

Solar storage-to-boiler connection kit



264 – 265 series



01163/24 EN

replaces 01163/08 EN



Function

The solar storage-to-boiler connection kits automatically control and optimise the thermal energy contained in the solar water storage, ensuring that domestic hot water is distributed throughout the system at a controlled optimum temperature.

The kits come complete with anti-scald thermostatic mixing valves, motorised diverter valves, and an electronic thermostat with temperature probe for the solar thermal system.

They ensure that users always receive hot water at the set temperature and switch the boiler on if the temperature of the water coming from the solar storage falls below the set point.

The kits are available in two versions, for use with either modulating or non-modulating boilers.

These compact kits are designed for quick and easy installation in both new and existing systems.

They come complete with a pre-formed shell protective cover.



PATENT

Product range

Code 264352 SOLARNOCAL Solar storage-to-boiler connection kit without thermal integration _____ size 3/4"
 Code 265352 SOLARINCAL Solar storage-to-boiler connection kit with thermal integration _____ size 3/4"

Technical specifications

Materials

Mixing valve

Body: dezincification resistant alloy **CR**
 EN 12165 CW724R
 Obturator: PSU
 Springs: stainless steel ISO 6931-1 (4310-301-00)
 Seal elements: EPDM
 Knob: ABS

Diverter valve

Body: brass EN 12165 CW617N
 Ball: brass EN 12164 CW617N, chrome plated
 Ball seal: PTFE with EPDM O-Ring
 Control stem seal: double EPDM O-Ring
 Union seals: non-asbestos fibre

Actuator

Protective shell: self-extinguishing polycarbonate
 Colour: grey RAL 9002

Protective cover

Material: PVC
 Thickness: 7 mm
 Density: 1,29 kg/dm³
 Working temperature range: -5–110 °C
 Reaction to fire (EN 13501-1): class B

Connections: - inlet and outlet: 3/4" M (ISO 228-1) with union
 - boiler connection (265 series): 3/4" M (ISO 228-1)

Performance

Diverter valve

Maximum working pressure: 10 bar
 Maximum differential pressure: 10 bar
 Working temperature range: -5–110 °C

Mixing valve

Medium: potable water
 Maximum working pressure: 10 bar (static); 5 bar (dynamic)
 Adjustment temperature range: 35–55 °C
 Factory setting: 43 °C
 Accuracy: ± 2 °C
 Maximum inlet temperature: 100 °C
 Maximum inlet pressure ratio (H/C or C/H): 2:1
 Min. temperature difference between inlet hot water and outlet mixed water to ensure anti-scald performance: 10 °C
 Minimum flow rate for stable operation: 4 l/min

Actuator

Three-contact type
 Electric supply: 230 V ~ (AC)
 Power consumption: 8 VA
 Auxiliary microswitch contact rating: 0.8 A (230 V)
 Protection class: IP 44 (vertical control stem)
 IP 40 (horizontal control stem)
 Operating time: 10 s
 Ambient temperature range: 0–55 °C
 Dynamic torque: 6 N·m
 Supply cable length: 1 m

Temperature probe

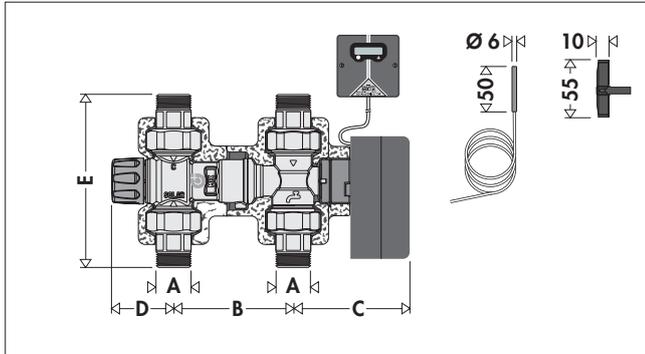
Size: Ø 6 mm
 Working temperature range: -25–110 °C
 Time constant: 1 min
 Response: 100 kΩ at 25 °C
 Two-wire cable: L = 2 m
 Maximum distance: 10 m with 2 x 0,25 mm² cable
 100 m with 2 x 0,5 mm² cable

Thermostat technical specifications

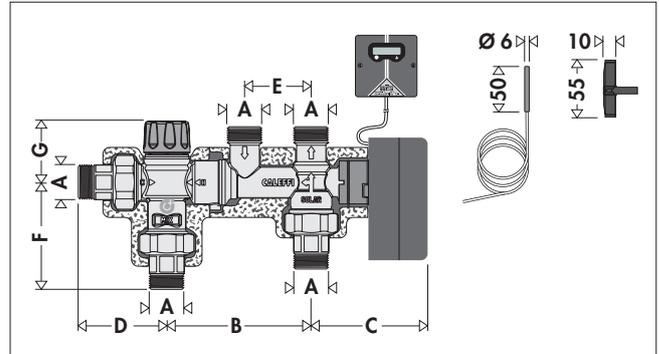
Electric supply:	230 V - 50 Hz
Power consumption:	10 VA
Contact rating on changeover:	0,315 A - 230 V
Tset adjustment range:	25–50 °C
Tset factory setting:	45 °C
ΔT adjustment range:	2–25 °C
ΔT factory setting:	10 °C (SOLARNOCAL), 2 °C (SOLARINCAL)

Measurable temperature range:	0–99,5 °C
Minimum display resolution:	0,5 °C
Accuracy of temperature reading:	± 0,1 °C
Ambient temperature range:	5–50 °C
Protection class:	IP 42
Storage temperature:	0–60 °C
Power supply cable:	H05VV-F type, minimum section 0,75 mm ²

Dimensions



Code	A	B	C	D	E	Mass (kg)
264352	3/4"	90	87,5	45	131	2,37



Code	A	B	C	D	E	F	G	Mass (kg)
265352	3/4"	108,5	87,5	66,5	50	81	45	2,43

High temperature and solar systems

In solar thermal systems with natural circulation in the primary circuit and a water storage with heating jacket, the temperature of the domestic water in the storage can vary considerably depending on the degree of solar radiation and can reach very high temperatures over long periods.

