

HYDROCAL™ Combination Air, Dirt and Hydraulic Separator

series 549 and NA549



Function

The Caleffi HYDROCAL™ combination air, dirt and hydraulic separator is a device that combines high performance air and dirt removal with hydraulic separation. Primary and secondary circuits connected to it become hydraulically decoupled thus eliminating pump conflict.

A proven, time tested stainless steel internal coalescing element continuously and automatically eliminates all entrained air, including microbubbles, in the system. Air discharge capacity is very high. Over time, dirt particles as tiny as 5 microns are captured and collected away from the flow stream.

The 3 in 1 high performance functionality of the HYDROCAL saves system installation and maintenance cost as there is no need to include separate air and dirt separators. It can be used on either hot or chilled water systems.

Product range

Series 549 Flanged Air, Dirt and Hydraulic Separator with insulation _____ sizes 2", 2 1/2", 3" and 4" ANSI Flange
 Series NA549 Flanged Air, Dirt and Hydraulic Separator with insulation _____ sizes 2", 2-1/2", 3", 4" ASME ANSI Flange
 Series NA549 Flanged Air, Dirt and Hydraulic Separator without insulation _____ size 6" ASME ANSI Flange
 *NA prefix indicates ASME tagged and registered with the National Board of Boiler and Pressure Vessel Inspectors

Technical specification

Materials: - separator body: epoxy resin painted steel body
 - air vent body: brass
 - shut-off and drain valve body: brass
 - internal element: stainless Steel
 - air vent seal: VITON
 - air vent float: stainless steel

Suitable fluids: water and non-hazardous glycol solutions up to 50%
 Max. operating pressure: 150 psi (10 bar)
 Temperature range: - with insulation 32–220°F (0 - 105°C)
 - without insulation 32–250°F (0 - 120°C)
 Particle separation capacity: to 5 µm
 Connections: - flanged 2"–6" ANSI B16.5 CLASS 150 RF

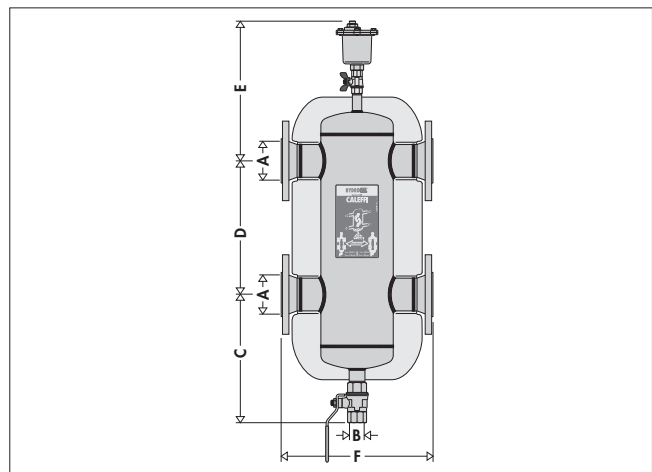
Technical specifications of insulation

Inner part
 Material: rigid closed cell expanded polyurethane foam
 Thickness: 2 3/8" (60 mm)
 Density: 3 lb/ft³ (45 kg/m³)
 Conductivity (ISO 2581): 0.16 BTU/in (0.023 W/(m·K))
 Temperature range: 32–220°F (0–105°C)

Outer part
 Material: Embossed aluminium
 Thickness: 7-mil (0.70 mm)
 Fire resistance (DIN 4102): Class 1

Head covers
 Heat formed material: PS

Dimensions



Code	A	B	C	D	E	E	Weight (lb)	Flow (gpm)	Vol. (gall)
549052A	2"	1 1/4"	13"	13"	15"	14"	73	37	4.0
549062A	2 1/2"	1 1/4"	13"	13"	15"	14"	79	62	4.0
549082A	3"	1 1/4"	15"	17 3/4"	17"	18"	108	94	8.0
549102A	4"	1 1/4"	15"	17 3/4"	17"	18"	117	148	8.0
NA549150A*	6"	1 1/4"	15"	22"	19"	25"	231	376	23.2

* without insulation
 NA prefix indicates ASME tagged and registered with the National Board of Boiler and Pressure Vessel Inspectors.
 Add NA prefix to 2" to 4" flanged connection for ASME approved.

Operating principle

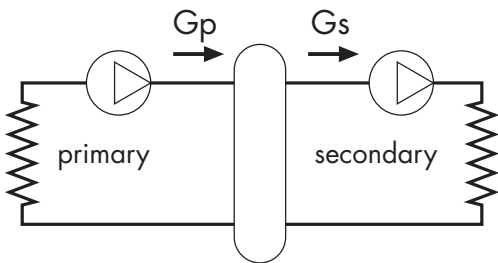
Hydraulic separation

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 zone 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.

