

## DISCALDIRT® - DISCALDIRTMAG® air and dirt separator

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546 - 5461 - NA546 - NA546\_M Series

### Installation, commissioning and servicing instructions



#### Function

Air and dirt separators are used to continuously remove the air and debris contained in the hydronic circuits of heating and cooling systems. The air discharge of these devices is very high. They are capable of automatically removing all of the air present in the system down to the microbubble level. The DISCALDIRT® air and dirt separator also removes any solid impurities in the system. The impurities collect at the bottom of the device and can be flushed through the integral drain shut-off valve. The circulation of fully de-aerated and cleaned water enables the equipment to operate under optimum conditions, free from noise, corrosion, or mechanical damage.

The DISCALDIRTMAG® air and dirt separator with added magnetic ring (brass and steel 5461 series) or probe (steel 546 and NA546 series) removes both ferrous and non-ferrous impurities continuously, featuring powerful removable mag-

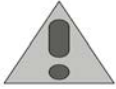
nets that remove up to 100% of the ferrous impurities, including magnetite, that can form in a hydronic system. The DISCALDIRTMAG® has 2½ times the ferrous impurities removal performance of a standard air and dirt separator.

Insulation shells are available separately for field installation on the brass DISCALDIRT® and DISCALDIRTMAG®.

#### Product range

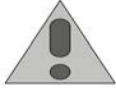
- 54609 series DISCALDIRT® air and dirt separator in brass, connections 1" and 1-¼" sweat
- 546016A DISCALDIRT® air and dirt separator in brass, connection 1" NPT male
- 546 series DISCALDIRT® air and dirt separator in steel, connections 2"-6" ANSI flanged
- 5461 series DISCALDIRTMAG® air and dirt separator with magnet in brass, connections ¾", 1", 1-¼" sweat, 1" NPT male
- 5461 series DISCALDIRTMAG® air and dirt separator with magnet in steel, connections 1-½" and 2" press union, sweat union and NPT female union
- NA546 series DISCALDIRT® air and dirt separator in steel, ASME & CRN, connections 2"-14" ANSI flanged
- NA546050T DISCALDIRT® air and dirt separator in steel, ASME & CRN, connections 2" NPT threaded
- NA546\_M series DISCALDIRTMAG® air and dirt separator with magnet in steel, ASME, connections 2-½"-6" ANSI flanged, 2" NPT threaded. CRN pending.

## SAFETY INSTRUCTION

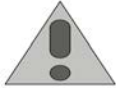


This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used, the safety alert symbol means.

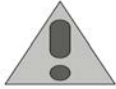
**ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**



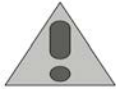
**CAUTION:** All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of systems in accordance with all applicable codes and ordinances.



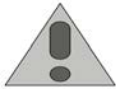
**CAUTION:** If the DISCALDIRT® and DISCALDIRTMAG® air and dirt separator is not installed, commissioned and maintained properly, according to the instructions contained in this manual, it may not operate correctly and may endanger the user.



**CAUTION:** Make sure that all the connecting pipework is water tight.



**CAUTION:** When making the water connections, make sure that the pipework connecting the DISCALDIRT® and DISCALDIRTMAG® is not mechanically over-stressed. Over time this could cause breakages, with consequent water losses which, in turn, could cause harm to property and/or people.



**CAUTION:** Water temperatures higher than 100°F (38°C) can be dangerous. During the installation, commissioning and maintenance of the DISCALDIRT® and DISCALDIRTMAG® air and dirt separator, take the necessary precautions to ensure that such temperatures do not endanger people.

**Leave this manual for the user**

## Technical specifications

### Brass body air and dirt separators and magnetic air and dirt separators

|                                |                                  |
|--------------------------------|----------------------------------|
| <b>Materials</b> - body:       | brass                            |
| - dirt separation chamber:     | brass                            |
| - air vent body:               | brass                            |
| - internal element:            | glass reinforced nylon, PA66GF30 |
| - air vent float:              | PP                               |
| - air vent float guide pin:    | stainless steel                  |
| - air vent float linkages:     | stainless steel                  |
| - spring:                      | stainless steel                  |
| - seals:                       | EPDM                             |
| - bottom drain shut-off valve: | brass                            |
| - magnet (5461 series):        | neodymium rare-earth             |