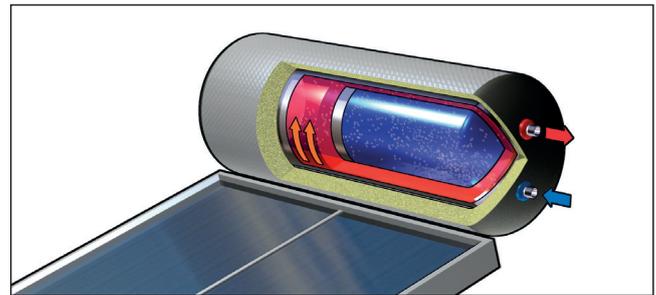
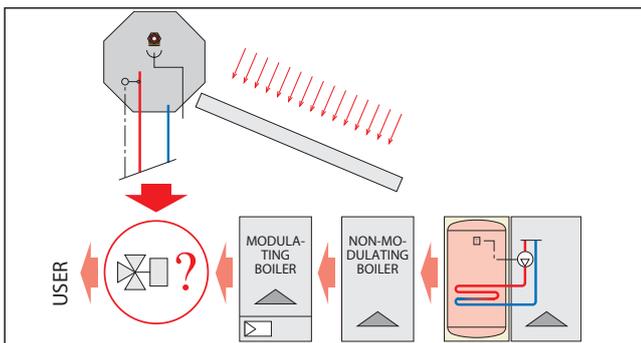
In summer and with low water usage, the hot water at the storage outlet can actually reach temperatures around 90 °C before the temperature and pressure safety relief valves are actuated.

At these temperatures, the hot water cannot be used directly, because of the danger of scalding for users.

Water temperatures over 50 °C can cause burns very quickly. For example, at 55 °C, partial burn occurs in about 30 seconds, whereas at 60 °C partial burn occurs in about 5 seconds.

It is therefore necessary to use a thermostatic mixing valve able to:

- reduce the temperature of the water distributed throughout the domestic water system to a value lower than that in the storage tank and suitable for the end user. For reasons of safety, it is recommended to set the temperature of the mixed water distributed to the users to values no higher than 50 °C;
- keep mixed water temperature constant despite variations in inlet temperature and pressure;
- continue functioning over time without any loss in performance and without problems due to the continuously high temperature of the incoming water;
- ensure the high-temperature water in the storage tank lasts longer, by distributing it to the user circuit at a reduced temperature;
- have an anti-scald safety function, in case of inlet cold water supply failure.



Exposure time required to cause partial burns

Temperature	Adults	Children 0-5 years
70 °C	1 s	--
65 °C	2 s	0,5 s
60 °C	5 s	1 s
55 °C	30 s	10 s
50 °C	5 min	2,5 min

Integration with boiler

Solar domestic hot water storage tanks are normally installed in system circuits in conjunction with boilers or water heaters. In this way, boilers or water heaters can be switched on to produce domestic hot water when solar radiation is insufficient, therefore the thermal energy available within the solar storage tank is low.

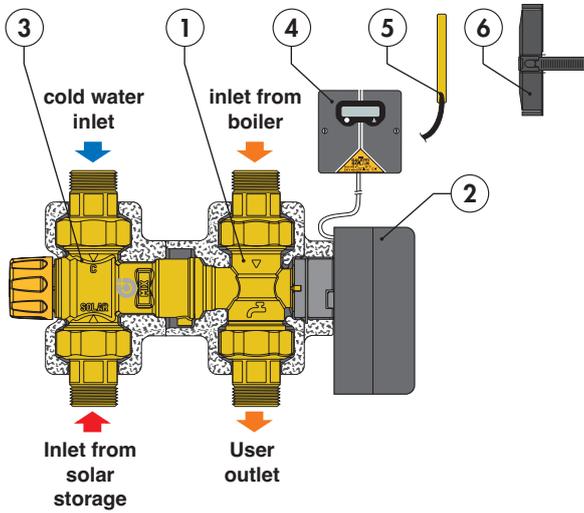
The following actions are necessary to control this type of system automatically and ensure the correct distribution of domestic hot water:

- install an actuator-operated diverter valve between the solar circuit and the boiler/water heater
- install a thermostat with the probe in the solar circuit, to operate the diverter valve on the basis of the temperature of the water originating from the solar water storage
- switch the boiler/water heater on if the temperature of the solar hot water is insufficient
- connect the solar domestic hot water circuit to the boiler/water heater according to the operating mode of the latter, and on the basis of whether it is an instant modulating system, a non-modulating system, or equipped with its own storage tank.

