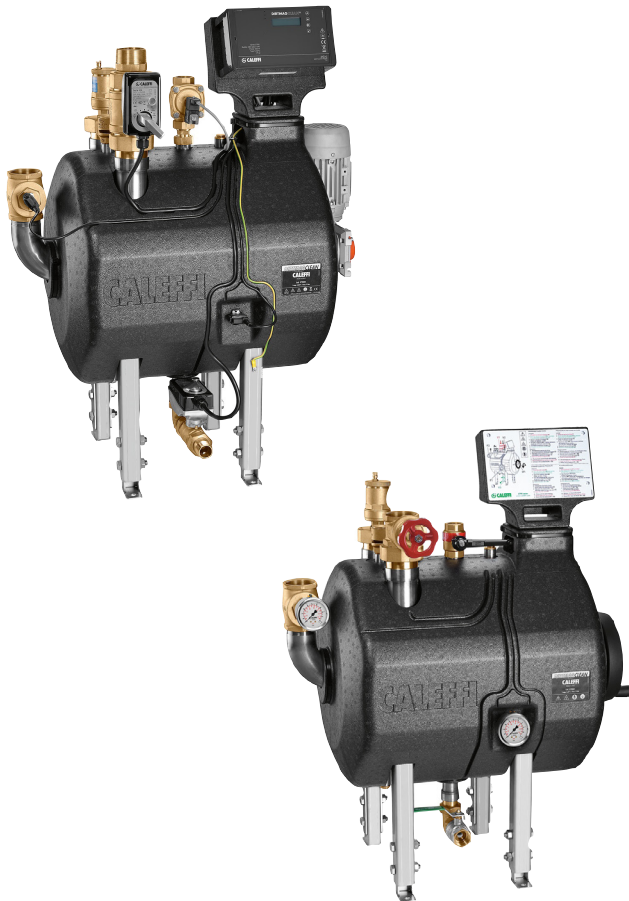# Self-cleaning and manual magnetic dirt separator strainer

Code 579000 – 579001

Function

The magnetic dirt separator strainer is used in central heating systems to remove dirt and impurities from the circuit, progressively and completely. This prevents the possibility of functional problems in components and regulating valves on the terminals.

The device operates through the continuous action of special filtering elements, located in a chamber through which the system water flows. The very fine filter mesh progressively intercepts particles down to 2 μm in diameter. At the same time, ferrous particles are separated out by the magnets on the surface of the filter element. The large area of the filter mesh keeps pressure drops to a minimum. Automatic cleaning of the filtering elements takes place mechanically by means of washing with pressurised mains water while the filtering elements rotate.

Two versions of the magnetic dirt separator strainer are available: self-cleaning and manual.
In the self-cleaning version, all its functional phases - operation, cleaning, filling and draining - are controlled by a special electronic regulator, which can also be managed remotely using a BMS system with the MODBUS-RTU protocol.

In the manual version, period cleaning is performed by shutting off the heating circuit and using high-pressure nozzles while simultaneously using the handwheel to rotate. The medium containing the impurities is then drained before restoring normal operation. Since there are no electrical connections, the device can be installed easily while maintaining the same filtering performance as the similar motorised version.

Product range

Code 579000	Self-cleaning magnetic dirt separator strainer.
Code 579001	Manual magnetic dirt separator strainer.

Technical specifications

Materials
Body, pipes
and support foot: stainless steel EN 10088-2 (AISI 304)
Internal filtering elements: Polyester

Inlet and drain valves
Body: brass EN 12165 CW617N
Ball: brass EN 12165 CW617N, chrome plated
Ball seal: PTFE with EPDM O-Ring
Control stem seal: double EPDM O-Rings
Union seal: EPDM O-Ring

Loading and cleaning valve
Body: brass EN 12165 CW617N
Seals: EPDM

Circuit return valve with clapet retainer
Body: brass EN 12165 CW617N
Seals: EPDM

Performance
Medium: water, glycol solutions
Max. percentage of glycol: 50 %
Maximum working pressure: 10 bar
Working temperature range: 5–85 °C (without condensation)
Hydraulic characteristics: Kv = 45 m³/h
Water content: 50 l
Strainer mesh size Ø: 30 µm
Particle separation rating: down to 2 µm
DHW inlet minimum dynamic pressure for washing: 3 bar
Motor noise: (code 579000): < 60 dB
Volume of water drained
during washing (code 579000): about 100 litres with p = 3 bar

Connections
• on circuit inlet: 2" M with captive nut
• on circuit outlet: 2" F
• cleaning drain: 1" F
• drain code 579000: 1" M with captive nut
• drain code 579001: 1" F

Technical specifications of regulators and actuators (code 579000)

Regulator
Material
Housing: PA6G30 anti-UV Grey RAL 7024
Electric supply: 230 V (ac) 50/60 Hz
Power consumption: 225 VA during cleaning and 5W in stand-by
Isolating class: I
Protection class: IP 42
Ambient temperature: 5–50 °C

Contact rating:
- IN1 relay: clean contact
- three-point G.OUT control: Max 5 (2) A, 250 V
- ALARM relays: Max 1A, 48 V
- OUT1 relay: Max 1A, 48 V
Fuses: 2A (motor) and 315mA (actuators)
Battery: R2032 225 mAh - life approximately 1 year
(for only keeping date and time in the absence of network)

Inlet and drain valves
Synchronous motor
Electric supply: 230 V (ac)
Power consumption: 6 VA
Protection class: IP 65

Loading and cleaning valve
Solenoid type - normally closed (NC)
Electric supply: 230 V (ac)
Power consumption: 6 VA
Protection class: IP 65

Single-phase electric motor
Electric supply: 230 V (ac)
Power consumption: 0.18 kW
Protection class: IP 55

Ambient temperature range:
- Operation: 5–50 °C EN 60721-3-3 Cl. 3K3 max. humidity 85 %
- Transportation: -30–70 °C EN 60721-3-2 Cl. 2K3 max. humidity 95 %
- Storage: -20–70 °C EN 60721-3-1 Cl. 1K3 max. humidity 95 %
Conforms to Directives: CE

Insulation
Material: EPP
Average thickness: 50 mm
Density: 45 kg/m³
Working temperature range: 5–85 °C
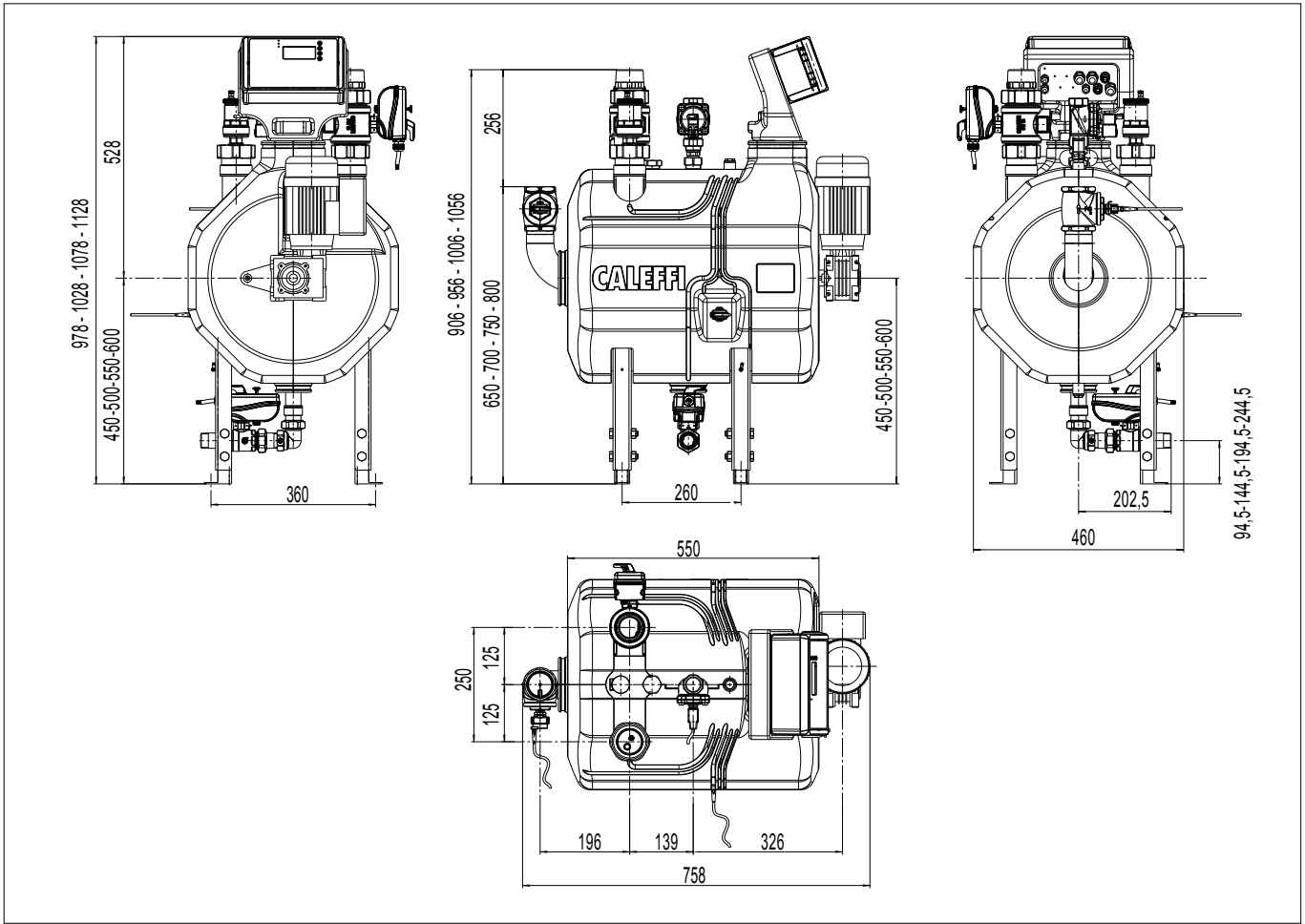Thermal conductivity: 0.037 W/(m•K) at 10 °C

