CALEFFI
Hydronic Solutions



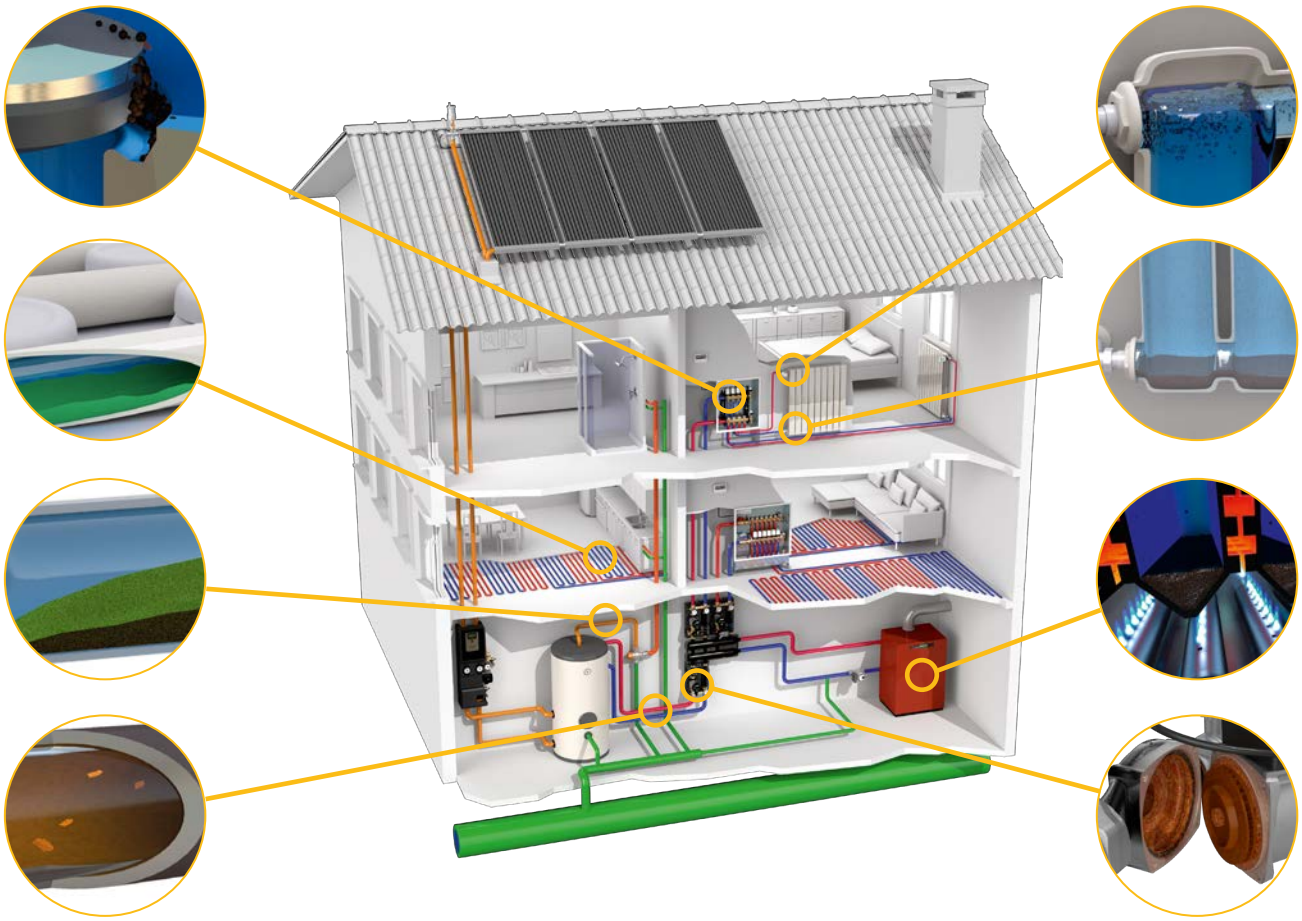


WATER TREATMENT IN HVAC SYSTEMS

2019

AIR AND DIRT IN HVAC SYSTEMS

Heating systems are often subject to problems such as deposits and encrustations, loss of efficiency in heat exchange, high noise, breakage of appliances, blocking of lines. These problems are mostly caused by the quality of the water, by the presence of air and impurities that provoke the formation of encrustations and facilitate the phenomenon of corrosion.



Problems linked to the presence of air

The problems due to the air contained in hydronic systems can be serious and unpleasant both for the users and for the professionals who service the system. If these problems are not analysed thoroughly, they can often lead to solutions that are not decisive in the long term.
Initially it is very important to identify the phenomena that the air in the system can provoke.

Noise in the pipes and in the terminals
The air in the system causes noise in the pipes and in the regulating devices due to the presence of air bubbles, which are more evident in the phase of switching on the system, therefore at the time when the flow is beginning to move in the pipes.

Insufficient flow rates or total circulation blocks.
Circulation can be partially or totally blocked by air bubbles present in some points in the system. This phenomenon is particularly serious in systems with radiant panels.

Insufficient heat exchange between the emission terminals and the environment
The quantity of the heat that is transferred to the environment decreases considerably where there is air in the radiators or in the exchange batteries. A lower efficiency of the heating bodies can cause serious thermal imbalances and therefore insufficient comfort levels, as well as greater running costs.

Corrosion of the system
This is provoked by the oxygen present in the air and can lead to the weakening but also the breakage of components such as pipes, radiators and boiler heat exchangers.

Problems linked to the presence of dirt

The impurities suspended in the water of the hydronic circuits can cause a series of problems that should not be underestimated.

Corrosion due to differential ventilation
This is due to the fact that, in the presence of water, a layer of dirt on a metal surface leads to the formation of two zones (water/dirt and dirt/metal) with a different oxygen content; for this reason, localised batteries are activated with current flows that lead to corrosion of the metal surfaces.

Irregular operation of the valves
This is due to dirt which can adhere stubbornly to the valve seats and cause deformities in regulation and leaks.

Blocking and seizing the pumps
These are caused by dirt that circulates through the pumps and can build up in them, due both to the particular geometry of the pumps and to the effect of the magnetic fields generated by the pumps themselves.

Lower efficiency of the heat exchangers
Dirt deposits can appreciably reduce both the flow rates of the fluids and the heat exchanging surfaces.

Devices for eliminating air

Automatic air vents

- ROBOCAL	5024 - 5025 - 5026 - 5027 series
- MINICAL	5020 - 5021 series
- VALCAL	5022 series
- MAXCAL	501 series
- DISCALAIR®	551 series



Air vents for radiators

- automatic	504 - 507 series
- valves for radiators	505 - 5055 - 5054 - 5080 series


Deaerators

- for horizontal pipes	551 series
- for vertical pipes	551 series



Devices for eliminating impurities

Dirt separators

- standard	5462 series 5469 series
- with magnet	5463 series 5468 series 5466 series
- in polymer with magnet	5453 series
- in polymer under-boiler	5451- 5452 - 5454 series







Dirt separator strainer

- multifunction device	5453 series
- with magnet self-cleaning or manual	5790 series


Strainers

- oblique in bronze	577 series
- oblique in cast iron	579 series


Devices for eliminating air and impurities

Deaerator-dirt separators

- standard	546 series
- with magnet	5461 series



THE PRESENCE OF AIR

The presence of air in air-conditioning systems is due to several causes:

- to the air not ejected during filling, that is the air that remains in non-vented niches, or in the highest part of the radiators, or even in pipes installed with a counter-slope.
- to the air sucked in from zones working with negative pressure. This air enters the system, instead of leaving it, through the normal venting systems.
- to the air dissolved in the water which the system is filled with: air dissolved in the water at the level of ions and molecules.

Air not ejected during filling: formation of bubbles

Before being started up, every hydronic system is obviously full of air. An inaccurate design/installation of the system that "foresees" particular routes for the lines can favour the entrapment of air during filling.
In particular, the air tends to gather:

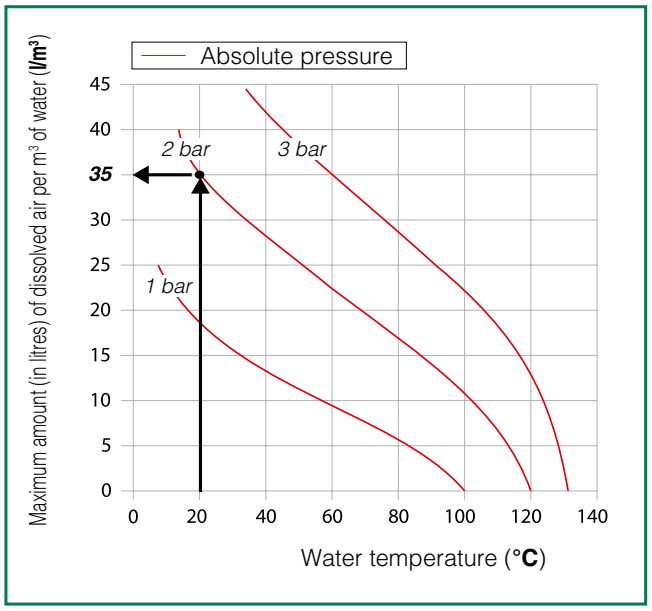
- in the upper part of the heating bodies;
- in pipe sectors that have to go round an obstacle;
- in long stretches of horizontal pipes that then turn downwards;
- in the upper part of the risers.

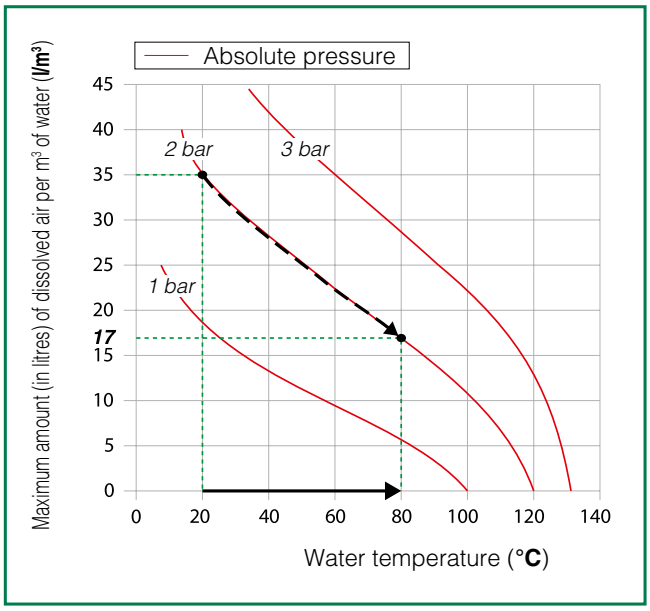
The air that enters during system operation

The air that enters during system operation is the air that can get in through the free surface of an open vessel (systems now little used), or that can filter through the venting systems, the gaskets and fittings if the system is working with negative pressure.
The latter case occurs when the sum of the static pressure of the system and the dynamic negative pressure induced by the pump is negative; this is possible especially in the higher parts of the system, that is where the static pressure is lower.
Generally, to understand whether a system is working with a negative pressure it is sufficient to open, for example, the valve on the highest radiator and to see whether water comes out or air goes in.

Air dissolved in a water solution: formation of micro-bubbles

The amount of air that can remain dissolved in a water solution depends on the pressure and temperature. This relationship is shown by Henry's law (the graph of which is provided), which links the water temperature to the number of litres of air dissolved in one m³ of water.
The air dissolved in the cold water used for filling or topping up is released principally when the water in the system is heated, for example in a 1000 l system (more or less a 100000 kcal/h system), when the filling water is heated from 20 to 80°C, at a constant pressure of 2 bar, from 17 to 18 litres of air are released.
This air appears in the system in the form of micro-bubbles.
In circuits of air-conditioning systems there are also specific points where this micro-bubble formation process takes place continuously: inside boilers and devices which operate under conditions of cavitation.



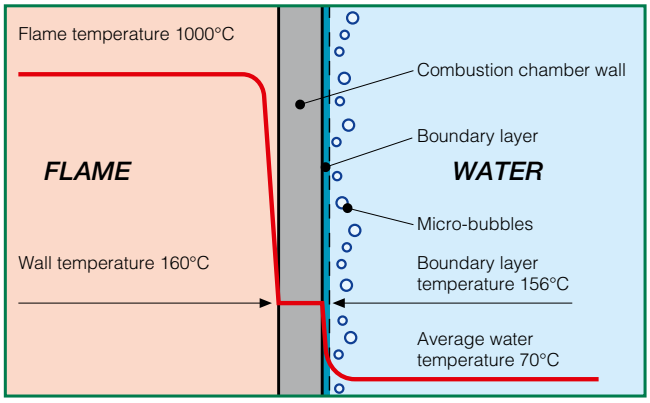


Micro-bubbles

These are very small air bubbles with diameters between 0,02 and 0,10 mm, in heating systems **they are formed on the internal surfaces of the boilers**; the heating fluid then drags these micro-bubbles into the system, where they are absorbed by the medium itself or they gather, forming air bubbles, in the most critical points of the system, for example in the highest zones of the radiators.

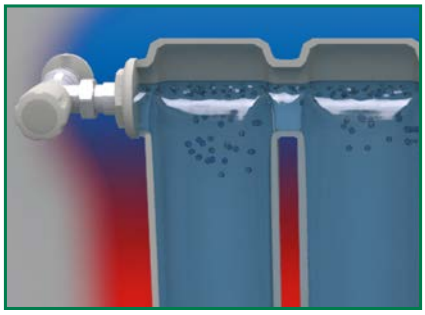
Boiler micro-bubbles

Micro-bubbles form continuously on the surfaces separating the water from the combustion chamber due to the high temperature of the medium. The phenomenon is similar to the one we can observe on the walls of a pan when we are heating water.
This air, carried by the water, collects at critical points of the circuit, from which it must be removed. Some of it is reabsorbed where it meets colder surfaces.