264 Series SOLARNOCAL

Characteristic components

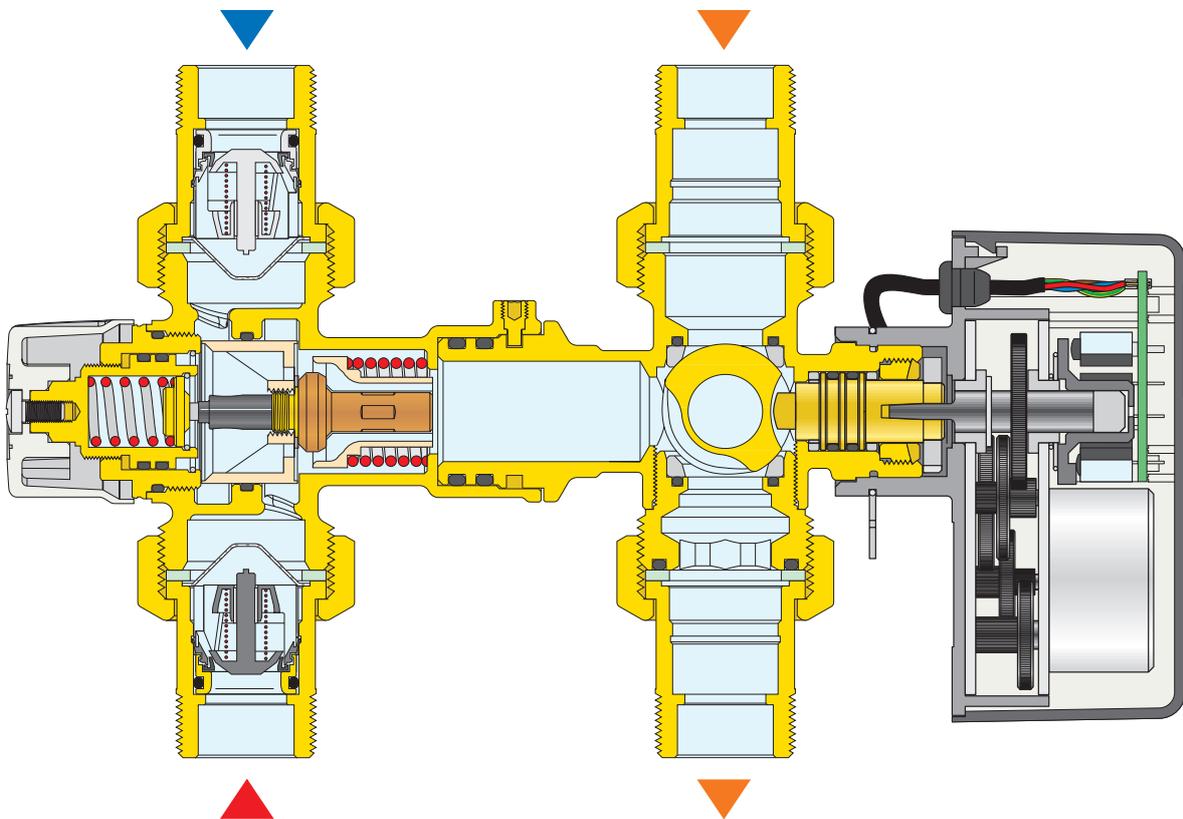
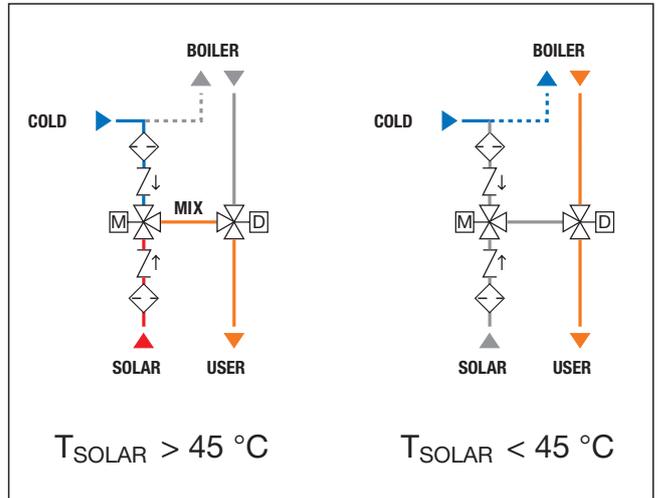
- 1) Diverter valve
- 2) Diverter valve actuator
- 3) Thermostatic mixing valve
- 4) Diverter valve control thermostat
- 5) Solar hot water cylinder temperature probe
- 6) Contact probe holder



Operating principle

An anti-scald thermostatic mixing valve, at the kit inlet, controls the temperature of the water coming from the solar water storage tank. A thermostat with a sensor on the hot water pipe from the solar hot water tank controls the diverter valve on the kit outlet. Depending on the temperature set (factory setting 45 °C), the valve diverts the water to the user or activates the boiler, excluding the solar hot water cylinder (ON-OFF logic), **without thermal integration**.

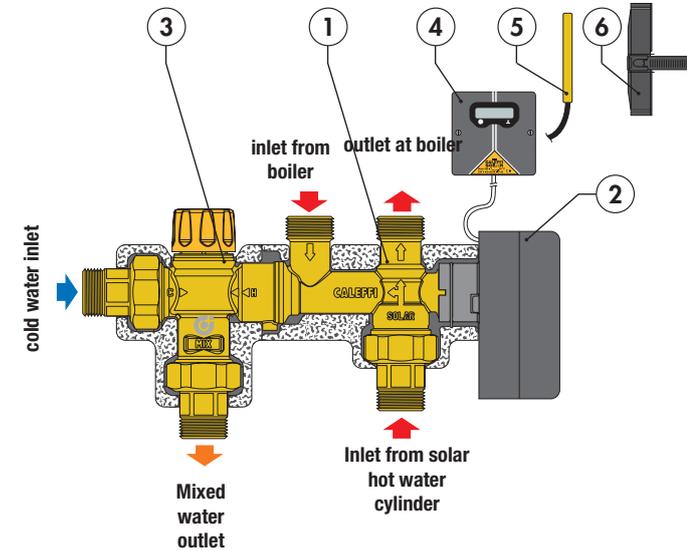
Hydraulic diagram



265 Series SOLARINCAL

Characteristic components

- 1) Diverter valve
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- 3) Thermostatic mixing valve
- 4) Diverter valve control thermostat
- 5) Solar hot water cylinder temperature probe
- 6) Contact probe holder

