

6000

hybrid electronic mixing
valve



altecnic
CALEFFI group

6000 hybrid electronic mixing valve



Introduction

The electronic hybrid mixing valve combines the typical function of the mechanical thermostatic mixing valve and the management efficiency of an electronic mixing valve in a single device.

The thermostatic mixing valve responds promptly to any variation in temperature, pressure and inlet flow rate to quickly restore the mixed water temperature to the outlet.

This standard mixing valve is effectively handled by a motorised actuator that, under the control of a specific regulator, changes the mixed water temperature set position.

Electronic Regulator

The electronic regulator, directly on the actuator, allows the mixed water temperature control according to different functional programs, both for normal control and for the thermal disinfection for the prevention of Legionella.

An optional memory system allows continuous recording of flow temperature, return temperature, alarm and functional statuses, useful for monitoring the operating status of the entire system.

Appropriate relays are used to manage the alarms and external appliances, for example for loading accumulation hot water and switching on/off the re-circulation pump.

The regulator is prepared for remote control with specific MODBUS transmission protocols, through optional board, for use in Building Management Systems (BMS).

Product Range

600045	1/2"	hybrid electronic mixing valve with union connections
600055	3/4"	hybrid electronic mixing valve with union connections
600065	1"	hybrid electronic mixing valve with union connections
600075	1 1/4"	hybrid electronic mixing valve with union connections
600085	1 1/2"	hybrid electronic mixing valve with union connections
600095	2"	hybrid electronic mixing valve with union connections

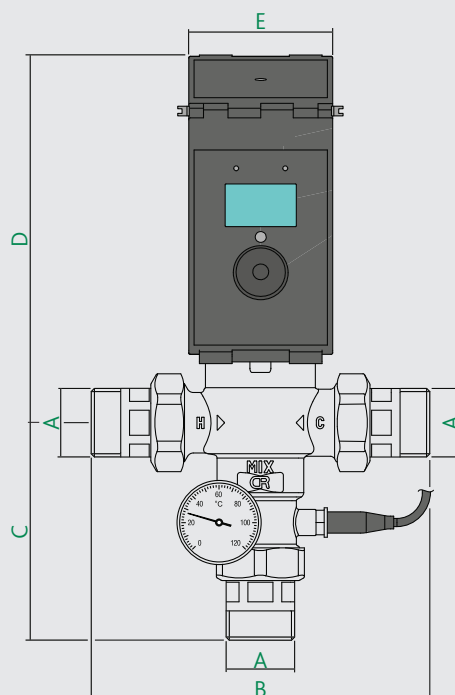
Technical Specification and Materials

Component	Material	Grade
Valve body		
Body	DZR	BS EN 1982 CC770S
Obturator	Polymer	PPSG40
Seals	Elastomer	EPDM
Springs	Stainless steel	BS EN 10270-3 AISI 302

Regulator - actuator

Housing:	PA6G30 anti-UV black
Covers:	PA6G30 anti-UV black
Electric supply:	230V (ac) 50/60 Hz
Power consumption:	6.5 W
Adjustment range:	35 to 65°C
Disinfection temperature:	50 to 85°C

Dimensions



Code	A	B	C	D	E	kg
600045	R1/2	157	130.5	217	88	3.0
600055	R3/4	157	130.5	217	88	3.0
600065	R1	209	134	220.5	88	4.1
600075	R1 1/4	209	134	220.5	88	4.7
600085	R1 1/2	242	159	224.5	88	5.5
600095	R2	262	179	229.5	88	6.2

Technical Specification and Materials

Ambient temperature range

Transportation:	30 to 70°C, BS EN60721-3-2 Cl. 2K3 max humidity 95%
Operation:	0 to 50°C, BS EN60721-3-3 Cl. 3K3 max humidity 85%
Storage:	-20 to 70°C, BS EN60721-3-1 Cl. 1K3 max humidity 95%

Protection class:	IP 54
Contact rating:	
Relay OUT1, OUT2, OUT3	5(2) A / 250 V
Digital inputs	without potential
Fuses:	self re-settable non replaceable (only for control unit)
Battery:	CR2032 225 mAh - life approximately 1 year (for keeping date and time in the absence of network)
Optional battery:	AA Lithium - duration approximately 10 years (for keeping date and time in the absence of network)
Conforms to Directives:	CE
Insulation class:	Class II

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Technical Specification and Materials