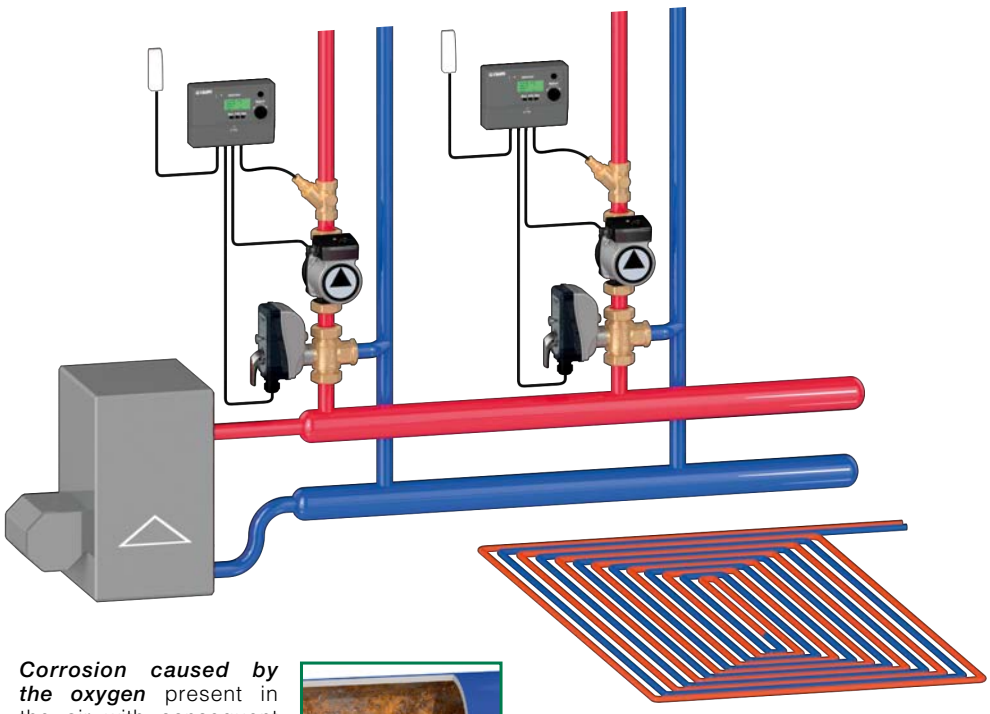


Problems linked to the presence of air in the systems

Insufficient heat exchange between the emission terminals
The thermal conductivity of air is notably lower than that of water. When the air collects in the highest points of the radiators or of the heat exchange batteries, the amount of heat that is transferred to the room decreases considerably. A lower efficiency of the heating bodies can cause serious thermal imbalances and therefore insufficient comfort levels, as well as greater running costs.



Noise in the heating bodies due to the passing of bubbles and micro-bubbles through the radiator valves and due to the formation of resonance chambers.



Cavitation phenomena that can compromise the duration and operation, especially of the pumps and regulating valves.

Total or partial blocks of circulation due to the formation of air bubbles in the pipes and in the panels, on both the floor and the wall.

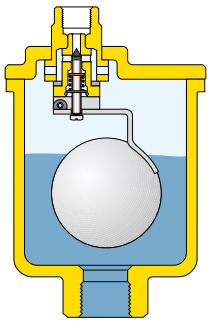
Corrosion caused by the oxygen present in the air with consequent weakening, and sometimes even breaking, of boilers, pipes and radiators.

Devices for eliminating air bubbles

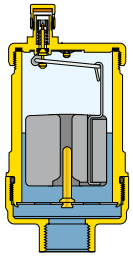
Automatic air vents

The accumulation of air bubbles in the valve body causes the float to drop so that the obturator opens automatically.
They are installed in the central heating system, on risers or in areas where bubbles collect.
There are various types which differ in the maximum working pressure and the air discharge pressure, as well as in the quantity of air that can be discharged with relation to the pressure existing in the system and the unit of time.
Correct valve operation is ensured as long as the water pressure remains under the maximum discharge pressure.

high discharge capacity



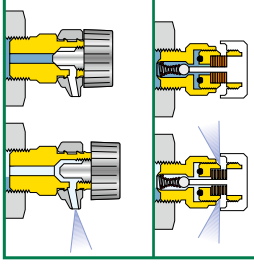
high discharge pressure



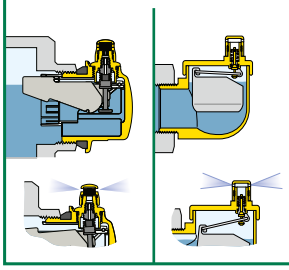
Standard and small air vents for radiators

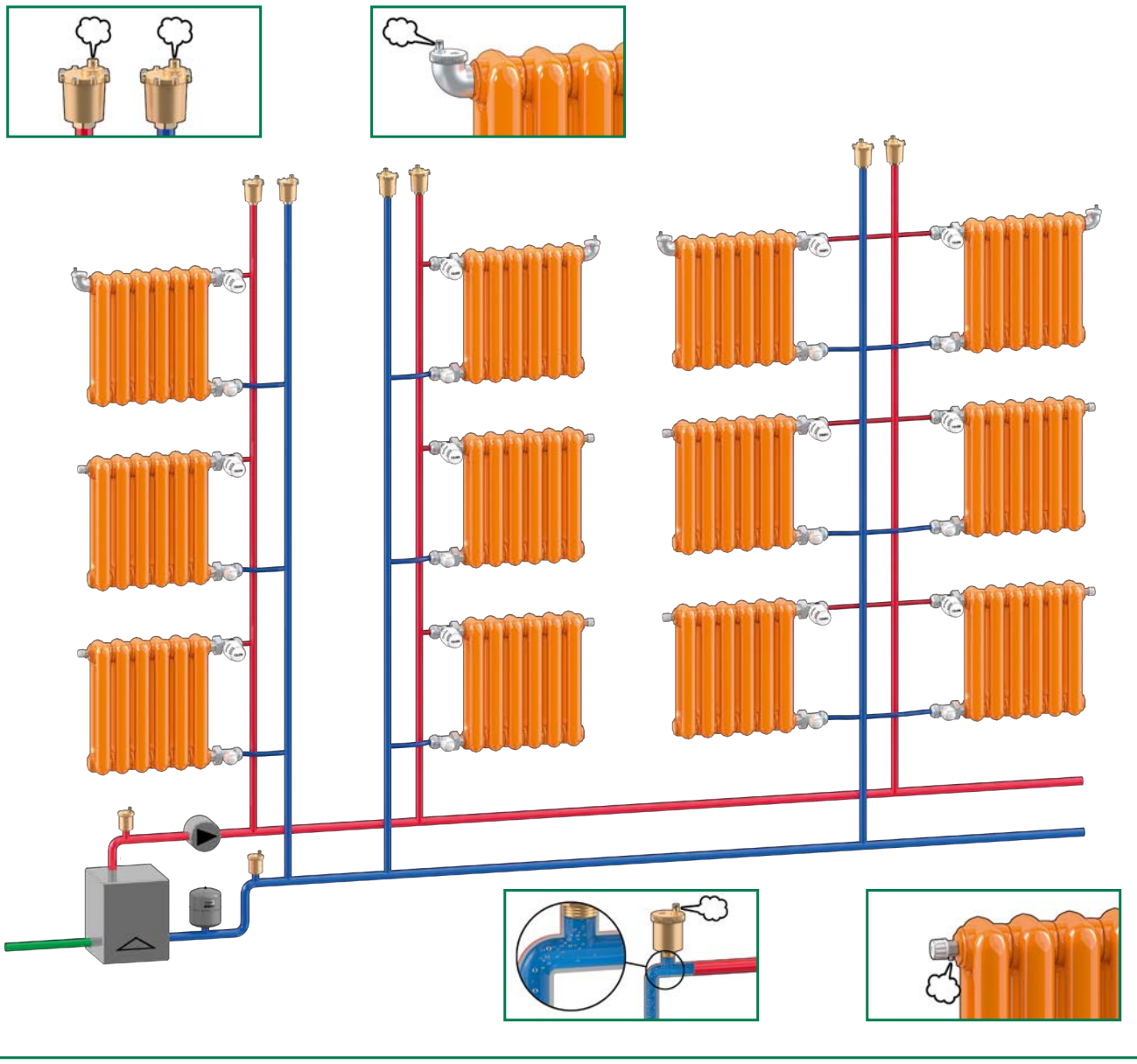
These may be manually or automatically controlled. The automatic controls may have a float or hygroscopic disks.
In ***manually operated valves*** the handwheel is unscrewed until the air present in the heating body is completely ejected with the consequent beginning of the water escape.
Instead, the ***valves with hydroscopic disks*** have special disks that expand in contact with water, keeping the valve closed, while in contact with air they contract, thus ejecting the air.
The operation of ***float valves*** is substantially similar to that of automatic air vents: the accumulation of air bubbles in the cup causes the float to come down, thus opening the obturator.

manual *hygroscopic*



float operation



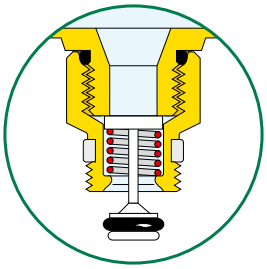


	Air vents with medium-high discharge pressure			Automatic air vents of traditional type					
Series	501	551	5022	5020	5020	5020	5020	5021	5021
	MAXCAL	DISCALAIR®	VALCAL	MINICAL					
									
Material	brass		chrome plated brass	brass	chrome plated brass	brass	chrome plated brass	brass	chrome plated brass
Maximum working pressure	16 bar	10 bar		10 bar					
Maximum discharge pressure	6 bar	10 bar	4 bar	2.5 bar					
Maximum working temperature	-20–120°C	0–110°C	120°C	120°C				110°C	
Automatic shut-off	-	-	optional	optional		-		✔	
Hygroscopic cap	-	optional		optional		✔		optional	
Connections	3/4"	1/2"	1/4" - 3/8" - 1/2"	3/8" - 1/2"	3/8" - 1/2"	3/4" - 1"	3/4" - 1"	3/8" - 1/2"	3/8" - 1/2"

	Automatic air vents with float anti-vibration system			
Series	5024	5025	5026	5027
	ROBOCAL			
				
Material	brass			
Maximum working pressure	10 bar			
Maximum discharge pressure	4 bar		6 bar	
Maximum working temperature	115°C	110°C	115°C	110°C
Automatic shut-off	optional	✔	115°C	✔
Hygroscopic cap	-	-	-	-
Connections	1/4" - 3/8"	3/8"	3/8" - 1/2"	3/8"

Automatic shut-off cock

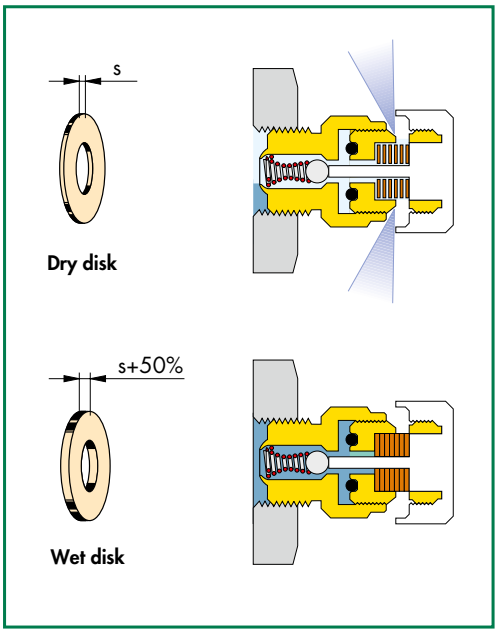
The automatic shut-off cock, the seal of which with the valve body is ensured by an EPDM O-ring, facilitates servicing operations, blocking the flow of water when the valve is deactivated, and the control of the functionality of the venting device.



Hygroscopic cap

The operating principle is based on the properties of the cellulose fibre disks forming the retaining cartridge. These discs increase in volume by 50% when they come into contact with water, thus closing the valve. In this way, when the system is working in normal conditions, the disks are wet and, thanks to their increase in volume, they close the valve. Instead, when air is present, the disks dry and allow it to escape. This avoids any damage in the event of water leakage.

	Air vents for radiators		Air vents for radiators			
Series	504	507	505	5055	5054	5080
	AERCAL					HYGRO
						
Material	chrome plated brass		chrome plated brass / technopolymer			
Maximum working pressure	10 bar		10 bar			
Maximum discharge pressure	2.5 bar	6 bar	-			
Maximum working temperature	100°C		90°C			100°C
Hygroscopic function	✔	✔	-			✔
Operating mode	Automatic		Manual			Automatic hygroscopic
Drain positioning	Fixed		Fixed		Adjustable	Fixed
Connections	1/2" - 3/4" - 1"	1" - 1 1/4"	1/8" - 1/4" - 3/8"	1/8" - 1/4" - 3/8" - 1/2"		



AUTOMATIC AIR VENTS

501 MAXCAL

tech. broch. 01031

Automatic air vent for heating, air conditioning and refrigeration.
High discharge capacity.
Brass body and cover, stainless steel internal components.
Max. working pressure: 16 bar.
Max. discharge pressure: 6 bar.
Temperature range: -20–120°C.

