

SEP4™ combination hydraulic, air, dirt and magnetic separator

5495 series



01249/13.1 NA
Replaces 01249/13 NA



Function

The Caleffi SEP4™ combination hydraulic, air, dirt and magnetic separator is a device that, incorporates high performance air and magnetic and non-magnetic dirt removal functionality into the hydraulic separation function which makes the primary and secondary circuits connected to it hydraulically independent, and can be used on hot or chilled water systems. The SEP4™ features an HDPE internal element that combines to continuously and automatically eliminate air micro-bubbles with the simultaneous removal of dirt particles as tiny as 5 microns. The air discharge capacity is very high, with the capability of automatically removing all the air present in the system down to the micro-bubble level. The 4-in-1 high performance functionality of the SEP4™ saves system installation and maintenance costs as there is no need to include separate air and dirt separators. In addition to removing sand and rust impurities, the added powerful removable external magnet around the lower body removes up to 95% of the ferrous oxide particles that can form in a hydronic system.

Product range

- 54950 series SEP4™ hydraulic, air, dirt and magnetic separator in steel with union connections, drain and insulationconnections 1", 1-1/4", 1-1/2", 2" NPT female union
- 54959 series SEP4™ hydraulic, air, dirt and magnetic separator in steel with union connections, drain and insulation connections 1", 1-1/4", 1-1/2", 2" sweat union

Technical specifications

- Materials**
- body: epoxy resin coated steel
 - union nuts: NPT F tailpieces, galvanized metal sweat tailpieces, brass
 - air vent body: brass EN 12165 CW617N
 - air vent hydraulic seal: EPDM
 - air vent float: PP
 - air vent float linkages: stainless steel
 - air vent float guide pin: stainless steel
 - int. element: HDPE
 - drain valve body: brass EN 12165 CW617N
 - magnet: neodymium rare-earth

Performance

- Suitable fluids: water, glycol solution
- Max. percentage of glycol: 50%
- Max. working pressure: 150 psi (10 bar)
- Temperature range: without insulation 32–230°F (0–110°C)
with insulation 32–210°F (0–100°C)
- Particle separation efficiency: to 5 µm (0.2 mil)
- Magnetic particle separation efficiency: up to 95% removal

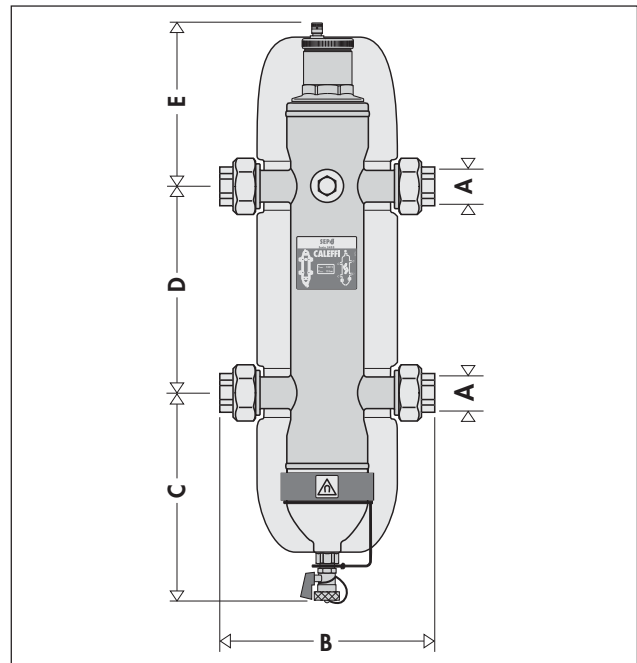
Connections

- Main connections: 1", 1-1/4", 1-1/2", 2" NPT F with unions
1", 1-1/4", 1-1/2", 2" sweat with unions
- Thermowell tap connection: 1/2" F straight thread
- Drain valve: 3/4" hose

Technical specifications of insulation

- Material: closed-cell expanded PE-X
- Thickness: 13/16" (20 mm)
- Density: - inner part: 1.9 lb/ft³ (30 kg/m³)
- outer part: 5.0 lb/ft³ (80 kg/m³)
- Conductivity (ISO 2581): at 32°F (0°C); .16 BTU/in (0.038 W/(m·K)
at 105°F (40°C); .26 BTU/in (0.045 W/(m·K)
- Water vapor resistance coefficient (DIN 52615): > 1,300
- Temperature range: 32–212°F (0–100°C)
- Fire resistance (DIN 4102): class B2

Dimensions



Code*	A	B	C	D	E	Wt. (lbs.)	Flow (gpm)	Vol (gal.)
549506A/96A	1"	8 3/4"	6 3/8"	8 3/8"	6"	15	11	0.5
549507A/97A	1 1/4"	9 3/4"	6 3/8"	9 1/2"	5 7/8"	19	18	0.7
549508A/98A	1 1/2"	11"	6 3/8"	10 1/2"	6 3/8"	27	26	1.3
549509A/99A	2"	12 3/8"	6 3/8"	11 3/8"	6 3/8"	29	37	3.5

*54950: NPT female union connections.
54959: sweat union connections.