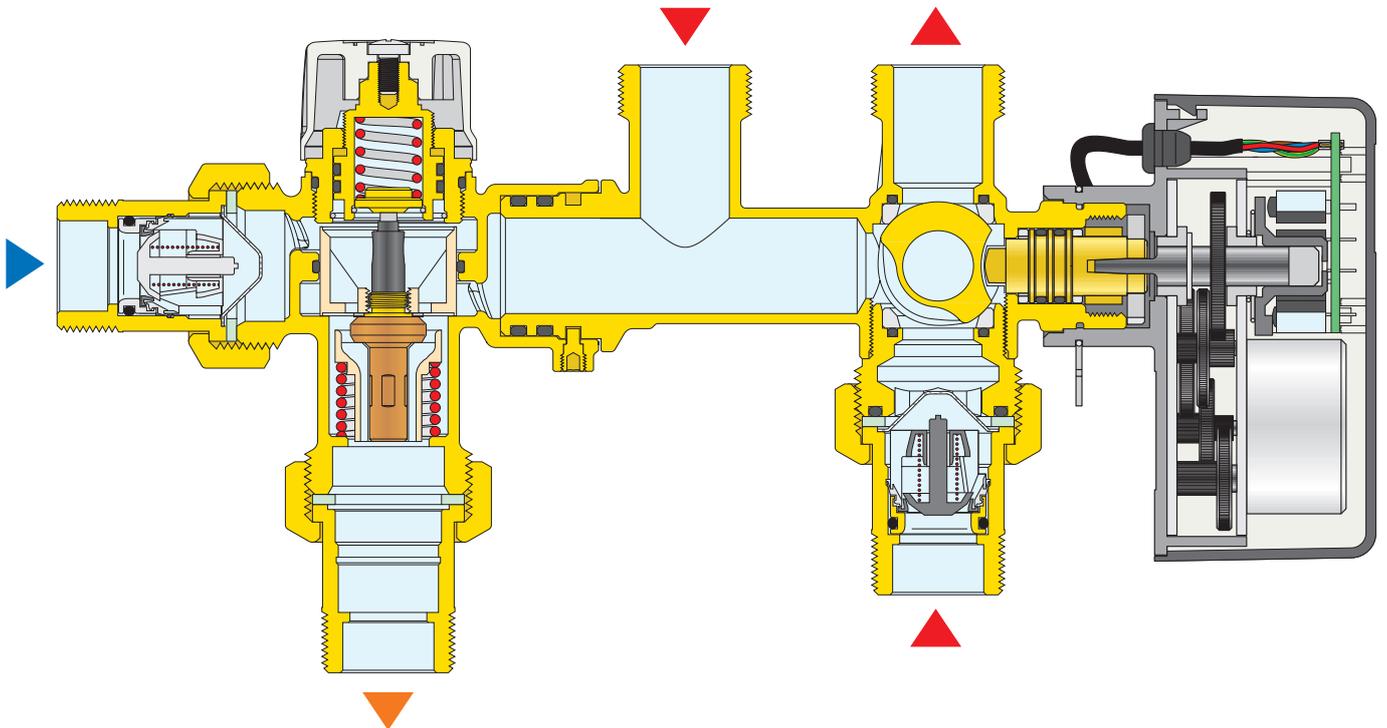
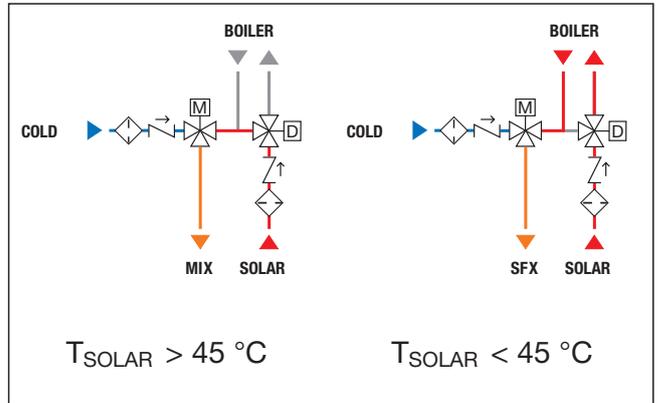


Operating principle

The thermostat, by means of the probe positioned on the hot water flow from the solar water storage, controls the diverter valve at the kit inlet. Depending on the temperature setting (factory setting 45 °C), the valve diverts the water between the user circuit and the boiler circuit, **with thermal integration**.

An anti-scald thermostatic mixing valve, at the kit outlet, constantly controls the temperature of the water sent to the end user.

Hydraulic diagram



Construction details

Mixing valve

High resistance to temperature

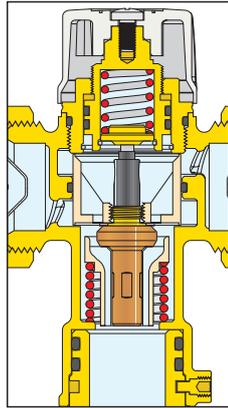
Internal regulating unit components are designed to maintain constant the mixing valve performance with inlet hot water temperatures up to 100 °C, in continuous operation.

Anti-scale materials

The materials used in constructing the mixing valve were selected to eliminate seizing due to limescale deposits. All functional parts have been made using a special anti-scale material with low friction coefficient, which ensures over time performance.

Anti-scald safety function

As a safety measure, in case of failure of the cold water supply at the inlet, the valve immediately shuts off the flow of the hot water. This prevents dangerous burns. This performance is guaranteed if there is a minimum temperature difference between the inlet hot water and the outlet mixed water of 10 °C. Also in case of failure of the hot water supply, the valve shuts off the cold water port and thus the outlet mixed water to prevent dangerous thermal shocks.



