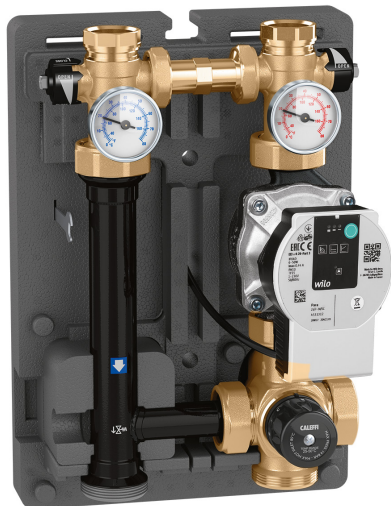


# Thermostatic regulating unit for heating systems

## 166 series



### Function

The thermostatic regulating unit performs the function of keeping the flow temperature constant, at the set value, for the medium distributed in a low temperature system for floor radiant panels or radiators.

Complete with high-efficiency pump, thermostatic three-way mixing valve

with built-in temperature sensor, flow and return temperature gauges, secondary circuit shut-off valves and pre-formed shell insulation.

The unit is reversible: in fact, the flow direction can be inverted from right to left, depending on installation requirements. This unit can be coupled to the SEPCOLL 559 series separator-distribution manifold and to 550 series manifolds with 125 mm centre distance connections. The differential by-pass valve (code 519006), safety thermostat (code 165004) and mounting bracket (code 165001) are optional.

### Product range

Code 166600HE3 Thermostatic regulating unit. With PARA 25/7 pump.  
Centre distance 125 mm. Setting temperature 25–50 °C

DN size 25 (1")

### Technical specifications

#### Materials

##### Three-way thermostatic valve

Body:	brass EN 1982 CB753S
Obturator:	PSU
Springs:	stainless steel EN 10270-3 (AISI 302)
Seals:	EPDM

##### Connection pipes

Material:	Fe 360 steel
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##### Check valve

Body:	brass EN 12164 CW614N
Obturator:	PPAG40

##### Shut-off valves

Body:	brass EN 12165 CW617N
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#### Performance

Medium:	water, glycol solutions
Max. percentage of glycol:	30 %
Maximum working pressure:	1000 kPa (10 bar)
Minimum working pressure:	80 kPa (0,8 bar)
Adjustment temperature range:	25–50 °C;
Accuracy:	± 2 °C;
Spring:	steel
Maximum primary inlet temperature:	100 °C
Connections:	- system side: 1" F (ISO 228-1)
	- boiler side: 1 1/2" M (ISO 228-1)
	- connection centre distance: 125 mm

#### Insulation

Material:	EPP
Average thickness:	30 mm
Density:	45 kg/m <sup>3</sup>
Working temperature range:	-5–120 °C
Thermal conductivity:	0,037 W/(m·K) at 10 °C
Reaction to fire (UL94):	class HBF

#### Pump

High-efficiency pump:	PARA 25/70
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Body:	cast iron GG 15/20
Electric supply:	230 V - 50/60 Hz
Max. ambient humidity:	95 %
Max. ambient temperature:	70 °C
Protection class:	IPX4D
Pump centre distance:	130 mm
Pump connections:	1 1/2" M (ISO 228-1) with nut

#### Temperature gauges

Double scale:	0–80 °C (32–176 °F)
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#### Safety thermostat kit code 165004 (optional)

Setting temperature:	55 °C
Protection class:	IP 65
Contact rating:	10 A/ 240 V

#### Differential by-pass code 519006 (optional)

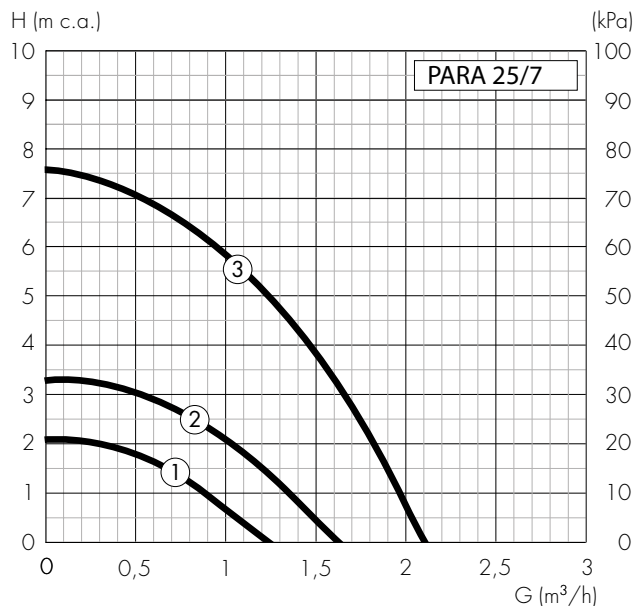
Body:	brass EN 1982 CB753S
Obturator:	EPDM
Seals:	EPDM
Maximum working pressure:	10 bar
Maximum working temperature:	100 °C
By-pass setting range:	2–30 kPa (0,2–3 m w.g.)
Connections:	1" M x 1" M (ISO 228-1)

