

Dirt separators *DIRTCAL*®



5462 - 5465 - 5469 series



01137/10 GB

replaces dp 01137/06 GB



Function

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

The dirt separator separates off these impurities, which are mainly made up of sand and rust particles. These are collected in a large collection chamber that requires low frequency cleaning procedures, from which they can be removed even while the system is in operation.

This device is capable of efficiently removing even the smallest particles, with extremely limited head loss.

The threaded connection product is available in versions for installation on horizontal or vertical pipes.

Flanged DIRTCAL® dirt separators are supplied complete with hot pre-formed shell insulation to ensure perfect thermal insulation when used with both hot and chilled water.

Reference documentation

- Tech. Broch. 01054 Automatic air vent MINICAL®-VALCAL® 5020 - 5021 - 5022 series
- Tech. Broch. 01031 Automatic air vent MAXCAL® for heating, air-conditioning and cooling systems. 501 series

Product range

- 5462 series DIRTCAL® dirt separator for horizontal pipes with threaded connections _____ sizes 3/4"-2"
- 5465 series DIRTCAL® dirt separator for horizontal pipes with flanged connections and pre-formed insulation _____ sizes DN 50-DN 150
- 5469 series DIRTCAL® dirt separator for vertical pipes with olive connections _____ size Ø 22 with nuts for copper pipe
- 5469 series DIRTCAL® dirt separator for vertical pipes with threaded connections _____ sizes 3/4", 1"

Technical specifications

series	5462 - 5469 threaded	5465 flanged
Materials:		
Body:	brass EN 1982 CB753S	epoxy resin coated steel
Dirt collection chamber:	brass EN 12165 CW617N	-
Top plug:	brass EN 12164 CW617N	brass EN 12165 CW617N
Internal element:	PA66G30 (stainless steel, 5469 series)	stainless steel
Hydraulic seals:	EPDM	non-asbestos fibre (top plug)
Drain cock:	brass EN 12165 CW617N	brass EN 12165 CW617N, chrome plated
Performance:		
Medium:	water, non-hazardous glycol solutions excluded from the guidelines of directive 67/548/EC	water, non-hazardous glycol solutions excluded from the guidelines of directive 67/548/EC
Max. percentage of glycol:	50%	50%
Max. working pressure:	10 bar	10 bar
Working temperature range:	0-110°C	0-110°C
Particle separation rating:	down to 5 µm	down to 5 µm
Connections:		
Main:	3/4", 1", 1 1/4", 1 1/2", 2" F Ø 22 mm with compression ends for copper pipe	DN 50 - 65 - 80 - 100 - 125 - 150 flanged PN 16 to be coupled with counterflange EN 1092-1
Top:	1/2" F (with plug)	3/4" M (with plug)
Drain:	hose connection	1" F

Technical specifications of insulation for flanged versions from DN 50 to DN 100

Internal part

Material: rigid closed cell expanded polyurethane foam
 Thickness: 60 mm
 Density: 45 kg/m³
 Thermal conductivity (ISO 2581): 0,023 W/(m·K)
 Working temperature range: 0–105°C

External cover

Material: embossed unfinished aluminium
 Thickness: 0,7 mm
 Reaction to fire (DIN 4102): class 1

Head covers

Heat moulded material: PS

Technical specifications of insulation for flanged versions DN 125 and DN 150

Internal part

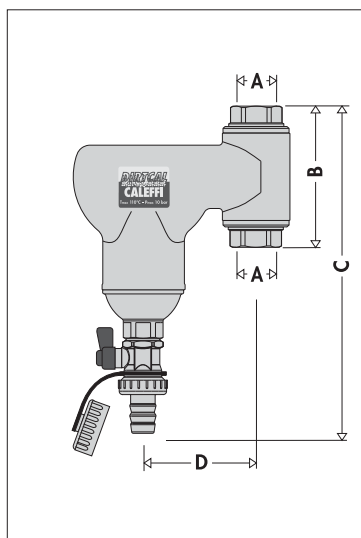
Material: closed cell expanded PE-X
 Thickness: 60 mm
 Density: - inner part: 30 kg/m³
 - outer part: 80 kg/m³
 Thermal conductivity (ISO 2581): - at 0°C: 0,038 W/(m·K)
 - at 40°C: 0,045 W/(m·K)