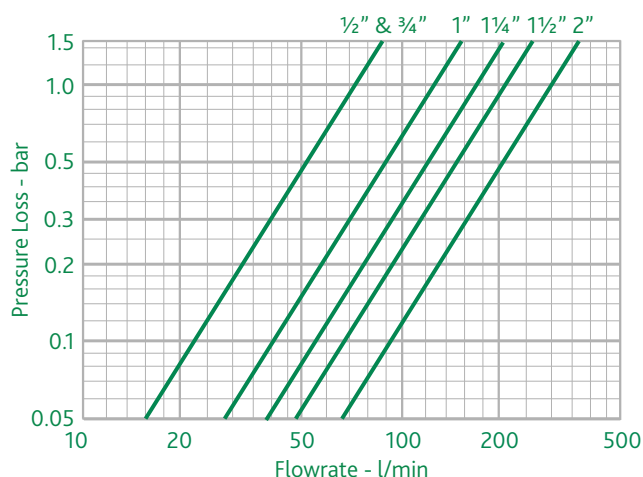
Temperature probes

Body material:	stainless steel
Type of sensitive element:	NTC
Working temperature range:	-10 to 125°C
Resistance:	10000 Ohm at 25°C
Time constant:	2.5
Max. distance for flow or re-circulation probe:	150 m cable 2x1 250m cable 2x1.5

Mixing valve performance

Accuracy:	± 2°C
Max. working pressure (static):	10 bar
Max. working pressure (dynamic):	5 bar
Max. in let pressure ratio (H/C or C/H):	2:1
Max. in let temperature:	90°C
Temperature gauge scale:	0 to 120°C

Hydraulic Characteristics



Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
Kv - m³/h	4.3	4.3	7.6	10.0	13.0	18.0

Recommended flow rates to ensure stable operation and an accuracy of ± 2°C

Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
Min - l/min	10	10	20	25	25	33
Max- l/min	88	88	155	208	266	368

Legionella - Distribution Temperature

In central systems that produce hot water with storage for domestic purposes, in order to prevent the proliferation of dangerous Legionella bacteria, the hot water must be stored at a temperature of at least 60°C.

At this temperature it is certain that the proliferation of the bacteria that cause Legionnaire's disease will be totally inhibited.

These temperatures, however, are too high to be able to be used directly by the consumer.

It is therefore necessary to reduce the temperature of the hot water distributed to the user to a lower value suitable for use.

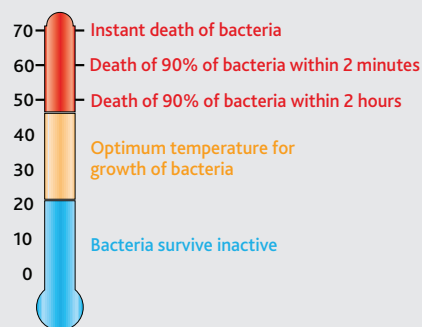
Moreover, not only the storage but also the entire distribution network requires thermal disinfection at regular intervals, otherwise the bacteria contained in the pipework would grow and multiply quickly.

In view of the above, it is therefore necessary to use an electronic mixing valve able to:

- reduce the temperature of the distributed water to an adjustable value which is lower than the storage temperature.
- keep the mixed water temperature constant despite any variation in inlet temperature and pressure, or in the drawn-off flow rate.
- allow thermal disinfection to be programmed with a higher temperature than the adjustment value, in the necessary time and in periods with less frequent consumption (night time).
- it allows remote monitoring and management of the domestic hot water distribution system, ensuring its functional status with continuous recording of the temperature reached.

Thermal Disinfection

The diagram below shows the behaviour of Legionella Pneumophila bacteria as the temperature conditions of the water containing the bacteria vary, in laboratory cultures.



To ensure correct thermal disinfection, it is necessary to go up to values of at least 60°C.

Applications

The electronic mixing valve is typically used in central systems serving hospitals, nursing homes, sports centres, shopping centres, hotels, campsites and boarding schools.

In these buildings with their collective use, it is more necessary to control and prevent legionnaire's disease in a programmed manner, managing the disinfection times in the best possible way.

These systems increasingly require remote control and continuous temperature adjustment for the best guarantee of effective functionality.

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Operating principle

The mixing valve has the hot water from the hot water storage and the cold water from the water mains entering the valve at their respective inlets.

At the outlet there is the flow mixed water.

By means of a specific probe, the regulator measures the temperature of the mixed water at the valve outlet and actuates an obturator in order to maintain the setting.

Temperature fluctuations caused by flow rate or pressure variations are compensated by the thermostat in the valve.

The device has a built-in digital clock, which can be used to set anti-legionella programs to disinfect the water system and to manage a re-circulation pump.