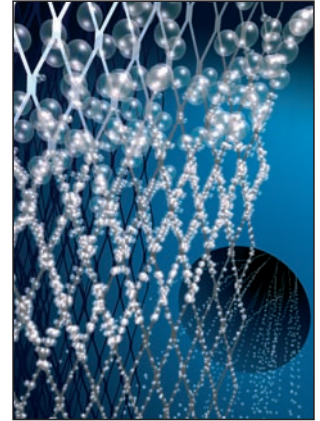
Three possible hydraulic balance situations are shown below.



Microbubble air separation

The HYDROCAL's internal 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.

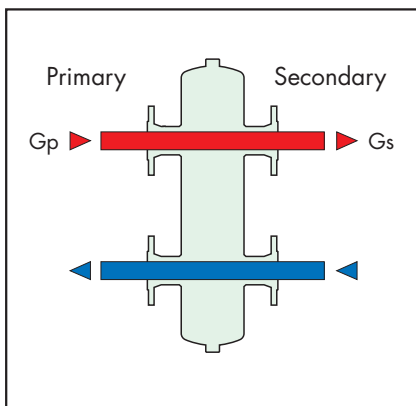
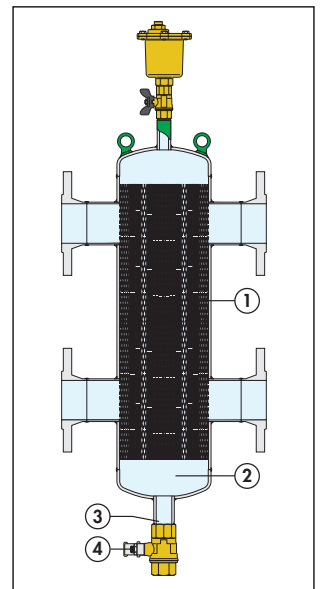


Microparticle dirt separation

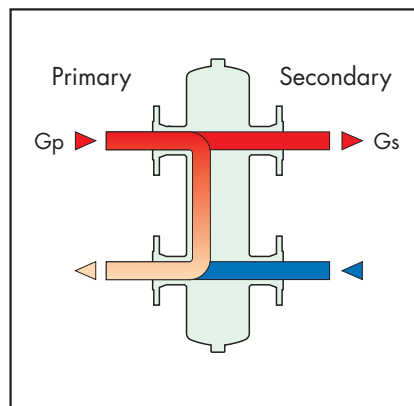
Impurities in the fluid upon striking the surfaces of the HYDROCAL's internal element (1), get separated and drop to the bottom of the body (2) where they collect.

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

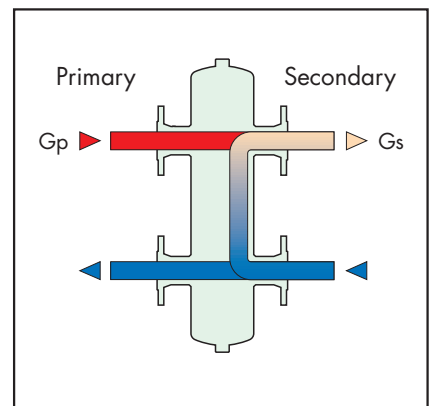
The collected impurities are discharged, by opening the drain cock (3) with the handle (4), even with the system operating.