Coefficient of resistance to water vapour (DIN 52615): > 1.300
 Working temperature range: 0–100°C
 Reaction to fire (DIN 4102): class B2

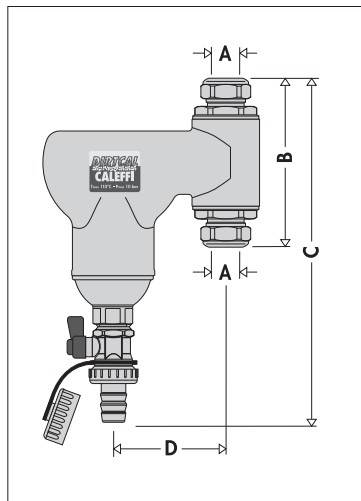
External cover

Material: embossed unfinished aluminium
 Thickness: 0,7 mm
 Reaction to fire (DIN 4102): class 1

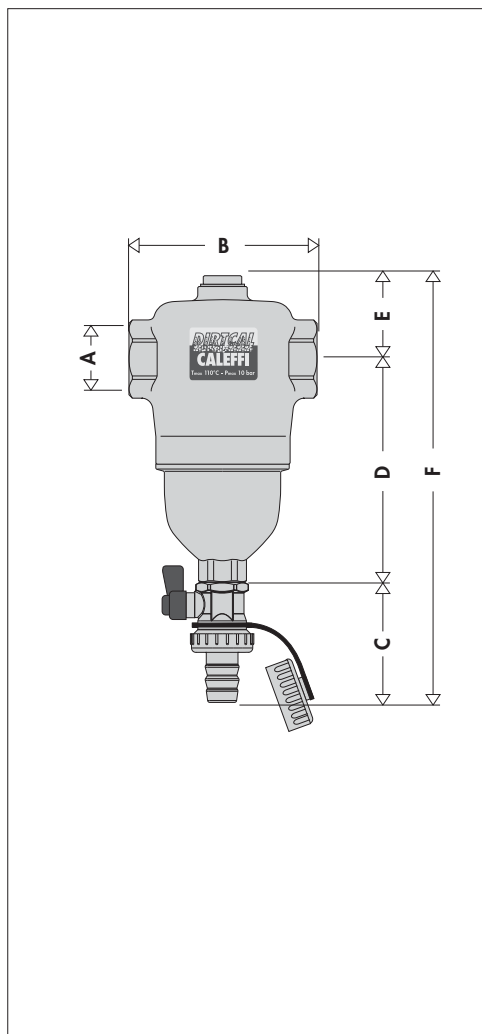
Dimensions



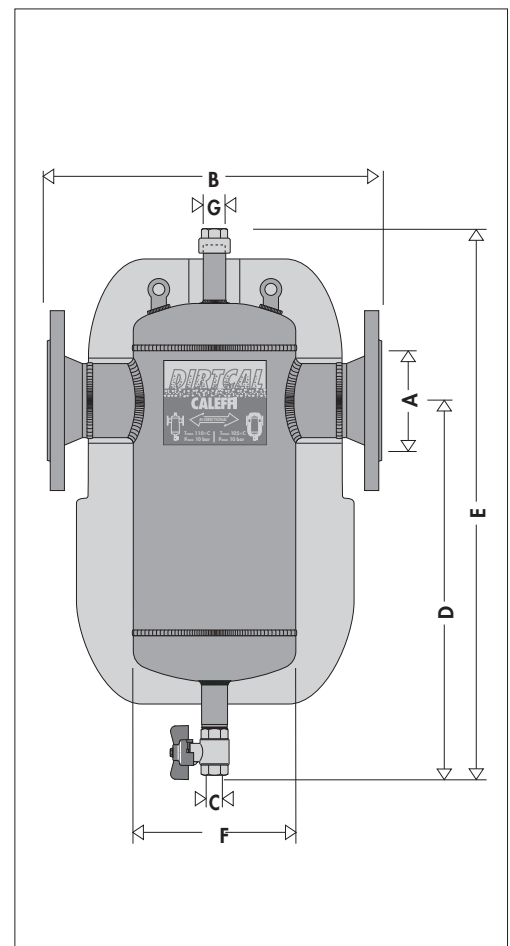
Code	A	B	C	D	Mass (kg)
546905	3/4"	102	223	80	1,95
546906	1"	107	225,5	80	1,95



