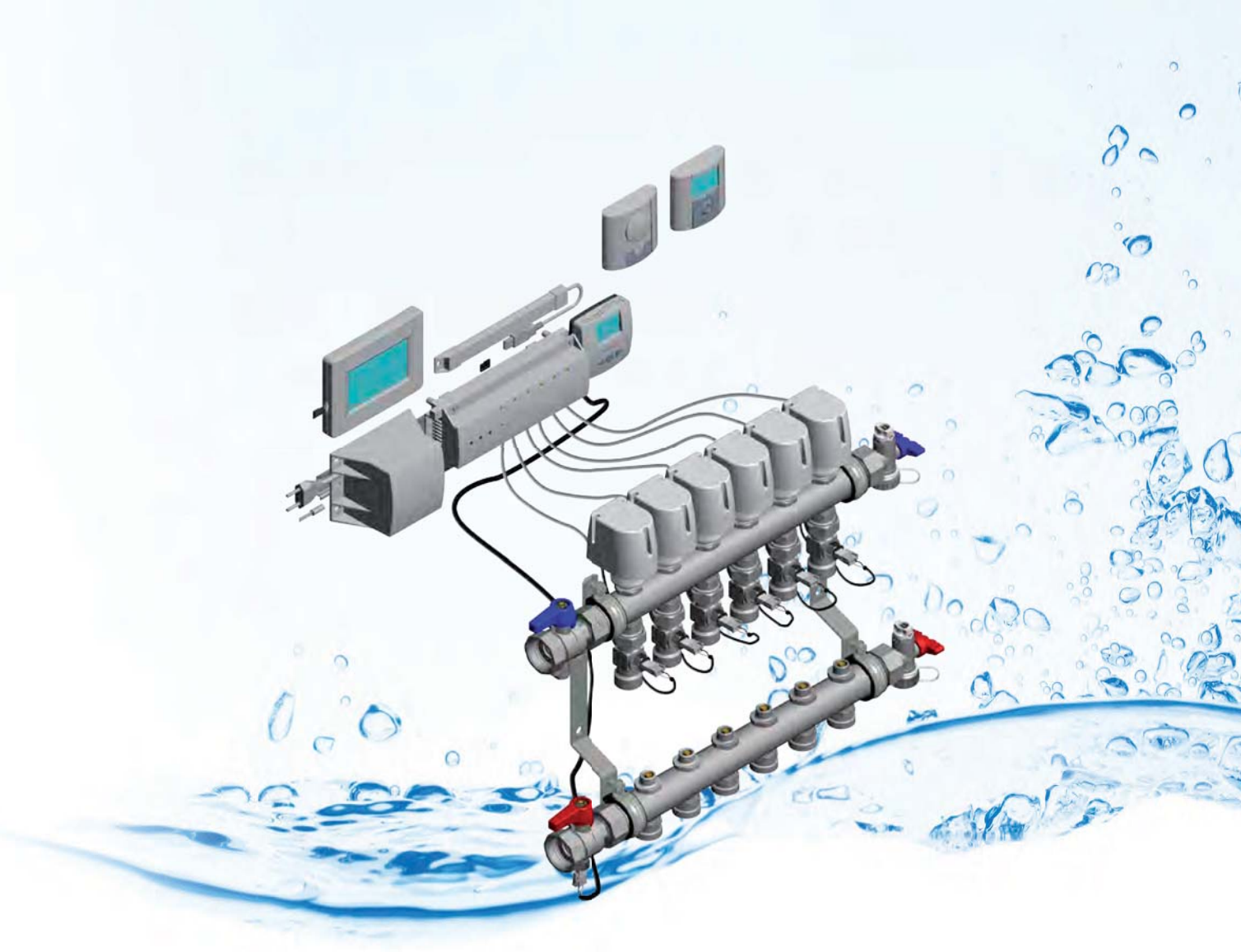


Smart balancing system Series SB

Main features

- Control system for radiant heating
- Innovative solution for auto-dynamic balancing
- Easy installation and start-up
- Dynamic adjustment to the operating point
- Demand driven flow rate
- Intelligent temperature control via Smartphone or Tablet or PC
- Free-Cooling operation
- Suitable for new and retro-fit installation

WATTS®

Description

Smart balancing control system records the actual value of the supply temperature and uses it to recognize the section of the heating curve in which the system is operating. It calculates the return set point temperature for each heating circuit in the same way.