Operating principle

Hydraulic separation

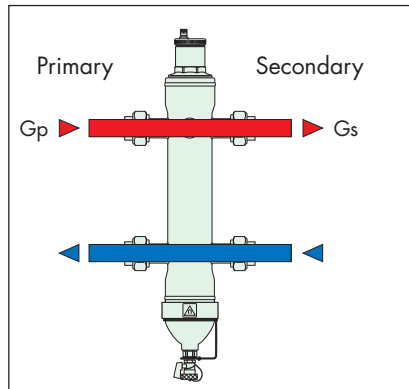
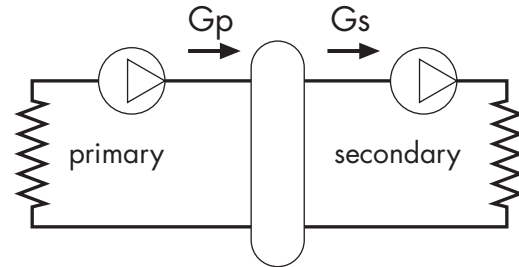
When a single system contains a primary production circuit, with its own pump, and a secondary user circuit, with one or more distribution pumps, operating conditions may arise in the system whereby the pumps interact, creating abnormal variations in circuit flow rates and pressures. The hydraulic separator creates a flow path with a low pressure loss, which enables the primary and secondary circuits connected to it to be hydraulically independent of each other; **the flow in one circuit does not affect flow in the other.**

In this case, the flow rate in the respective circuits depends exclusively on the flow rate characteristics of the circuit pumps, preventing reciprocal influence caused by connection in series. Therefore, using a device with these characteristics means that the flow in the secondary circuit only circulates when the relevant pump is on, permitting the system to meet the specific load requirements at that time.

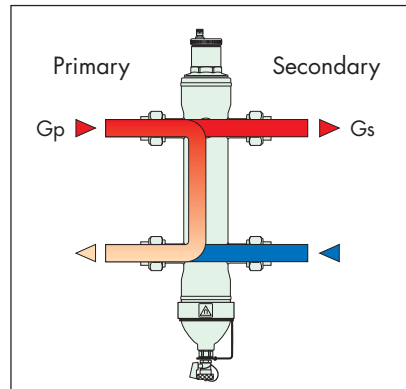
When the secondary pump is off, there is no circulation in the secondary circuit; the whole flow rate produced by the primary pump is by-passed

through the separator. With the hydraulic separator, it is therefore possible to have a primary production circuit with a constant flow rate and a secondary distribution circuit with a variable flow rate; these operating conditions are typical of modern heating and cooling systems.

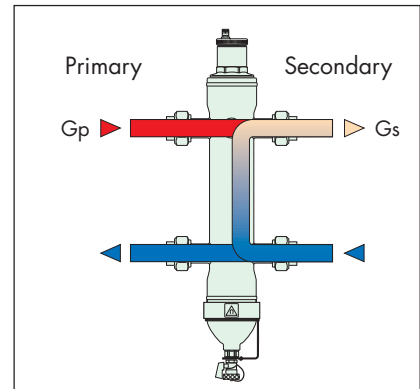
Three possible hydraulic balance situations are shown below.



$G_{primary} = G_{secondary}$



$G_{primary} > G_{secondary}$



$G_{primary} < G_{secondary}$

Microbubble air separation

The SEP4's internal air separation element (1) creates the whirling movement required to facilitate the release of microbubbles and their adhesion to the internal element surfaces. The bubbles, fusing with each other, increase in size until the hydrostatic thrust overcomes the adhesion force to the mesh. They rise towards the top of the unit from which they are released through a float-operated automatic air vent.