$$G_{\text{primary}} = G_{\text{secondary}}$$

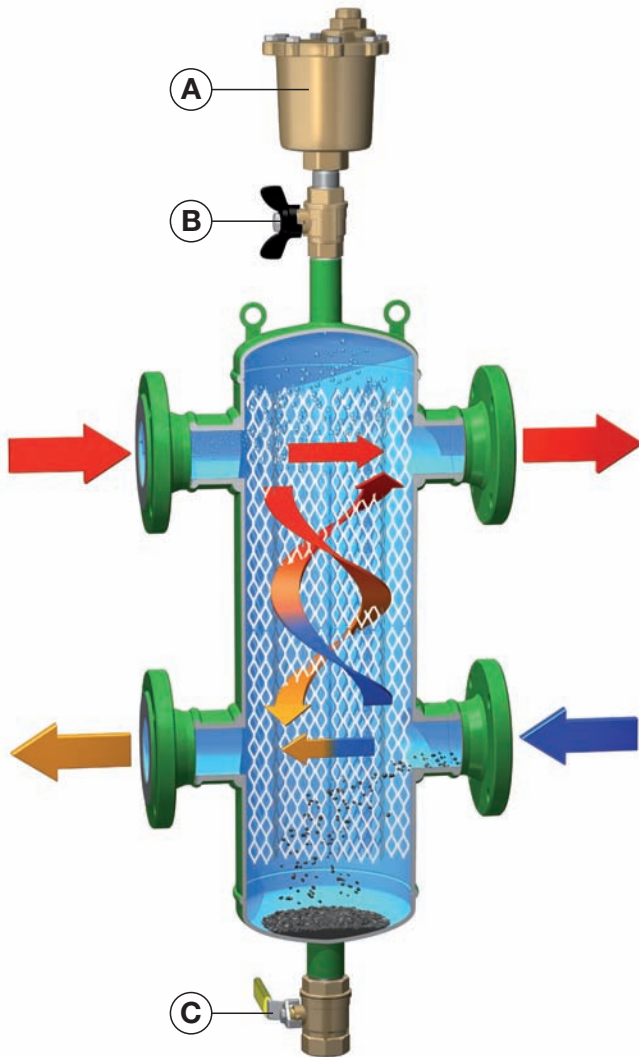


$$G_{\text{primary}} > G_{\text{secondary}}$$



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Construction details



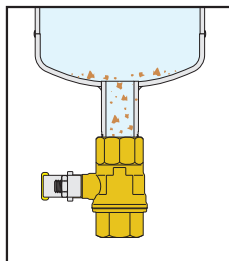
Isolating the air vent valve

The air vent (A), replacement part number 501502, is isolated manually, using a shut-off ball valve (B), replacement part number NA39589.

Dirt removing element

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

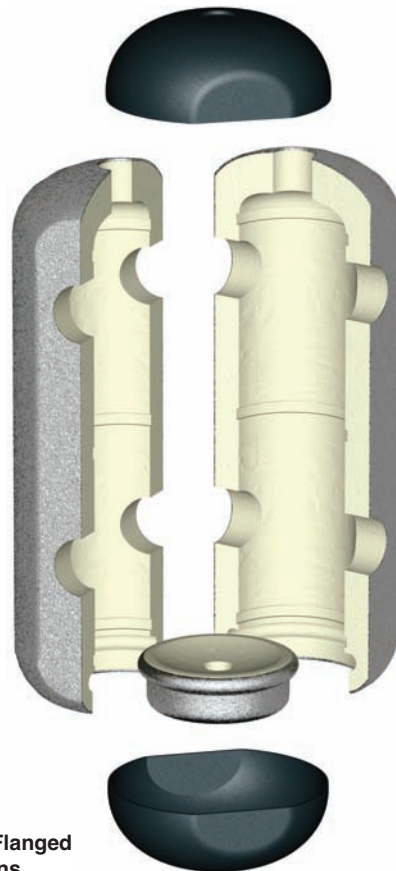
These impurities are removed by the drain valve (C) replacement part number NA39588, which can be connected to a discharge pipe, the bottom of the separator.



Insulation

The HYDROCAL is available complete with a hot preformed insulation shell. In the flanged series, up to 4", the insulation is made of a shell in expanded polyurethane foam covered with an aluminium layer. In the threaded version the insulation is made of a pre-formed shell in double density closed cell expanded PEX.

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.