Hydraulic characteristics
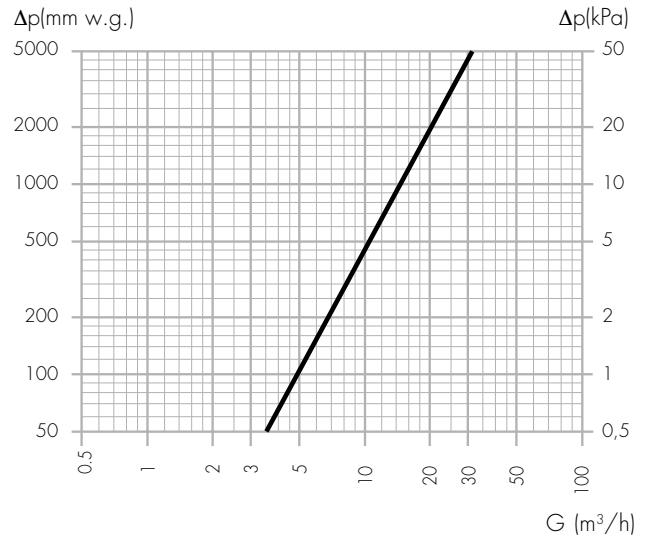
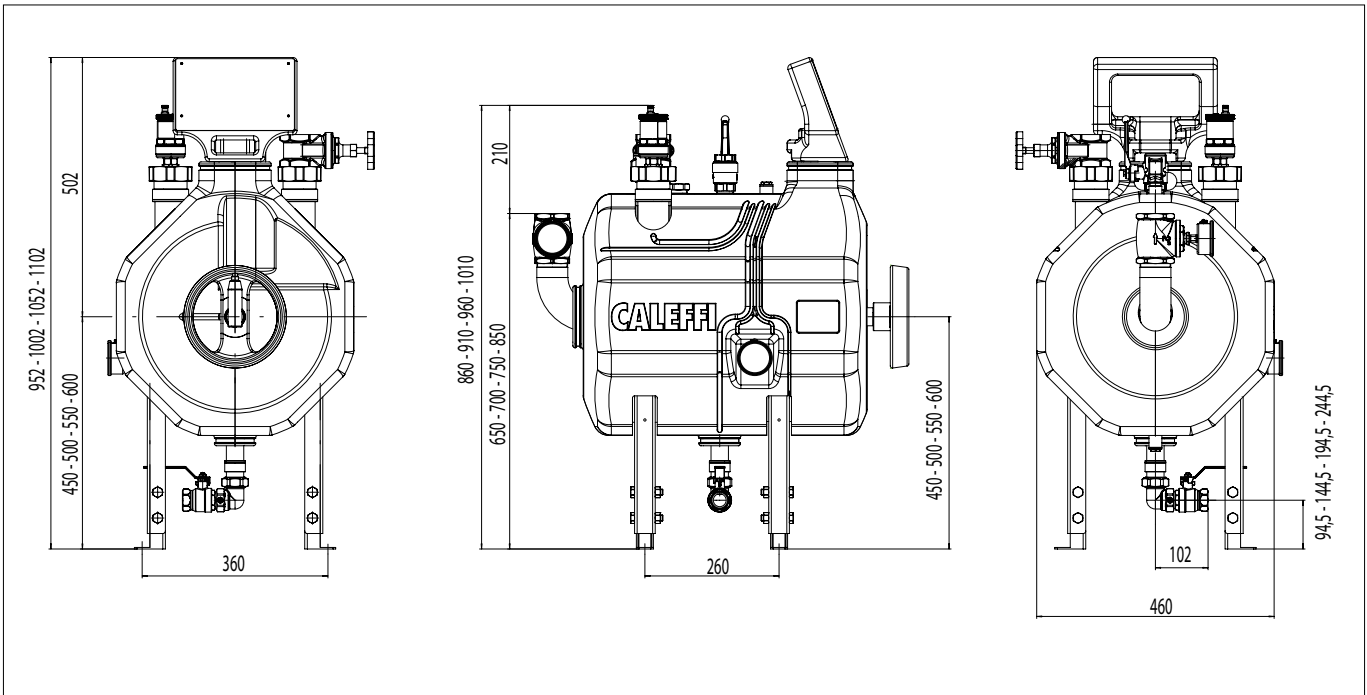| Connections	2"
Kv (m³/h)	45

Dimensioning
The sizing of the dirt separator strainer must be performed considering the following values:
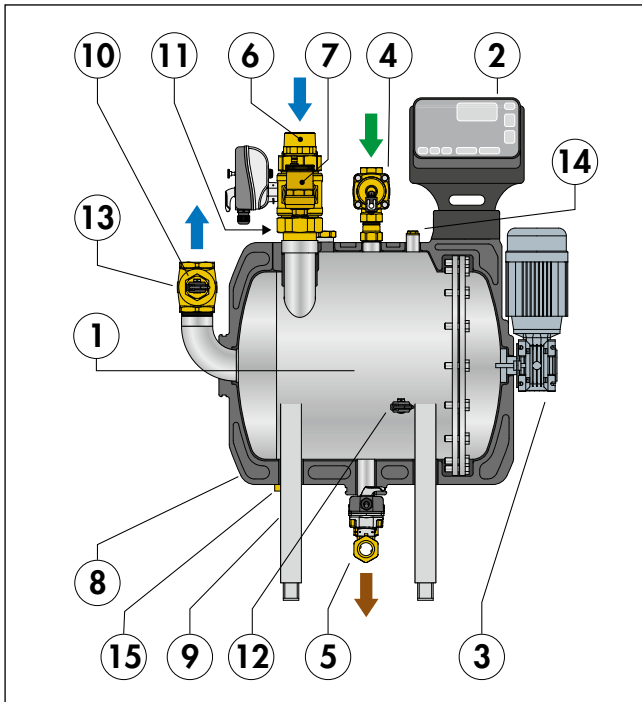max. recommended flow rate: **20 m³/h**