Code	A	B	C	D	Mass (kg)
546902	∅ 22	121	232,5	80	1,95



Code	A	B	C	D	E	F	Mass (kg)
546205	3/4"	110	56	131,5	49	236,5	1,87
546206	1"	110	56	131,5	49	236,5	1,87
546207	1 1/4"	124	56	151,5	49	256,5	2,22
546208	1 1/2"	124	56	151,5	49	256,5	2,22
546209	2"	127	56	145,5	55	256,5	2,36



Code	A	B	C	D	E	F	G	Mass (kg)
546550	DN 50	350	1"	425	620	169	3/4"	13
546560	DN 65	350	1"	425	620	169	3/4"	15
546580	DN 80	466	1"	500	740	219	3/4"	23
546510	DN 100	470	1"	500	740	219	3/4"	25
546512	DN 125	635	1"	600	900	324	3/4"	52
546515	DN 150	635	1"	600	900	324	3/4"	54
Dimensions	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150		
Volume (l)	7	7	18	18	52	52		

Operating principle

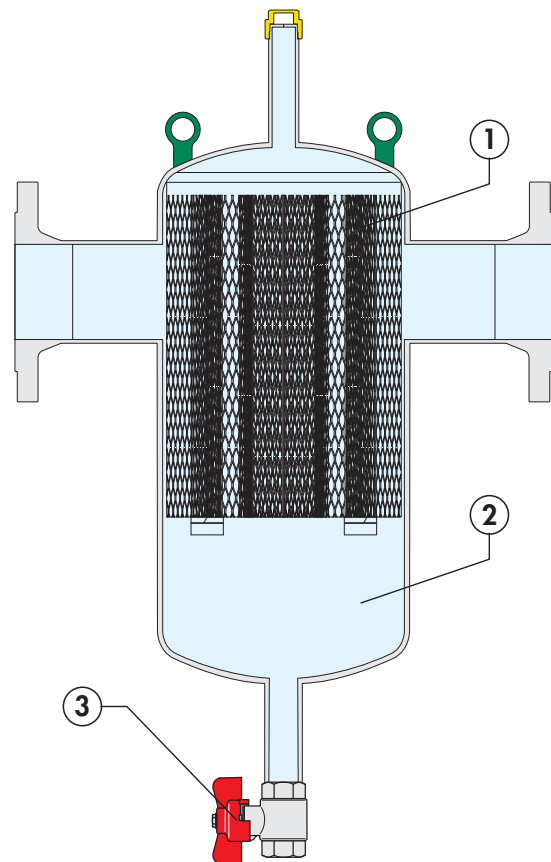
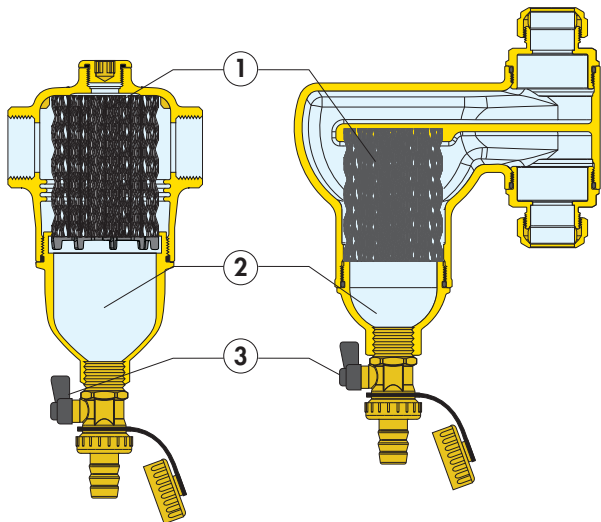
The dirt separator operating principle is based on the combined action of a number of physical phenomena.

