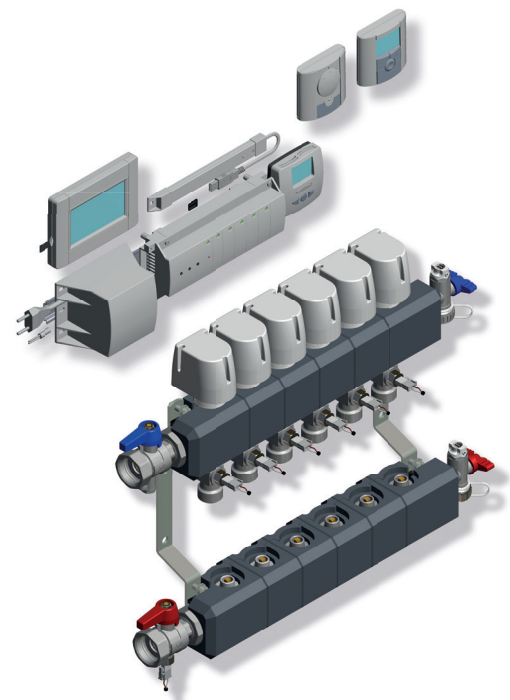




Smart Balancing System Series SB

**Automatic and dynamic balancing
of radiant heating systems**



WATTS®



Smart Balancing System Series SB

Automatic and dynamic balancing of radiant heating systems

General requirements for the control of a heating / cooling system

- Optimum energy use (efficiency)
- Simple, easy-to-understand operation
- Accurate maintenance of the setpoint temperature
- Prompt attainment of the setpoint temperature
- Rapid response to changing influences

A water-based heating or cooling system must not only meet the user's requirements in terms of comfort and operational efficiency, but must also comply with the applicable legal conditions and regulations as well as technical best practices. In order to meet these specifications, the heat / cold generator, the pipe distribution network and the components used to transfer heat and cold into the room need to be designed, calculated and set up in accordance with the requirements. The desired room temperature is just as important as structural elements (the building's age, construction, size, purpose, thermal insulation type and state, etc.) and local climatic conditions. Other influencing factors include internal sources of heat, for example through lighting, electrical equipment, fires and stoves, as well as external sources such as sunlight, especially over large south-facing windows.

Planning specifications::

- Heat requirements per room
- Room temperature (setpoint)
- Room geometry (perimeter surfaces)
- Room temperature of neighbouring rooms
- External temperature (design point)

Coordinated planning, calculation and design of the hydraulic systems ensures:

- Trouble-free function
- Energy-efficient operation



The necessity and conditions for planning and design are derived from:

- **EN 1264** (Water based surface embedded heating and cooling systems).
- **EN ISO 11855** (Design, dimensioning, installation and control of embedded radiant heating and cooling systems).
- **EnEV** (German regulation for energy saving in buildings and building systems).
- **VOB** (German construction contract procedures).

Conventional method of hydraulic balancing

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 setpoint 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 System Series SB** 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 behaviour, 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. $-10\text{ }^{\circ}\text{C}$), 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 System Series SB** 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 System Series SB** 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. $35\text{ }^{\circ}\text{C}$ when $T_{\text{outside}} -10\text{ }^{\circ}\text{C}$)
- Design return temperature per heating circuit (e.g. $28\text{ }^{\circ}\text{C}/32\text{ }^{\circ}\text{C}$ etc., when $T_{\text{outside}} -10\text{ }^{\circ}\text{C}$)
- Design target room temperature per heating circuit (e.g. $20\text{ }^{\circ}\text{C}/22\text{ }^{\circ}\text{C}/24\text{ }^{\circ}\text{C}$)



Advantages for planners and installation technician

- Dynamic balancing of changes in the pipe network thanks to the continuous correction of the flow rates in the individual heating circuits.
- No additional programming of the controller required, the parameters are stored on a Micro-SD card. Very easy commissioning.
- Existing systems can be retrofitted (no cabling required).

Advantages for customers

- Energy savings of up to 15 %.
- More balanced control of the room temperature through reduction of temperature setpoint deviations (i.e, the room temperature going too high or falling too low).
- Sunlight on the floor is detected before the room temperature can increase noticeably.
- User-defined room setpoint temperatures are implemented with precision and without delay.
- Ideal positioning of the radio-controlled room sensor for additional increased comfort.
- In combination with **WATTS® Vision® Smart Home System**
 - ✓ Centralized control of all connected rooms is possible (optional).
 - ✓ A comprehensive system that allows operation / programming via a smartphone or tablet app or via an Internet browser on the PC through an integrated WLAN router (optional).