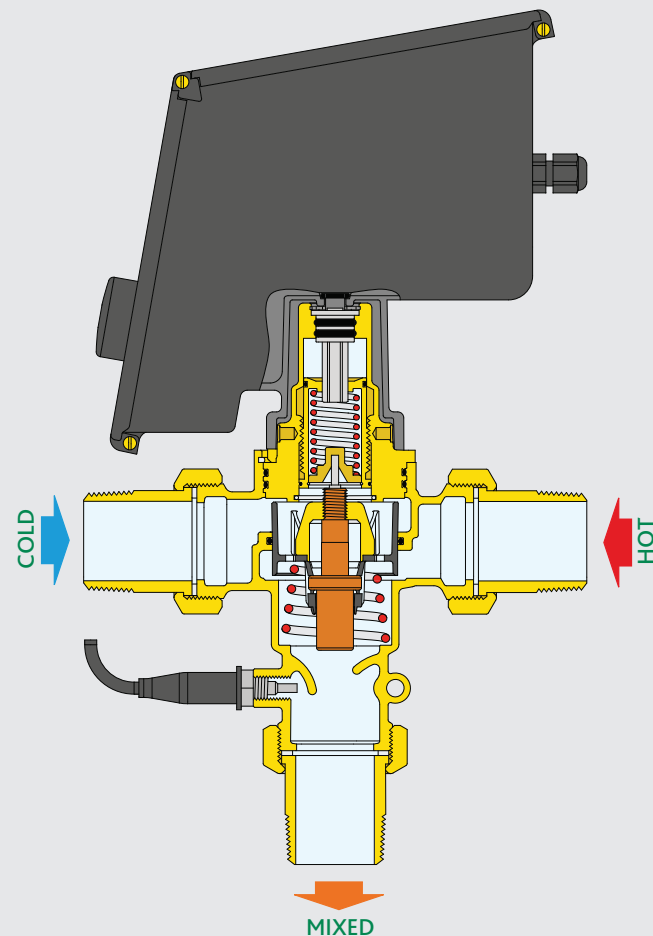
The system is disinfected by raising the water temperature to a specific value for a set time duration.

For the best thermal disinfection control, in this type of system it may also be necessary to measure the temperature of the water returning from the distribution network, using the recirculation probe.

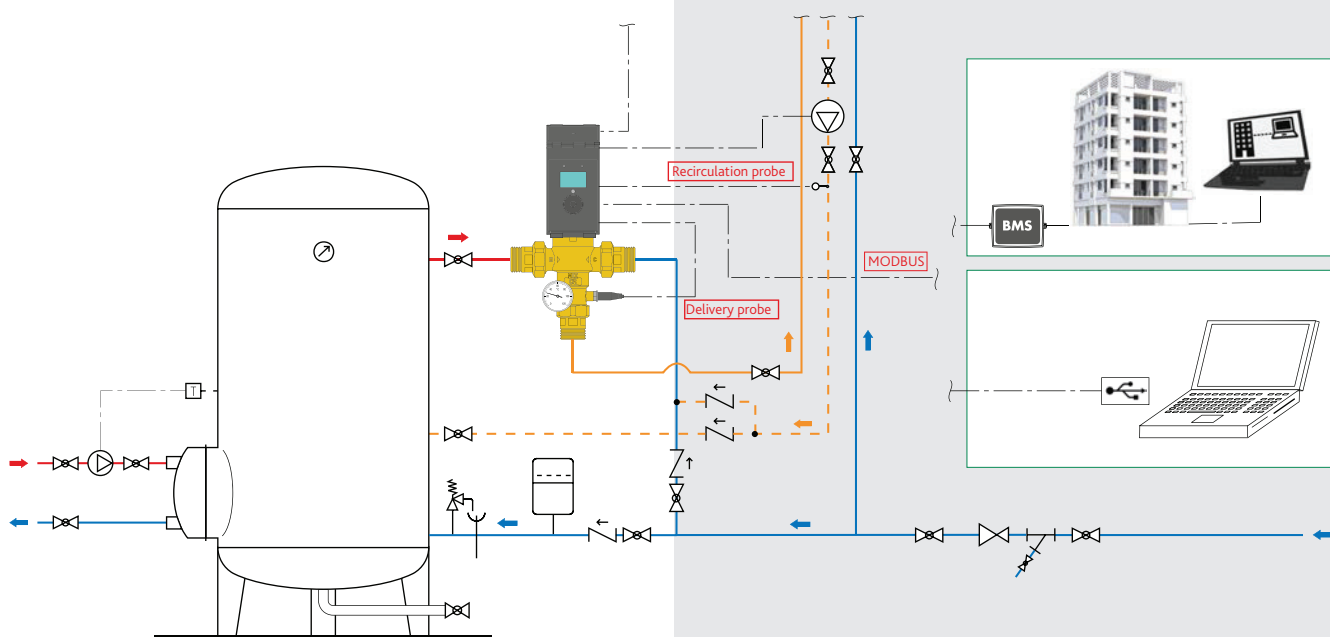
When this measurement is available, it is used to check and control the temperature reached over all or part of the network, since the probe may be located at a significant remote point of the system.