Code	
501500	3/4" F x 3/8" F

551 DISCALAIR®

tech. broch. 01124

High performance automatic air vent.
Brass body.
Female connection.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.

Code	
551004	1/2"

5022 VALCAL

tech. broch. 01054

Automatic air vent.
In hot-stamped brass.
Chrome plated.
Max. working pressure: 10 bar.
Max. discharge pressure: 4 bar.
Max. working temperature: 120°C.

Code	
502221	1/4" M
502231	3/8" M
502241	1/2" M

5020 MINICAL

tech. broch. 01054

Automatic air vent.
In hot-stamped brass.
Chrome plated.
Max. working pressure: 10 bar.
Max. discharge pressure: 2,5 bar.
Max. working temperature: 120°C.

Code	
502031	3/8" M
502041	1/2" M

5020 MINICAL

tech. broch. 01054

Automatic air vent.
In hot-stamped brass.
Chrome plated.
With hygroscopic safety cap.
Max. working pressure: 10 bar.
Max. discharge pressure: 2,5 bar.
Max. working temperature: 120°C.

Code	
502051	3/4" M
502061	1" M

5020 MINICAL

tech. broch. 01054

Automatic air vent.
In hot-stamped brass.
Max. working pressure: 10 bar.
Max. discharge pressure: 2,5 bar.
Max. working temperature: 120°C.

Code	
502030	3/8" M
502040	1/2" M

5020 MINICAL

tech. broch. 01054

Automatic air vent.
In hot-stamped brass.
With hygroscopic safety cap.
Max. working pressure: 10 bar.
Max. discharge pressure: 2,5 bar.
Max. working temperature: 120°C.

Code	
502050	3/4" M
502060	1" M

AUTOMATIC AIR VENTS

5021 MINICAL

tech. broch. 01054

Automatic air vent.
In hot-stamped brass.
With automatic shut-off cock.
Max. working pressure: 10 bar.
Max. discharge pressure: 2,5 bar.
Max. working temperature: 110°C.

Code	
502130	3/8" M
502140	1/2" M

5021 MINICAL

tech. broch. 01054

Automatic air vent.
In hot-stamped brass.
Chrome plated.
With automatic shut-off cock.
Max. working pressure: 10 bar.
Max. discharge pressure: 2,5 bar.
Max. working temperature: 110°C.

Code	
502131	3/8" M
502141	1/2" M

561

tech. broch. 01054

Automatic shut-off cock.
For automatic air vents 5020 series.
PTFE seal on thread.
Max. working pressure: 10 bar.
Max. working temperature: 110°C.

Code		
561300	3/8" M	
561400	1/2" M	without PTFE seal

561

tech. broch. 01054

Automatic shut-off cock.
For automatic air vents 5020 and 5022 series.
Chrome plated.
PTFE seal on thread.
Max. working pressure: 10 bar.
Max. working temperature: 110°C.

Code		
561301	3/8" M	
561401	1/2" M	without PTFE seal

5024 ROBOCAL

tech. broch. 01033

Automatic air vent.
In hot-stamped brass.
Max. working pressure: 10 bar.
Max. discharge pressure: 4 bar.
Max. working temperature: 115°C.

Code	
502420	1/4" M
502430	3/8" M

5025 ROBOCAL

tech. broch. 01033

Automatic air vent.
In hot-stamped brass.
With automatic shut-off cock.
Max. working pressure: 10 bar.
Max. discharge pressure: 4 bar.
Max. working temperature: 110°C.

Code	
502530	3/8" M

5026 ROBOCAL

tech. broch. 01033

Automatic air vent.
In hot-stamped brass.
Max. working pressure: 10 bar.
Max. discharge pressure: 6 bar.
Max. working temperature: 115°C.

Code	
502630	3/8" M
502640	1/2" M

5027 ROBOCAL

tech. broch. 01033

Automatic air vent.
In hot-stamped brass.
With automatic shut-off cock.
Max. working pressure: 10 bar.
Max. discharge pressure: 6 bar.
Max. working temperature: 110°C.

Code	
502730	3/8" M

END PLUG FOR RADIATORS WITH AUTOMATIC AIR VENT

507 AERCAL®

tech. broch. 01032

End plug for radiators
with automatic air vent.
In hot-stamped brass.
Chrome plated.
With hygroscopic safety cap.
With rubber seal.
Max. working pressure: 10 bar.
Max. discharge pressure: 6 bar.
Max. working temperature: 100°C.

Code	
507611	1" M right
507621	1" M left
507711	1 1/4" M right
507721	1 1/4" M left

504 AERCAL®

tech. broch. 01055

Automatic air vent for radiators.
In hot-stamped brass.
Chrome plated.
With hygroscopic safety cap.
Max. working pressure: 10 bar.
Max. discharge pressure: 2,5 bar.
Max. working temperature: 100°C.

Code	
504401	1/2" M
504501	3/4" M
504611	1" M right
504621	1" M left

ACCESSORIES FOR AUTOMATIC VALVES

R59720 AQUASTOP®

tech. broch. 01032

Hygroscopic safety cap.
For end plugs 507 series.
Chrome plated.

Code
R59720

R59681 AQUASTOP®

tech. broch. 01054

Hygroscopic safety cap.
For automatic air vents 5020 and 5021 series.

Code
R59681

5620 AQUASTOP®

tech. broch. 01054

Hygroscopic safety cap.
For automatic air vents
5020, 5021, 5022 and 504 series.
Chrome plated.

Code
562000

5621 AQUASTOP®

tech. broch. 01054

Anti-vacuum cap.
For automatic air vents
5020, 5021 and 5022 series.

Code
562100

5622

tech. broch. 01033

Anti-vacuum cap.
For automatic air vents
5024, 5025, 5026 and 5027 series.

Code
562200

AIR VENTS AND DRAIN COCKS

505

tech. broch. 01056

Manual air vent for radiators.
Chrome plated.
White POM (acetal resin) knob.
PTFE seal on thread.
Max. working pressure: 10 bar.
Max. working temperature: 90°C.

Code	
505111	1/8" M
505121	1/4" M
505131	3/8" M

5055

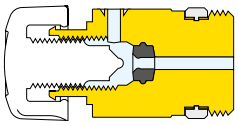
tech. broch. 01056

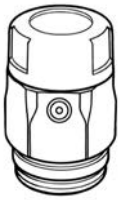
Manual air vent for radiators.
Rubber seal.
Chrome plated.
White POM (acetal resin) knob.
PTFE seal on thread.
Max. working pressure: 10 bar.
Max. working temperature: 90°C.

Code	
505511	1/8" M
505521	1/4" M
505531	3/8" M
505541	1/2" M

Manual air vent for radiators 5055 series

The identifying detail of this valve is an internal seal in a special elastic material which provides a tight seal in relation to limited tightening of the knob and possible temperature changes.





The knob of the valve is shaped so as to be similar in appearance to Caleffi thermostatic valve heads, which enhances the uniformity of the radiator component range.

For all the radiator air vents, the knob should be tightened with the system still cold.

5054

tech. broch. 01056

Manual air vent for radiators.
Chrome plated.
White POM (acetal resin) knob.
Adjustable outlet.
PTFE seal on thread.
Max. working pressure: 10 bar.
Max. working temperature: 90°C.

Code	
505411	1/8" M
505421	1/4" M
505431	3/8" M
505441	1/2" M

5080

tech. broch. 01056

Automatic hygroscopic air vent for radiators. Chrome plated.
White POM (acetal resin) knob.
PTFE seal on thread.
Max. working pressure: 10 bar.
Max. working temperature: 100°C.

Code	
508011	1/8" M
508021	1/4" M
508031	3/8" M
508041	1/2" M

5081

tech. broch. 01056

Spare hygroscopic cartridge for 5080 series.

Code	
508100	12 p.1,5

337

Drain cock.
Adjustable outlet.
PTFE seal on thread.
Max. working pressure: 6 bar.
Max. working temperature: 85°C.
Medium: water, glycol solutions.
Max. percentage of glycol: 30%.

Code	
337121	1/4"
337131	3/8"

337

Drain cock with metal seal.
Adjustable outlet.
PTFE seal on thread.
Max. working pressure: 10 bar.
Max. working temperature: 100°C.

Code	
337221	1/4"
337231	3/8"

560

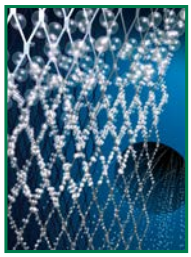
tech. broch. 01056

Drain cock for radiators and wall-mounted boilers.
Chrome plated.
Max. working pressure: 10 bar.
Max. working temperature: 100°C.

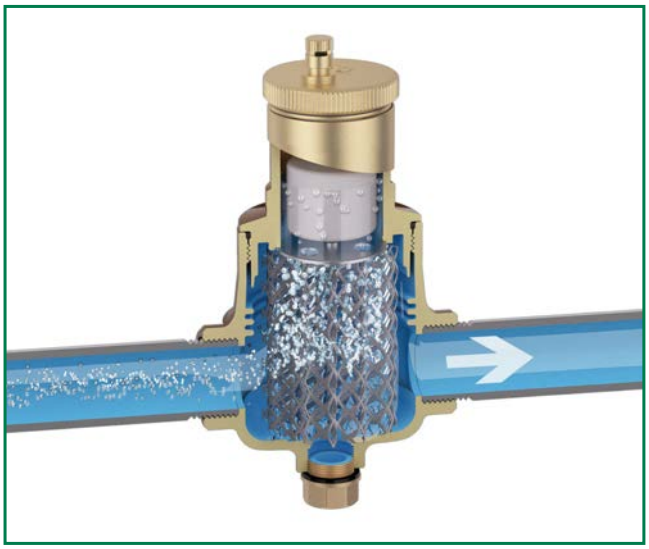
Code	
560421 ◆	1/2"
560000	extractor drain hose

◆ *One extractor drain hose code 560000 is included in each 10-item package*

Devices for eliminating micro-bubbles: deaerators



To avoid or minimise the phenomena considered, it is advisable to equip the systems with deaerators: suitable means for eliminating air micro-bubbles and composed essentially of an appropriate net and an air vent.
The deaerators make the systems work with water with a low air content that is thus able to absorb, and then eliminate, the air bubbles lurking in critical zones in the systems.

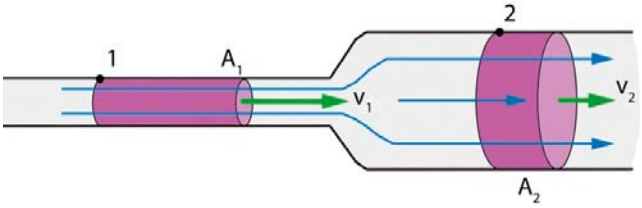


Operating principle

The deaerator utilises the combined action of several physics principles. The active part consists of a set of concentric mesh surfaces. These elements create the swirling movements required to facilitate the release of micro-bubbles and their adhesion to the surfaces.
The bubbles, fusing with each other, increase in volume until the hydrostatic thrust is sufficient to overcome the force of adhesion to the structure. They then rise towards the top of the device and are expelled through a float-operated automatic air vent.
It is designed in such a way that the direction in which the medium is flowing inside it makes no difference.

Air separation efficiency

The amount of air that can be removed from a circuit depends on different parameters: it increases as the circulation speed and the pressure decrease.
Thanks to the section's enlargement ($A_2>A_1$), the medium speed decreases ($V_2<V_1$). This feature, combined with the swirling movements created by a concentric mesh surface, allows an efficient air separation and the release of microbubbles.



Recomended speeds

The optimal recommended flow speed at the device connections is ~1,2 m/s. This allows an efficient air separation.

The maximum recommended flow speed at the device connections is ~1,5 m/s

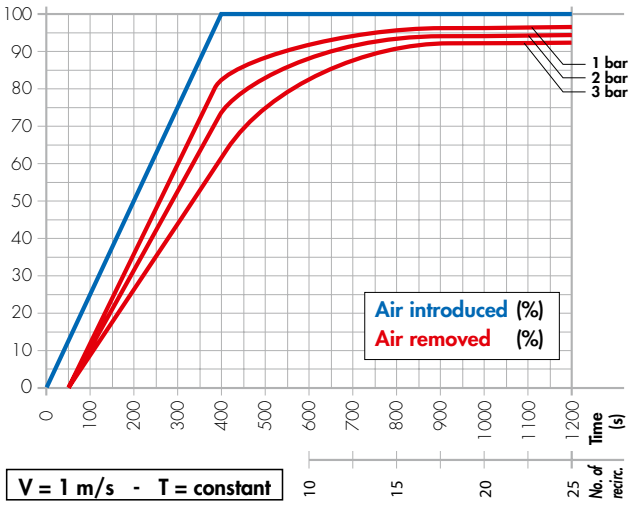
Recommended flow rates for good separation efficiency

The following table shows the maximum flow rates in order to meet this requirement.

DN	Connections	l/min	m³/h
20	3/4"	22,70	1,36
25	1"	35,18	2,11
32	1 1/4"	57,85	3,47
40	1 1/2"	90,33	5,42
50	2"	136,60	8,20

DN	l/min	m³/h
50	141,2	8,47
65	238,6	14,32
80	361,5	21,69
100	564,8	33,89
125	980,0	58,80
150	1436,6	86,20
200	2433,0	146,0
250	3866,0	232,0
300	5461,0	325,0

After just 25 recirculations at the maximum recommended speed, almost all the air introduced into the circuit is eliminated by the DISCAL® deaerator, with variable percentages according to the pressure within the circuit.
The small amount which remains is then gradually eliminated during normal system operation. In conditions where the speed is slower or the temperature of the medium is higher, the amount of air separated is even greater.