BT-M6Z02-RF BALANCE SET

6-zone RF control box base unit (master) for dynamic individual room temperature control of radiant panel heating systems with automatic hydraulic balancing. Heating and passive cooling function.
The number of zones or room thermostats can be increased to a maximum of 12 zones if you combine with the optional 6-zone extension (BT-S6Z02-RF BALANCE).
The RF control box works with a BT02-series RF room thermostat and is compatible with WATTS®Vision™. Connections for continuous 0-10 V actuators are provided via a RJ9 connector. Includes micro SD card, MBus operating unit, radio antenna, 60 VA WFH transformer, NTC SENSOR 1/8" supply line and top hat rail.
The system design data is stored on the micro SD card for automatic hydraulic balancing. An empty micro SD card is included in the scope of supply for the RF 6-zones control master (BT-M6Z02-RF Balance). This card must either be written with the "WSETUP.ini" parameters file or replaced with a prepared micro SD card.

Type	Item-Nr.	Description 1	Description 2	VPE	Weight	MOQ
BT-M6Z02 RF	10051921	BT-M6Z02-RF BALANCE SET	Standard SmartBalancing	1	2,13 kg	-

BT-S6Z02-RF BALANCE

Extension module (slave) for additional 6 zones (room thermostats); with cable to connect to RF control box master.
MBus operating unit - Control unit for RF-connecting box BT-M6Z02-RF BALANCE. For allocation of the zones to the loops and selection passive cooling Yes / No. Setting time, date, language, setback or absence mode.
WFH transformer 60 VA - Transformer to supply power to Smart Balancing System series SB RF control box master and slave. Operating voltage 230 V AC, output voltage 24 V AC, power output 60 VA. Protection class IP30. Supply line 1.2 m 2x 0.75 mm² with plug CEE 7/16 EN 50075, controller supply line 0.5 m.

Type	Item-Nr.	Description 1	Description 2	VPE	Weight	MOQ
BT-S6Z02 RF	10050511	BT-S6Z02-RF BALANCE	Standard SmartBalancing	1	0,34 kg	-

Modulating actuator STA010

Modulating actuator 0-10 V. Two RJ9 connector sockets for the temperature sensor return line and with 1.0 m cable and RJ9 connector to connect to Smart Balancing System series SB RF control box master or slave. 70 N actuating force. Electrical protection class I, IP30. LED function indicator.

Type	Item-Nr.	Description 1	Description 2	VPE	Weight	MOQ
STA10	10050512	STAD10 24V RJ9 cable 1m	Standard SmartBalancing	1	0,17 kg	-

Return temperature sensor connection

With 3/4" union nut and 3/4" EUKO male thread. NTC sensor 1/8" with Molex connector and gasket; with 0.3 m cable and RJ9 connector to connect STA010 actuator.

Type	Item-Nr.	Description 1	Description 2	VPE	Weight	MOQ
NTC-SET 3/4"	10050524	NTC SENSOR SET 3/4" EUKO	Standard SmartBalancing	1/10	0.11 kg	-

NTC Sensor 1/8"

Temperature sensor 1/8" with Molex plug and gasket. With cable 1,0 m and plug RJ9 to be used as supply or return sensor in combination with RF-connecting box Master/Slave or modulating actuator STA010.