Diverter valve

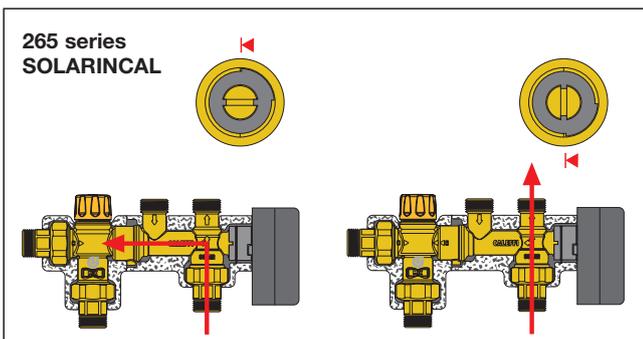
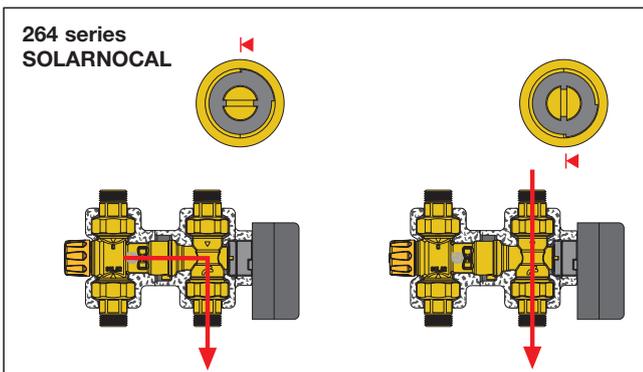
Directions of flow and position indicator

Removing the actuator reveals a slot in the top of the control stem on which the actuator pin acts:

- it allows the valve to be opened/closed manually using a screwdriver;
- its position indicates the position of the ball and therefore the direction of the flow. This is extremely useful in system testing and checking procedures.

Below are two diagrams, one for each type of valve, illustrating how the slot position indicates the direction of the flow.

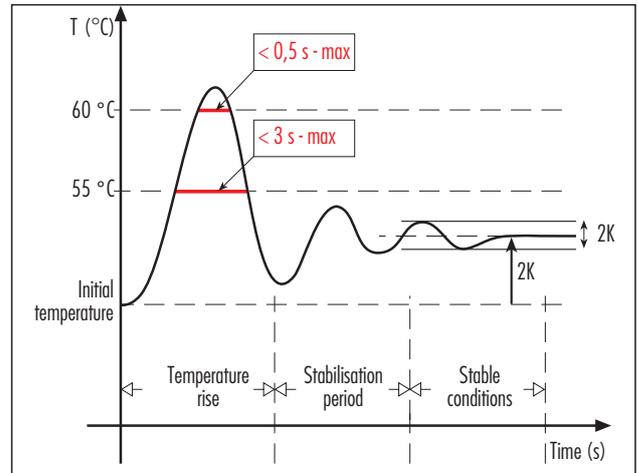
Valves are initially delivered with the slot/indicator in a vertical position (chill water circuit open).



Thermal transients

During transient, following rapid changes in pressure, temperature or flow rate, the outlet mixed water temperature increases with respect to the initial set point and this increase must be of limited duration to guarantee safety.

The anti-scald mixing valve always ensures that these conditions are respected.



Actuator

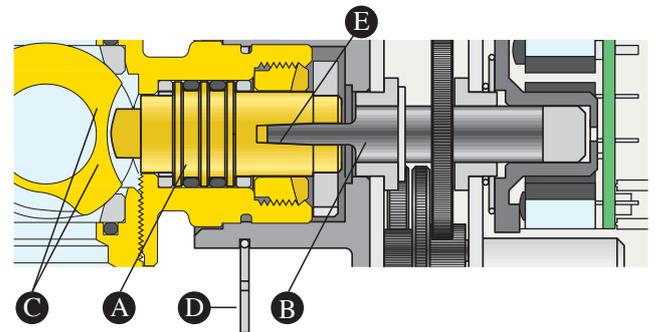
Drive transmission

The valve control stem (A) and the gearmotor shaft (B) are connected by a taper coupling (E) for constant connection between the two components.

This permits automatic compensation of the mechanical slack thanks to the thrust (S) on the stem applied by the pressure of the medium.

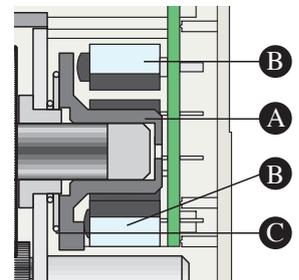
Valve actuator coupling

An elastic steel clip (D) allows the valve to be coupled to the actuator quickly and easily, simply by pushing the two parts together until they click into place and are automatically locked together.



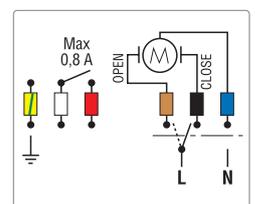
Cam and limit microswitches

Cam (A) operates the end of stroke limit microswitches (B). The cam, which can move vertically, is supported by cup spring (C). This keeps the cam in constant contact with the microswitches and compensates for wear over time.



Auxiliary microswitch

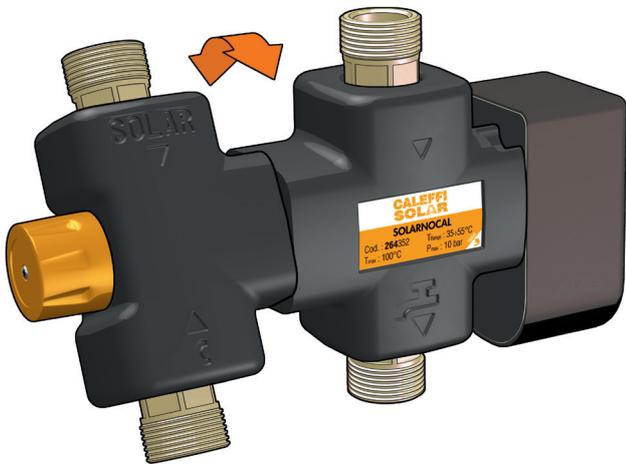
The diverter valve actuator is equipped with limit microswitches that cut off the electric supply on reaching the valve open/closed positions. The valve actuator also has an auxiliary microswitch. This shuts off at an average valve opening value of 80 % in diverting to the boiler mode. The white and red cables for the auxiliary microswitch (non-live contact) can also remain unused. In this case we recommend they are isolated.