Dimensions

Code 579000

978 - 1028 - 1078 - 1128
450 - 500 - 550 - 600
528
360

906 - 956 - 1006 - 1056
256
650 - 700 - 750 - 800
450 - 500 - 550 - 600
260

94,5 - 144,5 - 194,5 - 244,5
202,5
460

550
250
125
125
196   139   326
758

Code 579001

952 - 1002 - 1052 - 1102
502
450 - 500 - 550 - 600
360

860 - 910 - 960 - 1010
210
650 - 700 - 750 - 850
450 - 500 - 550 - 600
260

94,5 - 144,5 - 194,5 - 244,5
102
460

1. Strainer unit with magnets
2. Electronic regulator
3. Single-phase electric motor (M1)
4. Solenoid valve (V2) with built-in check valve
5. Drain valve (V3)
6. Ball inlet valve (V1)
7. Automatic air vent valve with combined strainer
8. Insulation
9. Adjustable support feet
10. Clapet check valve
11. Vacuum breaker valve
12. Temperature and pressure probe S1
13. Temperature and pressure probe S2
14. Additive pouring cap
15. 1/2" connection with pressure gauge cap
16. 1/2" connection with cap for additional drain valve
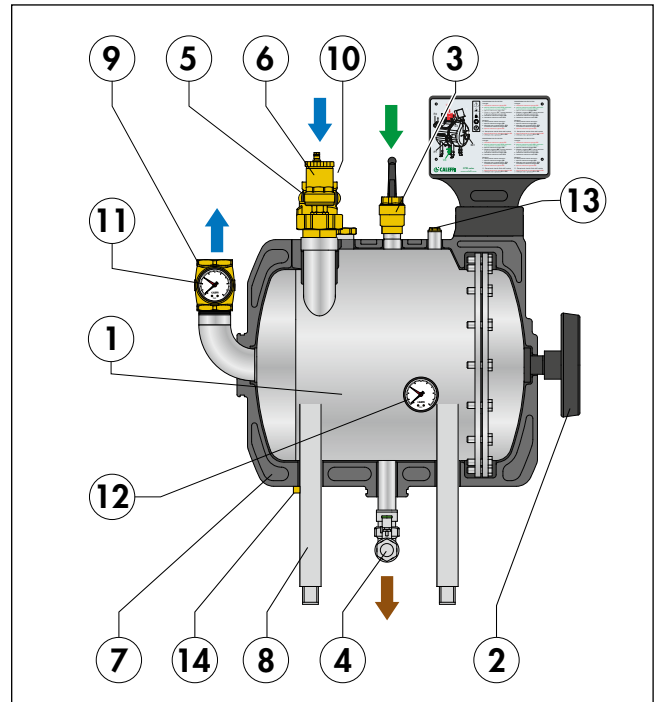
1. Strainer unit with magnets
2. Handwheel for manual cleaning (M1)
3. Inlet valve for cleaning nozzles with built-in check valve (V2)
4. Drain valve (V3)
5. Inlet gate valve (V1)
6. Automatic air vent valve with combined strainer
7. Insulation
8. Adjustable support feet
9. Clapet check valve
10. Vacuum breaker valve
11. System pressure gauge
12. Strainer pressure gauge
13. 1/2" connection with pressure gauge plug
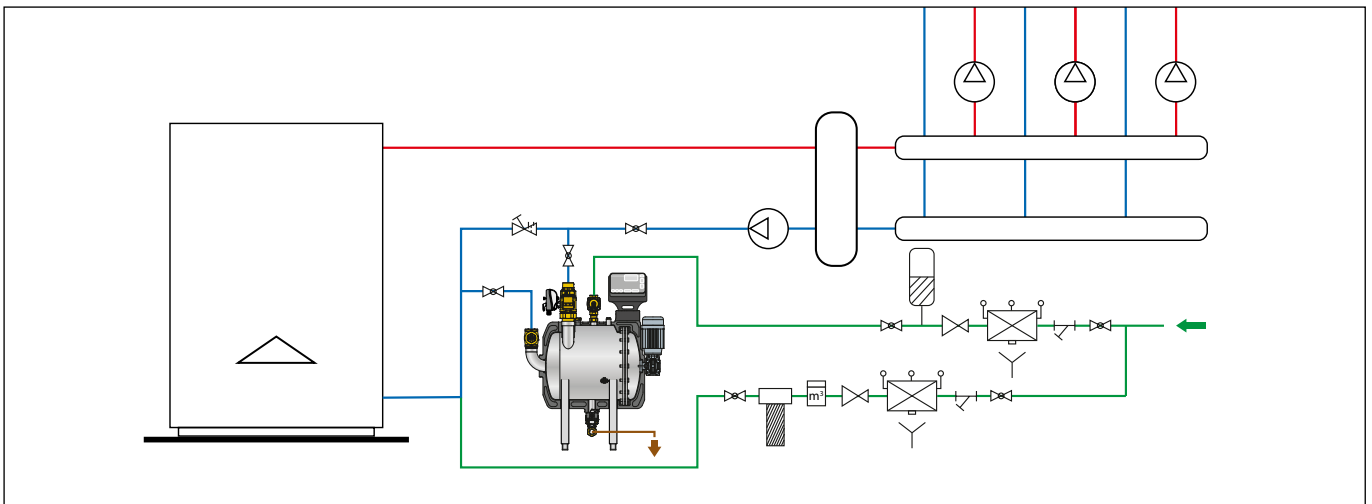14. 1/2" connection with plug for additional drain valve

Hydraulic diagram

Installation in by-pass with dedicated pump
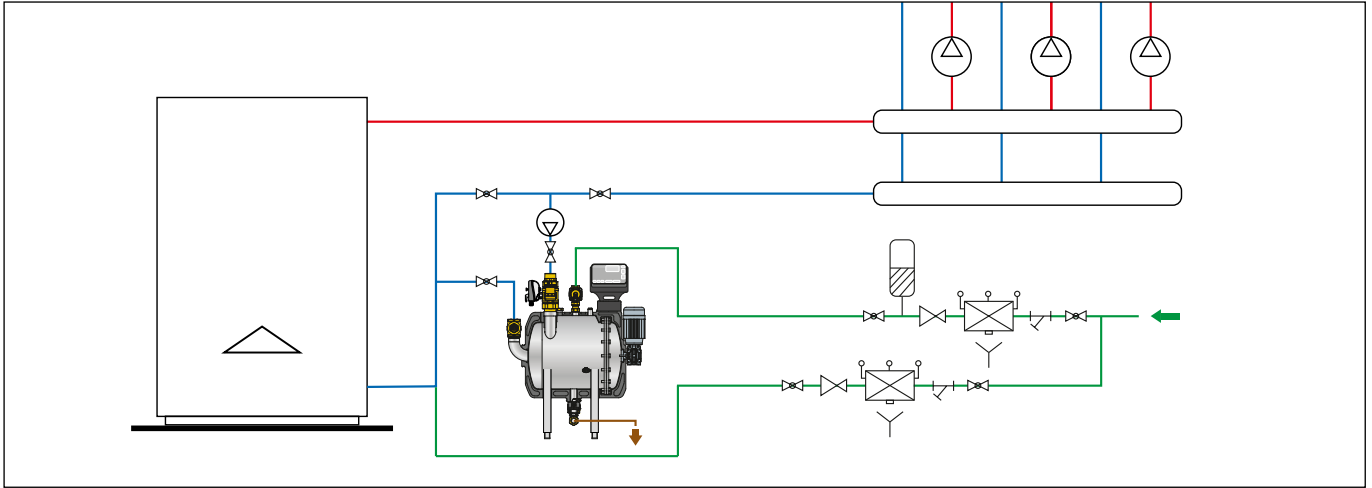
NOTE The strainer regulator does not directly control the activation of the circulation pump.

By-pass type installation

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 removal of impurities that are deposited on the external surface of the strainers.

The very selective mesh filters particles with a diameter of 30 µm at the first pass and separates dirt particles down to 2 µm. At the same time, ferrous particles are separated out by the magnets on the surface of the filter element.

Automatic cleaning of the filtering elements takes place mechanically by means of washing with pressurised mains water while the filtering elements rotate.

In all its functional phases - operation, cleaning, filling and draining - the self-cleaning magnetic dirt separator strainer code 579000 is controlled by a special electronic regulator, which can also be managed remotely using a BMS system with the MODBUS-RTU protocol.

This device operates according to different operating steps:
- filtration/ normal operation
- filtering elements cleaning
- 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.

For the manual dirt separator strainer code 579001, the inlet and load/drain valves must be opened manually, depending on the chosen work phase.

## Cleaning procedure for the automatic strainer code 579000

Filtration

During normal operation, the medium coming from the system enters in the strainer body through the motorised ball valve V1. The medium is forced to pass through the filtration discs, then it is conveyed into the central part until it comes out of the device through the clapet check valve.