2-4 inch Flanged Connections

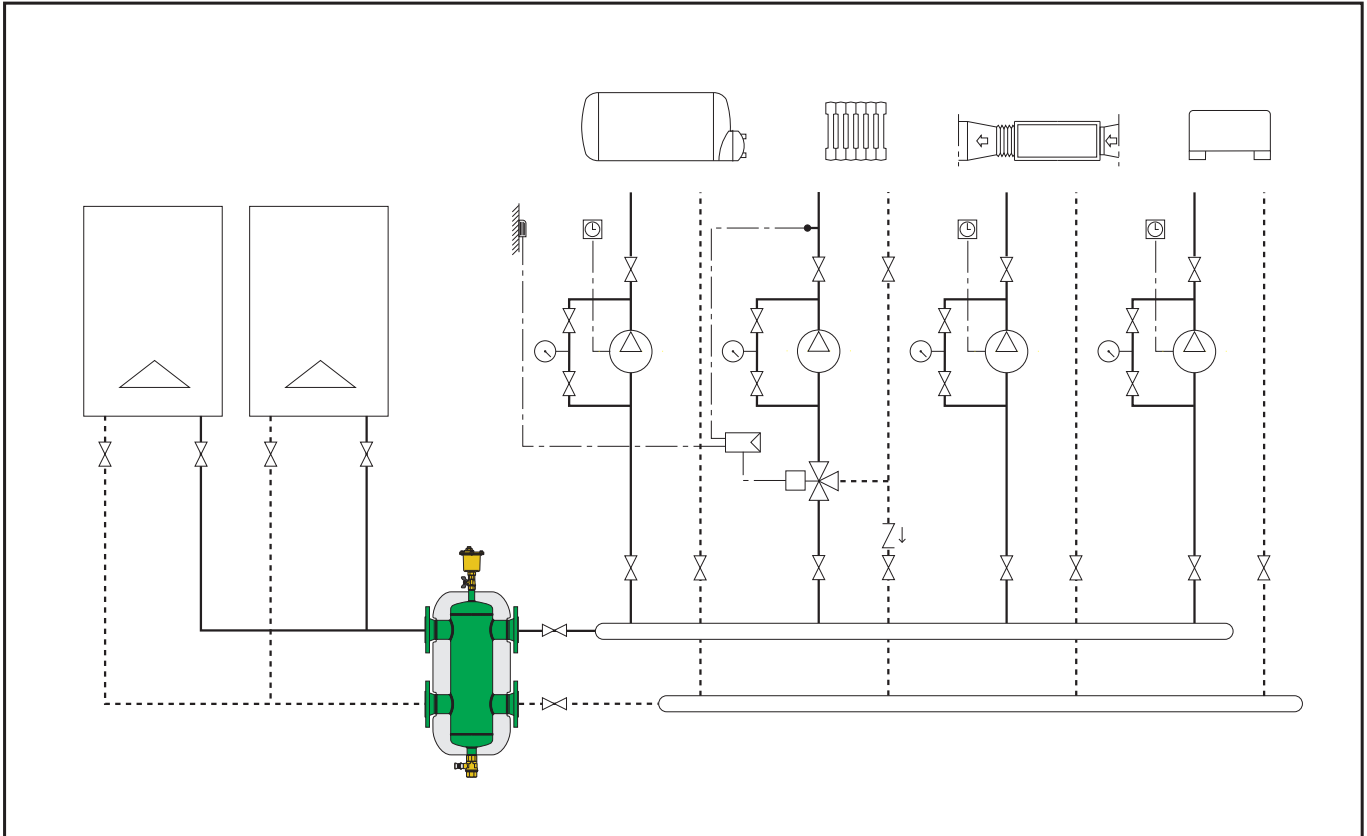
Hydraulic characteristics

The HYDROCAL should be sized according to the maximum flow rate value at the inlet. The selected design value must be the greatest between the primary circuit and the secondary circuit.

Flanged connections

Size	2"	2 1/2"	3"	4"	6"
gpm	37	62	94	148	376
m ³ /h	8.47	18	14.32	21.69	86.2
l/s	2.3	3.9	5.9	9.3	23.7

Application diagram



SPECIFICATION SUMMARIES

Series 549

Combination Air, Dirt and Hydraulic Separator. ANSI B16.5 CLASS 150 RF Flanged connections 2," 2 1/2", 3", 4" and 6". Epoxy resin painted steel body. Temperature range of 32 - 250°F (0 -120°C) with insulation. Max. working pressure 150 psi (10 bar). Supplied with: Automatic air vent with 3/4" NPT Female outlet connection and brass body. Brass body 3/4" NPT Female shut-off ball valve for air vent. Drain ball valve brass body with 1 1/4" NPT Female connection. Rigid closed cell expanded polyurethane foam shell insulation with external embossed aluminium cover for 2, 2-1/2, 3, and 4 inch sizes.

Series NA549

Combination Air, Dirt and Hydraulic Separator. ANSI B16.5 CLASS 150 RF Flanged connections 2," 2 1/2", 3", 4" and 6". Epoxy resin painted steel body. Temperature range of 32 - 250°F (0 -120°C) with insulation. Max. working pressure 150 psi (10 bar). Supplied with: Automatic air vent with 3/4" NPT Female outlet connection and brass body. Brass body 3/4" NPT Female shut-off ball valve for air vent. Drain ball valve brass body with 1 1/4" NPT Female connection. Rigid closed cell expanded polyurethane foam shell insulation with external embossed aluminium cover for 2, 2-1/2, 3, and 4 inch sizes. The separator is constructed in accordance with the latest revision of the ASME Boiler and Pressure Vessel Code and stamped for 150 psi (10 bar) working pressure.

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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