The internal element (1) is composed of a set of radial reticular surfaces. The impurities in the water, on striking these surfaces, get separated, dropping into the bottom of the body (2) where they are collected.

In addition, the large internal volume of DIRTCAL® slows down the flow speed of the medium thus helping, by gravity, to separate the particles it contains.

The collected impurities are discharged, even with the system running, by opening the drain cock (3); this procedure can even be performed while the system is in operation.

The dirt separator is designed in such a way that the direction in which the medium is flowing inside it makes no difference.



Construction details

Low head losses and performance maintained over time

The separating action of the dirt separator is based on using the internal element with reticular surfaces in place of the ordinary strainer. The screen, by its nature, offers little resistance to the flow of the medium while ensuring separation.

This occurs due to the particles colliding with the reticular surfaces and then settling, not by filtration, an action by which the strainer, over time, gets instead progressively clogged by the sludge it removes.

The internal shape of the body was also designed to offer minimum resistance to the passage of the medium. All this is to the benefit of performance, i.e. the high capacity to separate impurities and the low head losses that remain unaltered over time.



Geometric structure and large dirt collection chamber

The geometrical structure of DIRTCAL® is such that, the flow speed inside it is slowed down to help separate the particles of impurities.

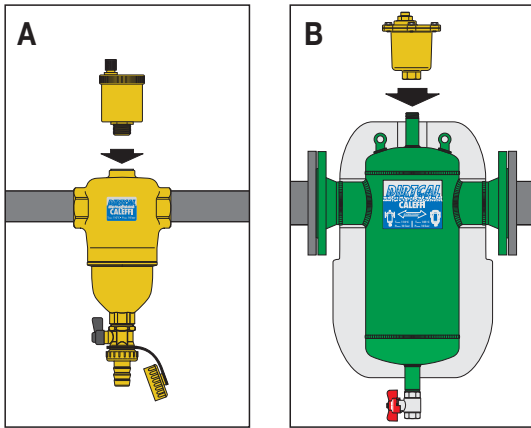
The dirt collection chamber has the following features:



- It is located at the bottom of the device, at such a distance from the connections that the collected impurities are not affected by the swirling of the flow through the screen.
- It is large enough to offer an increased amount of collected dirt, which means emptying/ discharging procedures are required less often (in contrast to strainers, which need to be cleaned frequently).
- It is easy to inspect, by unscrewing it from the valve body for any servicing of the internal element required in the event of obstruction by fibres or large particles of dirt.

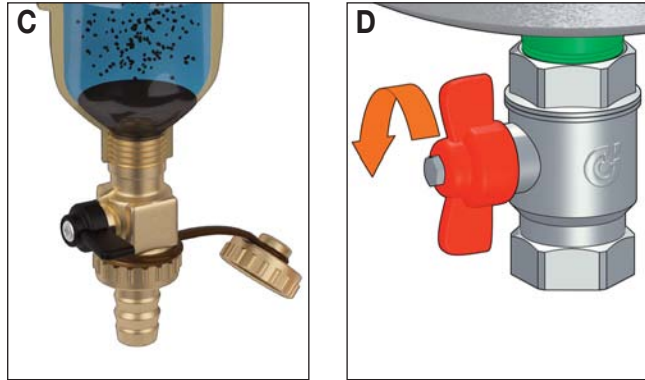
Top connection

The connection on the top of the dirt separator can be used to install an automatic air vent, code 502040 MINICAL® for the threaded version (A), code 501500 MAXCAL® for the flanged version (B).