Inlet from the system

V1

System return

Clapet check valve
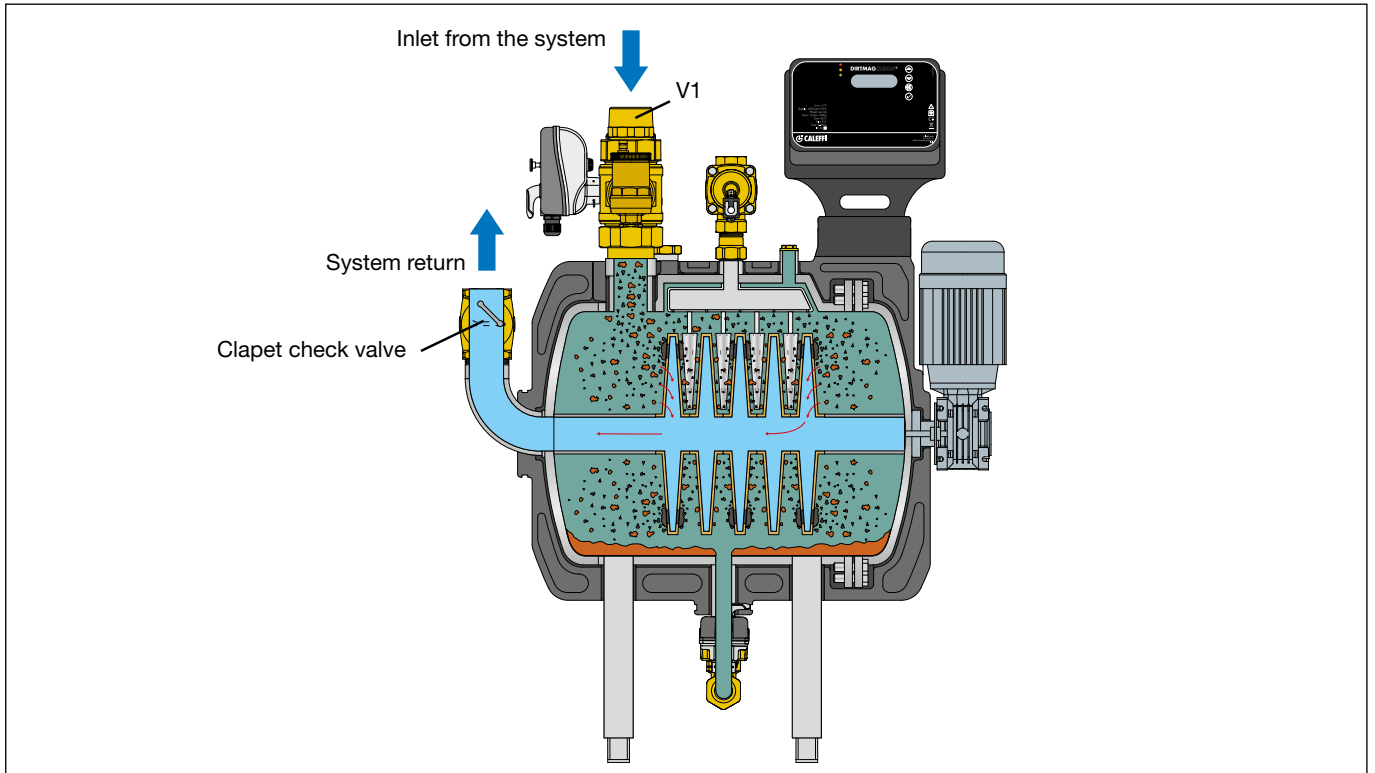
Cleaning of filtering elements

It can be activated manually, by time or automatically by controlling the medium pressure drop between internal pressure and pressure detected after the filtering elements. The choice of the type of operation is carried out by the regulator. During the first cleaning phase (emptying) the inlet ball valve V1 closes while the clapet check valve prevents the system backflow. Once the inlet valve V1 is completely closed, the drain valve V3 is opened, located 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.

Vacuum breaker valve

V1

Clapet check valve

V3
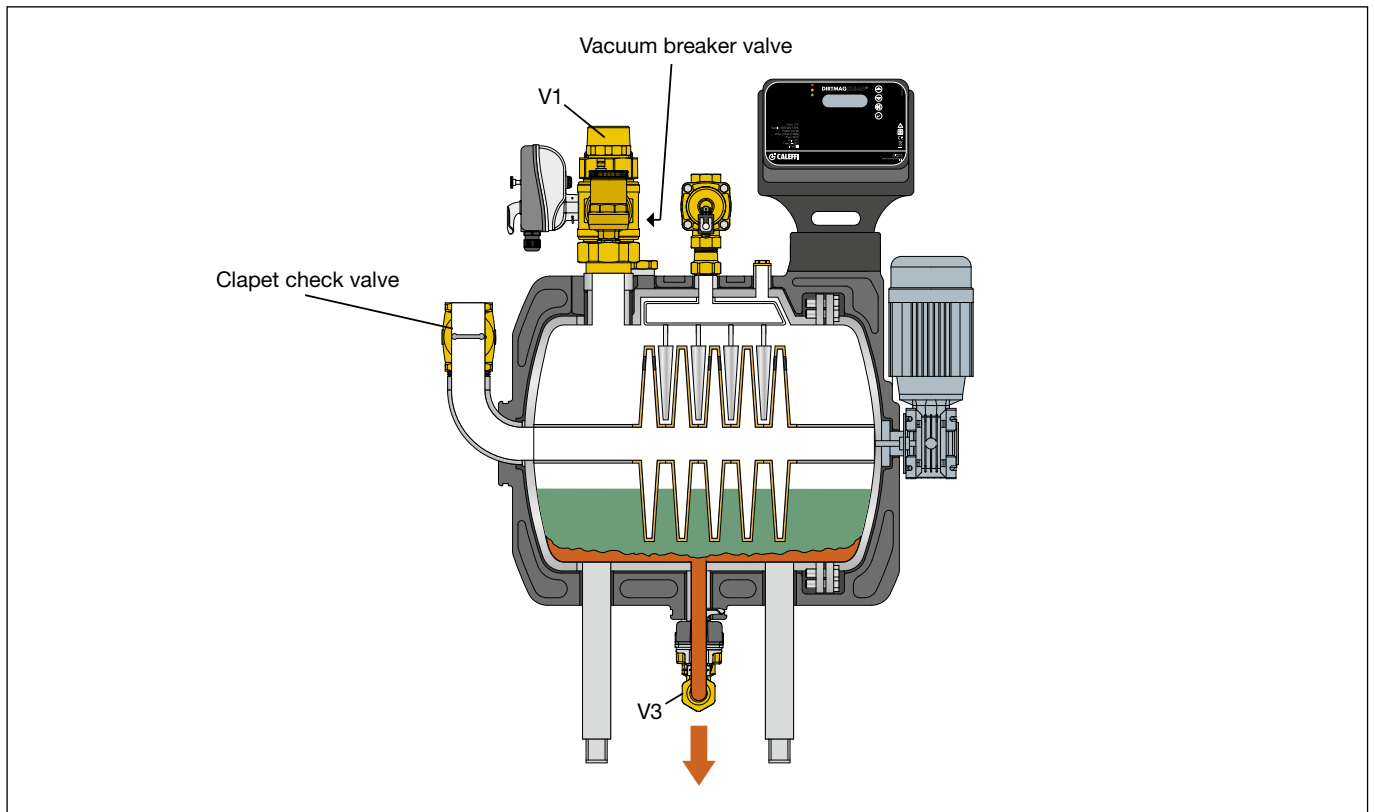
During the second cleaning phase (mechanical cleaning with water injection), the two-way solenoid valve V2 (equipped with check valve) is opened injecting water from the water mains. In order to perform an effective cleaning, a minimum dynamic pressure of 3 bar must be guaranteed during washing and the installation of an anti-backflow system is mandatory to protect the mains water system network (apply according to local regulations in force). At the same time the shaft on which the filtering discs are clamped is rotated by means of the motor M1, in order to allow the fixed brushes to clean their surface and to clean the magnets.
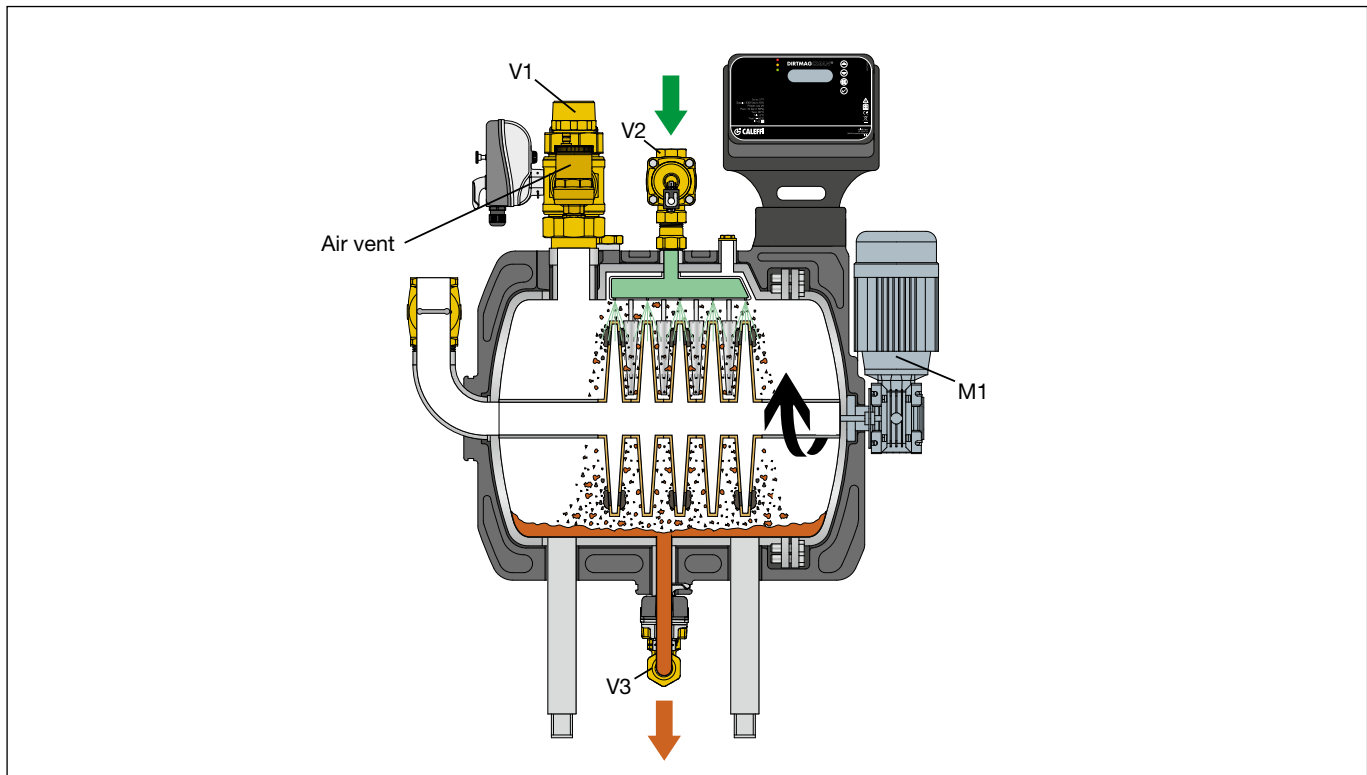
### Circuit filling and operating conditions reset