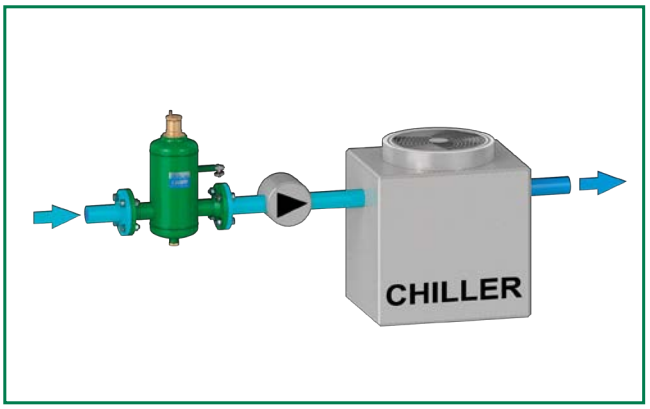


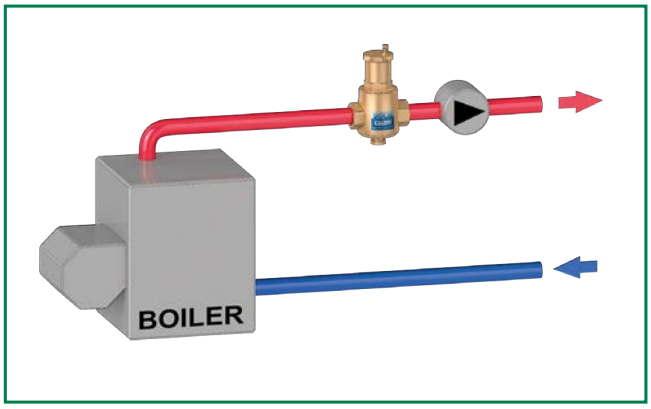
Systems with glycol solutions

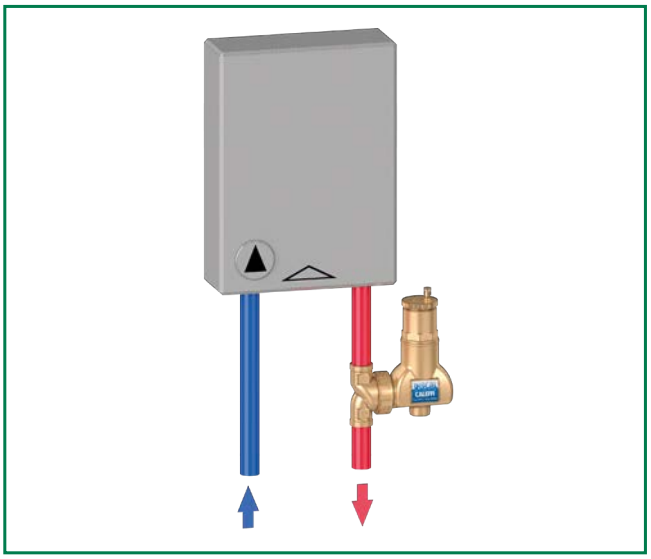
It is also useful to use deaerators in systems with antifreeze mixtures of water and glycol.
Water-glycol mixtures are highly viscous and therefore have a strong tendency to trap both air bubbles and micro-bubbles, preventing their elimination.

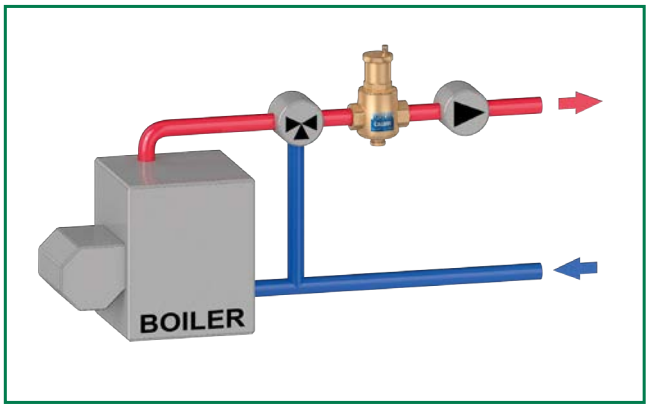
Installation

DISCAL® units may be used in both heating and cooling systems, to ensure the progressive removal of air which is continuously formed. The units should preferably be installed after the boiler and on the pump suction side, as these are the points where the formation of micro-bubbles is greatest. DISCAL® deaerators must be installed in a ver tical position, and preferably upstream of the pump where, due to the high speed of the medium and the ensuing drop in pressure, air micro-bubbles develop more easily.
The flow direction of the medium is not important in DISCAL® devices.









COMPOSITE DEAERATORS

551 DISCALSLIM®

tech. broch. 01337

Deaerator. Technopolymer body.
Adjustable for horizontal and vertical pipes.
With hygroscopic safety cap.
Max. working pressure: 3 bar.
Max. working temperature: 110°C.
PATENT PENDING.

Code	
551805	3/4" F
551806	1" F

551 DISCALSLIM®

tech. broch. 01337

Deaerator. Technopolymer body.
Adjustable for horizontal and vertical pipes.
With hygroscopic safety cap.
Max. working pressure: 3 bar.
Max. working temperature: 110°C.
PATENT PENDING.

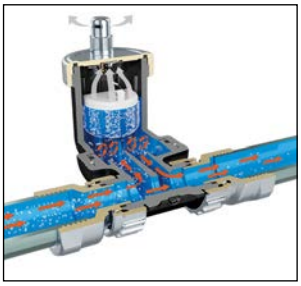
Code	
551801	Ø 18
551802	Ø 22

Insulation for deaerators DISCALSLIM® 551 series.

Code
CBN551805

Operating principle

Thanks to its special internal configuration, DISCALSLIM® has a very low pressure drop.
The internal shape deviates a part of flow in the deaeration chamber. In the above mentioned chamber the flow slows down and is subdivided by the fins present in secondary chambers which cause appropriate turbulences. Thanks to these mini-vortices, the micro bubbles of air present in the flow are separated, collected in the lower part of the chamber, and after aggregating into larger bubbles, they rise upwards through the drain ducts located aside the float. Once the top of the valve is reached, the aggregate bubbles push the float downwards, causing the air vent to open and therefore to discharge the air.



DEAERATORS

551 DISCAL®

tech. broch. 01060

Deaerator.
Brass body.
Adjustable for horizontal and vertical pipes.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.

Code	
551705	3/4" F
551706	1" F
551716	1" M
551702	Ø 22
551703	Ø 28

551 DISCAL®

tech. broch. 01060

Deaerator.
Brass body.
With drain.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.

Code	
551005	3/4" F
551006	1" F
551007	1 1/4" F
551008	1 1/2" F
551009	2" F

551 DISCAL®

tech. broch. 01060

Deaerator.
Brass body.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.

Code	
551003	3/4" F
551002	Ø 22

Insulation
for deaerators 551 series.

Code	Use
CBN551005	551005-551006
CBN551007	551007-551008
CBN551009	551009

DEAERATORS

551 DISCAL®

tech. broch. 01060

Deaerator.
Epoxy resin coated steel body.
Flanged connections PN 16.
To be coupled with flat counterflanges EN 1092-1.
With insulation.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range:
0–105°C (DN 50–DN 100),
0–100°C (DN 125-DN 150).
0–110°C (without insulation).

Code		
551052	DN 50	
551062	DN 65	
551082	DN 80	
551102	DN 100	
551122	DN 125	
551152	DN 150	
551050	DN 50	without insulation
551060	DN 65	without insulation
551080	DN 80	without insulation
551100	DN 100	without insulation
551120	DN 125	without insulation
551150	DN 150	without insulation

551 DISCAL®

tech. broch. 01060

Deaerator.
Epoxy resin coated steel body.
Weld ends.
With insulation.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range:
0–105°C (DN 50–DN 100),
0–100°C (DN 125-DN 150).
0–110°C (without insulation).

Code		
551053	DN 50	
551063	DN 65	
551083	DN 80	
551103	DN 100	
551123	DN 125	
551153	DN 150	
551051	DN 50	without insulation
551061	DN 65	without insulation
551081	DN 80	without insulation
551101	DN 100	without insulation
551121	DN 125	without insulation
551151	DN 150	without insulation

551 DISCAL®

tech. broch. 01060

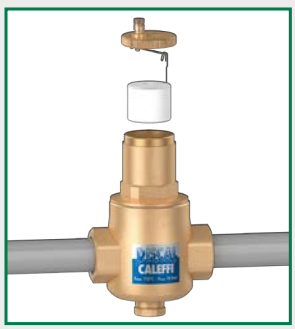
Deaerator.
Epoxy resin coated steel body.
Flanged connections PN 10.
To be coupled with flat counterflanges EN 1092-1.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.
Temperature probe connection: 1/2" F.

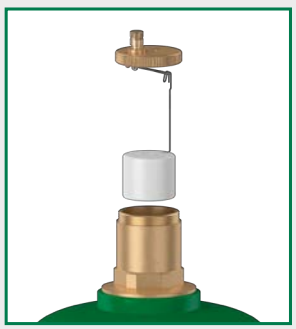
Code		
551200	DN 200	
551250	DN 250	
551300	DN 300	

Hot pre-formed shell insulation ensures not only perfect thermal insulation, but also the tightness required to prevent atmospheric water vapour from entering the unit. For this reason, this type of insulation may also be used in **cooling water circuits** as it prevents condensation from forming on the surface of the valve body.

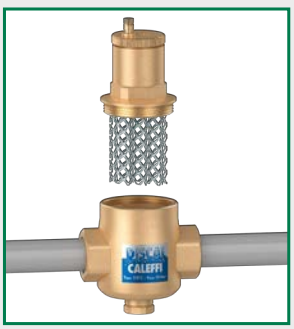
Maintenance

The moving parts that control the air venting are accessed simply by removing the upper cover.

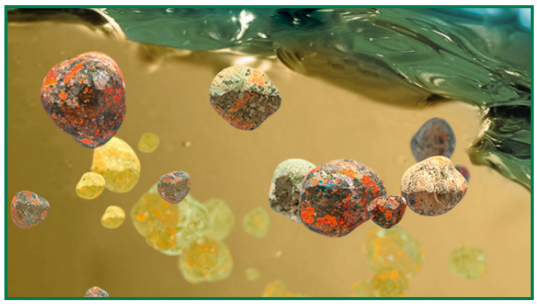




When cleaning, simply unscrew the part of the body containing the automatic air vent.



THE PRESENCE OF IMPURITIES



The presence of impurities is due to:

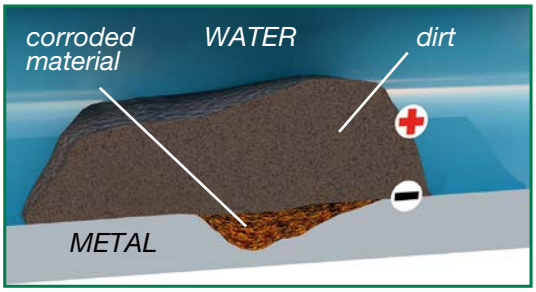
- particles arriving from the water supply mains,
- dirt resulting from processing and from the system components,
- corrosion due to differential ventilation,
- the oxidation of the metal surfaces caused by the oxygen present in the dissolved air.

Particles arriving from the mains, from processing and from the system components

These consist of sealing residue (hemp, PTFE tape), lubricants (oil and grease), impurities left by materials (metal burrs, casting sand, clots and flakes of paint).

Corrosion due to differential ventilation

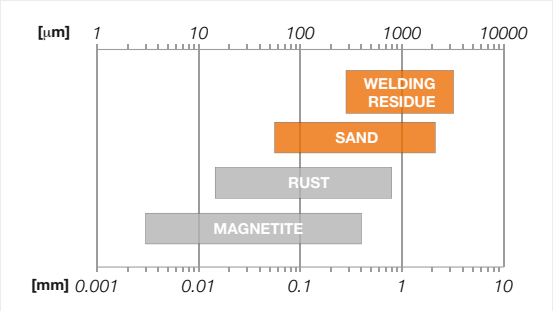
Corrosion due to differential ventilation is caused by the fact that, in the presence of water, a layer of dirt on a metal surface leads to the formation of two zones (water/dirt and dirt/metal) with a different oxygen content.
The water/dirt zone is appreciably richer in oxygen than the dirt/metal zone. For this reason, localised batteries are activated (the cathodes are the zones rich in oxygen, the anodes are the poor zones), with current flows that lead to corrosion of the metal surfaces.
Like corrosion due to oxidation, this can lead to the weakening, but also the breaking, of components such as boilers and radiators.



Corrosion due to oxidation of the metal surfaces

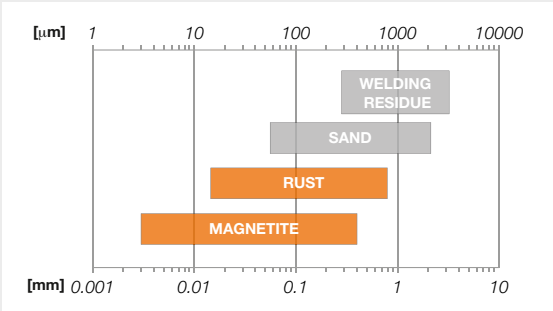
This is caused by the presence of air, and therefore of oxygen, in the water.
A thin film of oxide which, within limits, protects the metal form corrosion, forms on the metal surface. This patina usually has a different colour from the original metal, and with time it tends to change further, generally becoming lighter or darker. In this case we speak of an oxidised (or coated) surface, a surface which, from the point of view of colour, is transforming continuously. If the protective patina deteriorates for any reason, the corrosion continues until it makes a hole in the metal.