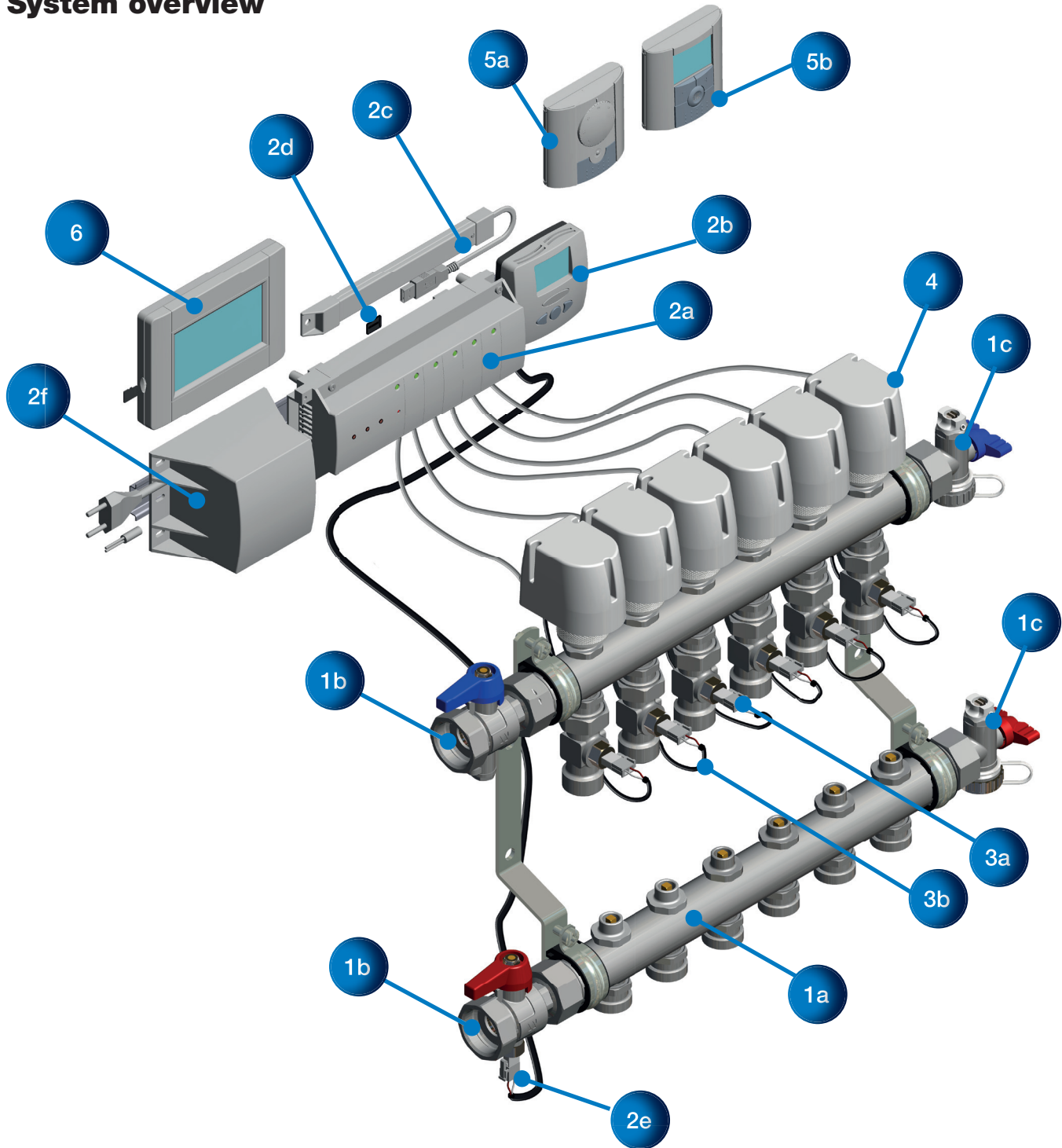
Passive cooling function

In certain conditions, the **Smart Balancing System Series SB** 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.

System overview



1) Manifold

- a) HKV2010SB
- b) Ball valve set
- c) Fill / drain set

2) Control box Master

- a) Connecting box
- b) Control unit
- c) Antenna
- d) Micro SD-Card
- e) Supply temperature sensor 1,5 m cable
- f) WFH-TRAFO 60VA

3) Return temperature connection

- a) Sensor connection adapter
- b) Supply temperature sensor 0,3 m cable

4) Modulating actuator STA 0 - 10 V, 1 m cable

5) RF room thermostats

- a) BT-A02-RF
- b) BT-D02-RF or BT-DP02-RF

6) Central control unit (option)

- BT-CT02- RF WIFI or BT-CT02-RF

HKV 2010SB - Stainless steel manifold

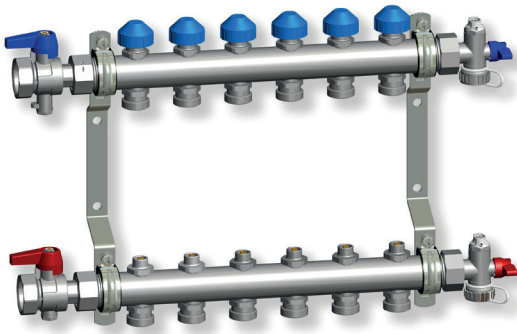
Stainless steel round pipe manifold according to EN 1264-4 with bilateral flat sealing male threads. Low installation depth. Function and pressure tested.