#### Mounting bracket code 165001 (optional)

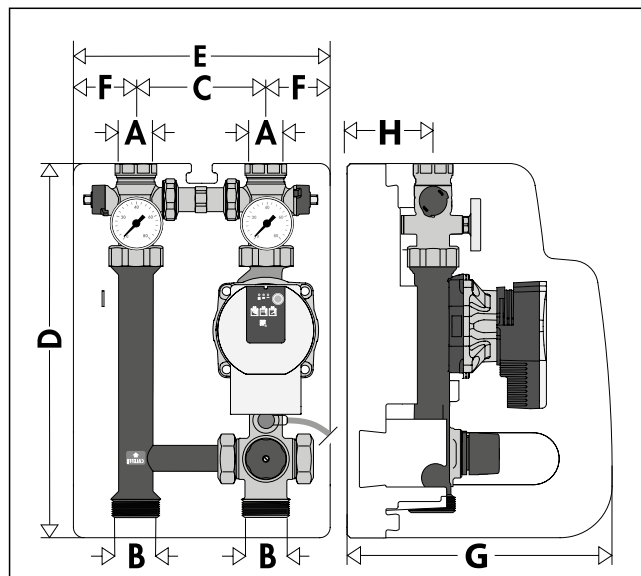
Material:	stainless steel
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## Head available at the regulating unit connections

Tests carried out with constant speed control.



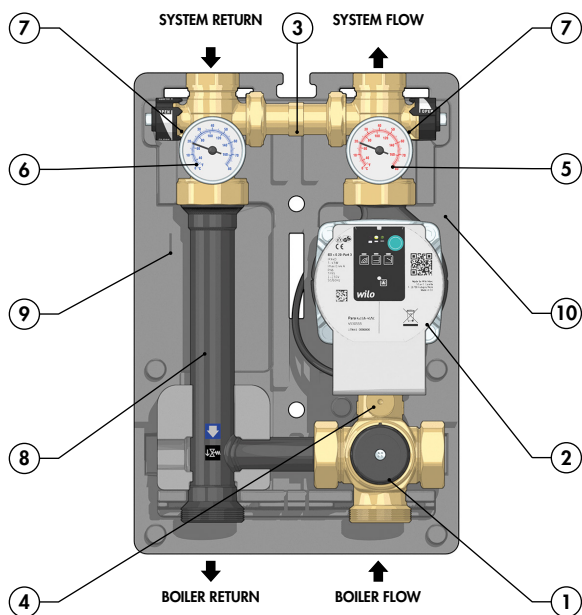
## Dimensions



Code	A	B	C	D	E	F	G	H	Mass (kg)
166600HE3	1"	1 1/2"	125	360	247	61	255	80	7,1

## Note:

The pump can operate with constant speed, constant pressure and proportional pressure control, which adapts the performance to the system requirements. For further details, see the pump installation instruction sheet supplied in the package.