Particles of dirt



These are suspended particles (sand, iron chips, foreign bodies) originating from the water mains (aqueduct) or as residue from processing and system maintenance (welding residue, hemp, lubricants). These particles are deposited and form encrustations that cause clogging of the pipes, the heat exchangers and the components with small passages, with consequent blocks of circulation.

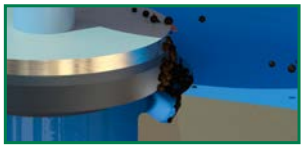
Micro-particles of dirt



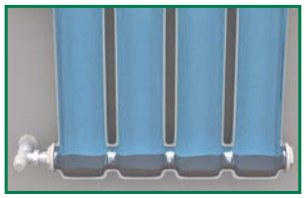
For systems, not only visible dirt can be a hazard, but also non-visible dirt, consisting of micro-particles with dimensions of up to 5–10 µm (0,005–0,010 mm), such as magnetite and rust.
Corrosion produces and releases in the water both non-magnetic iron dust (rust) and magnetic dust (magnetite, which forms in tiny flakes and possesses very high magnetic properties).

Problems linked to the presence of impurities in the systems

Irregular operation of the valves due to dirt which can adhere stubbornly to the valve seats and cause both problems in regulation and leaks.

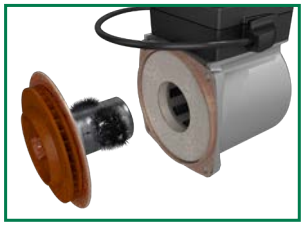


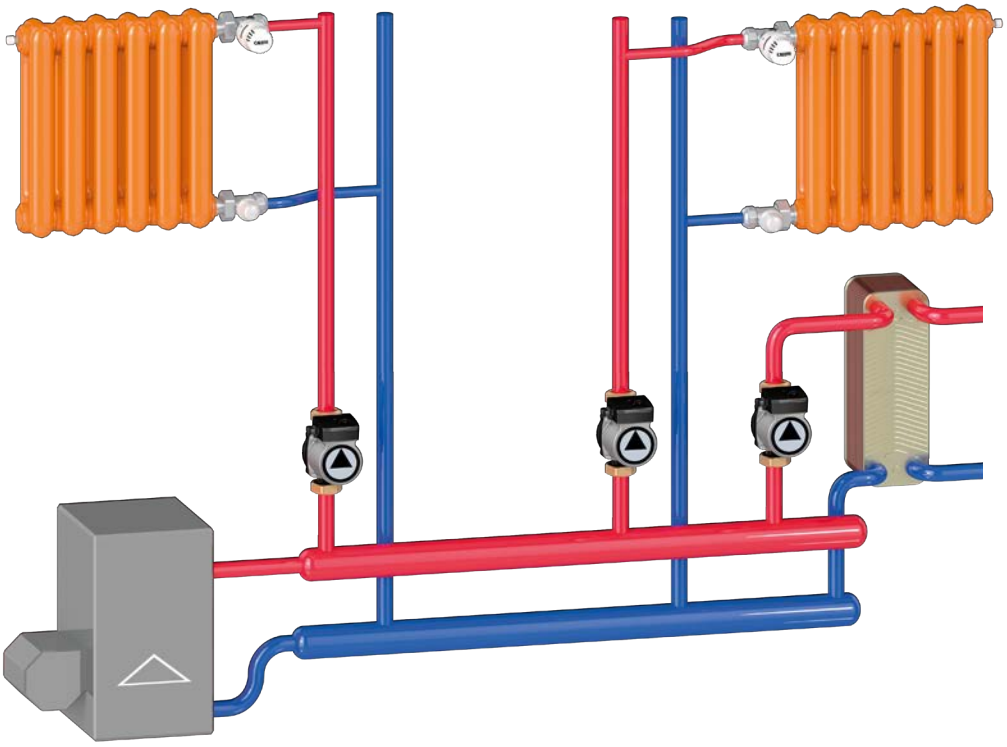
Insufficient heat exchange due to the presence of dirt in the lower part of the radiator.



Lower efficiency of the heat exchangers due to the reduction of flow rates and of the heat exchanging surfaces.

Blocking and seizing of the pumps caused by dirt that can build up in them, due both to the particular geometry of the pumps and to the effect of the magnetic fields generated by the pumps themselves.

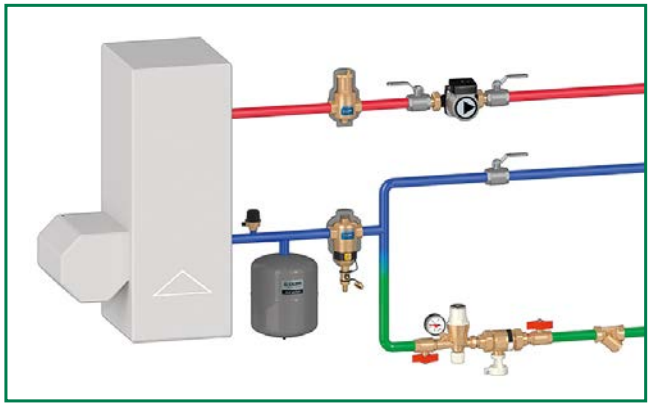




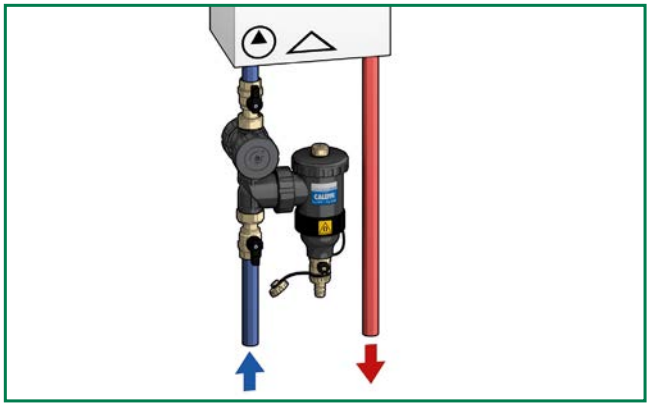
Corrosion caused by oxidation and differential ventilation with consequent weakening, and sometimes even breaking, of boilers, pipes and radiators.

Encrustations and deposits in the pipes can appreciably reduce the section of the passage and therefore the flows of medium.

The separation of the impurities in the water of the closed circuit presents difficulties especially as regards the elimination of the smallest particles, consisting essentially of sand, rust (non-magnetic iron oxides) and magnetite.
The following are generally used to eliminate these particles: ***Y-strainers, simple dirt separators (horizontal and vertical) and dirt separators with a magnet***. Since the main objective is to preserve the heat exchangers of heat generators against blocking and clogging, it is advisable to install strainers and dirt separators on the return line before the generator.



Medium/large systems: *installation of a strainer on the filling line and of a dirt separator or dirt separator strainer on the system.*



Small systems*: installation of a multi-function device (dirt separator strainer) or of a compact under-boiler dirt separator.*

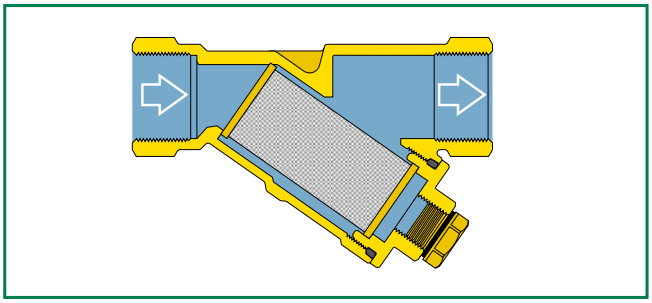
The operating principle of strainers and dirt separators is completely different; for this reason, refer to the sections below for further information.

Strainers

Filtration is a physical-mechanical process in which a moving medium separates from the solid particles dispersed in it thanks to their being captured by a porous filtering strainer through which the medium is passed.

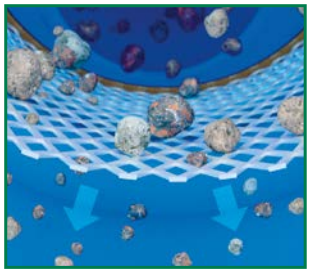
Operating principle

They are composed essentially of a metal mesh basket that acts as a filtering element and a dirt collector.
The metal mesh is characterised by various parameters, one of the most important of which is the mesh size (or filtering capacity): it indicates the minimum dimensions of the particles that the strainer is able to intercept.
For example, a strainer with mesh size 0,4 mm (400 µm) is able to capture dirt particles from that value upward.
The strainer therefore holds back at the first passage all the particles larger than the diameter of the strainer mesh.



Head losses

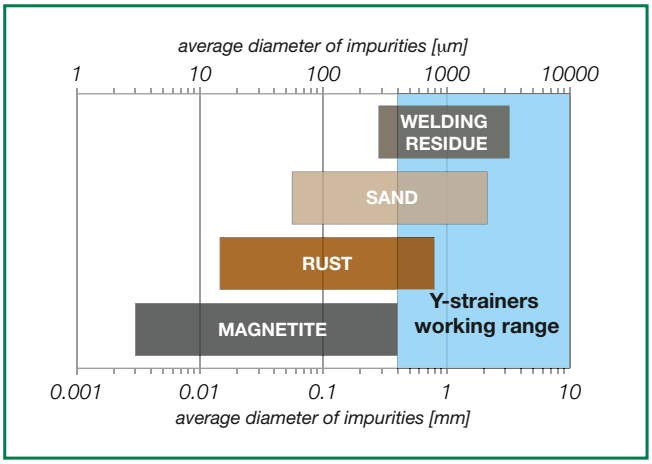
Due to the passage through the strainer mesh, a head loss is produced in the medium which increases as the degree of clogging increases.
A strainer (size 1") with mesh size 400 µm has a head loss (with clean strainer) of about 180 mm w.g. in a system with a flow rate of 1500 l/h.
Its head loss with 70% clogging increases by more than 4 times, amounting to about 810 mm w.g..
It is extremely important to carry out periodic maintenance of the strainer.



Dirt separation efficiency

The strainers block at the first passage all the particles with dimensions larger than the mesh size.
The limit of these devices lies in the fact that they are not able to intercept, and thus remove from circulation, particles of dirt smaller than that value (generally, for air-conditioning systems, 0,4–0,5 mm, that is 400–500 µm).
As a result they are not sufficiently able to combat particles of fine sand, rust and magnetite.

It should also be considered that the intercepted particles adhere to the basket, often stubbornly, considerably increasing the head losses of the strainer: this situation requires frequent interventions to clean or replace the basket.



577

Y-strainer.
Bronze body,
1/2"–2": PN 16,
2 1/2" - 3": PN 10.
Female connections.
Temperature range: -20–110°C.
Max. percentage of glycol: 30%.
Strainer in stainless steel stretched plate.

Code		Mesh size Ø (mm)	Kv (m³/h)
577004	1/2"	0,40	3,4
577005	3/4"	0,40	7
577006	1"	0,40	10
577007	1 1/4"	0,47	16
577008	1 1/2"	0,47	24
577009	2"	0,53	35
577020	2 1/2"	0,53	57
577030	3"	0,53	73

579

Y strainer for heating systems.
Grey cast iron body,
grey epoxy coating.
Max. working pressure: 16 bar.
Temperature range: -10–100°C.
Max. percentage of glycol: 50%.
Flanged connections PN 16.
To be coupled with flat counterflanges EN 1092-1.
Filtering mesh in stainless steel AISI 304.

Code		Mesh size Ø (mm)	Kv (m³/h)
579051	DN 50	0,87	54
579061	DN 65	0,87	76
579081	DN 80	1,55	108
579101	DN 100	1,55	170
579121	DN 125	1,55	295
579151	DN 150	1,55 *	408
579201**	DN 200	1,55 *	725
579251**	DN 250	1,55 *	938

** Rhomboidal reinforcing mesh*
*** Blue epoxy coating*

Dirt separators

Dirt separation is a physical treatment similar to filtration but more effective from the point of view of particle dimensions. Exploiting the principle of precipitation by gravity, it is able to separate and deposit even particles with dimensions down to 0,005 mm (5 µm).

Operating principle

The action of separating impurities carried out by the dirt separator is based on the combined action of several phenomena: the reduction of the speed of the medium favours the precipitation by gravity of the dirt particles into the collection chamber.
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 mesh;
- it is large enough to increase the dirt accumulating capacity, which means emptying/discharging procedures are required less often (in contrast to strainers, which need to be frequently cleaned);
- it has a drain cock for discharging the impurities collected in the lower part even while the system is operating.

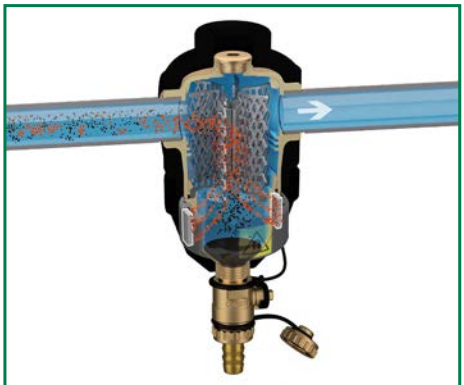
The internal element with reticular surfaces instead of the ordinary strainer, due to its constitution, opposes a low resistance to the passage of the medium, while still guaranteeing separation.
This occurs due to the particles colliding with the reticular surfaces and then settling, and not by filtration.

In subsequent passages, the dirt separator completely eliminates the impurities present in the water down to a rated dimension of 5 µm.

