# » JOY SR HC AO2DO | HC 3AO RS485 Modbus

Room Regulator

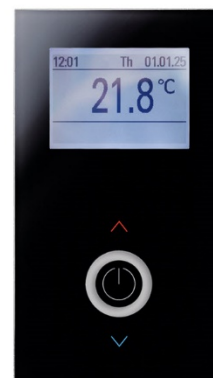**thermokon**®
HOME OF SENSOR TECHNOLOGY

## Datasheet

Subject to technical alteration
Issue date: 05.08.2020 • A111

*enocean*®

*Modbus*

## »APPLICATION

### JOY SR HC AO2DO (85..260 V ~)

The 230 V supplied type AO2DO controls the 230 V heating and cooling valve as a 2-point or thermal 230 V actuator via PWM. The analog output is also used to control a 6-way valve. Two configurable inputs can be used as sensor input, room occupancy or energy lock. In addition to wired valve drives and sensors, sensors and actuators can also be controlled by radio. In addition, as an alternative to wired sensors, an external radio temperature sensor, radio motion detector, a radio temperature sensor for changeover function and radio window contacts/handles can be learnt in. The override by radio is possible by means of higher-level controller profile and cable-bound via Modbus. Radio and wired sensors and actuators are processed identically and can be used in any combination. This guarantees individual and energy-efficient room air conditioning. The device (front of glass in white or black) has a monochrome display and touch-sensitive control buttons. It has a timer with three time channels of four time periods each. Mounting is designed for a flush-mounted box. For hotel applications, the device offers the option of an additional zone (bathroom heating) in conjunction with room temperature sensor and radio actuator SAB.

### JOY SR HC 3AO (24 V =/~)

The 24 V supplied type 3AO has three 0..10 V outputs for controlling heating/cooling valves or a 6-way valve. The analog output is also used to control a 6-way valve. Two configurable inputs can be used as sensor input, room occupancy or energy lock. In addition to wired valve drives and sensors, sensors and actuators can also be controlled by radio. In addition, as an alternative to wired sensors, an external radio temperature sensor, radio motion detector, a radio temperature sensor for changeover function and radio window contacts/handles can be learnt in. The override by radio is possible by means of higher-level controller profile and cable-bound via Modbus. Radio and wired sensors and actuators are processed identically and can be used in any combination. This guarantees individual and energy-efficient room air conditioning. The device (front of glass in white or black) has a monochrome display and touch-sensitive control buttons. It has a timer with three time channels of four time periods each. Mounting is designed for a flush-mounted box. For hotel applications, the device offers the option of an additional zone (bathroom heating) in conjunction with room temperature sensor and radio actuator SAB.

## »PRODUCT TESTING AND CERTIFICATION

CE

**Declaration of conformity**

The declaration of conformity of the products can be found on our website https://www.thermokon.de/.

## » SECURITY ADVICE – CAUTION

The installation and assembly of electrical equipment should only be performed by authorized personnel.

The product should only be used for the intended application. Unauthorised modifications are prohibited! The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or assets. Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

**CAUTION! Risk of electric shock due to live components within the enclosure, especially devices with mains voltage supply (usually between 90..265 V).**

Please comply with

* Local laws, health & safety regulations, technical standards and regulations
* Condition of the device at the time of installation, to ensure safe installation
* This data sheet and installation manual

## » NOTES ON DISPOSAL

As a component of a large-scale fixed installation, Thermokon products are intended to be used permanently as part of a building or a structure at a pre-defined and dedicated location, hence the Waste Electrical and Electronic Act (WEEE) is not applicable. However, most of the products may contain valuable materials that should be recycled and not disposed of as domestic waste. Please note the relevant regulations for local disposal.

## » REMARKS TO ROOM SENSORS

**Location and Accuracy of Room Sensors**

The room sensor should be mounted in a suitable location for measuring accurate room temperature. The accuracy of the temperature measurement also depends directly on the temperature dynamics of the wall. It is important, that the back plate is completely flush to the wall so that the circulation of air occurs through the vents in the cover. Otherwise, deviations in temperature measurement will occur due to uncontrolled air circulation. Also the temperature sensor should not be covered by furniture or similar devices. Mounting next to doors (due to draught) or windows (due to colder outside wall) should be avoided. The temperature dynamics of the wall will influence the temperature measurement. Various wall types (brick, concrete, dividing and hollow brickwork) all have different behaviours with regards to thermal variations.

**Surface and Flush Mounting**

The temperature dynamics of the wall influence the measurement result of the sensor. Various wall types (brick, concrete, dividing and hollow brickwork) have different behaviours with regard to thermal variations. A solid concrete wall responds to thermal fluctuations within a room in a much slower way than a light-weight structure wall. Room temperature sensors installed in flush boxes have a longer response time to thermal variations. In extreme cases they detect the radiant heat of the wall even if the air temperature in the room is lower for example. The quicker the dynamics of the wall (temperature acceptance of the wall) or the longer the selected inquiry interval of the temperature sensor is the smaller the deviations limited in time are.