SUPPLY: Shut-off valve.

RETURN: Control and shut-off valve with adaption M30x1,5 (closing point 11,8 mm). Optimized valve characteristic by the valve cone. Connection nipple G 3/4 with Eurocone, 50 mm distance.

Supply and return branches exchangeable.

Incl. ball valve set 1" for connection of NTC-SENSOR 1/8", fill / drain set.



Item-Nr.	Description 1	Description 2	VPE	Weight
10050513	HKV2010SB-50-1" RLo VA02	Standard SmartBalancing	1	2,93 kg
10050514	HKV2010SB-50-1" RLo VA03	Standard SmartBalancing	1	3,23 kg
10050515	HKV2010SB-50-1" RLo VA04	Standard SmartBalancing	1	3,63 kg
10050516	HKV2010SB-50-1" RLo VA05	Standard SmartBalancing	1	4,08 kg
10050517	HKV2010SB-50-1" RLo VA06	Standard SmartBalancing	1	4,53 kg
10050518	HKV2010SB-50-1" RLo VA07	Standard SmartBalancing	1	4,88 kg
10050519	HKV2010SB-50-1" RLo VA08	Standard SmartBalancing	1	5,43 kg
10050520	HKV2010SB-50-1" RLo VA09	Standard SmartBalancing	1	5,83 kg
10050521	HKV2010SB-50-1" RLo VA10	Standard SmartBalancing	1	6,13 kg
10050522	HKV2010SB-50-1" RLo VA11	Standard SmartBalancing	1	6,53 kg
10050523	HKV2010SB-50-1" RLo VA12	Standard SmartBalancing	1	6,98 kg

Manifold insulation

Snap-fit EPP heat insulation for round pipe manifolds 1", suitable for manifolds with 6 zones. Excess modules can be cut off when used for smaller manifolds. Use 2 insulations for larger manifolds. Delivery includes one insulation each for the supply and return pipe as well as a knife to adapt the insulation to different manifold sizes.

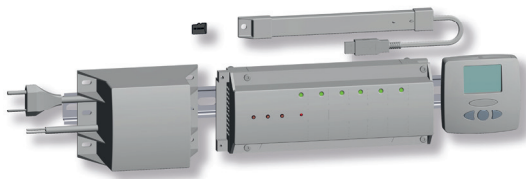


Item-Nr.	Description 1	Description 2	VPE	Weight
10023474	HKV-ISO	HKV 1", 50 mm	1	0,35 kg

RF - connecting box Master

6 zones RF-connecting box master for dynamic individual room temperature control of radiant heating systems with automatic hydraulic balancing. Function HEATING and PASSIVE COOLING. The number of zones or room thermostats can be increased by combination with the optional 6 zone Slave (BT-S6Z02 RF BALANCE) to a maximum of 12 zones.

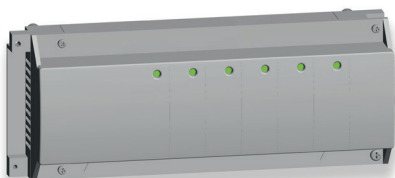
The RF-connecting box works with wireless room thermostat series BT02 and is compatible with **WATTS® Vision® Smart Home System**. Connection of the modulating actuators 0 - 10 V with RJ9 plug. Incl. Micro SD-card, control unit MBus, radio antenna, WFH-TRANSFORMER 60VA, supply NTC SENSOR 1/8" and DIN-rail.



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

RF - Connecting box Slave

Extension for additional 6 zones (room thermostats). With cable for connection with RF-connecting box master.



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

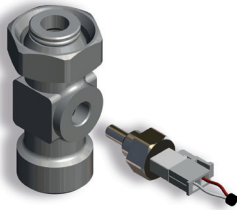
Modulating actuator STA010



Modulating valve actuator 0-10 V. 2 Connection sockets RJ9 for return temperature sensor and with cable 1.0 m and plug RJ9 / RJ9 to connect to **Smart Balancing System Series SB** RF-connecting box Master/Slave. Actuator force 70 N. Protection class I / IP20. LED position indication.