At the end of the cleaning phase the initial conditions are restored, in order to continue with the normal filtration. The drain valve V3 is closed and the rotation of the motor M1 is stopped. The strainer can be filled in two ways: with mains water through the solenoid valve V2 or using the system circuit through the valve V1. This second option is preferable when the water in the heating circuit is treated and contains additives. The filling action is gradual until the pressure detected in the system is reached. During this phase the air vent valve operates in order to expel the air in the tank and allow optimal filling.

Filling with mains water   Filling with system water
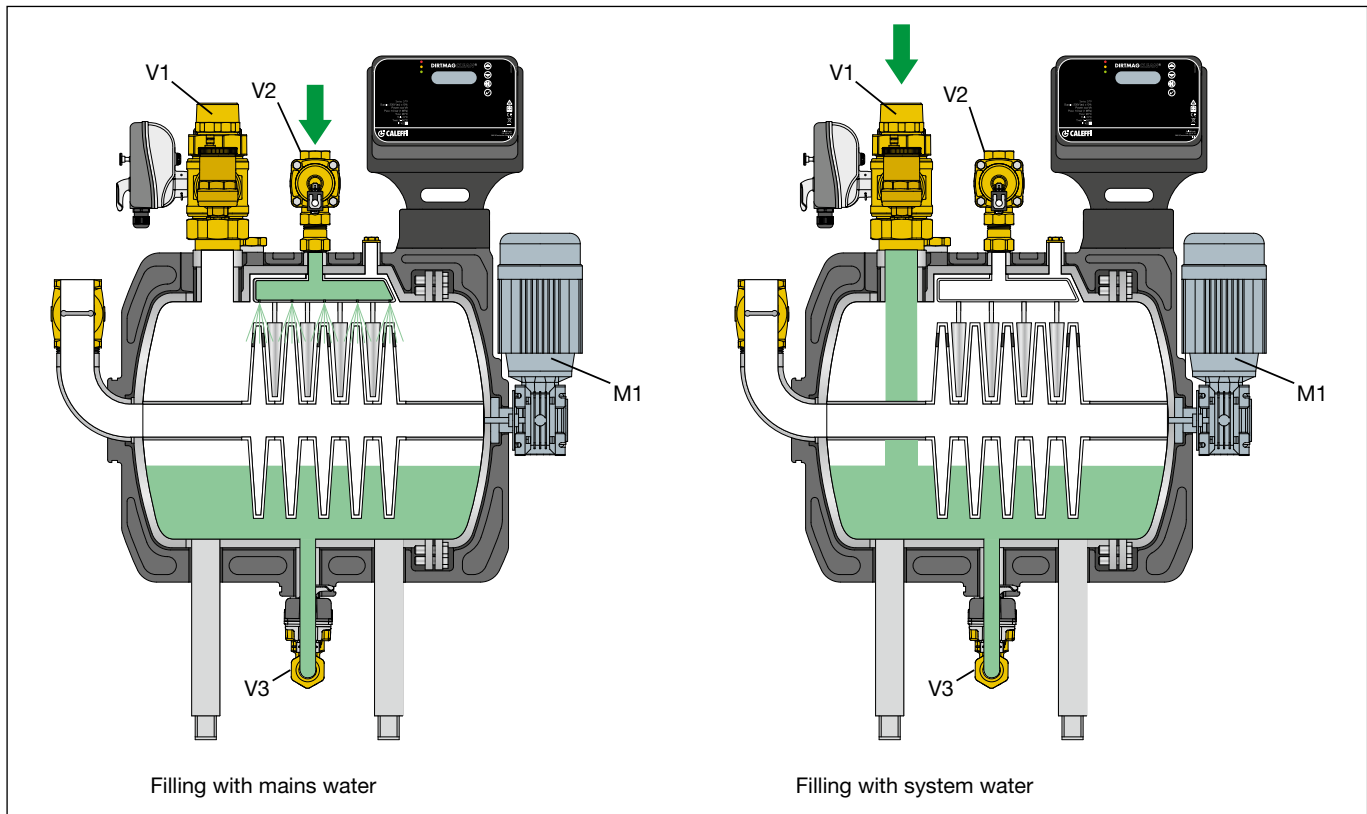
## Cleaning procedure for the manual strainer code 579001

Filtration

During normal operation, the medium coming from the system enters in the strainer body through ball valve V1. The medium is forced to pass through the filtration discs, then it is conveyed into the central part until it comes out of the device through the clapet check valve.

Inlet from the system

V1

System return

Clapet check valve
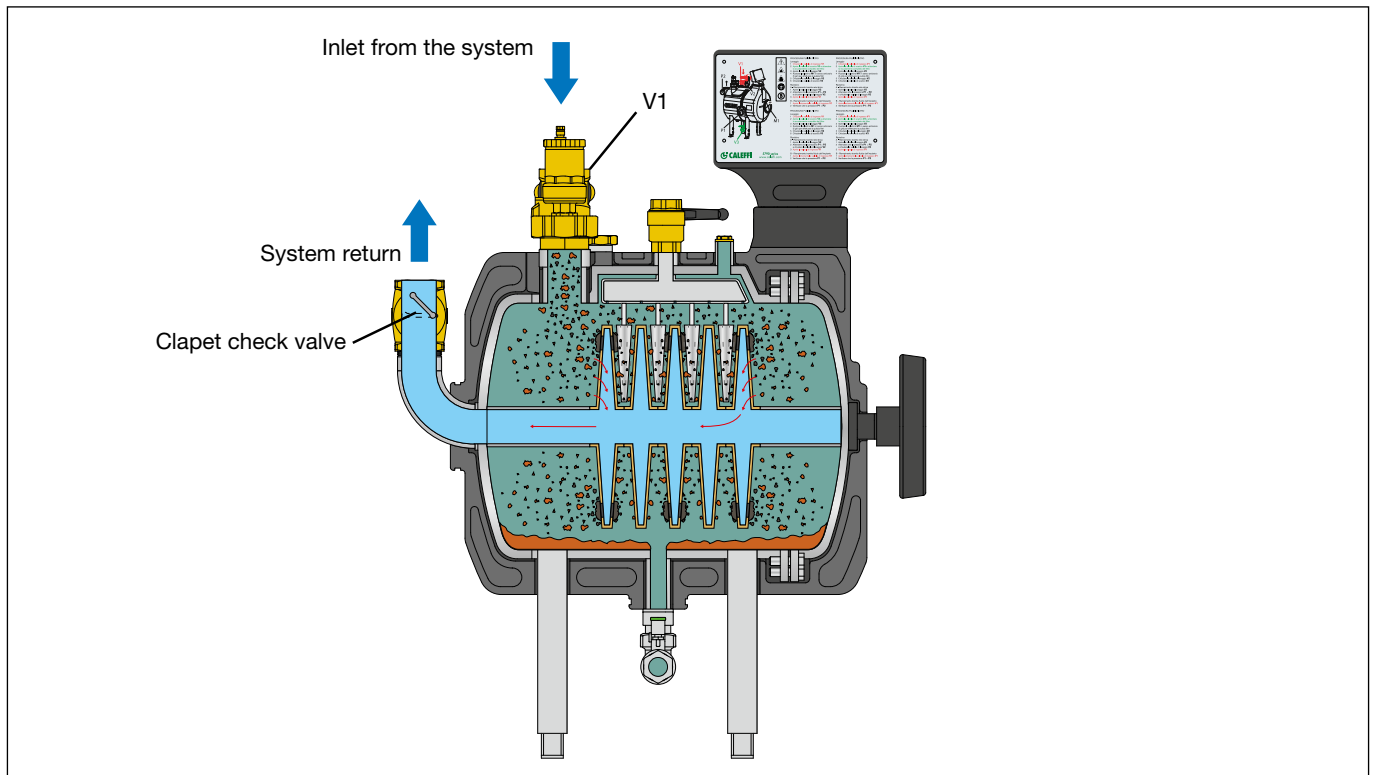
Cleaning of filtering elements

During the first phase, it is necessary to close the inlet valve V1 and open the drain valve V3 to empty the strainer.