Standard version

VERSION WITH MAGNET

As well as the traditional functional characteristic of dirt separation, the magnetic dirt separator is equipped with a special system for collecting the ferromagnetic impurities contained in the circuit water. A special ring, with two housings for holding the magnets, is located on the outside of the device body, in the impurity collecting area. Ferromagnetic particles are thus retained in the collection chamber and prevented from returning to circulation.
In the flanged version, the magnetic element consists of an articulated cylinder inserted in the device by means of a pocket.



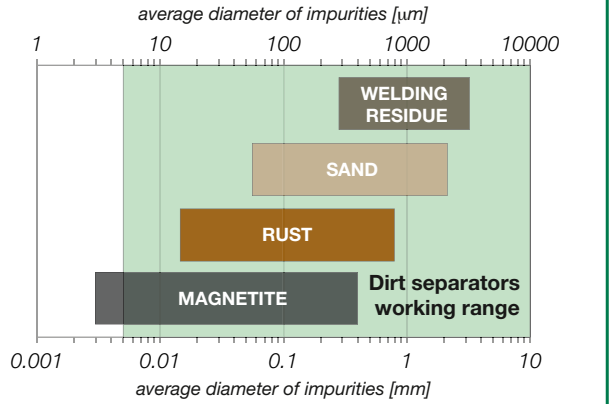
Standard version with magnet

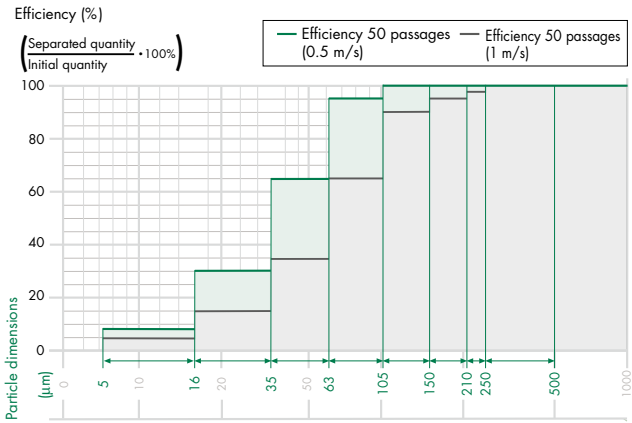
Flanged version with magnet

Flanged version with magnet

Particle separation capacity

The Caleffi 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.
Tests performed in a specialist lab (TNO - Science and Industry - NL) established that the Caleffi dirt separator can quickly remove almost all impurities after just 50 recirculations, i.e. about one day of operation. Up to 100% impurities with a particle diameter greater than 100 µm are removed from the circuit and on average up to 80% considering the smallest particles.
The continual passing of the medium during normal operation of the system gradually leads to complete dirt removal.





Tests in the specialised laboratory TNO - Science and Industry (NL)

DIRT SEPARATORS

5462 DIRTCAL®

tech. broch. 01137

Dirt separator.
Brass body.
Drain cock with hose connection.
Top connection with plug.
Max. working pressure: 10 bar.
Temperature range: 0–110°C.
Particle separation rating down to 5 µm.

Code	
546205	3/4" F
546206	1" F
546207	1 1/4" F
546208	1 1/2" F
546209	2" F

5469 DIRTCAL®

tech. broch. 01137

Dirt separator for vertical pipes.
Brass body.
Drain cock with hose connection.
Max. working pressure: 10 bar.
Temperature range: 0–110°C.

Code	
546905	3/4" F
546906	1" F
546902	Ø 22

Pre-formed insulation
for dirt separators 5462 and
5463 series.

Code	Use
CBN546205	546205-546206-546305-546306
CBN546207	546207-546208-546307-546308
CBN546209	546209-546205-546309

Discharge and maintenance

The collected impurities are discharged, even with the system running, by opening the drain cock located in the lower part of the collection chamber.

In threaded versions, the collection chamber 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 dirt particles.

DIRT SEPARATORS WITH MAGNET

5463 DIRTMAG®

tech. broch. 01137

Dirt separator **with magnet**.
Brass body.
Drain cock with hose connection.
Top connection with plug.
With pre-formed insulation.
Max. working pressure: 10 bar.
Temperature range: 0–110°C.
Particle separation rating down to 5 µm.

Code		
546315	3/4”	
546316	1”	
546317	1 1/4”	
546318	1 1/2”	
546319	2”	
546305	3/4”	without insulation
546306	1”	without insulation
546307	1 1/4”	without insulation
546308	1 1/2”	without insulation
546309	2”	without insulation

5466 DIRTMAG®

tech. broch. 01137

Dirt separator **with magnet**.
Epoxy resin coated steel body.
Flanged connections PN 16.
To be coupled with flat counterflanges EN 1092-1.
With pre-formed insulation.
Max. working pressure: 10 bar.
Temperature range: 0–100°C.
Particle separation rating down to 5 µm.

Code	
546650	DN 50
546660	DN 65
546680	DN 80
546610	DN 100
546612	DN 125
546615	DN 150

5468 DIRTMAG®

tech. broch. 01137

Dirt separator **with magnet** for vertical pipes.
Brass body.
Drain cock with hose connection.
Max. working pressure: 10 bar.
Temperature range: 0–110°C.

Code	
546805	3/4” F
546806	1” F
546802	Ø 22 mm
546803	Ø 28 mm

5466 DIRTMAG®

tech. broch. 01137

Dirt separator **with magnet**.
Epoxy resin coated steel body.
Flanged connections PN 10.
To be coupled with flat counterflanges EN 1092-1.
Max. working pressure: 10 bar.
Temperature range: 0–100°C.
Temperature probe connection: 1/2” F.
Particle separation rating down to 5 µm.

Code	
546620	DN 200
546625	DN 250
546630	DN 300

Discharge and maintenance

The outer magnetic ring can also be removed from the body to allow the decantation and subsequent expulsion of sludge while the system is still running.

In the flanged version, the magnet is inserted in a special pocket and is articulated so that it can be extracted easily. This characteristic facilitates removal and reduces the space required for maintenance.

COMPOSITE UNDER-BOILER DIRT SEPARATORS WITH MAGNET

5451 DIRTMAG*SLIM*®

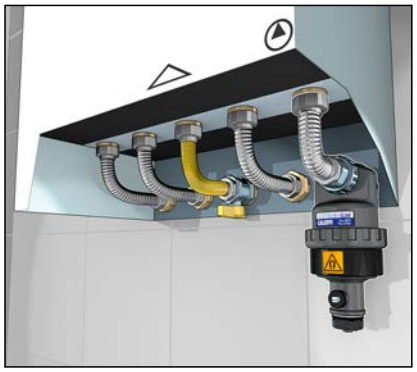
tech. broch. 01327

Dirt separator **with magnet**
for under-boiler installation.
Technopolymer body.
Drain cock with hose connection.
Fitting for wall connection: 3/4" M.
Fitting for boiler connection: 3/4"F.
Max. working pressure: 3 bar.
Temperature range: 0–90°C

PCT INTERNATIONAL APPLICATION PENDING

Code	Wall connection	Boiler connection
545105	3/4" M	3/4" F

Installation code 545105



5451 DIRTMAG*SLIM*®

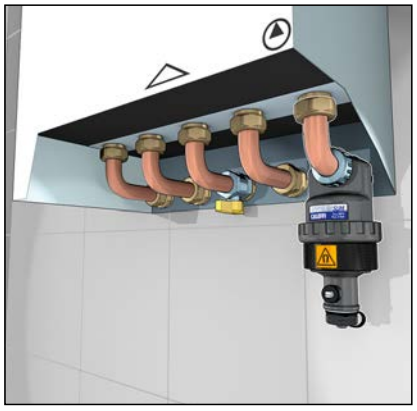
tech. broch. 01327

Dirt separator **with magnet**
for under-boiler installation.
Technopolymer body.
Drain cock with hose connection.
Fitting for wall connection: 3/4" M.
Fitting for boiler connection:
Ø 18 and Ø 22 mm copper pipe.
Maximum working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION PENDING

Code	Wall connection	Boiler connection
545101	3/4" M	Ø 18
545102	3/4" M	Ø 22

Installation code 545101



5451 DIRTMAG*SLIM*®

tech. broch. 01327

Dirt separator **with magnet**
for under-boiler installation.
Suitable for non-linear installations,
with crossed pipes.
Technopolymer body.
Drain cock with hose connection.
Fitting for wall connection: 3/4" M.
Fitting for boiler connection with flexible pipe:
3/4" F.
Max. working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION PENDING

Code	Wall connection	Boiler connection
545135	3/4" M	3/4" F

Installation code 545135

5451 DIRTMAG*SLIM*®

tech. broch. 01327

Dirt separator **with magnet**
for under-boiler installation.
Suitable for non-linear installations,
with crossed pipes.
Technopolymer body.
Drain cock with hose connection.
Fitting for wall connection: 3/4" M.
Fitting for boiler connection with flexible pipe:
3/4" F.
Max. working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION PENDING

Code	Wall connection	Boiler connection
545155	3/4" M	3/4" F

Installation code 545115

COMPOSITE UNDER-BOILER DIRT SEPARATORS WITH MAGNET

5454 DIRTMAG*SLIM*®

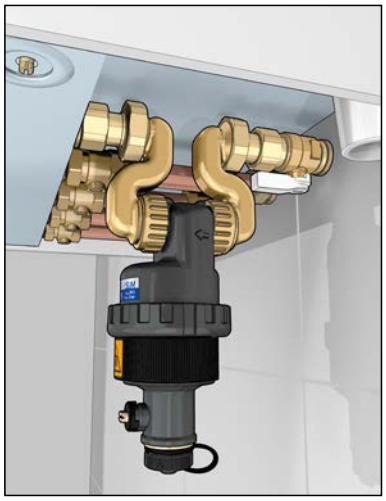
tech. broch. 01327

Dirt separator **with magnet** for under-boiler installation.
Specific configuration for installation with **Vaillant boilers with horizontal connections in new line template**.
Technopolymer body.
Drain cock with hose connection.
Fitting for wall connection: 3/4" M.
Fitting for boiler connection: 3/4" F.
Max. working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION PENDING

Code	Wall connection	Boiler connection
545455	3/4" M	3/4" F

Installation code 545455



5452 DIRTMAG*SLIM*®

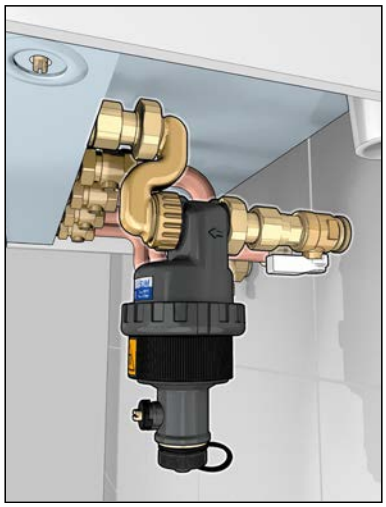
tech. broch. 01327

Dirt separator **with magnet** for under-boiler installation.
Specific configuration for installation with **Vaillant boilers with horizontal connections in old W inverted template**.
Technopolymer body.
Drain cock with hose connection.
Fitting for wall connection: 3/4" M.
Fitting for boiler connection: 3/4" F.
Max. working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION PENDING

Code	Wall connection	Boiler connection
545255	3/4" M	3/4" F

Installation code 545255



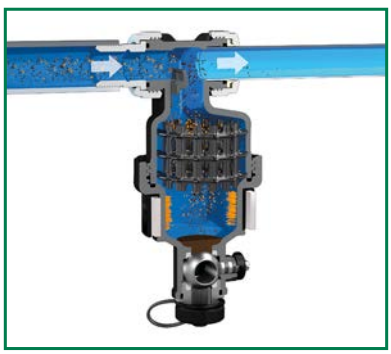
Protective cover.

Code
545100

Installation code 545100

Operating principle

The **DIRTMAG**SLIM® magnetic dirt separator removes and collects impurities present in the circuit thanks to an internal deflector located in the medium flow. This device creates turbulence in the medium that helps to transfer impurities to the decanting chamber where, thanks to the low medium velocity, the particles are captured and unable to return to the circuit. This operating principle makes it possible to keep the head loss inside the device to the minimum. Separation efficacy is enhanced by the presence of an external magnetic collar.



DIRT SEPARATORS IN COMPOSITE WITH MAGNET

5453 DIRTMAG®

tech. broch. 01240

Dirt separator **with magnet**.
Technopolymer body.
Adjustable for horizontal and vertical pipes.
Drain cock with hose connection.
Max. working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION

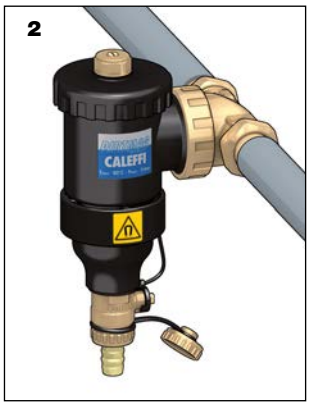
Code	
545305	3/4" F
545306	1" F
545302	Ø 22
545303	Ø 28

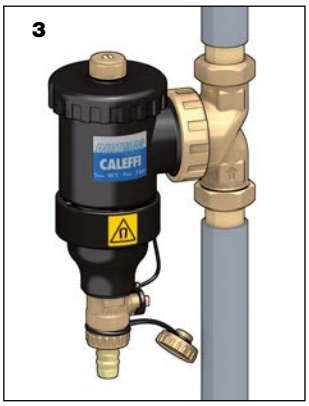
Insulation for dirt separator 5453 series.