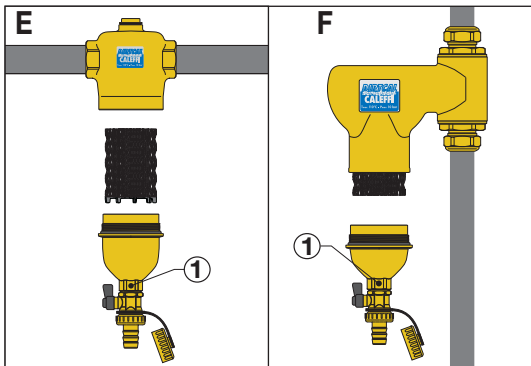
Draining off with the system running

The dirt separator collection chamber is equipped with a shut-off ball cock with special lever in the threaded version (C), and with a shut-off ball valve with butterfly handle in the flanged version (D). These valves can be used to drain off the impurities which have collected at the bottom of the dirt separator, even with the system in operation.



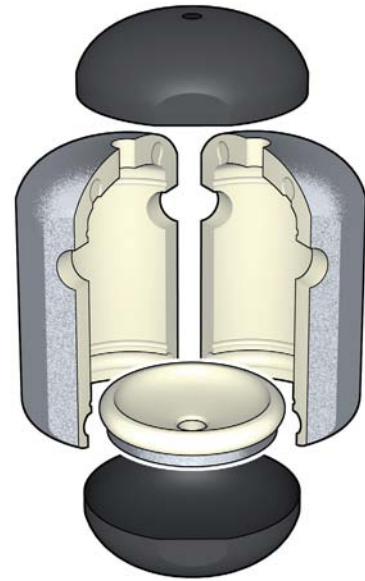
Maintenance

To carry out maintenance operation (in threaded models for horizontal pipes) (E), simply use a 26 mm hex wrench (1) to unscrew the dirt collection chamber to which the internal element is fixed, in order to extract it for cleaning purposes. For vertical pipe models (F), only the dirt collection chamber may be unscrewed for cleaning procedures, without the whole internal element being removed.

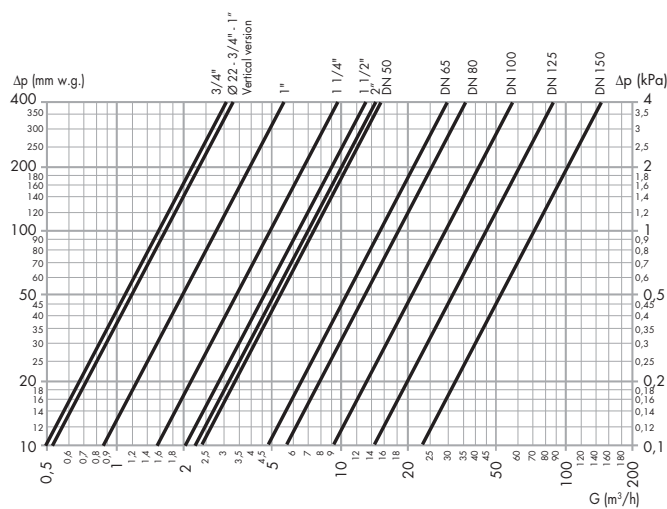


Insulation

Flanged DIRTICAL® devices are supplied complete with hot preformed shell insulation. This system ensures not only perfect thermal insulation, but also the tightness required to prevent water vapour entering the device from the ambient. For this reason, this type of insulation may also be used in chilled water circuits as it prevents condensation from forming on the surface of the valve body.



Hydraulic characteristics



Sizes	3/4"	Ø 22-3/4"-1" Vertical version	1"	1 1/4"	1 1/2"	2"
Kv (m³/h)	16,2	17	28,1	48,8	63,2	70,0

Sizes	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
Kv (m³/h)	75,0	150,0	180,0	280,0	450,0	720,0

The maximum recommended speed of the medium inside the pipe is 1,2 m/s. The following table shows the maximum flow rates in order to meet this requirement.