Vacuum breaker valve

V1

Clapet check valve

V3
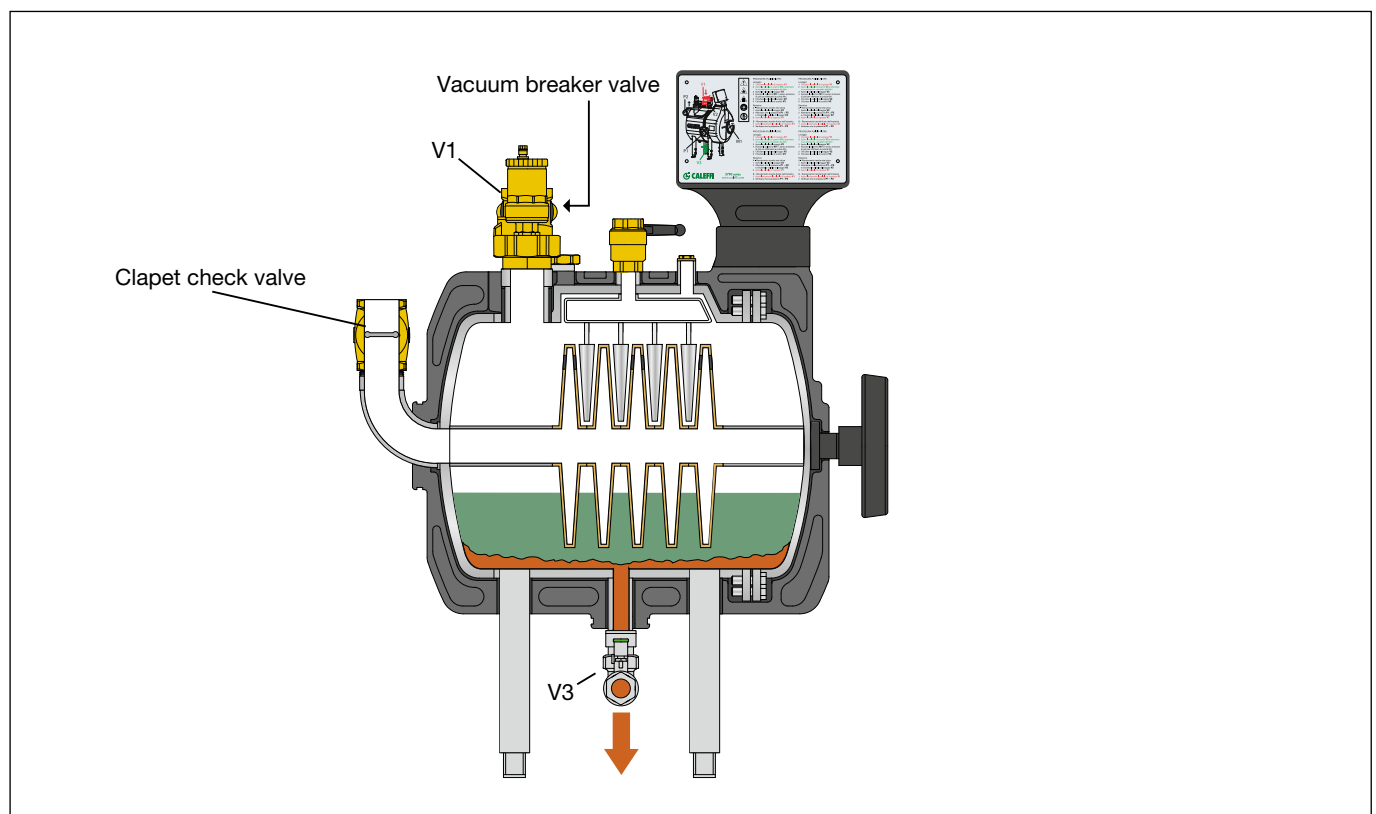
During the second phase (mechanical cleaning with water injection) open the valve V2, and inject water from the domestic hot water circuit. For efficient washing, domestic water circuit pressure of between 3 and 5 bar must be guaranteed and it is mandatory to install a backflow prevention system to protect the water mains from possible contamination. Now turn the spindle on which the strainer discs are mounted by means of handwheel M1 (at least 5 counter-clockwise revolutions), thus allowing the fixed brushes to clean the disc surfaces and to clean the magnets. Operate the valves gradually, to prevent the situation wherein the device internal pressure is higher than the plant pressure. If this recommendation is disregarded the pressure in the plant would increase or air would be drawn into the circuit.
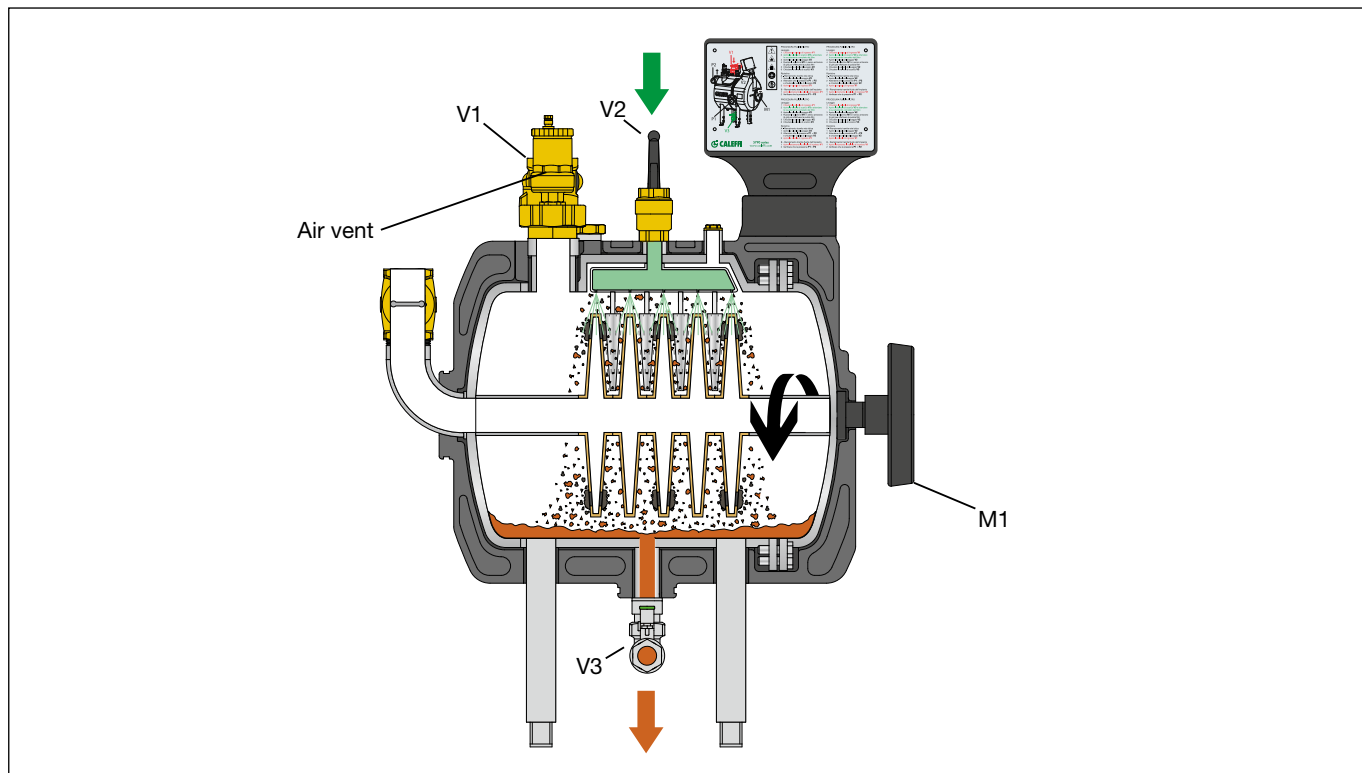
## Circuit filling and operating conditions reset

Close valve V2. At the end of the cleaning phase the initial conditions are restored to proceed with normal filtration, after having closed drain valve V3. Strainer filling can occur in two ways: with domestic water via valve V2 or using the plant circuit via valve V1. This option is preferable when the water in the heating circuit is treated and contains additives. The filling action must be gradual until reaching the required pressure reading in the plant. During this phase the air vent valve operates in order to expel the air in the tank and allow optimal filling. The starting conditions are now restored. Check on the pressure gauges that P1 (strainer internal pressure) = P2 (plant pressure). Open valve V1.