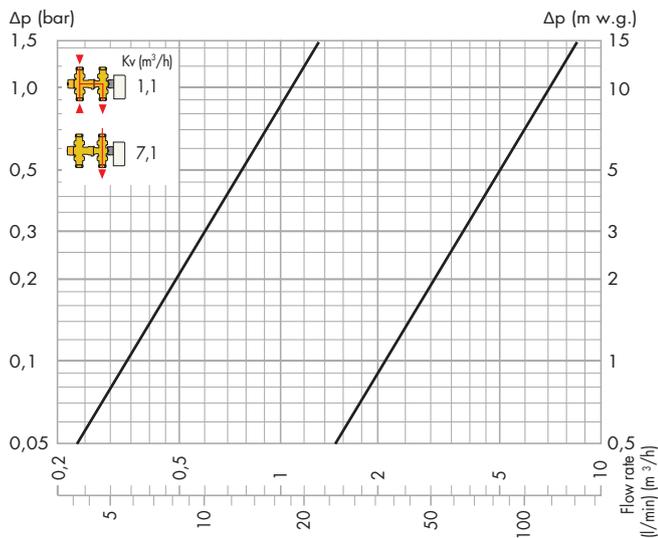
Diverter-mixing valve coupling

The mixing valve-diverter valve coupling in SOLARINCAL and SOLARNOCAL solar hot water storage to boiler connection kits allows the mixing valve to rotate through 360° to satisfy all possible installation needs.

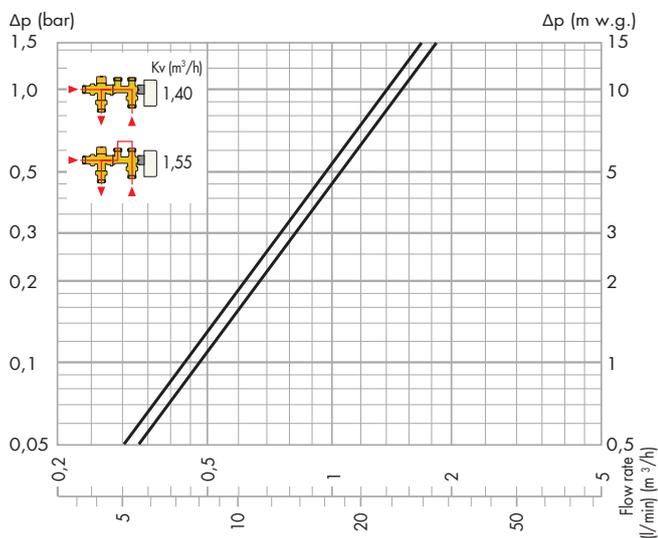
The kit comes complete with a special pre-formed protective shell cover.



264 series SOLARNOCAL hydraulic characteristics



265 series SOLARINCAL hydraulic characteristics



Usage

Solar storage-to-boiler connection kits are generally installed near the boiler, on the pipe of the hot water coming from the solar storage tank, to ensure a constant temperature of the mixed water supplied to the user.

Given their flow rate characteristics, thermostatic mixing valves can be installed to control water temperature for single user points (e.g. washbasins, bidets, showers) and for multiple users. To ensure a stable supply of mixed water at the set temperature, the thermostatic mixing valves must ensure a minimum flow rate of 4 l/min.

Checking the pressure drop in the kit

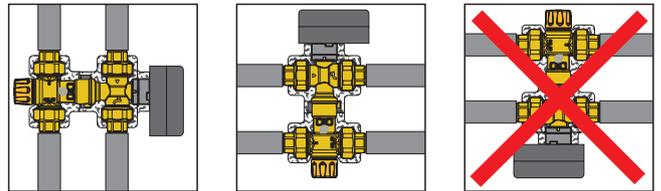
If the design flow rate is known and taking into account the simultaneous use of sanitary appliances, the pressure drop produced by the kit can be checked using the diagram.

It is necessary to check the available pressure, the pressure drop in the system downstream of the kit and the residual pressure to be guaranteed to user devices.

Installation

Before installing the kits, the pipework must be flushed to ensure that no circulating impurities can compromise their operation. We recommend always installing strainers of sufficient capacity at the inlet from the water mains. The kits must be fitted according to the installation diagram provided in the instruction sheet or in this brochure.

The kits can be installed in any position, vertically or horizontally. They cannot, however, be installed with the actuator for the diverter valve upside down.



Check valves

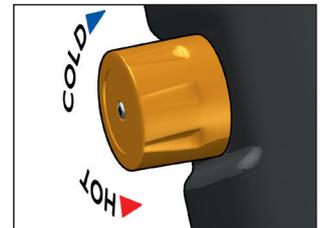
In systems with thermostatic mixing valves, check valves must be installed to prevent undesired backflow. Kits 264 and 265 with mixing valve incorporate built-in check valves on the hot and cold water inlets.

Commissioning

In view of the special applications of the thermostatic mixing valve, it must be commissioned in accordance with current regulations by qualified technicians, using appropriate temperature measurement equipment. We recommend using a digital temperature gauge for measuring the mixed water temperature.

Temperature adjustment mixed water

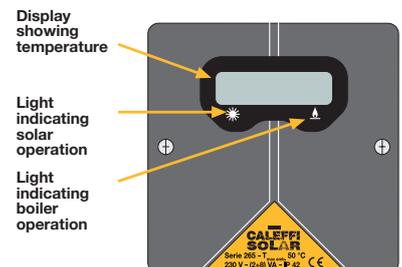
Temperature adjustment for the mixed water sent to the user at the desired value takes place using the control knob with graduated scale, which is fitted with a thermostatic mixing valve.



Thermostat operating information

The thermostat display shows the temperature detected by the probe or any error indications. On the front, the two backlit indicator lights provide a clear indication of system operation at all times: active on the solar circuit or on the chill water circuit.

The thermostat, by means of the probe positioned on the hot water flow originating from the solar water storage tank, controls the diverter valve in the solar kits, activating the boiler in the event that the temperature of the water originating from the solar water storage tank is low.