Sizes	Ø 22-3/4"-1"	1"	1 1/4"	1 1/2"	2"
l/min	22,7	35,18	57,85	90,36	136,6
m³/h	1,36	2,11	3,47	5,42	8,2

Sizes	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
l/min	141,20	238,72	361,5	564,8	980,0	1436,6
m³/h	8,47	14,32	21,69	33,89	58,8	86,2

Separation efficiency

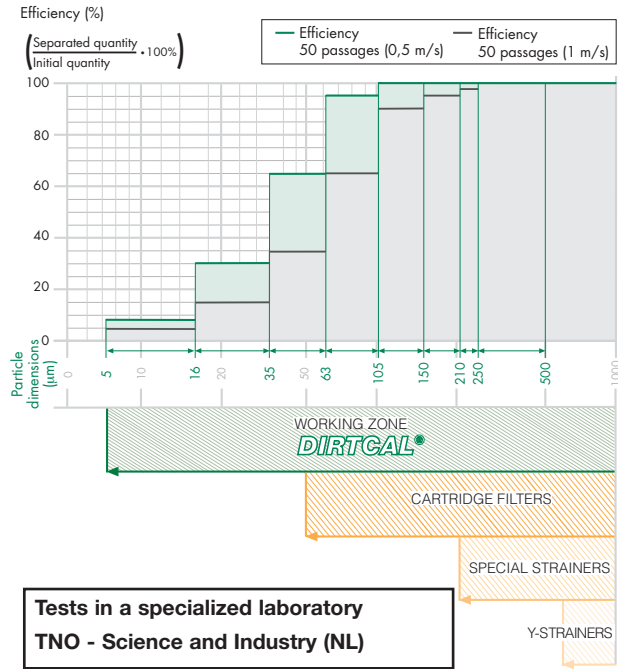
The capacity for separating the impurities in the medium circulating in the closed circuits of the systems basically depends on three parameters:

- 1) It increases as the size and mass of the particle increase. The larger and heavier particles drop before the lighter ones.
- 2) It increases as the speed decreases. If the speed decreases, there is a calm zone inside the dirt separator and the 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 progressive action of separation, until the impurities are completely removed.

The Caleffi DIRTICAL® dirt separator, thanks to the special design of its internal element, is able to completely separate the impurities in the circuit down to a minimum particle size of 5 µm.

The graph alongside, summarising the tests carried out in a specialised laboratory (TNO - Science and Industry), illustrates how it is able to quickly separate nearly all the impurities. 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 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.

Particle separation rating - Dirt separator efficiency

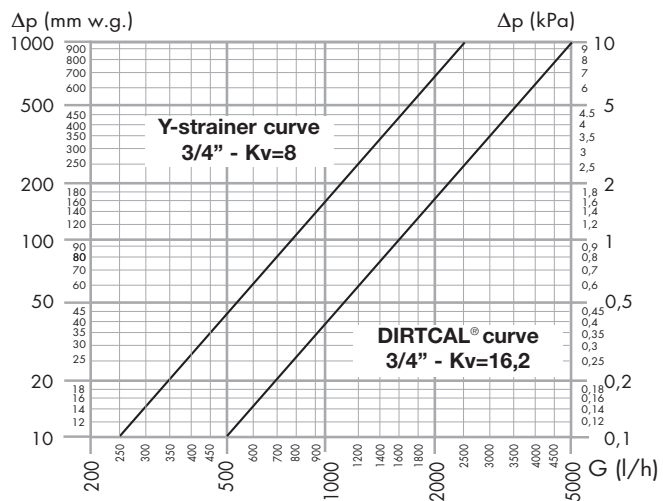


Reduced head losses

A normal Y strainer performs its function via a metal mesh selected for the size of the largest particle. The medium therefore has a consequent initial loss of head that increases as the degree of clogging increases.

Whereas, the dirt separator carries out its action by the particles striking the internal element and subsequently dropping into the collection chamber. The consequent head losses are greatly reduced and are not affected by the amount of impurities collected.

The graph alongside shows a comparison of the differences in head loss between the two types of device.