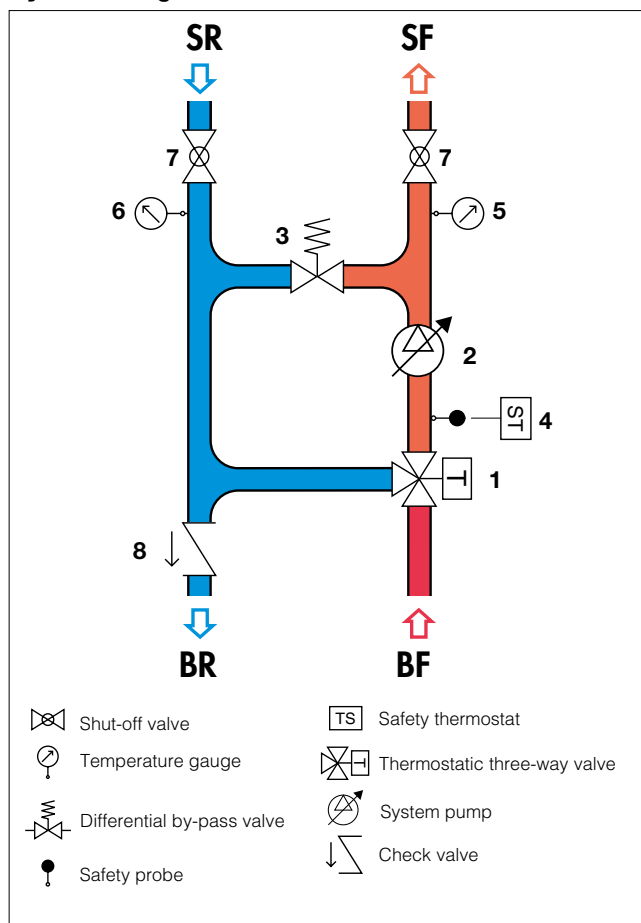


## Characteristic components

- 1 Three-way thermostatic valve with built-in temperature sensor
- 2 High-efficiency pump PARA 25/7
- 3 Differential by-pass valve (optional)\*
- 4 Safety thermostat kit (optional)
- 5 Flow temperature gauge
- 6 Return temperature gauge
- 7 Shut-off valves on secondary circuit
- 8 Connection pipe (with check valve)
- 9 Operating wrench for secondary circuit shut-off valves
- 10 Insulation

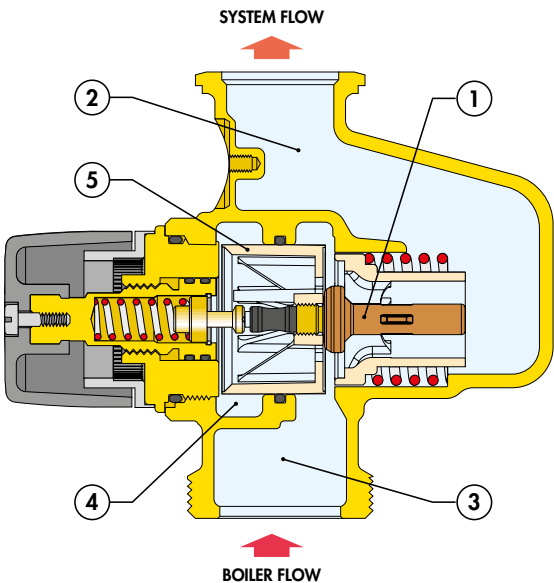
\*The factory setup includes installation of a blind spacer (closed)

## Hydraulic diagram



Operating principle

The regulator element inside the thermostatic three-way valve consists of a temperature sensor (1) fully immersed in the mixed water outlet chamber (2). By expanding and contracting, it continuously ensures a correct proportioning of hot water (3), coming from the boiler, and water returning from the panel circuit (4). The water intake is regulated by a shaped obturator (5) that slides inside a special cylinder placed between the hot water flow and the water returning from the circuit. Even if the thermal load of the secondary circuit or the inlet temperature from the boiler changes, the mixing valve automatically adjusts the flow rates until it obtains the set temperature.



Construction details

Low-inertia thermostatic sensor

The temperature-sensitive element, the “engine” of the thermostatic three-way valve, has low thermal inertia; in this way it can quickly react to changes in the conditions of inlet pressure and temperature, shortening the valve response time.

Temperature adjustment and locking

The control knob is used to adjust the temperature in a full turn (360°) between min. and max. It also has a tamper-proof system for locking the temperature at the set value.

Temperature adjustment

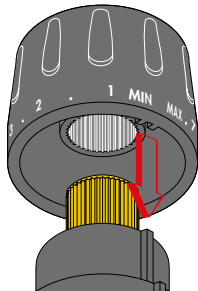
The temperature is set at the desired value using the control knob with the graduated scale on the three-way mixing valve.