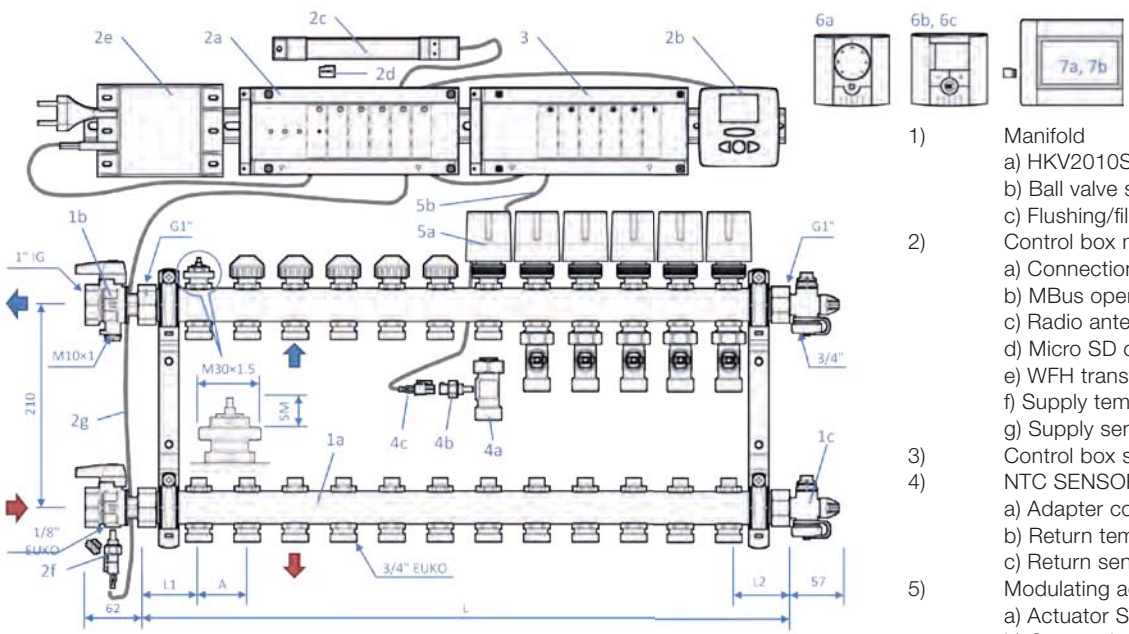
Type	Item-Nr.	Description 1	Description 2	VPE	Weight	MOQ
NTC 1/8"	10050616	NTC SENSOR SET 1/8" 1,5m kpl	Standard SmartBalancing	1	0,12 kg	-

Technical features	
RF control box master (BT-M6Z02-RF BALANCE) and slave (BT-S6Z02-RF BALANCE)	
Operating temperature	0 °C to 50°C
Control characteristic	Control adjustment is made depending on the measured return temperatures in the heating circuit.
Input voltage	24 V AC ± 10% 50 Hz
Outputs:	Control signal: 0-10 V
Radio frequency	868.3 MHz, <10 mW. Read range about 100 metres on open land.
Approvals	EN 300220-1, -2 and EN 301489-1, -3
Protection class	IP30
Combinations	Max. 12 zones: 1 x master with 6 zones plus 1 x slave with 6 zones

Transformer (WFH-TRAFO 60 VA)	
Operating temperature	0 °C to 50°C
Input voltage	Primary input 230 V / 50 Hz
	Secondary output 24 V / 60 VA

Modulating actuator (STA010)	
Ambient temperature	0 °C to 50 °C
Input voltage	24 V AC ± 10% 50 Hz
Electrical protection class/protection class	Class I - IP30
Power consumption	3 W (in actuating mode only).
Actuating force	70 N
Control signal	0 … 10 V
Closing point	at 0 V Shut when control signal < 0.2 V
Actuating lift	2.7 mm
Duration	3 seconds for full lift from 0 to 2.7 mm
Valve adaptation	M 30 × 1.5 - Closing point 11.8 ± 0.3 mm
Inputs, connections	1 x RJ9 socket to connect master or slave - with 1.0 m RJ9 cable and RJ9 connector 1 x RJ9 socket to connect sensor