Code
CBN545305

Adjusting the body to horizontal and vertical pipes

Thanks to the special coupling between the locking nut and the tee fitting, the DIRTMAG® dirt separator can be adjusted (1) for installation to both horizontal (2) and vertical (3) pipes, keeping the same operating features.





Operating principle

As well as the traditional functional characteristic of dirt separation, the magnetic dirt separator in polymer is equipped with a special patented system for collecting the ferromagnetic impurities contained in the circuit water.
The impurities in the water, on striking the internal reticular surfaces, get separated, dropping into the bottom of the body where they are collected. Ferrous impurities are also trapped inside the dirt separator body, thanks to the action of the two magnets inserted in a special removable outer ring.
The large internal volume of the DIRTMAG® slows down the flow speed of the medium thus helping, by gravity, to separate the contained particles.

Separation of ferrous impurities

This series of dirt separators, fitted with a magnet, offer greater efficiency in the separation and collection of ferrous impurities.
The impurities are trapped inside the dirt separator body by the strong magnetic field created by the magnets inserted in the special outer ring.
The outer ring can also be removed from the body to allow their decantation and subsequent expulsion while the system is still running.
Since the magnetic ring is positioned outside the dirt separator body, the hydraulic characteristics of the device are not altered.

THE CHEMICAL TREATMENT OF WATER

The purely chemical treatment of water is considered an internal treatment and requires the addition of specific products able to perform different functions.

Cleaning the system

This category includes all products dedicated to the removal of dirt and deposits, metal oxides, greases, oils and processing residues in new and existing systems. Depending on their formulation they can be more or less “aggressive” in order to remove dirt and sludge even in totally compromised systems.

System protection

This category is very wide but among the most known and used products there are corrosion and fouling inhibitors for radiator or radiant panel systems, biocides and products with antifreeze function.

Maintaining the system efficiency

In this category there are all the products dedicated to perform targeted actions such as sealants (to eliminate small leaks of water from the system), noise reducers (to eliminate the annoying fouled boiler noise) and pH stabilizers (to maintain the circuit pH value in the optimal range).

Products for cleaning the system CLEANER

On the market there are three macro categories of products for the systems cleaning and flushing:

- **acids**, weak or strong. They allow to restore the circuit functionality in a short time but are not recommended in the presence of circuits with galvanized or metal components in general because the risk of corrosion is high.
- **sequestrants**. They bind to the substances present in the water with more or less stable bonds but still able to remove the particles from the water solution and prevent its aggregation. They are not aggressive products and do not affect metals. Acting at the “ions” (molecular particles) level, the “sequestered” particles, being very small, can not, however, be retained by the traditional filtration systems. Therefore, using sequestrants, it is necessary to completely drain the system after flushing.
- **dispersants**. They adhere to any substance in the water inducing an electrical charge that prevents the particles from aggregating creating a sort of repulsion between them. As they act on the particles it is possible to retain and eliminate them through the common filtration systems.They also have a corrosion-proof effect and are kept stable with temperature. It is therefore not necessary to drain these products after cleaning the system. However, it is advisable to drain the impurities retained by the filtration systems during the cleaning.

Corrosion and fouling inhibitors INHIBITOR

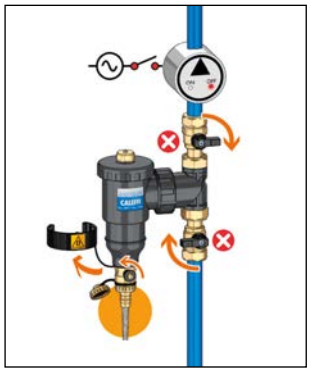
They are the most popular products among those dedicated to system protection.
Corrosion and fouling inhibitors can act for:

- **adsorption.** A chemical-physical interaction is created between the product and the metal.
- **precipitation.** Also called “filming” because they create a protective film on the system pipes and components so as not to allow the deposit of material.
  Often these products also contain chemicals that can regulate the water pH.

As heating and cooling systems are made of many different metals, the corrosion inhibitor must be compatible with all metal materials but also with plastic, rubber, diaphragms and seals. It is preferable to add the inhibitors after having carried out an accurate cleaning and flushing of the system with specific products, in order to eliminate most of the impurities present in the circuit. Once a year it is useful to check the concentration of the product inside the system in order to keep it always within the optimal working limits.

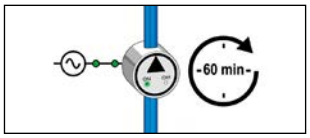
System flushing and water treatment

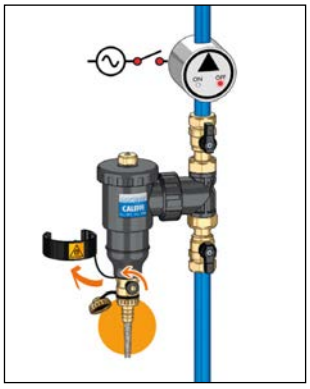
Stop the circulator, close the shut-off ball valves and drain the water out of the dirt separator.



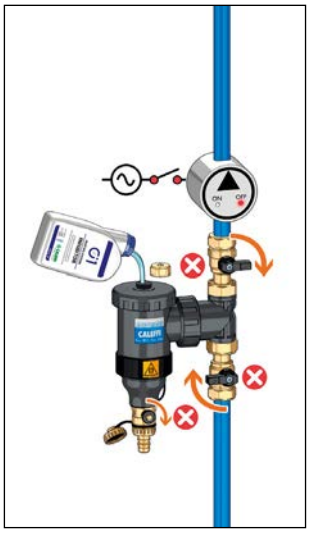
Add C3 CLEANER, using the dirt separator as a convenient point of access to the circuit.

Allow to circulate through the system for 1 hour. Stop the circulator and drain the circuit until clean water comes out.





Close the shut-off ball valves and fill with C1 INHIBITOR via the dirt separator.



DIRT SEPARATORS IN COMPOSITE WITH MAGNET

5453 DIRTMAG®

tech. broch. 01240

Dirt separator with ball valves **and magnet**.
Technopolymer body.
Adjustable for horizontal, vertical or 45° pipes.
Drain cock with hose connection.
Max. working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION

Code	
545345	3/4" F
545346	1" F
545347	1 1/4" F

Insulation for dirt separator with ball valves 5453 series.

Code
CBN545345

Protection pack

Consisting of:
- dirt separator with shut-off valves **and magnet**;
- C3 CLEANER;
- C1 INHIBITOR.

Code	
KIT545345	with dirt separator 3/4"
KIT545346	with dirt separator 1"

BELGAQUA

5709 C3 CLEANER

tech. broch. 01345

Removes dirt, limescale and debris.
Dose:
0,5 litres of product every 150 litres of water in the system.

Code	
570911	0,5 litres

BELGAQUA

5709 C1 INHIBITOR

tech. broch. 01345

Protects against corrosion and deposits.
Dose:
0,5 litres of product every 150 litres of water in the system.

Code	
570912	0,5 litres

5709 C7 BIOCIDE

tech. broch. 01345

Prevents bacterial anf fungal growth.
Dose:
0,5 litres of product every 150 litres of water in the system.

Code	
570913	0,5 litres

5709 C4 LEAK SEALER

tech. broch. 01345

Liquid sealer.
Dose:
0,5 litres of product every 150 litres of water in the system.

Code	
570914	0,5 litres

BELGAQUA

5709 C3 FAST CLEANER

tech. broch. 01351

Removes dirt, limescale and debris.
Dose:
0,4 litres of product every 150 litres of water in the system.

Code	
570915	0,4 litres

BELGAQUA

5709 C1 FAST INHIBITOR

tech. broch. 01351

Protects against corrosion and deposits.
Dose:
0,4 litres of product every 150 litres of water in the system.

Code	
570916	0,4 litres

MULTIFUNCTION DEVICE IN COMPOSITE WITH DIRT SEPARATORS AND STRAINER

5453 DIRTMAG*PLUS*®

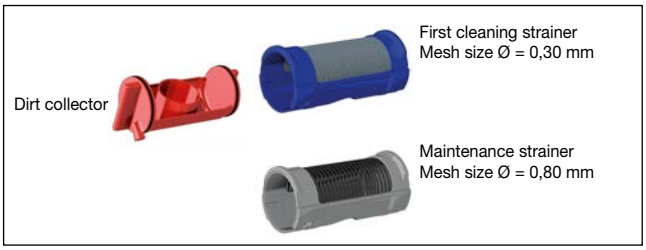
tech. broch. 01258

Multifunction device
with dirt separator and strainer.
Specific for the complete cleaning of the hydraulic circuit, to protect continuously generator and components.
Composite body.
Dirt separator with technopolymer internal element, **with magnet**.
Two inspectable strainers with stainless steel mesh:
1 for first passage (blue) already installed,
1 for maintenance (grey) in package.
Shut-off valve with nut, brass body.
Adjustable for horizontal, vertical or 45° pipes.
Drain cock with hose connection.

Max. working pressure: 3 bar.
Temperature range: 0–90°C.

PCT INTERNATIONAL APPLICATION PENDING

Code	
545375	3/4" F
545376	1" F
545372	Ø 22
545373	Ø 28



Strainer accessories.

Code	
F49474/BL	First cleaning strainer (blue colour)
F49474/GR	Maintenance strainer (grey colour)

Accessory kit for circuit filling and flushing for device DIRTMAGPLUS® 5453 series.

Code
F49476

Operating principle

The multifunction device is obtained by coupling a dirt separator and a cartridge strainer arranged in series.
The water circulating in the system flows, in sequence, first through the dirt separator and then through the cartridge strainer.
The dirt separator separates the impurities contained in the water by means of the action of the internal element.
Ferrous impurities are also trapped inside the body of the device thanks to the action of the two magnets inserted in a special removable outer ring.
The first passage through the dirt separator makes it possible to separate a high percentage of the impurities in the circulating water, down to minimal particle sizes.
The cartridge strainer separates impurities by means of mechanical selection of the particles in accordance with their size, by means of a special metal mesh.
All the particles with diameter bigger than the mesh size are automatically stopped and separated, **with maximum separation efficiency at the first passage**.

Additives dosing

The multifunction device can also be used as an access point to inject into the circuit chemical additives designed to protect the system.

Circuit cleaning and maintenance

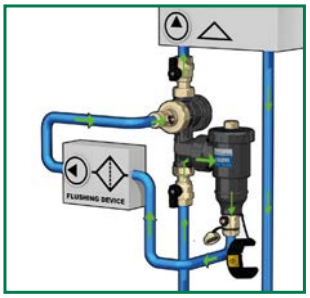
The strainer (blue) downstream of the dirt separator and fitted with a specific strainer mesh is able to intercept all particles remaining in circulation, thereby ensuring optimal initial cleaning of the pipe, to protect generator and system components. The strainer is available also with a second cartridge (grey) fitted with a filtering mesh of bigger passage cross-section, which can be used **during maintenance phase after the first cleaning**.

Cartridge strainer

The high-capacity strainer cartridge consists of two parts: an outer body with stainless steel mesh and a specially shaped internal element for collecting impurities. The complete collection of impurities is always optimal, whether the installation is vertical, horizontal, or 45°.

Accessory kit for circuit filling and flushing

A specific accessory kit, composed of a plug with a drain cock and an internal element for flow separation (black), allows the connection to an external machine for system flushing.



MANUAL CLEANING DIRT SEPARATOR FILTER WITH MAGNET

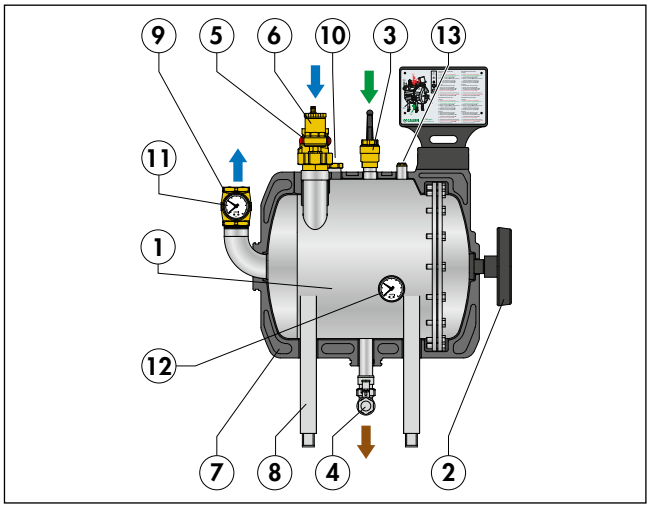
5790 DIRTMAGCLEAN®

Manual cleaning dirt separator filter with magnet.
Body and support feet in stainless steel AISI 304.
Connections: inlet 2" F,
outlet 2" F,
drain 1" F,
flushing 1" F.
Max working pressure: 10 bar.
Temperature range: 5–85°C.
Particle separation rating down to 2 µm.
Fitted for inserting chemical additives.
PATENT PENDING.