## Performance

|   |                                   |
|---|-----------------------------------|
| Suitable fluids:  | water, glycol solution            |
| Max. percentage of glycol:                              | 50%                               |
| Max. working pressure:                                  | 150 psi (10 bar)                  |
| Temperature range:                                      | 32–250°F (0–120°C)                |
| Air separation efficiency:                              | 100% removal to microbubble level |
| Particle separation capacity:                           | to 5 µm (0.2 mil)                 |
| Ferrous impurities separation efficiency (5461 series): | up to 100% removal                |
| Connections - main:                                     | ¾", 1", 1-¼" sweat; 1" NPT male   |
| - drain shut-off valve:                                 | ¾" garden hose connection         |

## Steel body air and dirt separators and magnetic air and dirt separators

|                                    |  |
|------------------------------------|--|
| <b>Materials</b> - body:           | epoxy resin painted steel  |
| - air vent body:                   | brass  |
| - internal element:                | (546, 5461, NA546) stainless steel<br>(NA546_M) stainless steel and HDPE |
| - air vent float:                  | PP   |
| - air vent float guide pin:        | stainless steel  |
| - air vent float linkages:         | stainless steel  |
| - spring:                          | stainless steel  |
| - seals:                           | EPDM   |
| - bottom drain shut-off valve:     | brass  |
| - side drain shut-off valve:       | brass  |
| - magnet (5461 and M series):      | neodymium rare-earth   |
| - magnet probe drywell (M series): | brass  |

## Performance

|   |   |
|---|---|
| Suitable fluids:  | water, glycol solution  |
| Max. percentage of glycol:                                    | 50%   |
| Max. working pressure:  | 150 psi (10 bar)  |
| Temperature range (vessel): -546, NA546, NA546_M series       | 32–270°F (0–132°C)  |
| -5461 series  | 32–230°F (0–110°C)  |
| Air separation efficiency:                                    | 100% removal to microbubble level   |
| Particle separation capacity:                                 | to 5 µm (0.2 mil)   |
| Ferrous impurities separation efficiency (5461 and M series): | up to 100% removal  |
| Connections - flanged (546 series):                           | 2"–6" ANSI B16.5 150 CLASS RF   |
| - flanged (NA546, NA546_M series):                            | 2 ½"–12" ANSI B16.5 150 CLASS RF  |
| - threaded (5461 series):                                     | 1 ½" and 2" NPT female union  |
| - threaded (NA546, NA546_M series):                           | 2" NPT male   |
| - sweat union (5461 series):                                  | 1 ½" and 2"   |
| - press union (5461 series):                                  | 1 ½" and 2"   |
| - lay length (press connections):                             | size 1 ½ inch: 11-1/8"<br>size 2 inch: 12 ½"  |
| - bottom drain valve:   | 2"–6": 1" NPT female<br>8"–12": 2" NPT female<br>5461 series: ¾" garden hose connection |

## Agency approval

-NA546, NA546\_M series designed and built in accordance with Section VIII, Div. 1 of the ASME Boiler and Pressure Vessel Code and tagged, registered with the National Board of Boiler and Pressure Vessel Inspectors, stamped for 150 psi (10 bar) working pressure, with ASME U stamp.

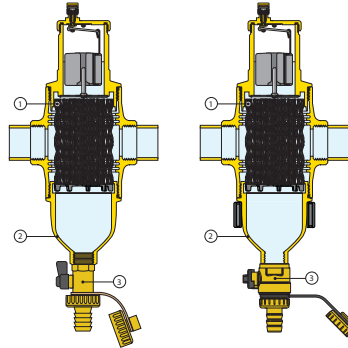
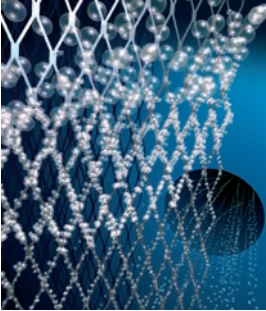
-NA546 series is also CRN registered. NA546\_M series is CRN pending, consult Caleffi.

## Operating principle

### Microbubble air separation

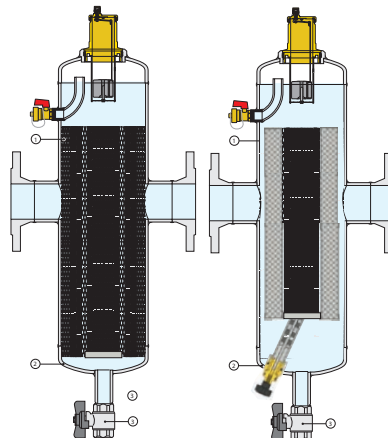
The air and dirt separator uses the combined action of several physical principles. The active part is the internal element (1) and consists of a glass-reinforced nylon mesh for the brass DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup>, or for the steel DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup> an assembly of concentric metal mesh (stainless steel) surfaces. These elements create the whirling movement required to facilitate the release of micro-bubbles and their adhesion to these surfaces.