Magnetic particle separation

The SEP4™ incorporates a fourth separation function by removing both magnetic and non-magnetic particles continuously. The SEP4™ features

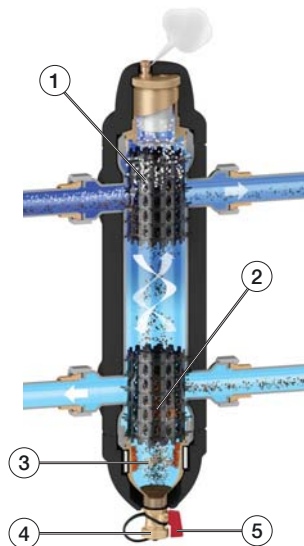
a powerful removable external rare-earth magnet around the body below the flow line for fast and effective capture of ferrous particles. The SEP4™ magnetic particle separation function causes no added system pressure drop since the magnet is positioned externally and not inside the flow path. Ferrous oxide forms in hydronic systems when iron or steel corrodes. The abrasive, extremely fine sediment is difficult to remove and can deposit onto heat exchange surfaces and accumulate in pump cavities causing reduced efficiency and premature wear. The SEP4™ accomplishes 2 1/2 times the ferrous oxide removal performance of standard dirt separation function, delivering up to 95% elimination efficiency. Captured impurities are easily flushed by unclamping the collar and purging - even with the system still operating.

Microparticle dirt separation

Impurities in the fluid upon striking the surfaces of the SEP4's internal dirt separation element (2), get separated and drop to the bottom of the body (3) where they collect.

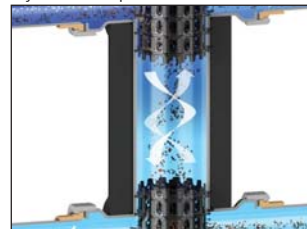
In addition, the large internal volume of SEP4™ slows down the flow speed of the fluid thus helping, by gravity, to separate the particles it contains.

The collected impurities are discharged, by opening the drain valve (4) with the handle (5), even with the system operating.



4-in-1 high performance functionality

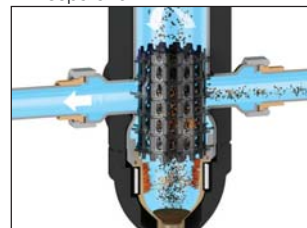
Hydraulic separation



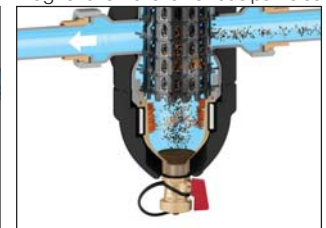
Air separation



Dirt separation



Magnetic removal of ferrous particles



Construction details

The automatic air vent (A), located at the top of the units, has a long chamber for the movement of the float. This feature prevents any debris present in the water from reaching the sealing seat. A stainless steel float guide pin prevents the float from sticking due to accumulating residue in the flowing fluids, even when the SEP4™ is not installed perfectly vertical.

A replacement air vent assembly is code 59829.

The moving parts that control air venting are accessed simply by removing the upper cover. Replacement cap and float assembly for the SEP4™ is code F39807.

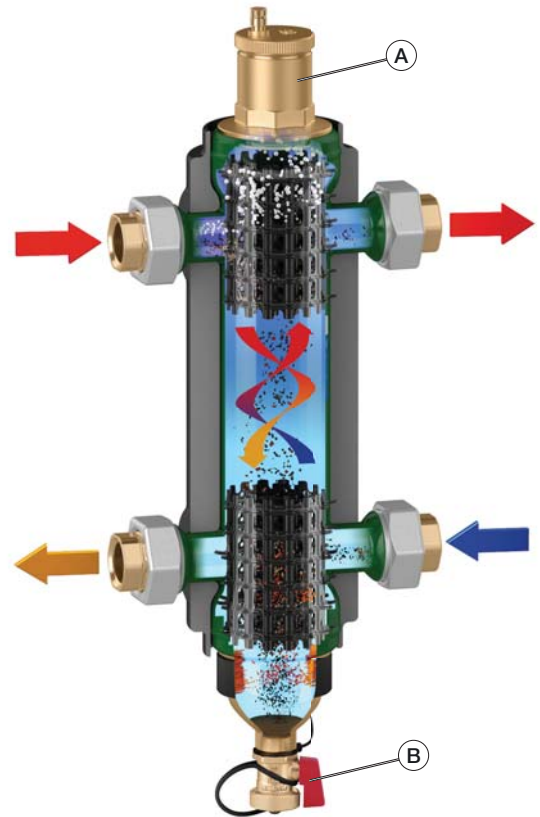
When cleaning, simply unscrew the portion of the body containing the automatic air vent.