Code	Kv (m³/h)
579001	45

Characteristics components

1) Filter unit with magnet
2) Handwheel for manual cleaning
3) Inlet valve for cleaning with nozzles
4) Drain valve
5) Inlet ball valve
6) Automatic air vent with built-in filter
7) Insulation
8) Adjustable support feet
9) Swing check valve
10) Vacuum breaker
11) System pressure gauge
12) Filter pressure gauge
13) Cap

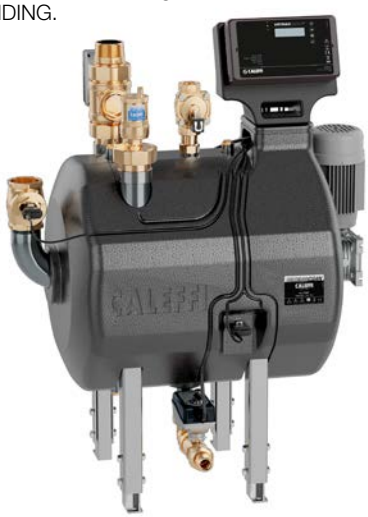


SELF-CLEANING DIRT SEPARATOR FILTER WITH MAGNET

5790 DIRTMAGCLEAN®

Self-cleaning dirt separator filter with magnet.
Body and support feet in stainless steel AISI 304.
Connections: inlet 2" M with union,
outlet 2" F,
drain 1" M with union,
flushing 1" F.
Max working pressure: 10 bar.
Temperature range: 5–85°C.
Supply: 230 V.
Particle separation rating down to 2 µm.
Fitted for inserting chemical additives.
Fitted for MODBUS-RTU management.
PATENT PENDING.

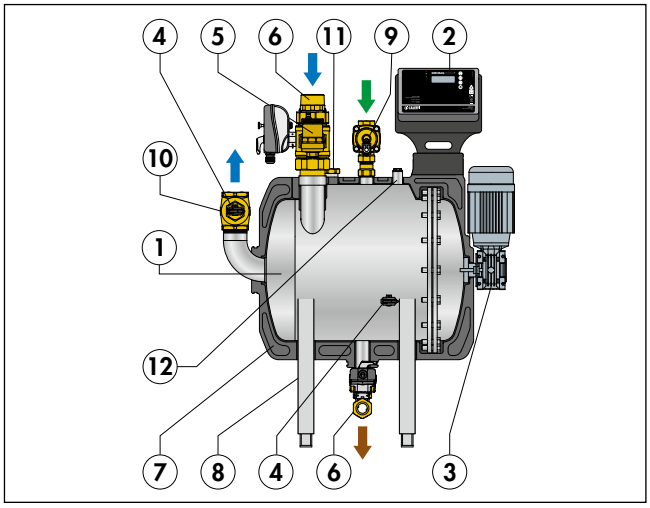
CE



Code	Kv (m³/h)
579000	45

Characteristics components

1) Filter unit with magnet
2) Controller
3) Motorised self-cleaning unit
4) Pressure and temperature sensors
5) Air vent
6) Automatic motorised valves
7) Insulation
8) Adjustable support feet
9) Solenoid valve
10) Check valve
11) Vacuum breaker
12) Cap

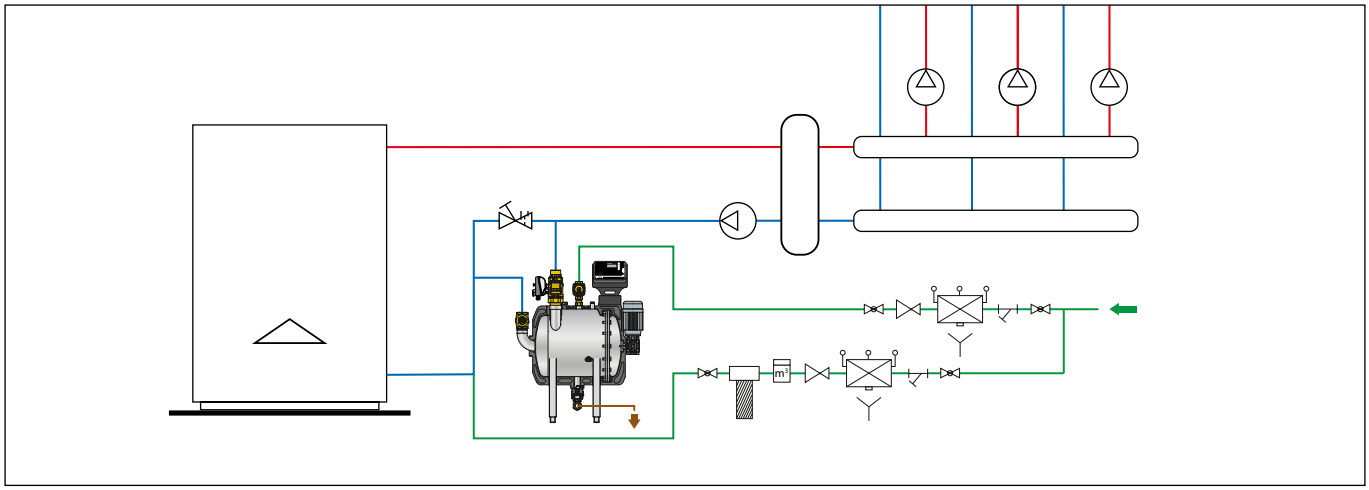


SELF-CLEANING DIRT SEPARATOR FILTER WITH MAGNET

Operating principle

This device flushes the system circuit medium by direct action through the direct action of passing through the specific filtering elements appropriately arranged inside the body. The specific filtering mesh allows the progressive removal of impurities that are deposited on the external surface of the strainers. Specific magnets attract the ferromagnetic particles. This device operates according to different operating steps:
- Filtration/ normal operation
- Dirt discharge
- Cleaning of filtering elements
- Circuit filling and operating conditions reset

The digital regulator manages the opening status of the inlet and load/drain valves, together with the strainers rotation motor during the cleaning. The cleaning phase is automatically activated according to a preset pressure drop value or in a programmed way.
Depending on the type of system, the device can be combined with others for parallel operation.

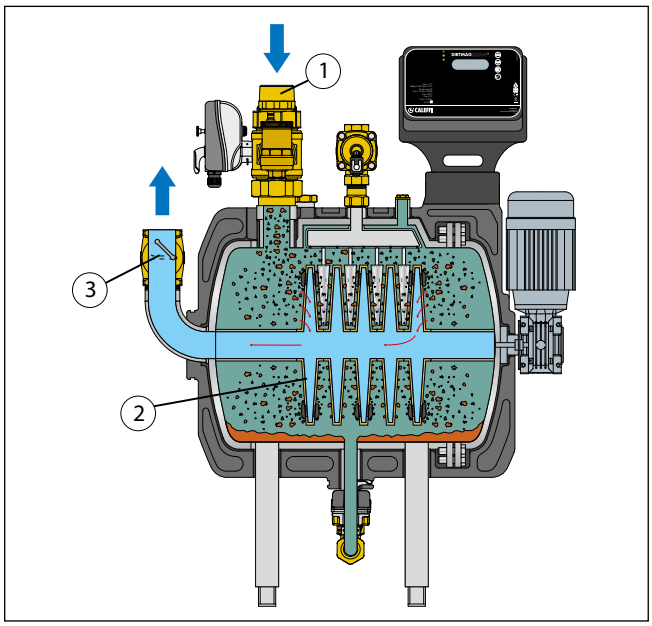


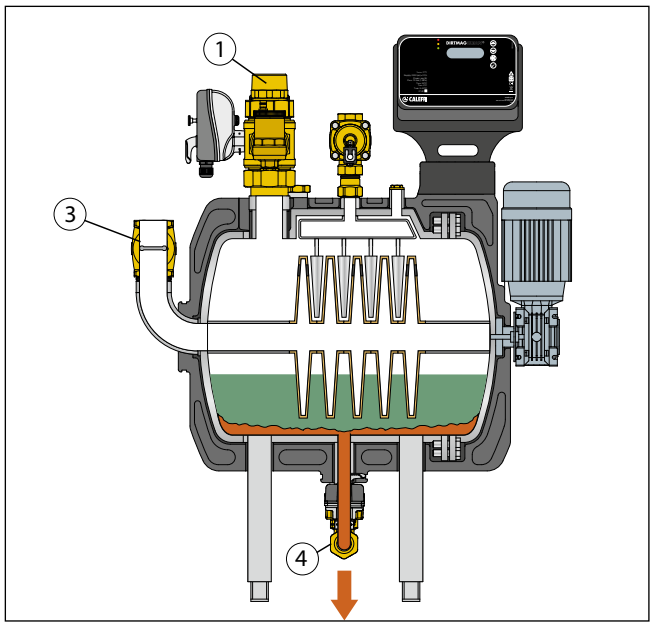
Filtration

During normal operation, the medium coming from the system enters in the strainer body through the motorised ball valve **1**. The medium is forced to pass through the filtration discs **2** then it is conveyed into the central part until it comes out of the device through the clapet check valve **3**.

Cleaning of filtering elements

It can be activated manually, by time or automatically by controlling the medium pressure drop between input and output from the device. The choice of the type of operation is carried out by the regulator. During the first cleaning (emptying) the inlet ball valve **1** closes while the clapet check valve **3** prevents the system backflow. Once the inlet valve is completely closed **1**, the drain valve is opened **4**, present in the lower part of the device. When the vacuum breaker valve, present in the upper part of the strainer body, is opened it allows the progressive draining of the tank, causing part of the dirt to come out.



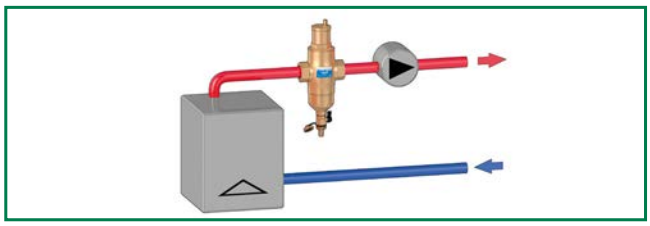


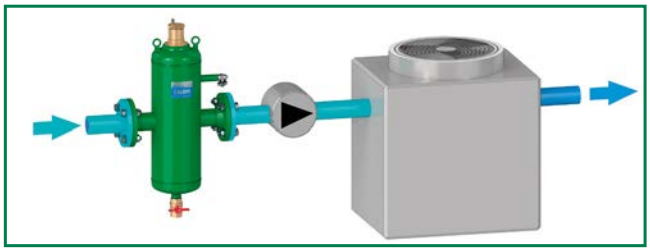
ELIMINATION OF AIR AND IMPURITIES

This is achieved by assembling, in a single product, a deaerator and a dirt separator (of a simple or magnetic type). A single product can therefore be used both to eliminate air and to eliminate the impurities present in the system water.

Operating principle

The device makes use of the combined action of the deaerator and of the dirt separator.
The internal element creates swirling movements that facilitate the release of micro-bubbles and the subsequent creation of bubbles that then rise to the top of the device, from which they are evacuated by means of an automatic air vent with float.
Moreover, the impurities in the water, striking against the surfaces of the internal element, are separated and fall to the bottom of the valve body.
With respect to the solutions that call for the installation of separate deaerators and dirt separators, the deaerator-dirt separators present the following advantages: they take up less space and require a smaller number of connections, and are therefore ideal for systems where it is not possible to install the two separate components.





DEAERATORS-DIRT SEPARATORS

546 DISCALDIRT®

tech. broch. 01123

Deaerator-dirt separator.
Brass body.
Drain cock with hose connection.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.
Particle separation rating down to 5 µm.

Code	
546005	3/4" F
546006	1" F
546007	1 1/4" F
546002	Ø 22

Insulation for deaerators-dirt separators 546 series.

Code	Use
CBN546002	546005-546006
CBN546007	546007

5461 DISCALDIRTMAG

tech. broch. 01123

Deaerator-dirt separator **with magnet**.
Brass body.
Drain cock with hose connection.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.
Particle separation rating down to 5 µm.

Code	
546105	3/4"
546106	1"
546107	1 1/4"

5461 DISCALDIRTMAG

tech. broch. 01123

Deaerator-dirt separator **with magnet**.
Epoxy resin coated steel body.
Female union connections.
With insulation.
Drain cock with hose connection.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–100°C.
Particle separation rating down to 5 µm.

Code	
546118	1 1/2" F
546119	2" F

546 DISCALDIRT®

tech. broch. 01123

Deaerator-dirt separator.
Epoxy resin coated steel body.
Flanged connections PN 16.
To be coupled with flat counterflanges EN 1092-1.
With insulation.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range:
0–105°C (DN 50–DN 100),
0–100°C (DN 125-DN 150),
0–110°C (without insulation).
Particle separation rating down to 5 µm.

Code		
546052	DN 50	
546062	DN 65	
546082	DN 80	
546102	DN 100	
546122	DN 125	
546152	DN 150	
546050	DN 50	without insulation
546060	DN 65	without insulation
546080	DN 80	without insulation
546100	DN 100	without insulation
546120	DN 125	without insulation
546150	DN 150	without insulation

546 DISCALDIRT®

tech. broch. 01123

Deaerator-dirt separator.
Epoxy resin coated steel body.
Flanged connections PN 10.
To be coupled with flat counterflanges EN 1092-1.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range: 0–110°C.
Temperature probe connection: 1/2" F.
Particle separation rating down to 5 µm.

Code		
546200	DN 200	
546250	DN 250	
546300	DN 300	

546 DISCALDIRT®

tech. broch. 01123

Deaerator-dirt separator.
Epoxy resin coated steel body.
Weld ends.
With insulation.
Max. working pressure: 10 bar.
Max. discharge pressure: 10 bar.
Temperature range:
0–105°C (DN 50–DN 100),
0–100°C (DN 125-DN 150),
0–110°C (without insulation).
Particle separation rating down to 5 µm.

Code		
546053	DN 50	
546063	DN 65	
546083	DN 80	
546103	DN 100	
546123	DN 125	
546153	DN 150	
546051	DN 50	without insulation
546061	DN 65	without insulation
546081	DN 80	without insulation
546101	DN 100	without insulation
546121	DN 125	without insulation
546151	DN 150	without insulation

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