Filling with mains water

Filling with system water
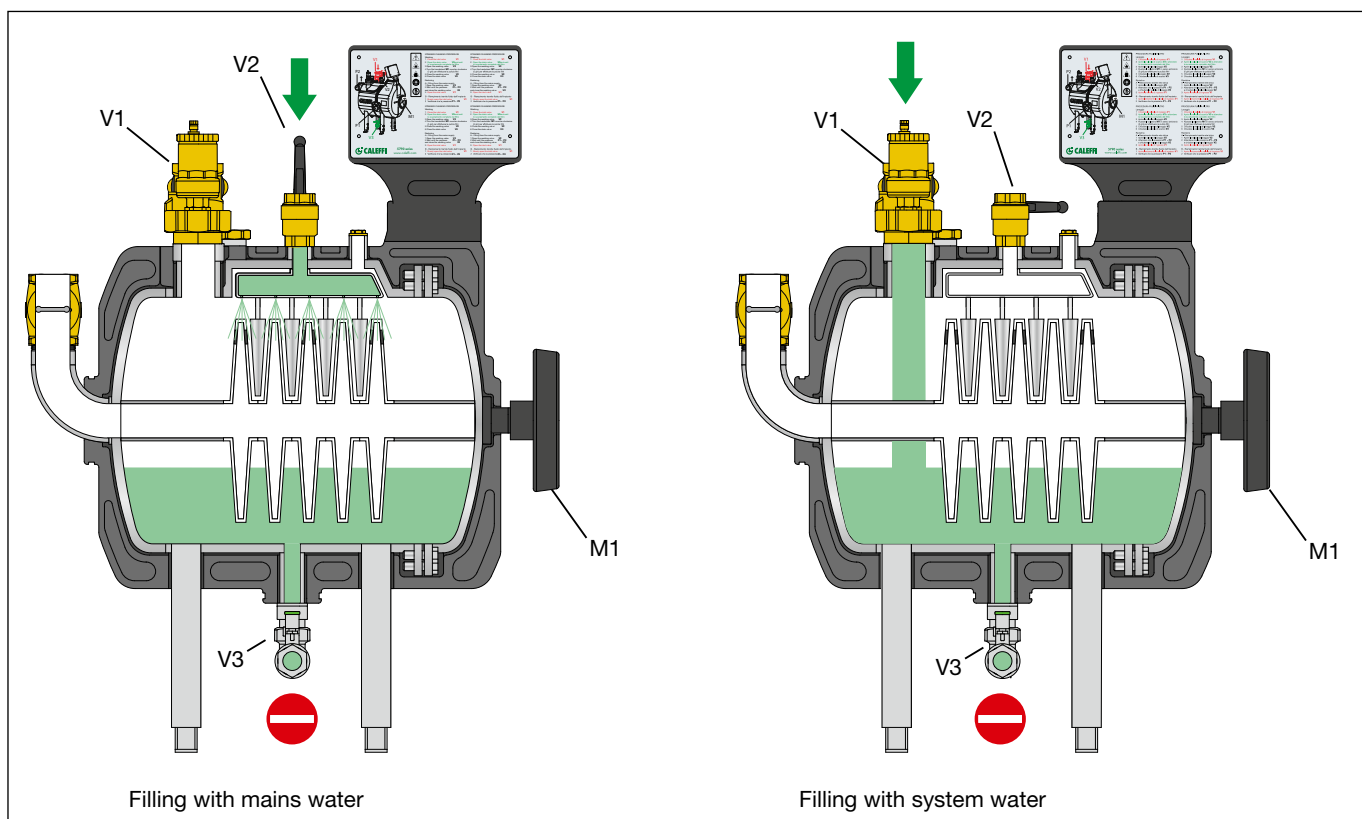
Description and operating principle of code 579000

The regulator is provided with several programs to clean the strainers. This can be performed according to a periodic program or it can be directly controlled by an operator. The most suitable operating mode can be selected for the type and conditions of the circuit and the system maintenance management.
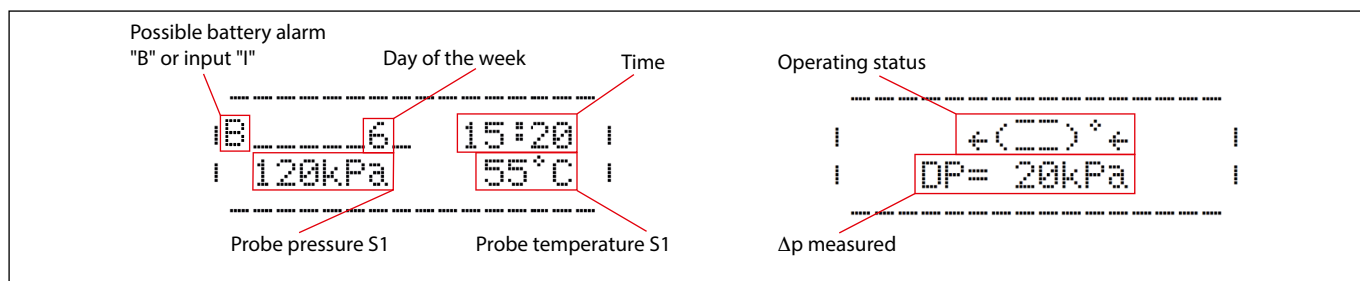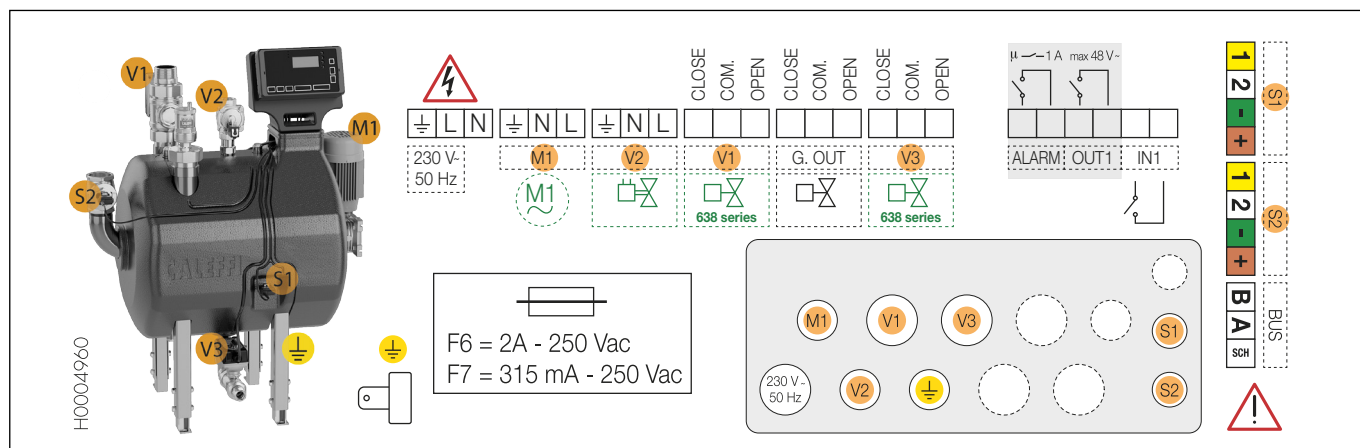
Front panel
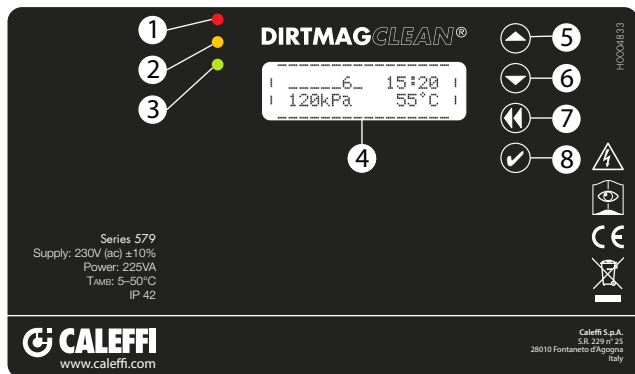
1 Red LED:	- fixed (alarm notification with locked system)
	- flashing (anomaly, system working)
2 Yellow LED:	cleaning signal or additive insertion in progress
3 Green LED:	on (normal operation) and flashing during the first cleaning phase