Temp.	Min	1	2	3	4	5	6	7	Max
(°C)	22	25	30	35	40	43	46	50	55

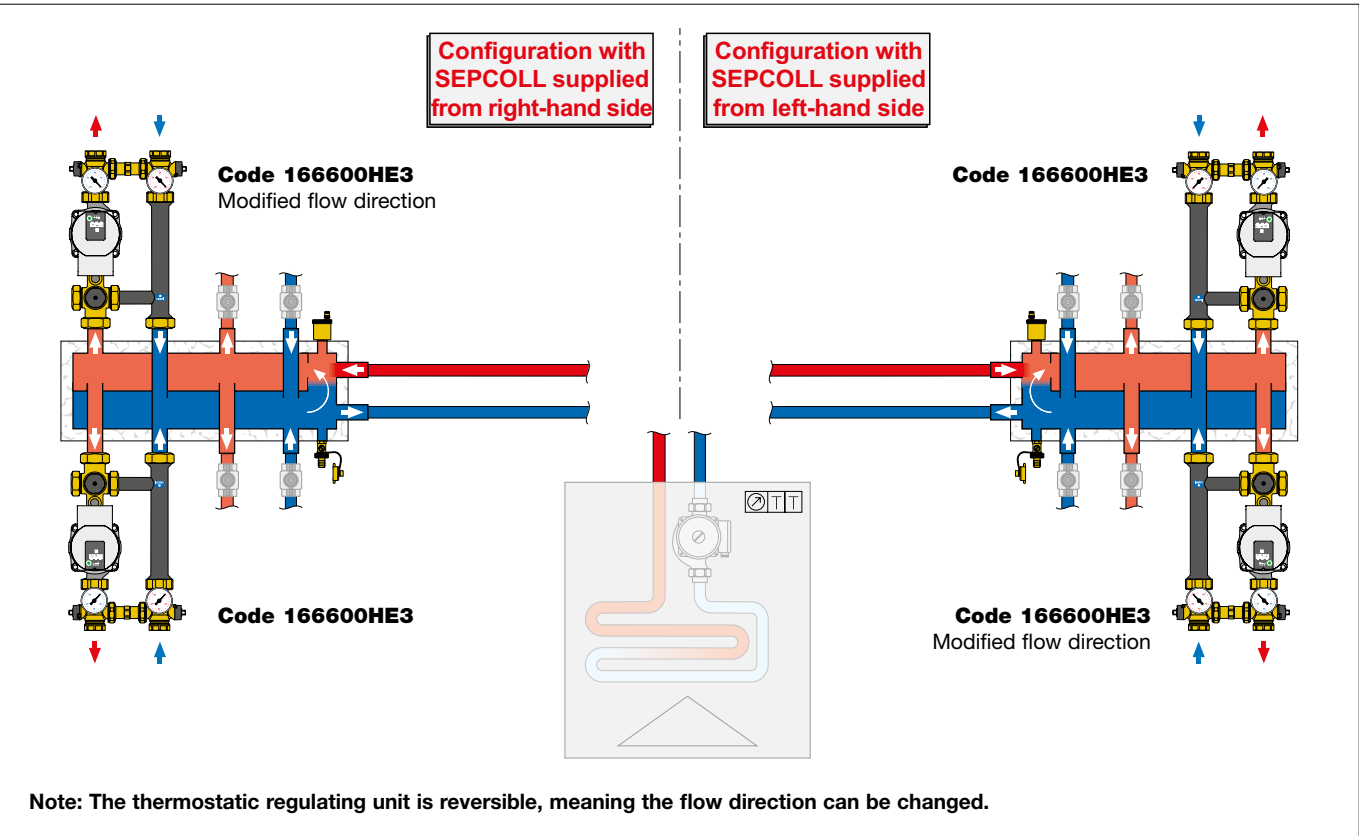
Reference conditions:  $T_{boiler} = 70^{\circ}\text{C}$

Adjustment locking

Turn the knob onto the required number, unscrew the upper screw, remove the knob and put it back on so that the internal reference couples with the protrusion on the knob holder nut.