The bubbles, fusing with each other, increase in volume until the hydrostatic thrust is such as to overcome the adhesion force to the structure. They rise towards the top of the unit from which they are released through a float-operated automatic air vent valve.



**Brass DISCALDIRT<sup>®</sup>**  
(546 series)

**Brass DISCALDIRTMAG<sup>®</sup>**  
(5461 series)



**Steel DISCALDIRT<sup>®</sup>**  
(546, NA546 series)

**Steel DISCALDIRTMAG<sup>®</sup>**  
(NA546\_M series)

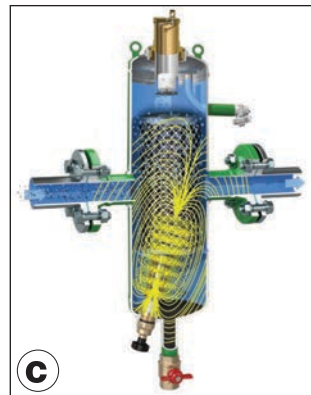
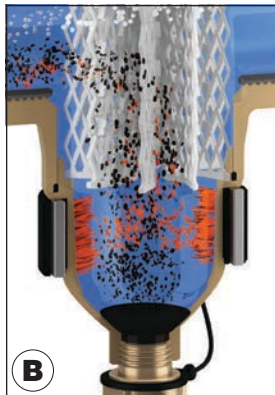
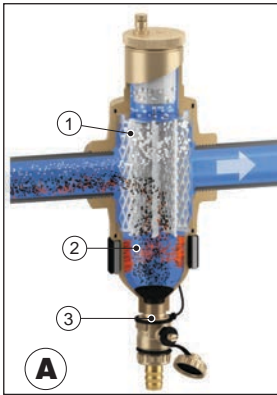
### Microparticle dirt separation

The DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup> dirt removing element separates and collects any impurities present in the system.

Impurities in the fluid upon striking the surfaces of the DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup>'s internal element (1), get separated and drop to the bottom of the body in the dirt collection chamber (2) where they collect.

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

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



### Ferrous impurities separation

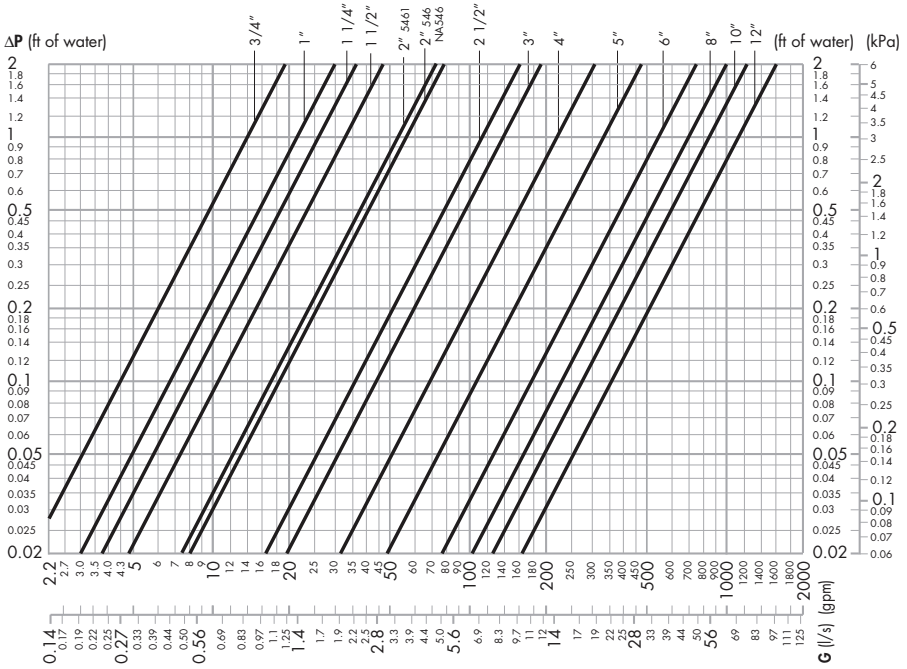
Non-ferrous and ferrous impurities, including magnetite, in hydronic systems can deposit onto heat exchanger surfaces and accumulate in pump cavities causing reduced thermal efficiency and premature wear. The small and often microscopic magnetic particles, called magnetite, form when iron or steel corrodes. Highly abrasive, the extremely fine particles are difficult to remove by traditional means. DISCALDIRTMAG<sup>®</sup> separators offer highly efficient separation of typical dirt as well as magnetite. The versatile DISCALDIRTMAG<sup>®</sup> magnetic air and dirt separator removes both ferrous and non-ferrous impurities continuously. In addition to removing typical dirt particles with an internal element in a low-velocity-zone chamber, the DISCALDIRTMAG<sup>®</sup> features a powerful removable magnet below the flow line for fast and effective capture of ferrous impurities. The magnet removes up to 100% of the ferrous impurities, including magnetite, that can form in a hydronic system.