## » DIAGNOSTICS MENU

To access the diagnostics menu, select the header in the startscreen of the parameter menu, and press the ENTER key. Here you will find various information, such as device type, software version, state of the inputs and outputs and controller state (current manipulated variable).

## » MOUNTING ADVICES

Plasterboard boxes shall be covered by wall paper or paint to avoid that the plasterboard box's front rim will be partially visible underneath JOY. Maybe consider using white plasterboard boxes (i.e. Kaiser 9063-77)

## » TECHNICAL DATA

| Measuring values | temperature | |
|---|---|---|
| Network technology | RS485 Modbus | |
| Radio technology | EnOcean (IEC 14543-3-10) | |
| Frequency | 868 MHz | |
| Measuring range temp | 0..+50 °C | |
| Accuracy temperature | ±1 °C (typ. at 21 °C) | |
| Control functions | setpoint adjustment +0..+50 °C | |
| Display | LCD 60x44 mm, 240x160 px, white backlighting | |
| Functions | integrated PI- and 2-point-/ 3-point-controllers, MSG server for 2nd control loop via radio | |
| Enclosure | PC and glass, optional black or white | |
| Protection | IP30 according to EN 60529 | |
| Connection electrical | **Terminal 1..8** <br> terminal block max. 1,5 mm² | **Terminal 9..12** <br> terminal block max. 1.0 mm² |
| Ambient condition | 0..+50 °C, max. 85% rH non-condensing | |
| Weight | 195 g | |
| Mounting | flush mounted with standard EU box (Ø=60 mm) | |
| Notes | there are 20 EnOcean transmit / receive channels available for various functions | |

### JOY SR HC AO2DO (85..260 V ~)

| Output voltage | 0..10 V =, max. load 5 mA, (for 6-way valves) | |
|---|---|---|
| Output switch contact | 2x normally open contacts (heating/cooling), 240 V max. load 500 mA | |
| Power supply | 85..260 V ~ | |
| Power consumption | max. 2 VA (260 V ~) | |
| Inputs | **DI 1** <br> input for NTC 10 K or change-over sensor | **DI 2** <br> digital input for non-floating contact (230 V ~) |

### JOY SR HC AO2DO 3AO (24 V =/~)

| Output voltage | 3x 0..10 V, max. load 5 mA, 6-way valve control, heating & cooling | |
|---|---|---|
| Power supply | 24 V = (±10%) or 24 V ~ (±10%) SELV | |
| Power consumption | max. 1,5 W (24 V =) | |
| Inputs | **DI 1** <br> 1 input for NTC10K or floating contact | **DI 2** <br> 1 input for floating contact |

**\*Power supply**

When several BUS devices are supplied by one 24 V AC voltage supply, it is to be ensured that all "positive" operating voltage input terminals (+) of the field devices are connected with each other and all "negative" operating voltage input terminals (-) (=reference potential) are connected together (in-phase connection of field devices).

In case of reversed polarity at one field device, a supply voltage short-circuit would be caused by that device. The consequential short-circuit current flowing through this field my cause damage to it.

**Therefore, pay attention to correct wiring.**

## »INFORMATION ABOUT EASYSENS® (RADIO) / AIRCONFIG GENERAL USAGE

**EasySens® - airConfig**

Basic information about EasySens® radio and about general usage of our airConfig software, please download from our website.

## »OVERVIEW OF THE RADIO TELEGRAMS

**EEP**

The structure of the data contained in the telegram can be found in the EEP (EnOcean equipment profile) list provided by the EnOcean Alliance.