4 LCD display
5 UP button
6 DOWN button
7 BACK button
8 Confirm/OK button

Display

The following information normally appears on the display:

Possible battery alarm "B" or input "I"
Day of the week
Time
Operating status
Probe pressure S1
Probe temperature S1
Δp measured

Electrical connections

F6 = 2A - 250 Vac
F7 = 315 mA - 250 Vac

IN1	input for contact with no voltage applied. When the contact is closed, the strainer cleaning is inhibited
OUT1	NO relay output The contact closes when the strainer is in the cleaning phase (max 48 V (ac), 1A)
ALARM	NO relay output for alarm management (max 48 V (ac), 1A)
V3	electric supply output for inlet motorised ball valve V3 management
G. OUT	electric supply outlet for cold water injection valve control on the drain 5 (2A), 250 V (ac) max
V1	electric supply relay output for ball motorised valve with input ball V1 management
V2	electric supply relay output for nozzle cleaning solenoid valve V2 management
M1	electric supply relay output for motor M1 management
L – N – T	electric supply 230 V (ac) 50/60 Hz
BUS	MODBUS RTU 485 control interface
S1	digital input for pressure and temperature sensor S1
S2	digital input for pressure and temperature sensor S2

Operating programs

Cleaning on instantaneous Δp
During normal operation, the device monitors the strainer clogging status, by measuring the differential pressure between inlet and outlet of the strainer elements measured by the probes S1 and S2. When the difference exceeds a value set and modifiable by the user, an automatic strainer cleaning cycle is immediately started.

Cleaning on delayed Δp
When the ΔP exceeds a predefined value (the same used to start the instantaneous cleaning), the cleaning is programmed to be performed but at a time specified by the user.

Scheduled cleaning
It is possible to carry out a cleaning cycle on a specific day of the week, at a specific time or on several days of the same week. The device is cleaned anyway even if the maximum set Δp value is not exceeded during operation. Cleaning can be scheduled for a particular day of the month, every two months, every three months or every six months.

Initial cleaning
This function can be used after washing the system or anyway whenever an extraordinary cleaning of the system is necessary. Before starting this function it is necessary to configure the duration. When the set Δp is reached, a washing cycle is immediately started. When the set number of hours is reached, the first system cleaning function stops and the normal operating mode starts again, with the washes time management (e.g. once a week) and/or based on the normal operation Δp value.

Manual forcing
It is possible to start the operating status through the forcing function, from the user interface or from remote (via bus). Once the required activation is completed, the device returns to normal operation. Forcing allows, from the user interface, to individually start the cleaning, sleep, additive addition, sensor control cycles.

Sleep
The sleep mode temporarily deactivates the device, setting it in a waiting status, with the valve V1 closing and without any control on the operation. This status allows the device to be deactivated for a set time, for example when the system is shut down in the summer. At the end of the sleep phase, the device resumes normal operation. The notifications for alarms remain active.

Use of additives
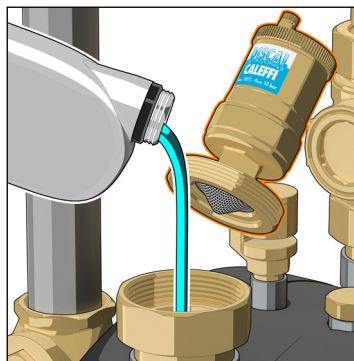
Additives can be added to the system medium activating the appropriate function. In this case the system is set in stand by, after having carried out a forced cleaning cycle with a view to reducing as much as possible the use of the water in the network, taking advantage of the tank emptying. During the waiting phase, it is possible to add the required additives to the device using a 2 1/2" connection, removing the air vent valve. To prevent leaks or flooding, carefully check that the cap is hermetically sealed.

Sensors check
The regulator periodically checks the correct operation of the sensors. This procedure can be carried out manually through the item on the regulator menu.

Drain temperature limitation
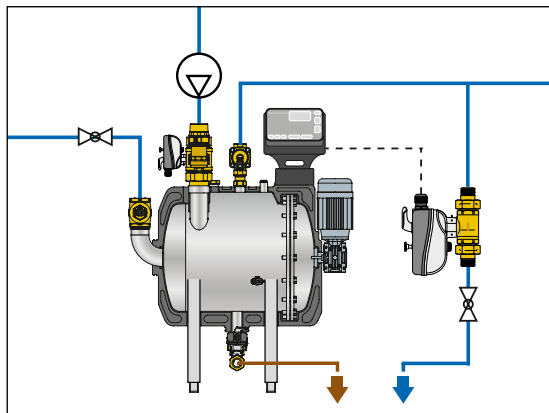
The system is provided with a function to cool the water drain when the temperature is higher than a given value (that can be changed). During cleaning, if the system detects that the medium temperature is higher than the admissible temperature, the activation of a specific G. OUT relay is activated, which remains active until the drain ends.

SPECIFICATION SUMMARY

Code 579000

Self-cleaning magnetic dirt separator strainer. EN 10088-2 (AISI 304) stainless steel body, pipes and support foot, polyester internal filtering elements. Medium: water, glycol solutions. Max. percentage of glycol 50%. Maximum working pressure 10 bar. Working temperature range 5–85 °C. Kv 45 m³/h. Water content 50 litres. Strainer mesh size Ø 30 μm. Particle separation rating down to 2 μm. DHW inlet minimum dynamic pressure for washing, 3 bar. Motor noise < 60 dB. Water volume drained during washing, approximately 100 litres with an inlet pressure of 3 bar. Circuit inlet connections 2" M with captive nut, circuit outlet 2" F, load for cleaning 1" F, drain 1" M with captive nut, cap for adding additives 1" F. Inlet and drain valve. EN 12165 CW617N brass body, chrome plated EN 12165 CW617N brass ball, PTFE ball seal with EPDM O-ring, control stem seal with double EPDM O-Ring, EPDM O-Ring union seals, synchronous motor, electric supply 230 V (ac), power consumption 6 VA, protection class IP 65, operating time 60 s. Loading and cleaning valve. EN 12165 CW617N brass body, EPDM seals, solenoid type, normally closed (NC), electric supply 230 V (ac), power consumption 6 VA, protection class IP 65, single-phase electric motor, electric supply 230 V (ac), power consumption 0,18 kW, protection class IP 55. Circuit return valve with clapet retainer. EN 12165 CW617N brass body, EPDM seals. Regulator. PA6G30 housing, anti-UV grey RAL 7024, electric supply 230 V (ac) 50/60 Hz, power consumption 225 VA during cleaning and 5 W in stand-by, isolating class I, protection class IP 42, ambient temperature 5–50 °C, three-point control Contact rating of IN1 relay voltage-free contact, G.OUT output max 5 (2) A, 250 V, ALARM relay max 1 A, 48 V, relay OUT1 max 1 A, 48 V, fuses 2 A (motor) and 315 mA (actuators). R2032 225 mAh battery, lasting about 1 year (only for holding date and time in the absence of mains) PPE insulation, average thickness 50 mm, density 45 kg/m³Working temperature range 5–85 °C, thermal conductivity 0,037 W/(m•K) at 10 °C.

Code 579001

Manual magnetic dirt separator strainer. EN 10088 2 (AISI 304) stainless steel body, pipes and support foot, polyester internal filtering elements. Medium: water, glycol solutions. Max. percentage of glycol 50 %. Maximum working pressure 10 bar. Working temperature range 5–85 °C. Kv 45 m³/h. Water content 50 litres. Strainer mesh size Ø 30 μm. Particle separation rating down to 2 μm. DHW inlet minimum dynamic pressure for washing, 3 bar. Water volume drained during washing, approximately 100 litres with an inlet pressure of 3 bar. Circuit inlet connections 2" M with captive nut, circuit outlet 2" F, load for cleaning 1" F, drain 1" M with captive nut, cap for adding additives 1" F. Inlet and drain valve. EN 12165 CW617N brass body, chrome plated EN 12165 CW617N brass ball, PTFE ball seal with EPDM O-ring, control stem seal with double EPDM O-Ring, EPDM O-Ring union seals. Loading and cleaning valve. EN 12165 CW617N brass body, EPDM seals. Circuit return valve with clapet retainer. EN 12165 CW617N brass body, EPDM seals.

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