For the brass and steel 5461 series DISCALDIRTMAG<sup>®</sup> (A, B, D), the ferrous impurities are captured by a strong neodymium rare-earth magnetic field created by a powerful removable magnet around the body below the flow line.

For the steel 546 and NA546 series DISCALDIRTMAG<sup>®</sup> (C), the ferrous impurities are captured by a concentrated magnetic field created by a stack of neodymium rare-earth magnets positioned inside a brass dry-well below the flow stream.



# Hydraulic characteristics



## Flow capacity

|         |     | FLOW RATE (brass body) |      |    |        |
|---------|-----|------------------------|------|----|--------|
|         |     | Size                   | 3/4" | 1" | 1 1/4" |
| 4.0 f/s | GPM |                        | 8    | 9  | 10     |
|         | Cv  |                        | 19   | 32 | 40     |

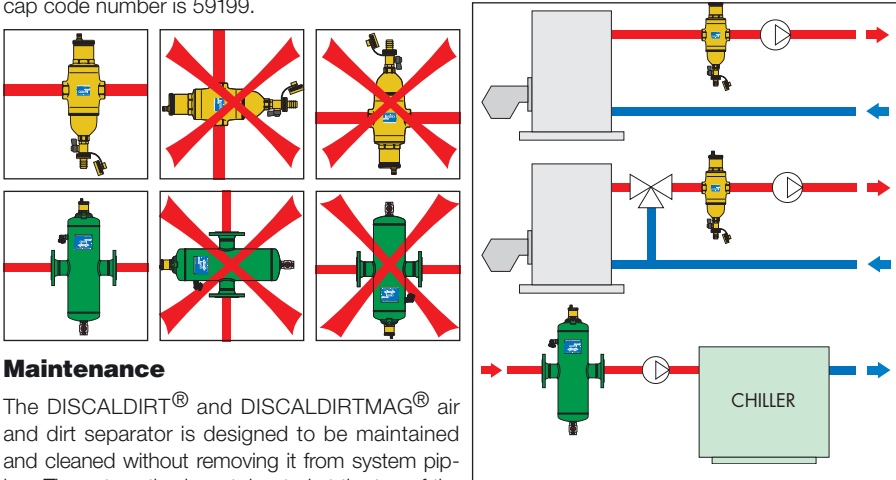
|          |     | FLOW RATE (DISCALDIRT® steel body) |    |        |     |     |     |     |       |       |       |
|----------|-----|------------------------------------|----|--------|-----|-----|-----|-----|-------|-------|-------|
|          |     | Size                               | 2" | 2 1/2" | 3"  | 4"  | 5"  | 6"  | 8"    | 10"   | 12"   |
| 4.0 f/s  | GPM |                                    | 37 | 63     | 95  | 149 | 259 | 380 | 625   | 980   | 1,410 |
|          | Cv  |                                    | 87 | 174    | 208 | 324 | 520 | 832 | 1,109 | 1,387 | 1,664 |
| 10.0 f/s | GPM |                                    | 89 | 150    | 227 | 355 | 816 | 904 | 1,570 | 2,450 | 3,530 |

|         |     | FLOW RATE (DISCALDIRTMAG® steel body) |        |          |        |        |     |     |     |     |
|---------|-----|---------------------------------------|--------|----------|--------|--------|-----|-----|-----|-----|
|         |     | Size                                  | 1 1/2" | 2" Union | 2" Flg | 2 1/2" | 3"  | 4"  | 5"  | 6"  |
| 4.0 f/s | GPM |                                       | 15     | 25       | 37     | 63     | 95  | 149 | 259 | 380 |
|         | Cv  |                                       | 50     | 79       | 87     | 174    | 208 | 324 | 520 | 832 |

## Installation

DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup> units may be used in both heating and cooling systems, to ensure continuous air and dirt elimination. The units should be installed after the boiler and on the pump suction side, as these are the points where the formation of micro-bubbles is greatest.