Scheme of the products and technical data



1) Manifold
   a) HKV2010SB
   b) Ball valve set
   c) Flushing/filling device
2) Control box master
   a) Connection box
   b) MBus operating unit
   c) Radio antenna
   d) Micro SD card
   e) WFH transformer 60VA
   f) Supply temperature sensor
   g) Supply sensor cable
3) Control box slave
4) NTC SENSOR 3/4" EUKO
   a) Adapter connection
   b) Return temperature sensor
   c) Return sensor cable
5) Modulating actuator
   a) Actuator STA 0-10 V
   b) Connecting cable
6) RF room sensor
   a) BT-A02-RF
   b) BT-D02-RF
   c) BT-DP02-RF
7) Central controller (optional)
   a) BT-CT02- RF WIFI
   b) BT-CT02-RF

Functions

For a radiant panel heating, the planner carries out a heat requirements calculation in which the system supply temperature is defined. The pipe length and the routing distance, together with the structure of the flooring, form the basis for the heat output into the room. Depending on the size and set point temperature of the room, the return temperature in each heating circuit is defined by adjusting the flow rate. When the system is being commissioned, the volumetric flow on the heating circuit manifold is also set for each circuit using the regulating valve and flow meter.
This type of hydraulic balancing is static, however, and based on the system's design point.
Since the external temperature defined in the design only prevails on certain cold days in the year, the system runs mostly in partial load operating mode for the rest of the time.
Static balancing on the design point:
- The planner carries out the design calculation and supplies this to the installation technician
- The installation technician adjusts the flow rate for each heating circuit to achieve the calculated temperature spread
- Read off the actual value on the flow meter
- Single room control via room thermostats (radio or wired) and OPEN/CLOSED actuators
- System mostly runs in partial load operating mode. The room temperature is controlled with the thermostat and actuator.

Experience has shown that, in the majority of systems, hydraulic balancing of the individual heating circuits is, unfortunately, either not carried out at all or carried out insufficiently. These systems do not operate to the best of their ability in terms of energy and offer only limited convenience and efficiency. Even if hydraulic balancing has been carried out, the pressure ratios within the system change continuously as a result of the legally required use of individual room controls. Adequately temperate rooms cause the electro thermal OPEN/CLOSED actuators to close in order to prevent further heat energy from being transported to the heating circuit and therefore to the room. The available volume of water is then distributed over the remaining open heating circuits, causing them to be over-supplied. As a result of the room control devices' response time, this leads to the room temperature being exceeded.

The **Smart Balancing control system** offers constant control, enabling the flow rate to be adjusted constantly in every single heating circuit, i.e. on a dynamic basis. The target parameter is the return temperature from the design calculation. This is recorded individually for each heating circuit and maintained through actuation of the constant 0 - 10 V actuators. A rise in return temperature indicates that the room is no longer taking in heat or is only taking it in at a reduced rate. As a result, the actuator reduces the flow rate until the defined temperature spread is reached again. At the same time, the room temperature is monitored by the radio-controlled thermostat. Any deviations in room temperature are also corrected through actuator adjustments.
An over-supply to individual heating circuits as a result of the closing valves is immediately prevented through the constant return and room temperature regulation; this significantly reduces the chance of the room temperature going above or falling below the desired level. This also applies if the floor is warmed up, for example through the action of direct sunlight. Here too, the return temperature in the heating circuit increases in part due to the heating of the floor, and in part due to the reduced amount of heat output in the room. The volumetric flow is already reduced before the room temperature is exceeded and before the valve position would be corrected by the room thermostat.
The measurement and correction of the return temperature also responds significantly more quickly and sensitively to changes in the room's heating requirements. During the design calculation, a room temperature setpoint value is defined. If this value is changed as a result of individual user behavior, however, these changes are recorded by the room thermostat and taken into account by the control box when determining the return setpoint temperature.

How it works

The design data is calculated by the planner as normal. This data is not, however, given to the installation technician in paper form, but rather saved onto a Micro-SD card and simply inserted into the control box. There is no need for additional programming of the control box, since all of the relevant data is transferred automatically to it. On site, all that needs to be done is to assign the heating circuits / actuators to the room.