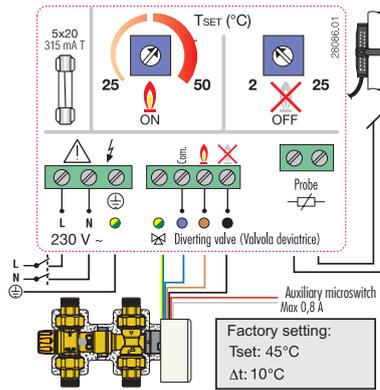


Electrical connections/Setting temperature adjustment

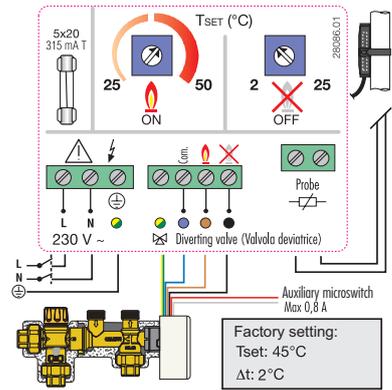
The thermostat is set in the factory to operate at a temperature of 45 °C, and diverts water to the boiler if temperature falls below this setpoint value. If necessary, the thermostat trigger value can be adjusted between 25 and 50 °C, by turning the adjustment trimmer to suit the needs of the system and boiler.

You can also set the temperature set point above which the valve is again diverted to the solar water circuit (Δt). This is factory set to 10 °C (SOLARNOCAL) and 2 °C (SOLARICAL) and can be adjusted between 2 and 25 °C using the relevant trimmer. This means the solar circuit is only used when the hot water storage tank is sufficiently charged with energy, avoiding excessive variations in the temperature of the distributed hot water caused by the action of the diverter valve.