Installation



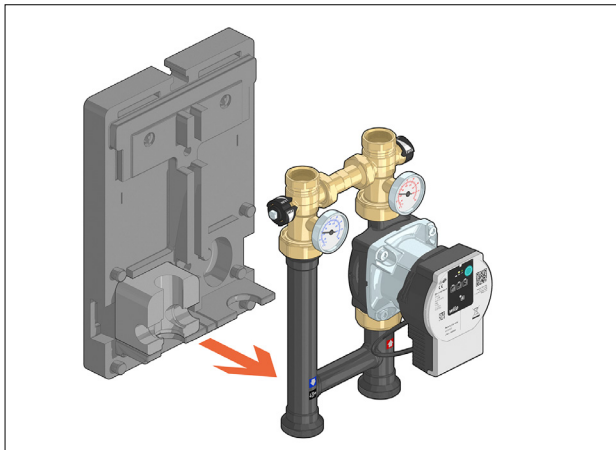
## Right hand-left hand reversibility

The unit is assembled in the factory with right-hand side upward flow (equivalent to left-hand side downward flow). If necessary, the flow direction can be exchanged. For this reason, the nuts on the unit are not fully tightened in the factory, making it easier to carry out this procedure if required.

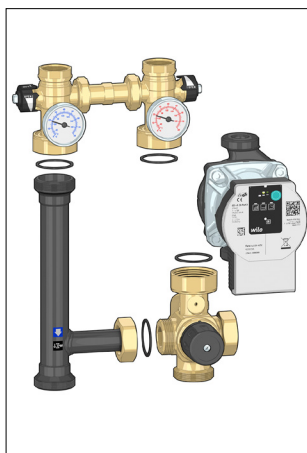
**We recommend always checking that the nuts have been fully tightened during installation.**

To make the exchange, proceed as follows:

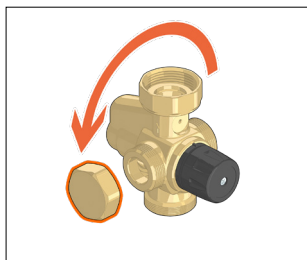
1. Remove the insulation: the front and rear shells are easy to remove as they are slightly restrained to each other.



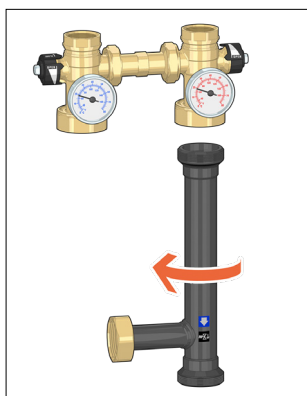
2. Fully unscrew the captive nuts (using suitable wrenches) located under the flow and return temperature gauges. Unscrew also the captive nuts on the mixing valve, remove the valve and the pump.



3. Unscrew the cap on the right of the mixing valve and screw it on from the opposite side.

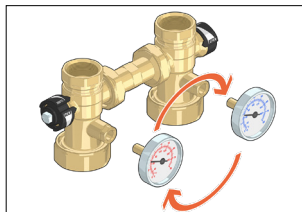


4. Position the connection pipe to the right, turning it 180° in relation to its axis.



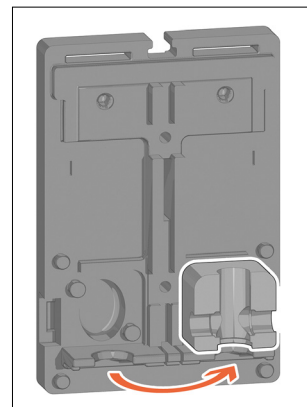
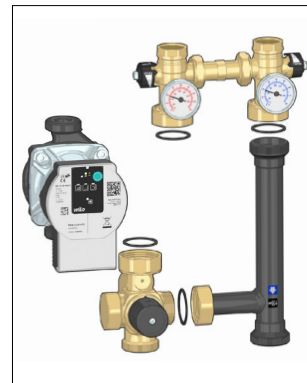
5. Reassemble the unit as shown, fully tightening the captive nuts, being careful to correctly position the seals.

6. Reverse the flow and return temperature gauges.

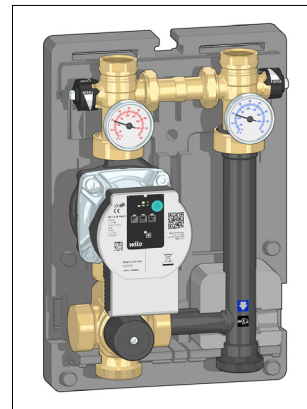


7. Move the square insert spacer to the right.

**Note:** It is possible to use the central notch in the insulation to house the electrical wiring cables of the circulator and safety thermostat.