59829



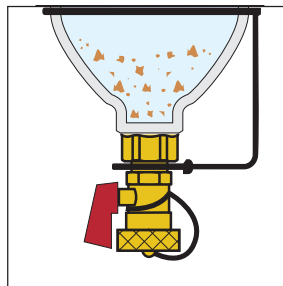
F39807



Dirt removing element

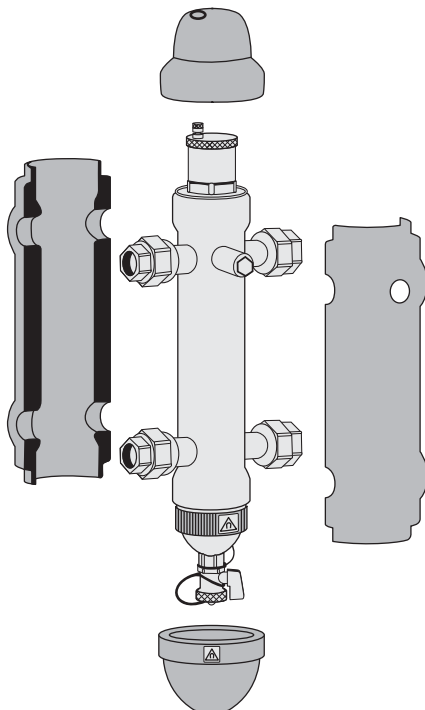
The SEP4™ dirt removing element separates and collects any impurities present in the system.

These impurities are removed by the drain valve (B), which can be connected to a discharge hose (3/4" standard garden hose thread), at the bottom of the separator.



Insulation

The SEP4™ comes standard with a hot preformed insulation shell. The insulation is made of a shell in closed-cell expanded PE-X foam. This insulation ensures not only perfect heat insulation but also the tightness required to prevent atmospheric water vapors from entering the unit. For these reasons, this type of insulation can also be used in cooling water circuits, as it prevents the formation of condensate on the surface of the separator body.



Hydraulic characteristics

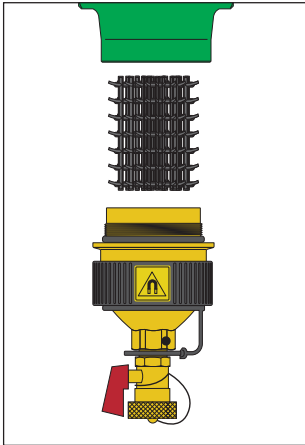
The SEP4™ should be sized according to the maximum flow rate at the inlet. The selected value is the primary circuit flow rate, or secondary circuit flow rate, whichever is largest.

Size	1"	1¼"	1½"	2"
gpm	11	18	26	37
m³/h	2.5	4.0	6.0	8.5
l/s	0.7	1.1	1.6	2.3
Gallons	0.5	0.7	1.3	3.5
liters	2.0	2.6	5.0	13.2

Maintenance

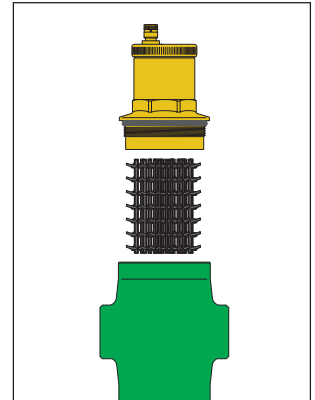
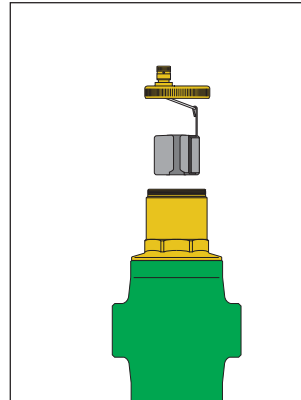
Dirt separation element

To perform maintenance simply use a 26 mm hexagon wrench (1) to unscrew the dirt collection chamber, to which the inner dirt separation element mesh element is connected for removal and for cleaning.