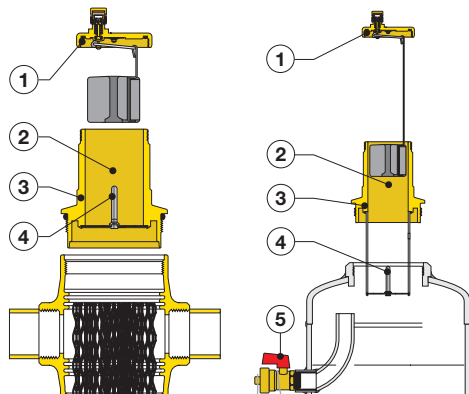
DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup> air and dirt separators must be installed vertically. In installation conditions where inspection is not possible, it is recommended that the venting valve cap is replaced by a Caleffi part number R59681 hygroscopic safety vent. The standard replacement cap code number is 59199.



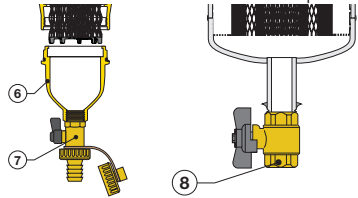
## Maintenance

The DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup> air and dirt separator is designed to be maintained and cleaned without removing it from system piping. The automatic air vent, located at the top of the device, has a long chamber for float movement (2). This prevents any impurities in the water from reaching the seal seat. The corrosion resistant stainless steel pinned linkage and PP float can be accessed by removing the upper cover (1). The stainless steel float guide pin (4) prevents the float from jamming against the inside housing, sticking due to accumulating residue in the flowing fluids, in non-vertical installations or from boiler or chiller residue buildup. Unscrew the top part of the casing (3) to clean the entire air venting system. The air venting system in the brass DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup> and steel DISCALDIRT<sup>®</sup> and DISCALDIRTMAG<sup>®</sup> air and dirt separators features a pinned float. Steel DISCALDIRT<sup>®</sup> 546 and NA546 series and DISCALDIRTMAG<sup>®</sup> NA546\_M series air and dirt separators with flanged and threaded connections have an integral side drain port with shut-off valve, code 538402 FD (5), which has two functions:

1. Air removal while filling the system during system commissioning.
2. Debris removal that float within the air separator.



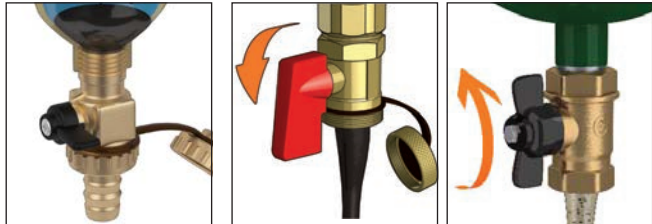
The drain valve (code NA39753 - 1 inch or code NA59600 - 2 inch) installed on the drain pipe at the base of the steel DISCALDIRT® and DISCALDIRTMAG® air and dirt separator (8) can be used to remove any debris that has settled at the bottom of the separator, even while the system is in operation. To inspect the internal element of brass DISCALDIRT® and DISCALDIRTMAG® air and dirt separators, unscrew the large dirt separation chamber (6) with a 26 mm hexagon wrench. The internal element can be removed for cleaning. Additionally, the brass and steel 5461 series air and dirt separators have a lever operated shut-off drain valve code 538402 FD, and 3/4" garden hose attachment with plug (7), to drain accumulated debris as needed.



**Draining off dirt and ferrous impurities**

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

For the brass and steel 5461 series DISCALDIRTMAG®, captured ferrous impurities are easily flushed by unclamping the magnetic collar and purging.



To purge the ferrous impurities in the steel 546 and NA546 series DISCALDIRTMAG®, the flexible magnetic stack is removed from the brass dry-well and, with the system still running, the drain valve is opened. Aided by the system pressure, the dirt and ferrous impurities, including magnetite, flushes out quickly and effectively.



**Leave this manual at the service of users for their use**



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