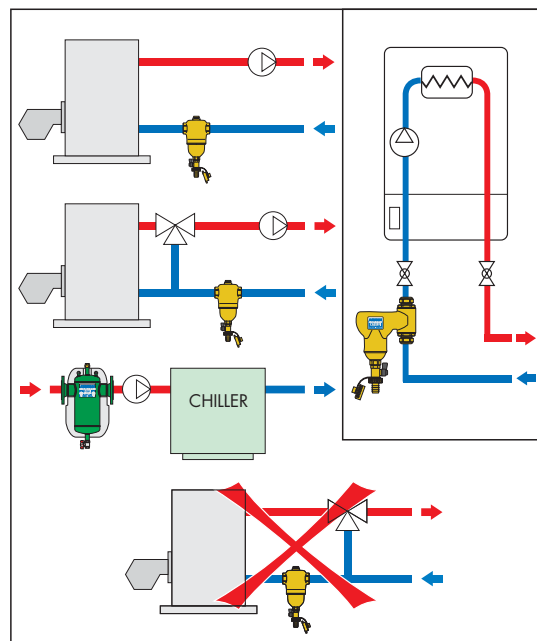
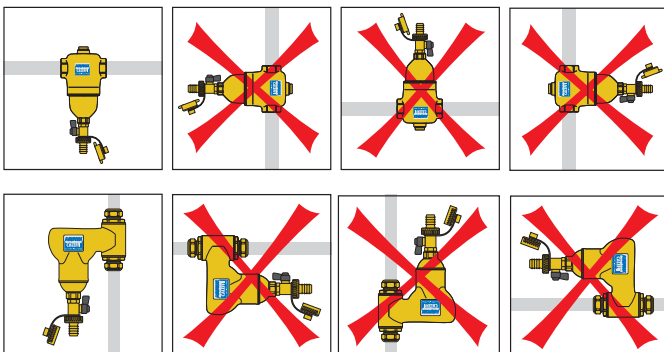


Installation

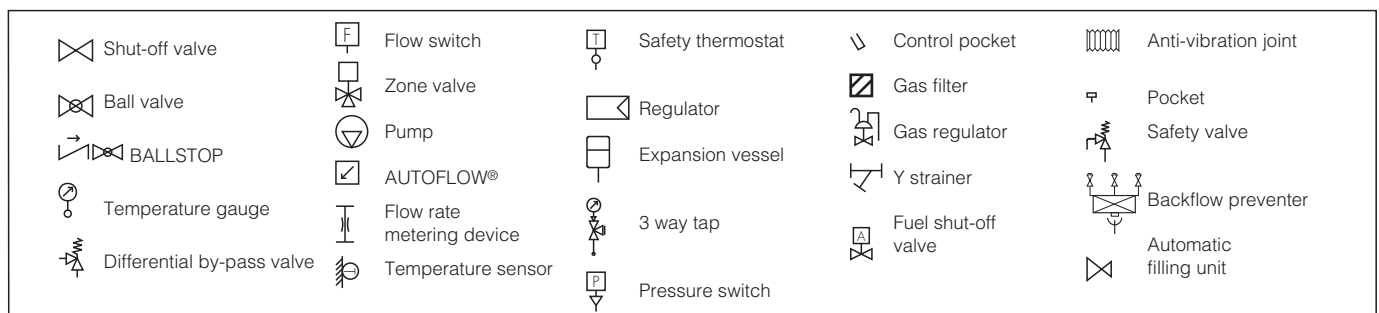
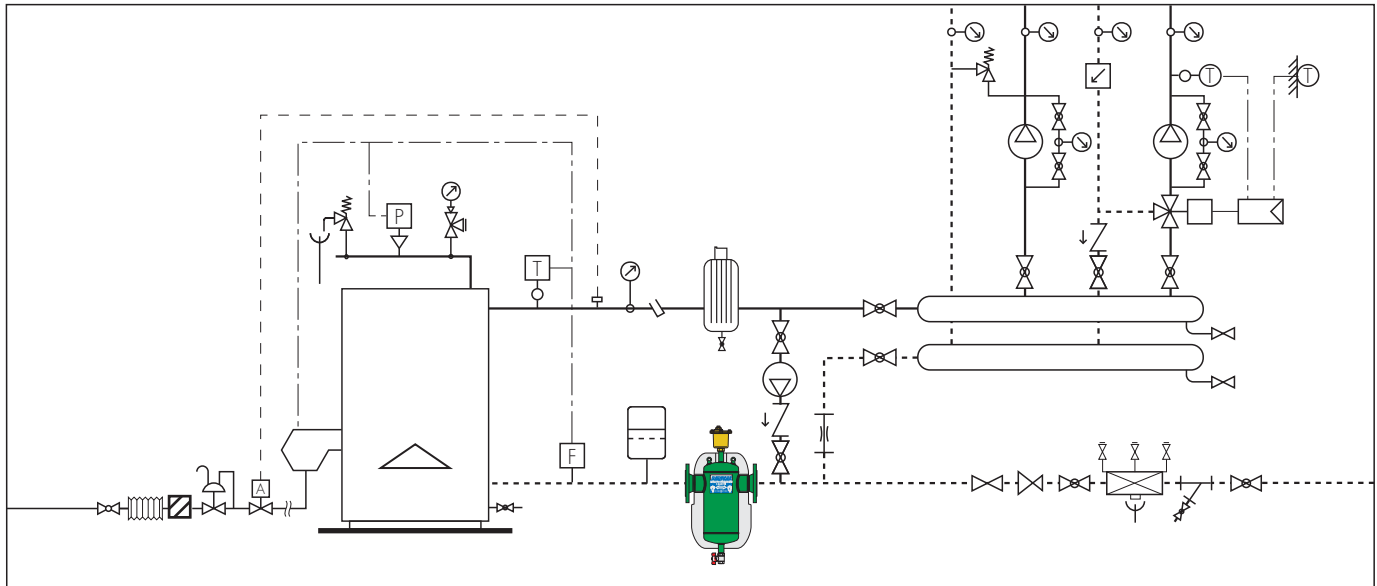
The dirt separator should preferably be installed on the return circuit upstream of the boiler. This enables it to intercept any impurities already present in the circuit, particularly when it is first started, before they reach the boiler.

