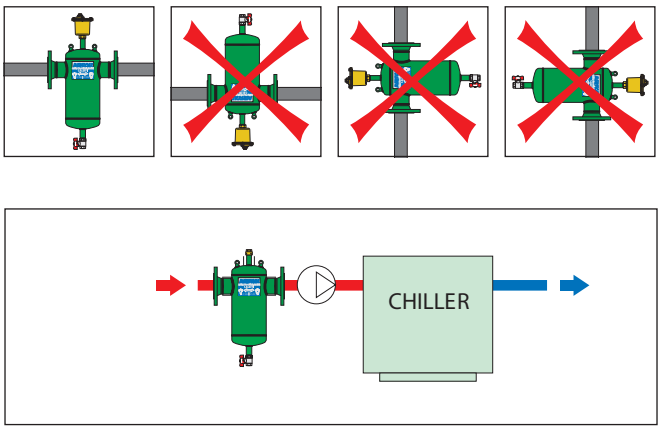
Comparison of head losses: dirt separator to Y-strainers

Y-strainers entrap dirt within a basket made of stainless steel or brass mesh, selected for the size of the largest particle. Particles smaller than the mesh size may pass through. On most Y-strainers, the basket must be removed periodically to clear the trapped debris. As the debris collects in the basket, flow is impeded resulting in increasing pressure drop and therefore higher head loss. The dirt separation function in the DIRTMAG utilizes the low-velocity-zone principle. The flow velocity of fluid flowing into the dirt separation chamber is greatly reduced causing the entrained dirt particles to drop due to their density.

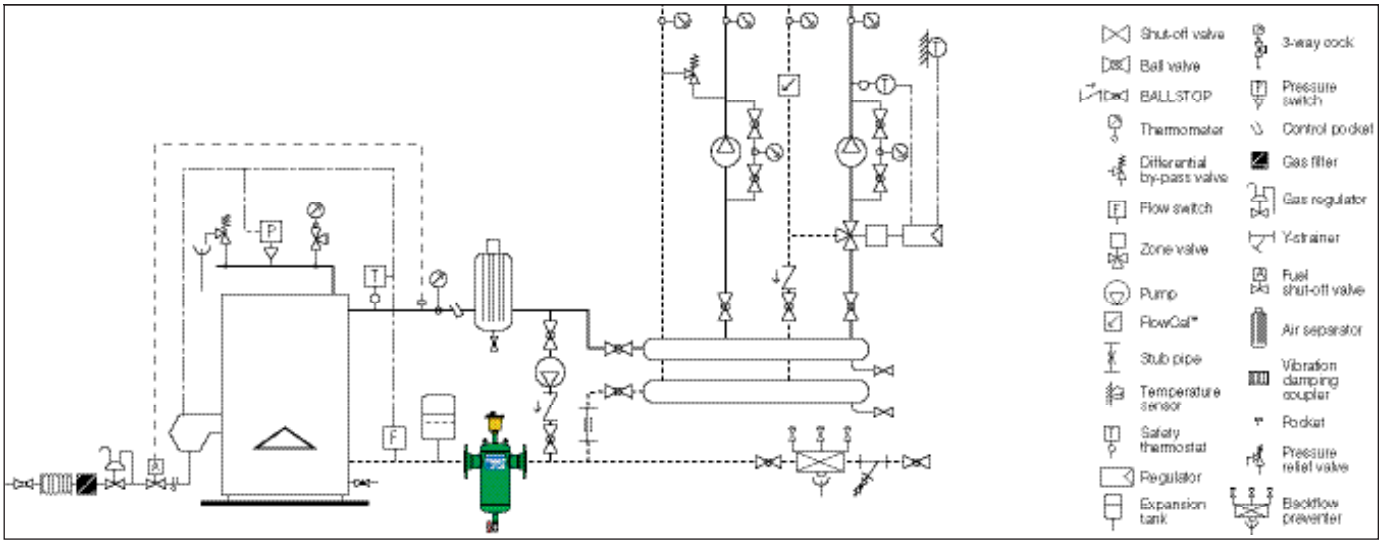
The internal element provides surfaces that assist in separating dirt particles and guide them downward to ultimately settle to the bottom of the separator. The dirt separator only creates about 25% of the pressure drop of a comparable sized, clean basket Y-strainer, depending on mesh size and amount of filtered debris. These head losses are not affected by the amount of dirt collected.

Installation

The dirt separator must always be installed in a vertical position, preferably on the return circuit upstream of the boiler (or chiller).This enables it to intercept dirt particles already present in the circuit, particularly when it is first started, before they reach the boiler (or chiller). Flow direction for the DIRTMAG dirt separators is bidirectional, flowing in either direction is permitted.



Application diagram



Find us in

MasterSpec®

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https://get.caleffi.info/specpoint

find BIM Revit files and system templates at
https://bim.caleffi.com/en-us

SPECIFICATION SUMMARIES

5465M Series DIRTMAG® — Flanged Steel

Dirt separator with magnet in steel. ANSI B16.5 CLASS 150 RF flanged connections from 2" to 4". Top connection 3/4" NPT male (with cap). Supplied with drain ball valve brass body with 1" NPT for drain. Internal mesh element of stainless steel and HDPE. Steel body with a stack of neodymium rare-earth magnets inside a brass dry-well, removable for purging. Non-asbestos fiber hydraulic seals. Suitable fluids: water or 50% maximum glycol solution. Maximum working pressure 150 psi (10 bar). Temperature range 32 to 270°F (0 to 132°C). Particle separation capacity: to 5 µm (0.2 mil). Ferrous impurities separation efficiency: up to 100% removal. Provide with optional automatic air vent, Caleffi code 501502A.

NA5465M Series DIRTMAG® — Flanged Steel ASME/CRN

Dirt Separator with magnet in steel. ANSI B16.5 CLASS 150 RF flanged connections from 2" to 8". Top connection ¾" NPT male (with cap). Supplied with drain ball valve brass body with 1" NPT female (code NA39753, separator size 2" to 6") or 2" NPT female (code NA59600, separator size 8") for drain. For separator size 8" only thermometer pocket well on inlet/outlet flanges ½" NPT female. Internal mesh element of stainless steel and HDPE. Steel body with a stack of neodymium rare-earth magnets inside a brass dry-well, removable for purging. Non-asbestos fiber hydraulic seals. Suitable fluids: water or 50% maximum glycol solution. Maximum working pressure 150 psi (10 bar). Temperature range 32°F to 270°F (0°C to 132°C). Particle separation capacity: to 5 µm (0.2 mil). Ferrous impurities separation efficiency: up to 100% removal. The separator is designed and built in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code and tagged and registered with the National Board of Boiler and Pressure Vessel Inspectors and stamped for 150 psi (10 bar) working pressure, with ASME U-stamp. CRN registered (size 14", contact Caleffi). Provide with automatic air vent, Caleffi code 501502A.

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.

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