The device is equipped with RS-485 interface (optional), with MODBUS protocol, for readouts and remote setting.

It is necessary to configure the MODBUS system with the addresses used by dedicated PC software available.

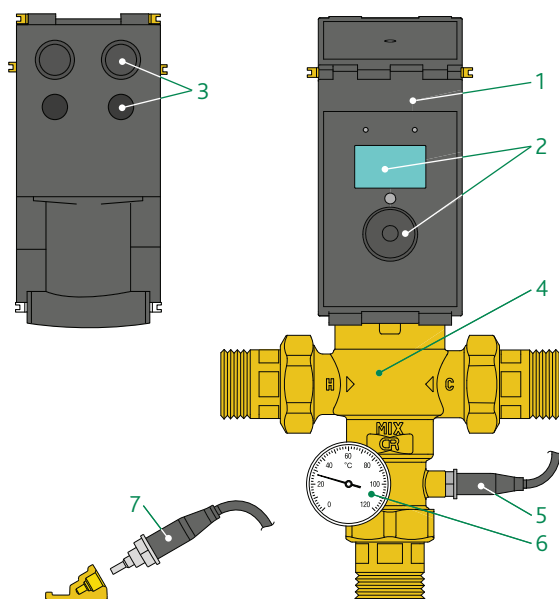


Application Diagram



6000 hydrid electronic mixing valve

Components



- 1 Digital regulator with actuator in single case
- 2 Control knob and LCD display
- 3 Fitted for cable seals and cable gland, with holes
- 4 Valve body
- 5 Mixed water temperature probe
- 6 Mixed water temperature gauge
- 7 System return probe and probe holder

Log

The device, through the data transmission board CS179 (optional) allows recording the flow temperature, return temperature, alarms and functional status, useful for monitoring the operation status of the valve.

It will then be possible to export the data from the device through a PC interface.

In addition, there is a failed disinfection menu on the device (the last 10 disinfections that have not been completed correctly are stored).

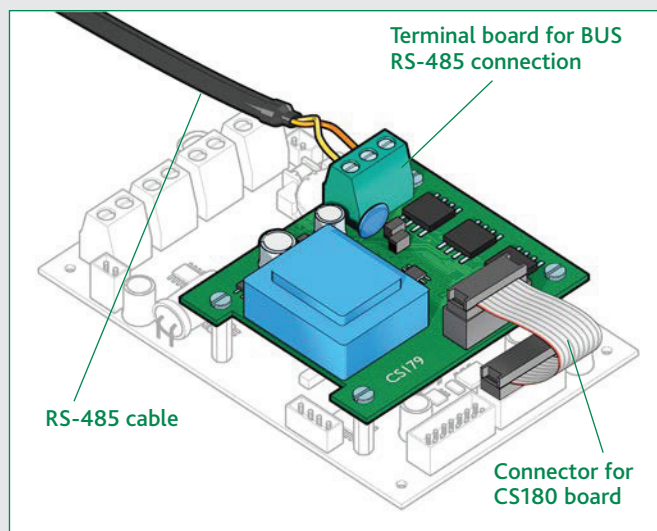
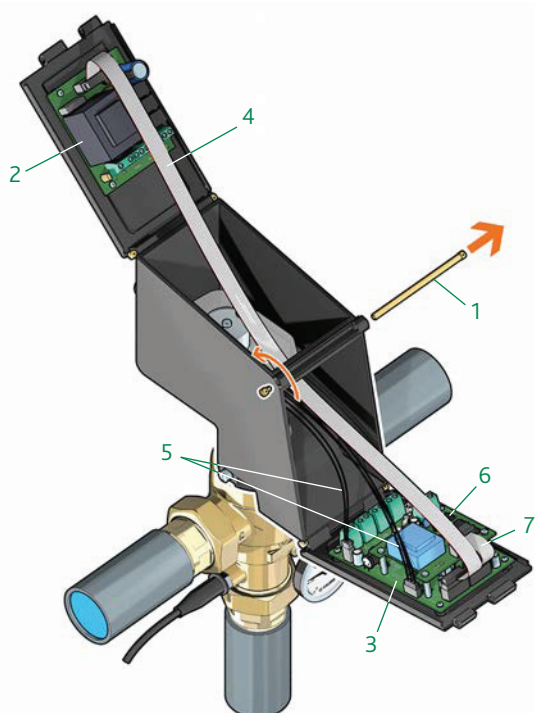
The device is fitted for remote control with specific MODBUS transmission protocols, for use in Building Management Systems (BMS).