The dirt separator should always be installed vertically and ideally upstream of the pump. Use the specific versions designed for installation on horizontal or vertical pipes.

The flow direction of the medium is not important in dirt separators.



Application diagram



SPECIFICATION SUMMARY

5462 series DIRTCAL®

Dirt separator. Connections for horizontal pipes 3/4" F (from 3/4" to 2"). Top connection 1/2" F (with plug). Drain with hose connection. Brass dirt collection chamber and body. PA66G30 internal element. EPDM hydraulic seals. Brass drain cock. Medium water and non-hazardous glycol solutions excluded from the guidelines of EC directive 67/548; maximum percentage of glycol 50%. Maximum working pressure 10 bar. Working temperature range 0-110°C. Particle separation rating down to 5µm. Patented.

5465 series DIRTCAL®

Dirt separator. Flanged connections DN 50 (from DN 50 to DN 150), PN 16; can be coupled with counterflanges EN 1092-1. Top connection 3/4" (with plug). Drain 1" F. Epoxy resin coated steel body. Stainless steel internal element. Hydraulic seals in non-asbestos fibre. Medium water and non-hazardous glycol solutions excluded from the guidelines of EC directive 67/548; maximum percentage of glycol 50%. Maximum working pressure 10 bar. Working temperature range 0-110°C. Particle separation rating down to 5µm.

Complete with:

- chrome plated brass drain valve
- rigid closed cell expanded polyurethane foam insulation for sizes up to DN 100 (closed cell expanded PE-X for DN 125 and DN 150) and embossed unfinished aluminium external cover. Working temperature range 0-105°C (0-100°C for DN 125 and DN 150). Patented.

5469 series DIRTCAL®

Dirt separator. Connections Ø 22 with compression ends for copper pipe and 3/4" (and 1") F connections. Brass dirt collection chamber and body. Steel internal element. EPDM hydraulic seals. Brass drain cock. Medium water and non-hazardous glycol solutions excluded from the guidelines of EC directive 67/548; maximum percentage of glycol 50%. Maximum working pressure 10 bar. Working temperature range 0-110°C. Particle separation rating down to 5µm.

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



CALEFFI S.P.A. · S.R.229, N.25 · 28010 FONTANETO D'AGOGNA (NO) · ITALY · TEL. +39 0322 8491 · FAX +39 0322 863723

· www.caleffi.com · info@caleffi.com ·

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