8. Reassemble the insulation.



## Accessories

### Differential by-pass

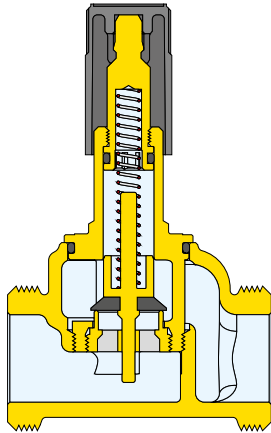


**519006**

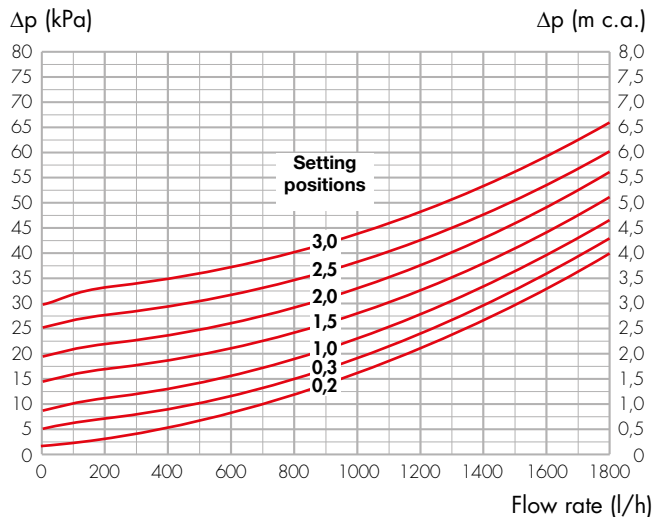
Differential by-pass.  
Max. working pressure: 10 bar.  
Max. working temperature: 100 °C.  
Setting range: 2–30 kPa (0.2–3 m w.g.).  
Connections 1" M x 1" M.

The differential by-pass valve is used to control the head to which the secondary distribution circuit is subjected. When the differential pressure setting value is reached, the obturator opens and allows the medium to pass from the flow to the return line of the circuit, limiting the differential pressure at the set value.

This action is particularly useful in the case where the single circuits are shut off by two-way automatic ON/OFF, modulating or thermostatic valves.



### Hydraulic characteristics



The hydraulic characteristics are calculated while taking account of the ball shut-off valves fitted.

### Mounting bracket

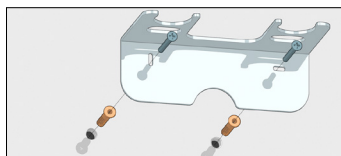


**165001**

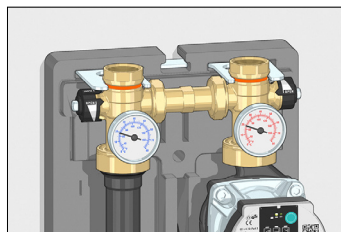
Mounting bracket.  
In stainless steel.

### Bracket installation

The mounting bracket for wall installation must be secured using wall anchors, using the corresponding holes on the base.

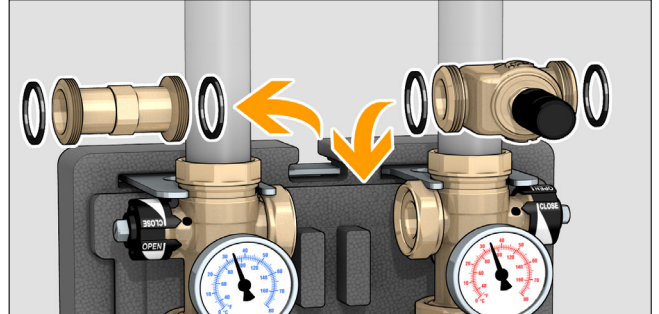
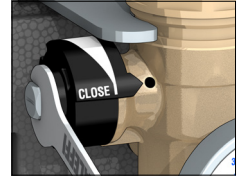


The unit should be applied to the bracket, using the corresponding seats under the hexagonal part of the shut-off valves.



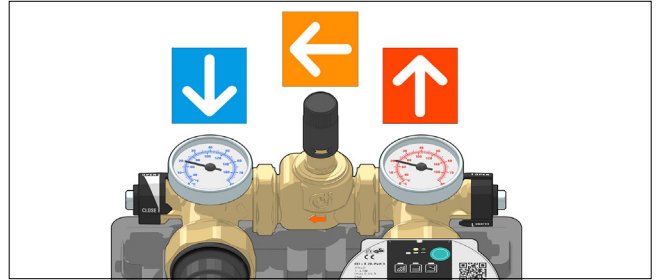
### Installation of the differential by-pass valve

To fit the differential by-pass, it should be applied in place of the by-pass spacer blind stub pipe. After shutting off the ball valves using the specific supplied spanner, unscrew the captive nuts as illustrated in the following figures.