Electronic Boards

There are two circuit boards in the regulator.

On the CS176 board there are the electric supply and relay contacts, but in the second board (CS180) there are the contacts for the probe connections and the disinfection start/end or thermal shock inputs.

There is a CS179 board (optional) for data transmission, with which is used to manage the device remotely.



- 1 Actuator-regulator opening/closing pin
 - 2 Power supply board (CS176)
 - 3 Control board (CS180)
 - 4 Multi pole cable for board connection*
 - 5 Motor connection cables*
 - 6 RS-485 interface board (CS179 optional)
 - 7 RS-485 interface connection cable (optional)
- * Factory assembled

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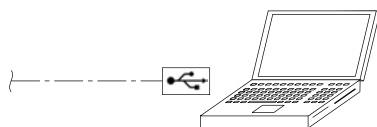
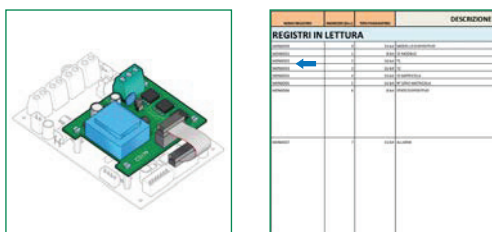
MODBUS and Connection to a PC



Code 600001 - Optional board CS179 and logs

By installing the CS179 board in the regulator, it will be possible to manage the device through a specific MODBUS transmission protocol for use in Building Management Systems (BMS).

The package includes the optional CS179 board, CS180 board connection cable and logs.



Code 600002 - RS485 USB cable and software

Using the cable with the RS485 USB interface and software included in the package, it is possible to manage the device from a PC.



Operational Status

Depending on the times and the programs that have been set, the device may be in one of the following operating modes:

- Regulation
- Disinfection
- Thermal shock*
- Zero and full scale acquisition

* (this function has priority over the disinfection/regulation).

In the event of anomalies, the device manages and signals an alarm trying to set into a safety condition for the user.

The device is equipped with a non-rechargeable battery that keeps the clock working in the event of electric supply failure.

Regulations

The electronics must adjust the flow temperature through the actuator in order to reach the working set-point.

The electronic actuator adjusts the flow so as to have a temperature centered in a suitable working range, within which the fine and dynamic adjustment is made by the thermostat.

The water mixing temperature is set through the regulator.

The management system always checks in real time the flow temperature detected by the probe: if the flow temperature deviates excessively from the set value, a correction is made through the electric motor.

In the case of installation with a return probe present, it is not used for the water mixing temperature adjustment.

Disinfection

In this mode, the device performs thermal disinfection, which consists in raising the mixed water temperature for a defined period of time.

The following can be set:

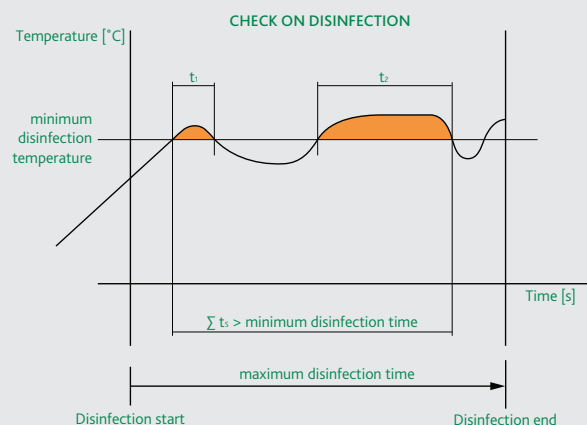
- Days of the week for performing the disinfection
- Minimum disinfection temperature
- Disinfection start time
- Minimum stay time above the minimum disinfection temperature in order to evaluate the successful outcome of the disinfection
- Maximum time within which it is possible to perform the disinfection

The disinfection can be:

- Programmed: it starts in the days and hours set
- Activated through the control: it can be controlled by the device from the "Controls submenu" or remotely through optional board
- Activated by IN1 inlet

The disinfection in progress OUT3 relay and the recirculation pump management OUT2 relay are always activated during the disinfection.

If the disinfection temperature does not last for sufficient time and the maximum available time is exceeded, the disinfection will be considered as failed by signalling the relevant alarm.



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Thermal Shock

The thermal shock mode can be controlled by the device from the "Controls sub-menu" or remotely through optional board

In this mode, the device raises the flow temperature to the set value for a certain period of time.

The disinfection in progress OUT3 relay and the recirculation pump management OUT2 relay are always activated during the thermal shock.

Zero and full scale acquisition

In the zero acquisition mode, the regulator and actuator totally closes the adjusting screw to check the correct phasing between the motor and the valve.