Dynamic balancing at the operating point:
- The planner carries out the design calculation and supplies the data on a Micro-SD card or via e-mail/web to the installation technician.
- Using the Micro-SD card, the installation technician transfers the planning data to the control distributor.
- No additional controller programming required
- The constant comparison of the return setpoint temperature with the actual value and adaptation of the flow rate through constant regulation of the actuators on each heating circuit ensure that the room's heating requirements are continuously met based on its actual needs.

Control parameters
Based on the design external temperature (e.g. -10 °C), a return temperature is calculated for each heating circuit. If the external temperature is higher, then the required spread changes as a function of the heating curve. Usually, however, the control box does not "know" the external temperature. Therefore the Smart Balancing control system records the actual value of the supply temperature and uses it to recognise the section of the heating curve in which the system is operating. It then calculates the return setpoint temperature for each heating circuit in the same way.

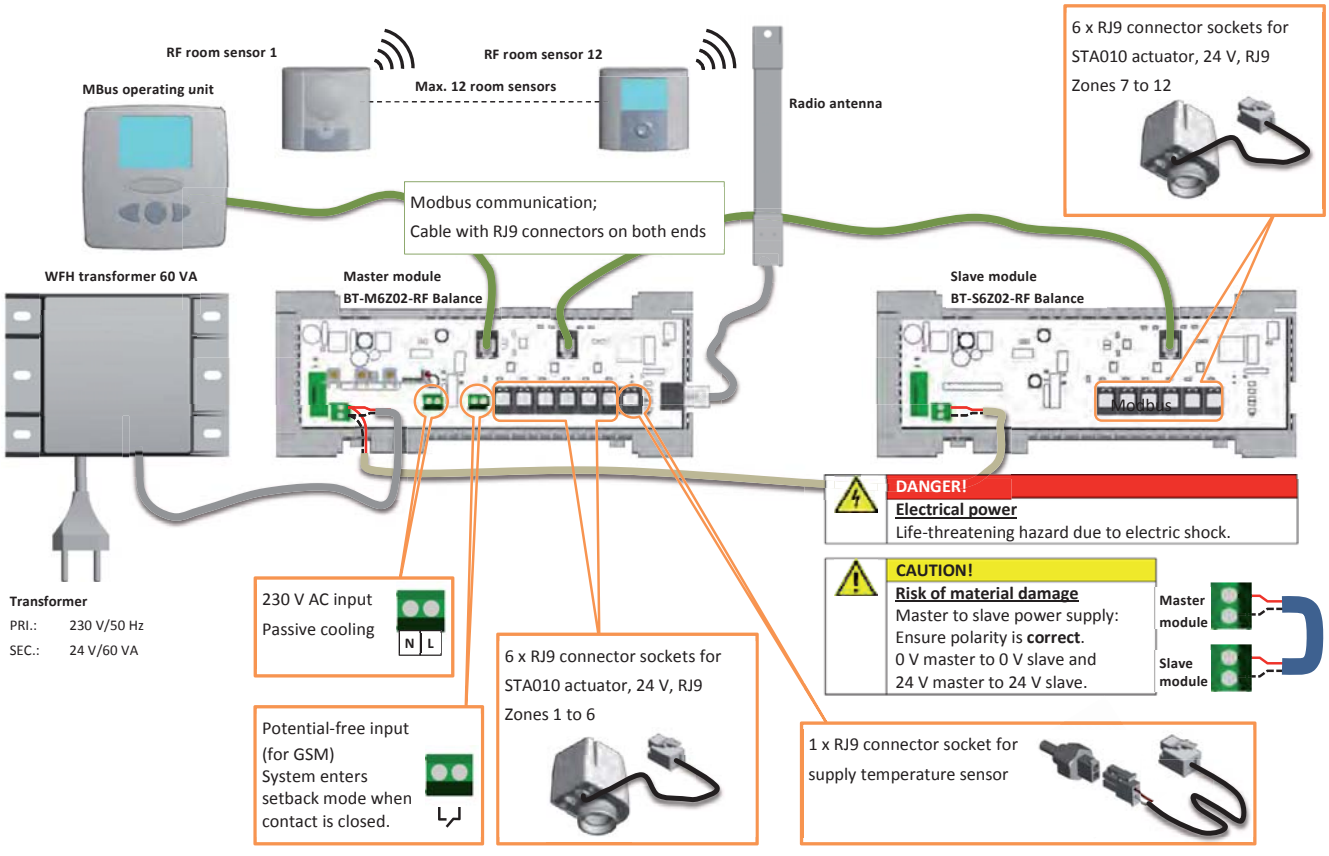
Situation-based determination of the return setpoint temperature
Provided no change is requested by the room sensor, the control box will attempt to maintain the return setpoint temperature through the set position on the control valve. If the temperature of the room falls below or exceeds the temperature set on the thermostat, the Smart Balancing controller calculates an appropriate return temperature for this heating circuit and regulates the flow rate via the valve position until the setpoint value is reached.