Item-Nr.	Description 1	Description 2	VPE	Weight
10050512	STA010 24V RJ9 CABLE 1m	Standard SmartBalancing	1	0,17 kg

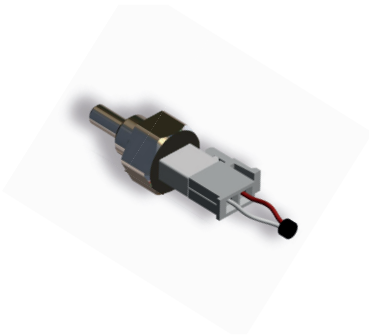
Return temperature sensor connection



With union nut 3/4" and male thread 3/4" EUKO. Sensor with 0,3 m cable and plug RJ9 to connect to modulating valve actuator STA010.

Item-Nr.	Description 1	Description 2	VPE	Weight
10050524	NTC SENSOR SET 3/4"EUKO	Standard SmartBalancing	1/10	0,11 kg

Return temperature sensor connection

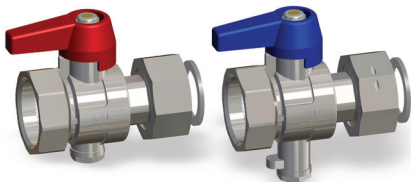


Temperature sensor 1/8" with Molex plug and gasket. With cable 1,0 m and plug RJ9 to be used as supply or return sensor in combination with RF-connecting box Master/Slave or modulating actuator STA010.

Smart Balancing System Series SB accessory / spare part.

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

Ball valve set



Supply ball valve with connection 1/8" for supply temperature sensor. Return ball valve with connection M10x1,5. This can be used in conjunction with heat meters with directly immersed sensors according to EN 1434. Optional accessory, if ball valves are not included with the manifold.

Item-Nr.	Description 1	Description 2	VPE	Weight
10028750	KH-SET 1" UM x 3/4" IG x 1/8" M10 x 1,5 NI	Standard SmartBalancing	1/16	0,60 kg
10028751	KH-SET 1" UM x 1" IG x 1/8" M10 x 1,5 NI	Standard SmartBalancing	1/16	0,70 kg

BT-A02-RF



Electronic RF room thermostat. 868 MHz.

Item-Nr.	Description 1	Description 2	VPE	Weight
10027787	BT-A02-RF	Standard BT02 neutral	1	0,20 kg

BT-D02-RF



Electronic RF room thermostat. With LCD display. 868 MHz.

Item-Nr.	Description 1	Description 2	VPE	Weight
10027788	BT-D02-RF	Standard BT02 neutral	1	0,20 kg



BT-DP02-RF

Electronic RF clock thermostat. Weekly programmable. 868 MHz.

Item-Nr.	Description 1	Description 2	VPE	Weight
10027789	BT-DP02-RF	Standard BT02 neutral	1	0,20 kg



WATTs® Vision® Central Unit, WIFI

Smart Home control, 50 Zones. 868 MHz, WIFI, 4,3" Colour Touch Screen.

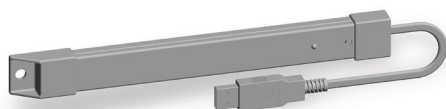
Item-Nr.	Description 1	Description 2	VPE	Weight
10027918	BT-CT02-RF WIFI	Standard BT02 neutral	1	0,40 kg



WATTs® Vision® Central Unit

Smart Home control, 50 Zones. 868 MHz, 4,3" Colour Touch Screen.

Item-Nr.	Description 1	Description 2	VPE	Weight
10027919	BT-CT02-RF	Standard BT02 neutral	1	0,40 kg



Repeater BT-FVR02-230-RF

RF repeater, 230 V power adapter, USB cable, for BT-xx02-RF range.

Item-Nr.	Description 1	Description 2	VPE	Weight
10029549	BT-FVR02-230-RF REPEATER	Standard BT02 neutral	1	0,22 kg

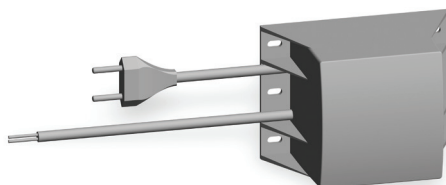


Control unit MBus

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, reduction or absence mode.

Smart Balancing System Series SB accessory / spare part.

Item-Nr.	Description 1	Description 2	VPE	Weight
10050509	BEDIENGERÄT MBUS	Standard SmartBalancing	1	0,18 kg



Transformator

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, reduction or absence mode.

Smart Balancing System Series SB accessory / spare part.

Item-Nr.	Description 1	Description 2	VPE	Weight
10021128	WFH-TRAF0 60VA	Transformator 60 VA	1	1,43 kg

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