In full scale acquisition mode, the regulator and actuator fully opens the adjusting screw so it can check all the stroke (potentially hazardous condition indicate with fixed red LED).

The zero and full scale acquisition controls are activated during the installation or after the "Reset alarms" control.

Reset

In the menu there is a special control to reset to the initial conditions. The history is not reset.

Test

The regulator and actuator performs full strokes in order to check that there are no obstructions during the motor opening and closing strokes.

It is possible to interrupt the test function at any time by pressing the control knob.

Disinfection Programs

Different programs can be set, chosen according to the type of system and its management:

Disinfection type with flow probe T1 enabled	
Disinfection Code	Description
d1	Disinfection performed at maximum available flow temperature, limited to the system maximum temperature set (T1 Hi). Disinfection check performed on probe T1.
d2	Disinfection performed at the minimum disinfection temperature (diS °C). Disinfection check performed on probe T1.

Disinfection type with recirculation probe T2 enabled	
Disinfection Code	Description
d1	Disinfection performed at maximum available flow temperature, limited to the system maximum temperature set (T1 Hi). Disinfection check performed on probe T2.
d2 (default)	Disinfection at the flow temperature calculated according to the return temperature T2. Disinfection check performed on probe T2.

Disinfection is considered successful when the temperature of the probe enabled remains above the minimum disinfection temperature (diS °C) for a minimum set time (tmin diS) within a maximum time limit (tHi diS).

Eco Function

The ECO function does not take into account the minimum disinfection time, but calculates it based on the actual temperatures according to the following table. If the temperature drops below 60°C, counting starts from the beginning.

Temperature - °C	Time - minutes
60	36
65	18
70	12

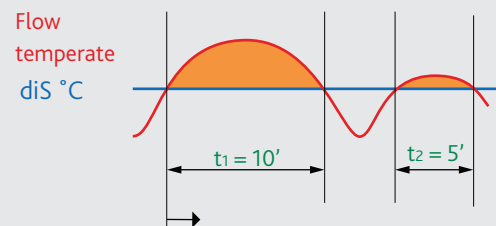
The ECO function is applicable to all disinfection modes, before using this mode, it is necessary to check that the proposed disinfection times are in accordance with the regulations in force in the country of installation.

Example with ECO function disabled

Disinfection code: d1

Flow temperature = Maximum available temperature

Minimum disinfection time = minimum disinfection time at a temperature diS °C = 30'



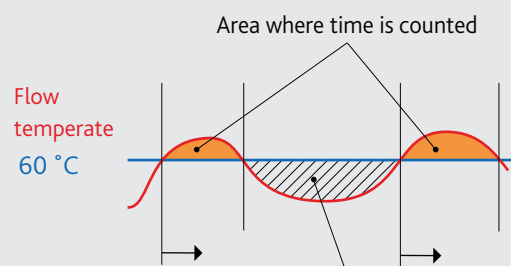
Disinfection is considered successful when: $\sum t_i \geq t_{min} diS$

Example with ECO function enabled

Disinfection code: d1 - ECO function

Flow temperature = Maximum available temperature

Minimum disinfection time = automatic check



When the temperature drops below 60°C, the countdown stops and resumes from zero when it returns above this value

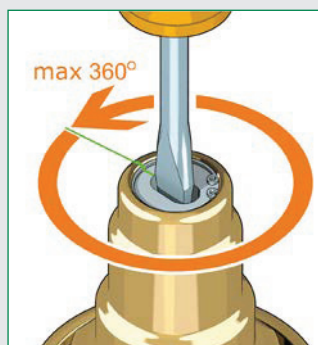
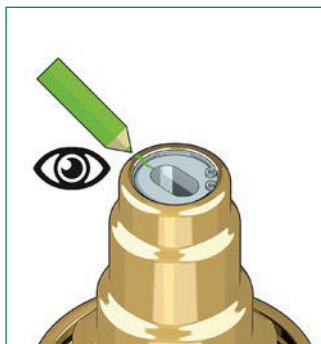
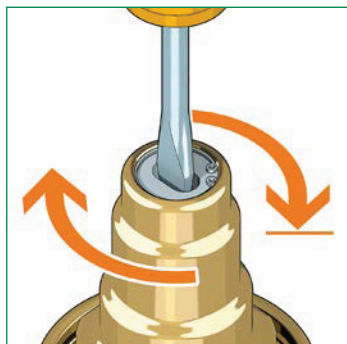
Disinfection is considered successful when the following conditions are continuously respected:

- Flow temperature $\geq 60^\circ\text{C} \rightarrow$ minimum time = 36'
- Flow temperature $\geq 65^\circ\text{C} \rightarrow$ minimum time = 18'
- Flow temperature $\geq 70^\circ\text{C} \rightarrow$ minimum time = 12'