Air separation element

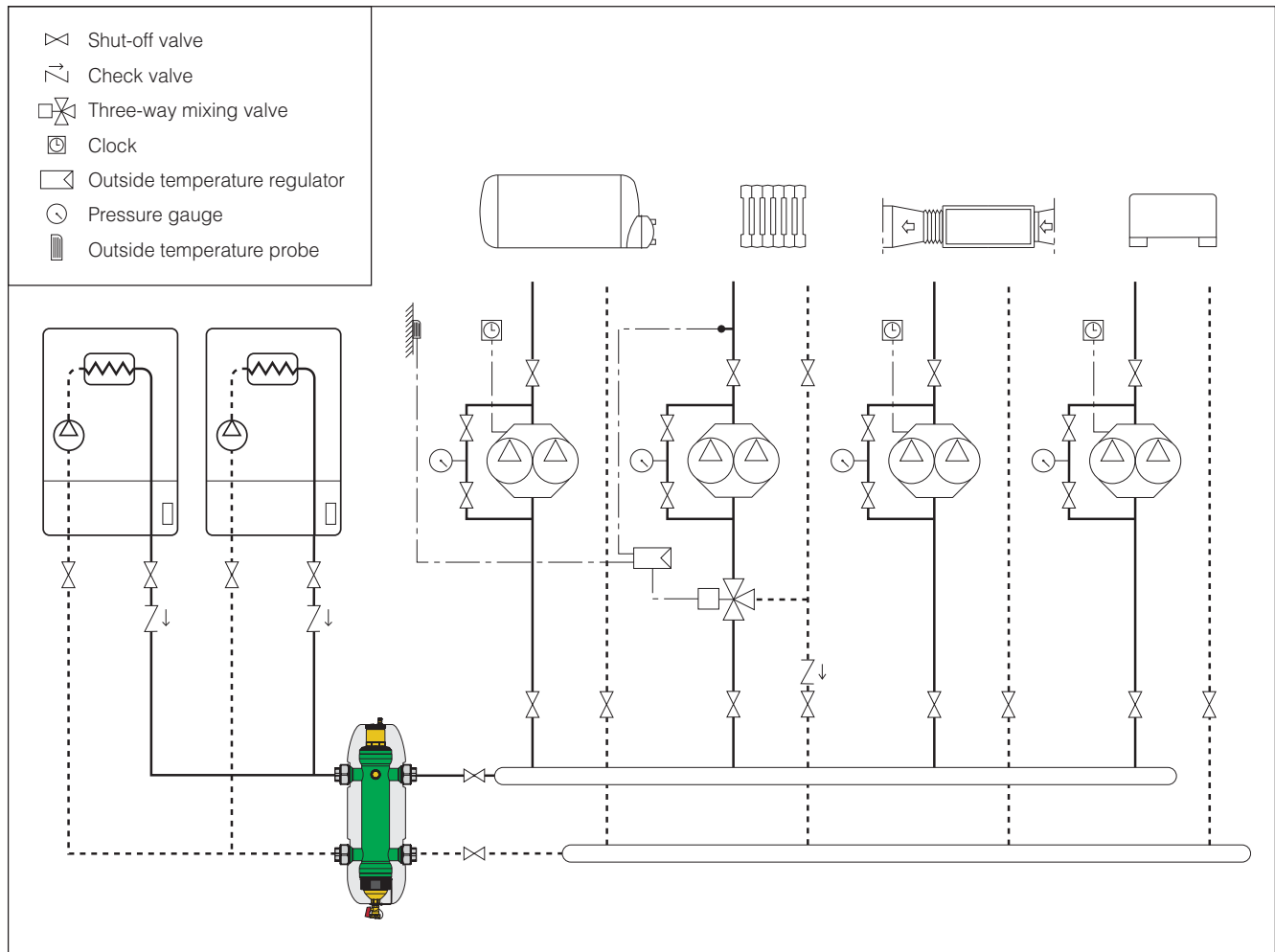
The automatic air release valve, located on the top of the unit, has a long chamber for the movement of the float. This feature prevents any debris present in the water from reaching the sealing seat.



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

When cleaning, simply unscrew the portion of the body containing the automatic air vent valve. The inner air separation mesh element can be removed for cleaning.

Application diagram



SPECIFICATION SUMMARIES

SEP4™ 5495 series

Combination hydraulic, air, dirt and magnetic separator. Sweat and NPT female connections with unions, 1", 1-1/4", 1-1/2" and 2". Epoxy resin painted steel body. HDPE internal elements, removable for cleaning. Temperature range 32–210°F (0–100°C) with insulation or 32–230°F (0–110°C) without insulation. Suitable fluids: Water or 50% maximum glycol solution. Maximum working pressure 150 psi (10 bar). External removable magnet belt, neodymium rare-earth. Particle separating capacity 5 µm (0.2 mil). Magnetic particle separation efficiency: up to 95% removal. Supplied with brass air vent with stainless steel float linkages and float guide pin, EPDM hydraulic seal and PP float and brass drain valve with hose connection. Pre-formed insulation shell is closed-cell expanded PE-X. Thermometer well pocket connection 1/2" straight female thread.

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



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