264 Series SOLARNOCAL

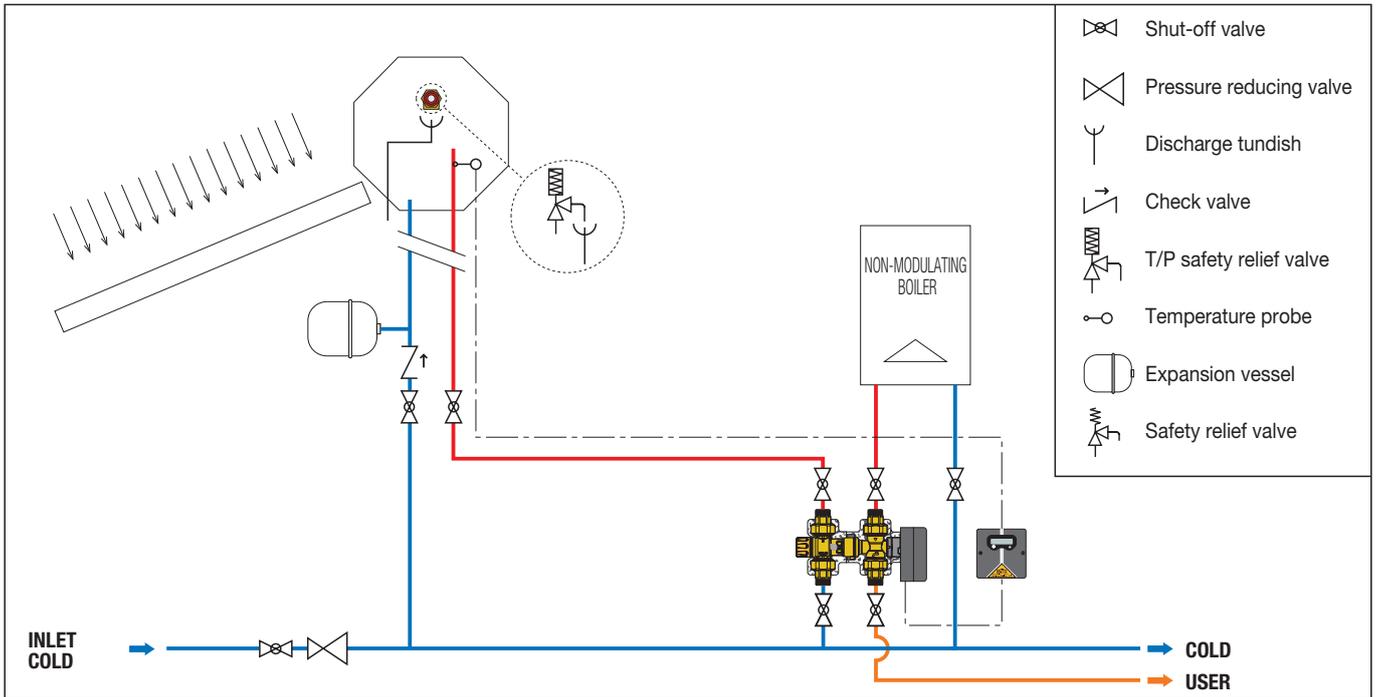


265 Series SOLARINICAL

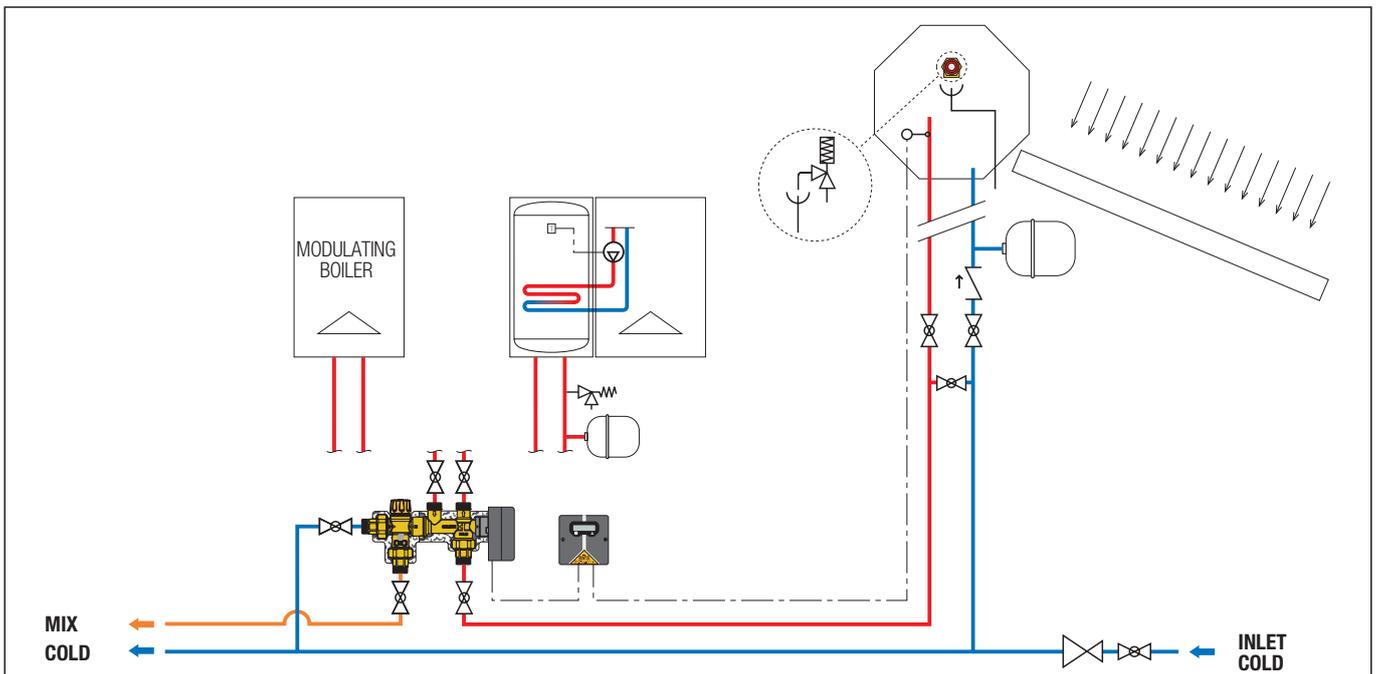


Application diagrams

264 Series SOLARNOCAL



265 Series SOLARINICAL



Optional accessories



Code

F29466 Ø 15 mm contact probe



Code

F29467 pocket for Ø 15 mm probe



Code

161014 pocket for Ø 6 mm probe

Pocket for Pt1000 probe.
Steel.
Length: 100 mm.

Code

264359 264 series kit without thermostat and probe

265359 265 series kit without thermostat and probe

F29525 3-contact switching relay box

SPECIFICATION SUMMARY

264 series

Solar storage tank to boiler connection kit without thermal integration. Inlet and outlet connections 3/4" M with union. Medium potable water. Consisting of:

- Thermostatic mixing valve with dezincification resistant alloy body; PSU obturator; stainless steel springs; EPDM seal elements; ABS control knob. Maximum working pressure 10 bar (static), 5 bar (dynamic); adjustment temperature range 35–55 °C; factory setting 43 °C; accuracy ±2 °C. Maximum inlet temperature 100 °C; maximum inlet pressure ratio (H/C or C/H) 2:1; minimum temperature difference between the inlet hot water and the outlet mixed water to ensure anti-scald performance 10 °C; minimum flow rate for stable operation 4 l/min.
- Diverter valve with brass body; brass ball, chrome plated; PTFE ball seal with EPDM O-Ring; control stem seal with dual EPDM O-ring; union seals in non-asbestos fibre. Maximum working pressure 10 bar; maximum differential pressure 10 bar; working temperature range -5–110 °C.
- Actuator with self-extinguishing polycarbonate protective shell; colour grey RAL 9002.
- Three-contact actuator and auxiliary microswitch; electric supply 230 V (ac); power consumption 8 VA; auxiliary microswitch contact rating 0,8 A (230 V); protection rating IP 44 with vertical control stem, IP 40 with horizontal control stem; rotation time 10 seconds; ambient temperature range 0–55 °C; dynamic torque 6 N·m; power supply cable length 1 m.
- Pre-formed protective shell cover in PVC. Working temperature range: -5–110 °C.
- Thermostat with temperature display: electric supply 230 V (AC); power consumption 10 (2+8) VA; adjustable temperature range 25–50 °C. Factory setting 45 °C; selectable Δt range 2–25 °C. Factory setting 10 °C; box protection class IP 42.
- Temperature probe, diameter 6 mm: working range 0–100 °C; time constant 1 min; response 100 kΩ a 25 °C; two-wire cable, L = 2 m. Maximum distance 10 m (2x0,25 mm² cable), 100 m (2x0,5 mm² cable).

265 series

Solar storage-to-boiler connection kit with thermal integration. 3/4" M inlet and outlet unions, 3/4" M boiler connection. Medium: potable water. Consisting of:

- Thermostatic mixing valve with dezincification resistant alloy body; PSU obturator; stainless steel springs; EPDM seal elements; ABS control knob. Maximum working pressure 10 bar (static), 5 bar (dynamic); adjustment temperature range 35–55 °C; factory setting 43 °C; accuracy ±2 °C. Maximum inlet temperature 100 °C; maximum inlet pressure ratio (H/C or C/H) 2:1; minimum temperature difference between the inlet hot water and the outlet mixed water to ensure anti-scald performance 10 °C; minimum flow rate for stable operation 4 l/min.
- Diverter valve with brass body; brass ball, chrome plated; PTFE ball seal with EPDM O-Ring; control stem seal with dual EPDM O-ring; union seals in non-asbestos fibre. Maximum working pressure 10 bar; maximum differential pressure 10 bar; working temperature range -5–110 °C.
- Actuator with self-extinguishing polycarbonate protective shell; colour grey RAL 9002.
- Three-contact actuator and auxiliary microswitch; electric supply 230 V (ac); power consumption 8 VA; auxiliary microswitch contact rating 0,8 A (230 V); protection rating IP 44 with vertical control stem, IP 40 with horizontal control stem; rotation time 10 seconds; ambient temperature range 0–55 °C; dynamic torque 6 N·m; power supply cable length 1 m.
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