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Manual Thermostatic Adjustment

In case of motor failure or power failure, the device is able to guarantee the temperature adjustment through the thermostatic element. To ensure thermostatic adjustment, it is necessary to perform the following operations:



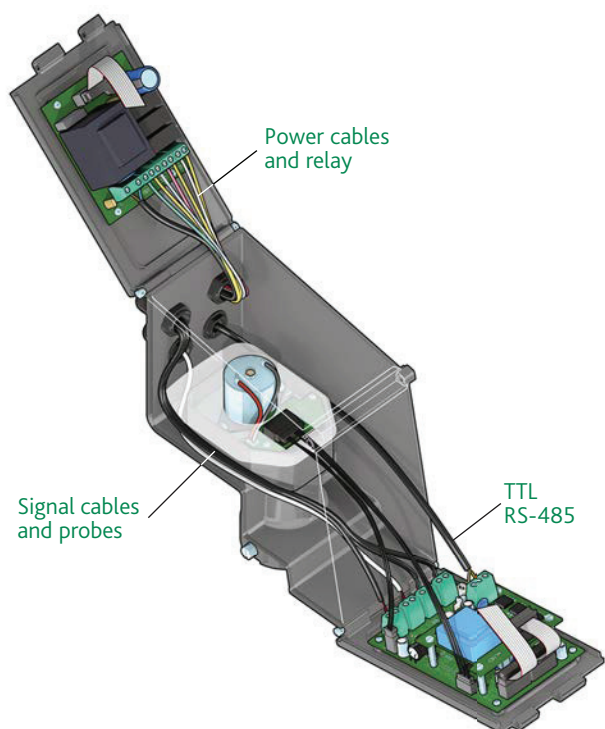
- Turn clockwise up to the stop
- Make a reference mark
- Adjust the desired set point, reading the temperature using a suitable thermometer (make a maximum of 1 turn)

The valve is also able to ensure the thermal closing function, i.e. in the case of the cold water supply, the mixing valve immediately shuts off the flow of hot water.

Also in the case of failure of the hot water supply, the device shuts off the cold water port and thus the mixed water outlet (in order to prevent thermal shock)

Cables Positioning

This image shows an example of a possible cable layout and their passage through the cable seals and cable glands included in the supply.

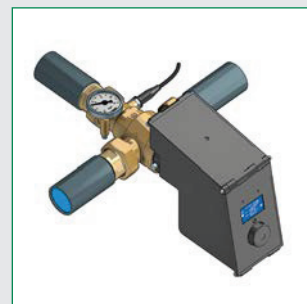


Connections layout: connections must not create thrust stresses on the circuit board.

Reading the Display

To facilitate reading the display, it is possible to change the panels positioning depending on the different installations.

For correct inversion see f.i. H0002123.

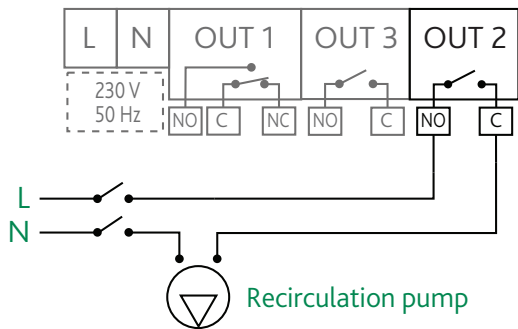


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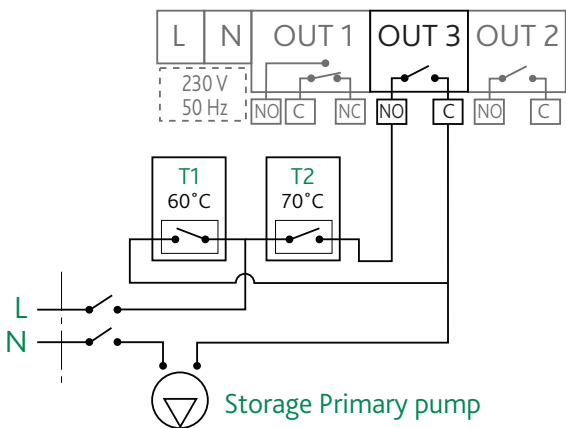
Relay Contact for Recirculation Pump and Second Storage Thermostat and Alarm Management

This diagram shows the wiring of the OUT2 relay, for managing the recirculating pump.