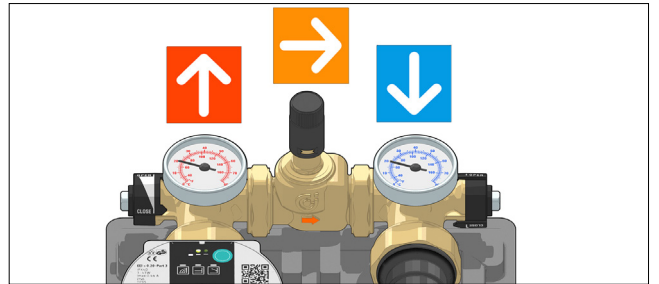


Installation differs depending on the supply direction in the flow circuit:

- by-pass installation in the right-hand side flow version with flow upwards (equivalent to the left-hand side flow with flow downwards);



- by-pass installation in the left-hand side flow version with flow upwards (equivalent to the right-hand side flow with flow downwards).



### Accessories



**165003**

Sensor holder extension.  
1" M x 1" M connections.  
Side connections: M4 F x M4 F x 1/8" F x 1/4" F



**165006**

Pair of eccentric tailpieces.  
Centre distance: 105-145 mm.  
Connections: 1 1/2" F with captive nut x 1" F.

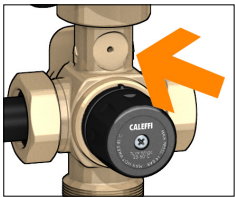
**Safety thermostat kit**



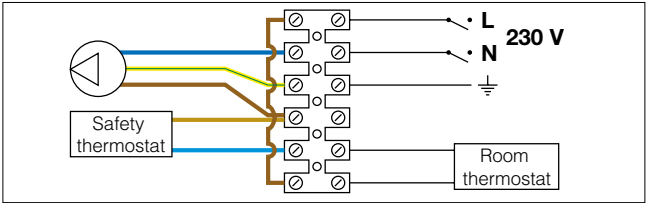
**165004**

Safety thermostat kit for heating.  
Setting temperature 55 °C ±3.  
Protection class: IP 65. M4 thread.

The safety thermostat kit is used to control the maximum flow temperature to the system. In the event of a fault, it stops circulation by shutting off the pump, thus preventing the system from being damaged. The bulb should be screwed into the corresponding seat on the mixing valve flow.



**Electrical connection**

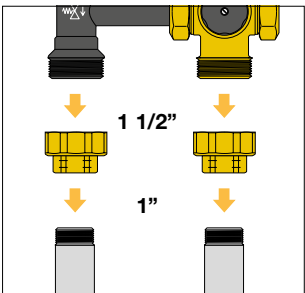


**165002**

Female union with captive nut, complete with seal.  
Connections: 1 1/2" F with captive nut x 1" F.