The control box uses the following reference parameters:
- Design supply temperature at the heating circuit distributor (e.g. 35 °C when Toutside -10 °C);
- Design return temperature per heating circuit (e.g. 28 °C/32 °C etc., when Toutside -10 °C);
- Design target room temperature per heating circuit (e.g. 20 °C/22 °C/24 °C).

Passive cooling function In certain conditions, the Smart Balancing system can also be used for passive cooling. In cooling mode, all rooms containing a room sensor are cooled. However, there is no flow regulation and the regulating valves remain fully open instead. The control unit on the controller allows rooms or zones to be excluded from the cooling function. The demand for cooling is made by applying voltage to the control box inlet or via a floating contact.

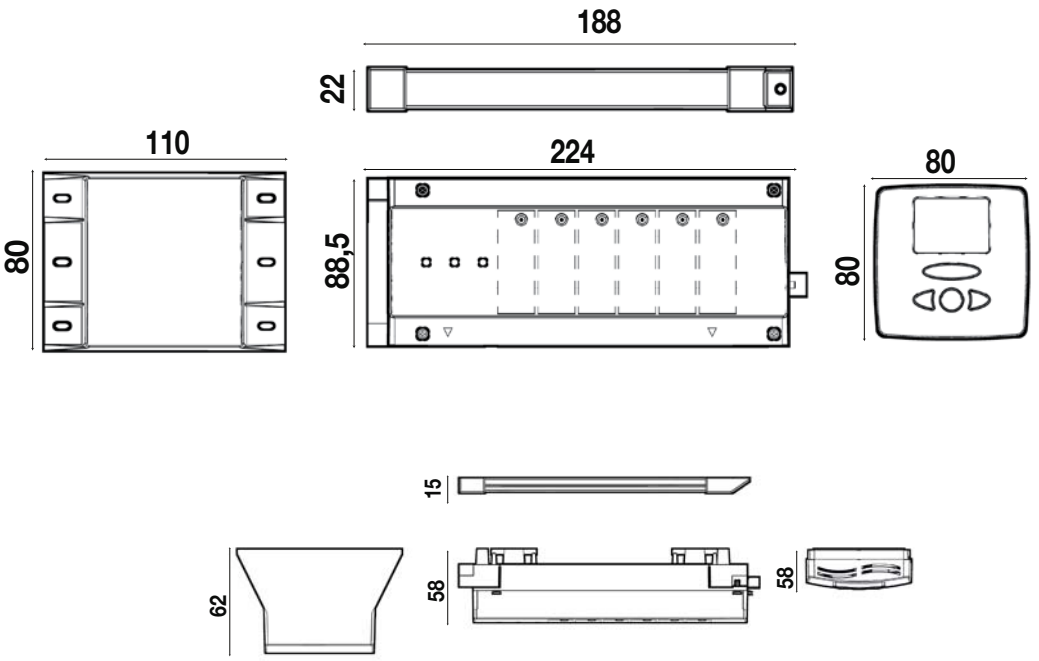
Installation

Smart balancing control system records the actual value of the supply temperature and uses it to recognize the section of the heating curve in which the system is operating. It calculates the return set point temperature for each heating circuit in the same way.



Overall dimensions (mm)

Main components of Series SB



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