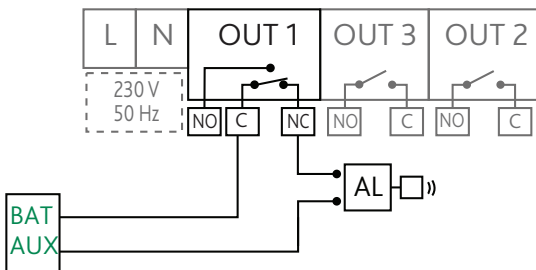
The regulator incorporates a digital clock used to manage the recirculating pump according to the pre-set time periods



Here is the wiring diagram for the OUT3 relay for connection to the secondary storage thermostat



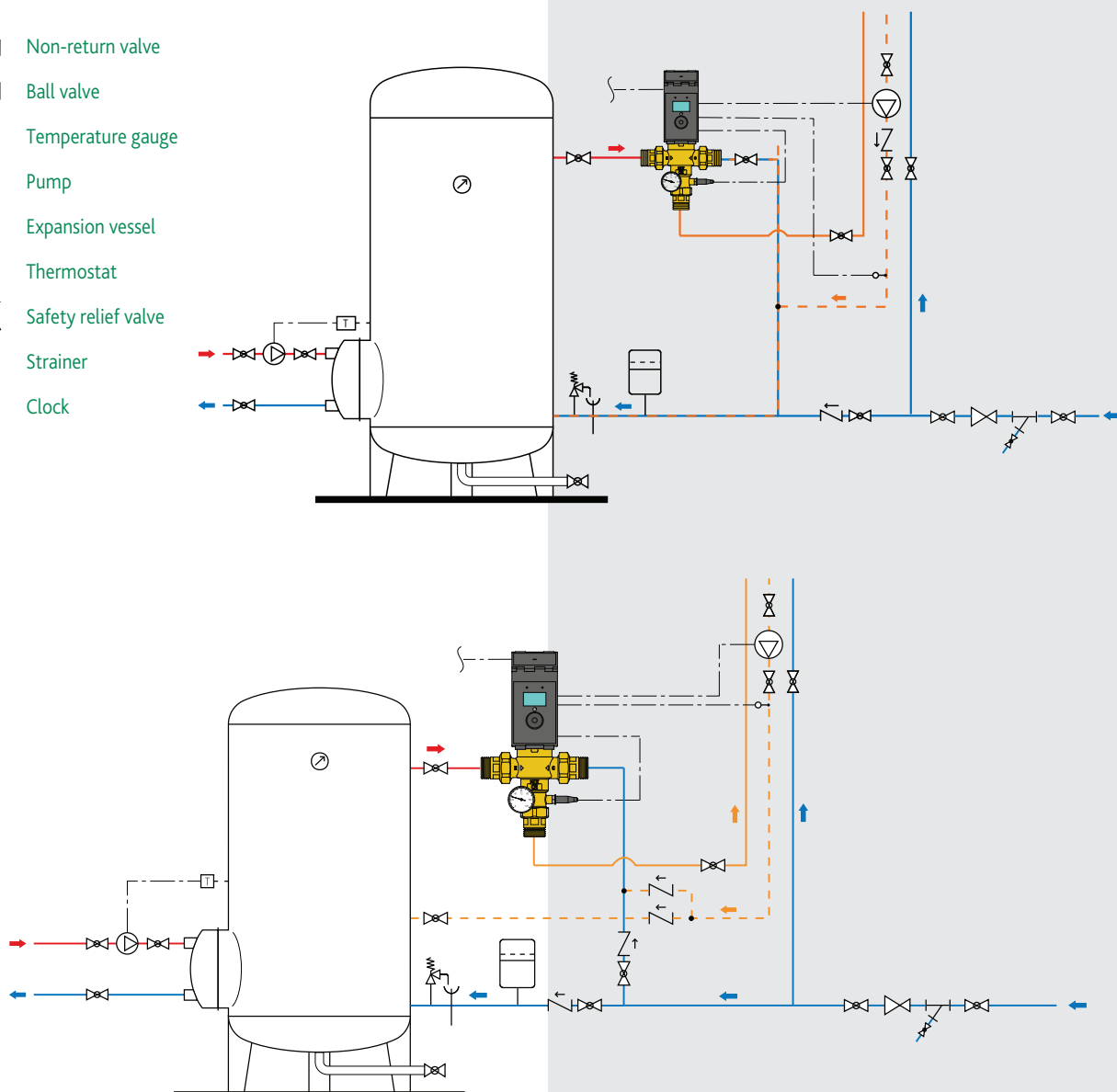
Here is the wiring diagram for the OUT1 relay for alarm management



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Typical Applications

-  Non-return valve
-  Ball valve
-  Temperature gauge
-  Pump
-  Expansion vessel
-  Thermostat
-  Safety relief valve
-  Strainer
-  Clock



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