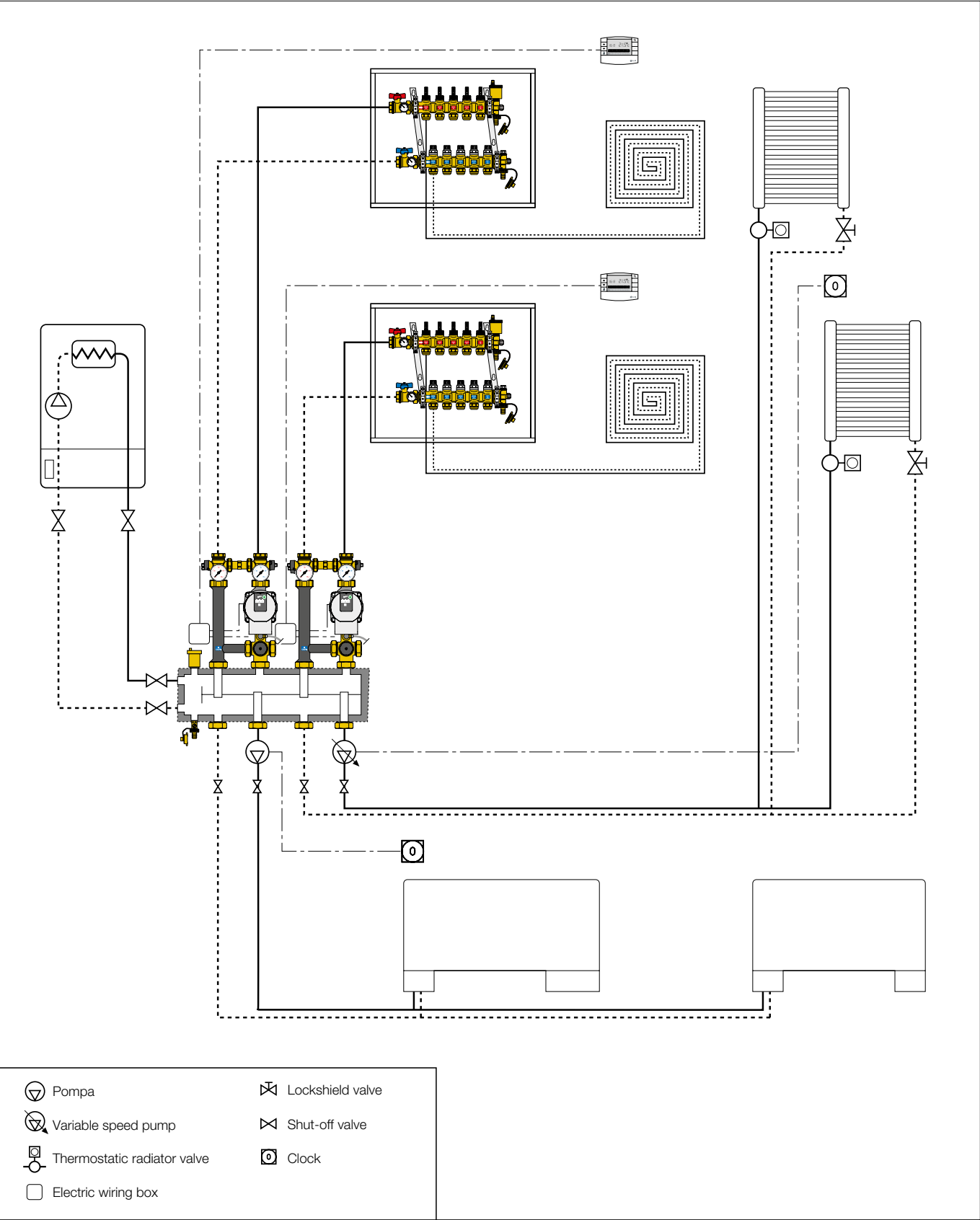
**Example of installation**

The union with captive nut allows installation of the 166 series unit on any 1" M pipe.





Application diagrams



## SPECIFICATION SUMMARY

### 166 series

Thermostatic regulating unit for heating systems, can be coupled to 559 series SEPCOLL. Configuration with upward flow and right-hand side flow, reversible. Connections to primary circuit 1 1/2" M (ISO 228-1). Connections to secondary circuit 1" F (ISO 228-1). Connection centre distance 125 mm. Adjustment temperature range 25–50°C. Adjustment accuracy  $\pm 2^\circ\text{C}$ . Maximum inlet temperature at primary circuit 100°C. Maximum working pressure 1000 kPa (10 bar). Minimum working pressure 80 kPa (0,8 bar). Complete with three-way thermostatic valve with built-in sensor, PSU obturator, stainless steel springs, EPDM seals. PARA 25/7 high-efficiency pump, protection class IPX4D. Double scale temperature gauge 0–80°C (32–176°F). Secondary circuit shut-off valves. Connection pipe in Fe360 steel. Check valve with brass body, obturator in PPAG40. With pre-formed shell insulation in EPP.

### Code 165004

Safety thermostat kit for heating, setting temperature  $55 \pm 3^\circ\text{C}$ , protection class IP 65.

### Code 519006

Differential by-pass valve. Brass body. Connections 1" M x 1" M. Stainless steel spring. Setting range from 0.2 to 3 m w.g. (2–30 kPa). Maximum working pressure 10 bar. Maximum working temperature 100°C.

### Code 165001

Stainless steel mounting bracket.

### Code 165002

Female union with captive nut, complete with seal. Connections 1 1/2" F with captive nut x 1" F.

### Code 165006

Pair of eccentric tailpieces. Connections 1 1/2" F with captive nut x 1" F (ISO 228-1). Centre distance 105–145 mm.

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