## »SUPPORTED PROFILES

**Receiving profiles**

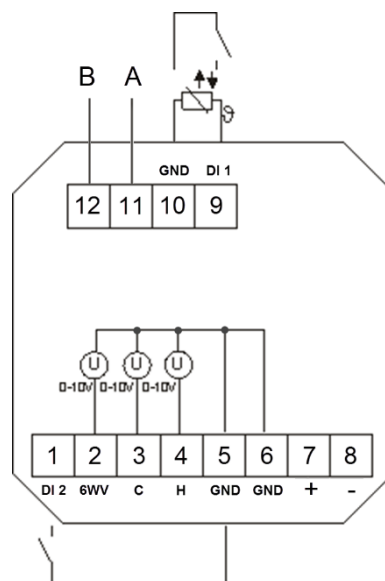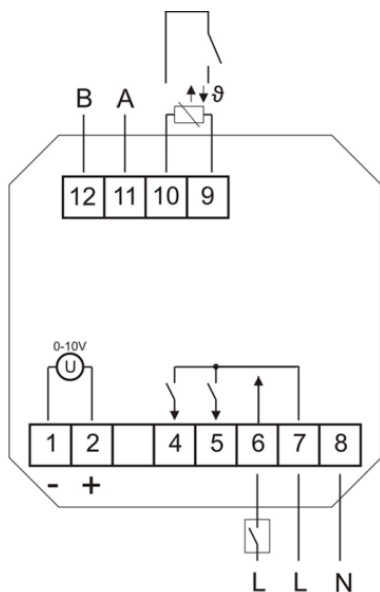| EnOcean-EEP | Type | Direction | Description | Thermokon Devices | Max. Quantity | LCD/ Funktions-gruppe |
|---|---|---|---|---|---|---|
| F6-02-01 | RPS | Rx | EnOcean button | Diverse | 1 | RPS |
| D5-00-01 | 1BS | Rx | Windows contacts | SRW01 | max.5 | SRW |
| F6-10-00 | RPS | Rx | Windows handle | SRG02 | | SRG |
| A5-02-06 | 4BS | Rx | Temperature 0-50°C | SR65 VFG, SR65 TF, SR65 AKF, SR65 | 1 | VFG |
| A5-02-16 | 4BS | Rx | Temperature 0-80°C | | | VFG |
| A5-02-05 | 4BS | Rx | Room Sensor (Temperature 0-40°C) | SR04, LC-SR04, SR07, SR65 | 1 | EXT |
| A5-10-03 | 4BS | Rx | (Room Operating Panel) Temperatur, Set Point | SR07P, SR04P, SR06 2T/2T+ | | WRF |
| A5-07-01 | 4BS | Rx | Room Sensor (Occupancy) | SR-MDS Solar, SR-MOC Solar, SR-MOW Solar | max. 3 | OCC |
| A5-08-01 | 4BS | Rx | Room Sensor (Occupancy, Light, Temperature) | SR-MDS | | OCC |
| F6-04-01 | RPS | Rx | Keycard | SR-KCS02, SR-KCS | 1 | KEY |
| A5-20-01 | 4BS | Rx/Tx | SAB | SAB+, SAB05 | max. 6 | SAB |
| A5-20-12 | 4BS | Rx | Superior Control Unt (Fan. Set Point, Controller, Energy Hold OFF/Dew point, Occup) | | 1 | SUP |

**Transmitting profiles**

| EnOcean-EEP | Type | Direction | Descripton | Max. Quantity | LCD |
|---|---|---|---|---|---|
| A5-10-02 (V2.1.1 +) | 4BS | Tx | *Valid from Version 2.1.1 (up to 2.1.0: A5-10-01)* Room operating panel (Fan,Temp, Sollwert, Occup) | 1 | WRF |
| A5-10-06 (V2.1.1 +) | 4BS | Tx | *Valid from Version 2.1.1 (up to 2.1.0: A5-10-05)* Room operating panel (Temp, Sollwert, Occup) | | |
| A5-11-02 | 4BS | Tx | Temperature Controller (Fan, Set point, alarming, Controller state, Energy Hold OFF, Occup) | 1 | OUT |
| A5-20-01 | 4BS | Rx/Tx | SAB | max. 5+1 | SAB |

# »CONNECTION PLAN

| JOY HC AO2DO (85..260 V ~) | JOY HC 3AO (24 V ~/=) |
|---|---|



| | |
|---|---|
| **1 GND (6-way valve)** | **1 Digital Input 2** |
| **2 0..10 V (6-way valve)** | **2 6-way valve (0..10 V)** |
| | **3 Cooling (0..10 V)** |
| **4 Cooling** | **4 Heating (0..10 V)** |
| **5 Heating** | **5 GND DI2** |
| **6 Digital Input 2 (230V)** | **6 GND** |
| **7 L** | **7 24 V = (±10%) or 24 V ~ (±10%)** |
| **8 N** | **8 GND** |
| | |
| **9 Digital Input 1 (or NTC10K)** | **9 Digital Input 1 (or NTC10K)** |
| **10 GND DI 1** | **10 GND DI 1** |
| **11 Digital Input 3** | **11 Digital Input 33** |
| **12 GND DI 3** | **12 GND DI 3** |

**Note:** Parallel connection of the potential-loaded inputs is not permitted!
If the operating mode (change-over DI) of several devices is to be switched together by one contact, the potential-free 230V input must be used (DI2, only possible with the 230V version). It must be ensured that the same phase is used for jointly switched devices.

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# »CONFIGURATION VIA MODBUS OR SD CARD

**Configuration software:**
uConfig

The JOY room thermostat can be parameterised using the uConfig configuration software.

The online installer for the configuration software can be found in our download center. The installer retrieves all necessary files and plug-ins from our web server.

A separate offline installer is available for installations on PCs without Internet connection.
→ **Download Online-Installer**

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| JOY HC AO2DO (85..260 V ~) | JOY HC 3AO (24 V ~/=) |
|---|---|
| PI controller (PWM) & 2-point/3-point controller *(configurable)* | PI controller (0..10 V) |

### 6WV (PI-controller 0..10 V) *(all types)*

The manipulated variable is output as a proportional control signal at the output for the 6-way valve. The type of valve used is set via the configuration software. You can choose from 2..10 V / 2..10 V INV (Belimo), 0..10 V DN15 / DN15 INV, DN20 / DN20 INV (Sauter). There is also the possibility of a freely parameterizable 6-way valve (generic 6WV).

### Heating/ cooling with 2-point-/ 3-point-controller *(only HC AO2DO)*

In the case of temperature control, the 2-point controller only knows the switching states heating ON and heating OFF. The 3-point controller also knows the switching state of cooling. Two - and three-point controller work with a hysteresis.
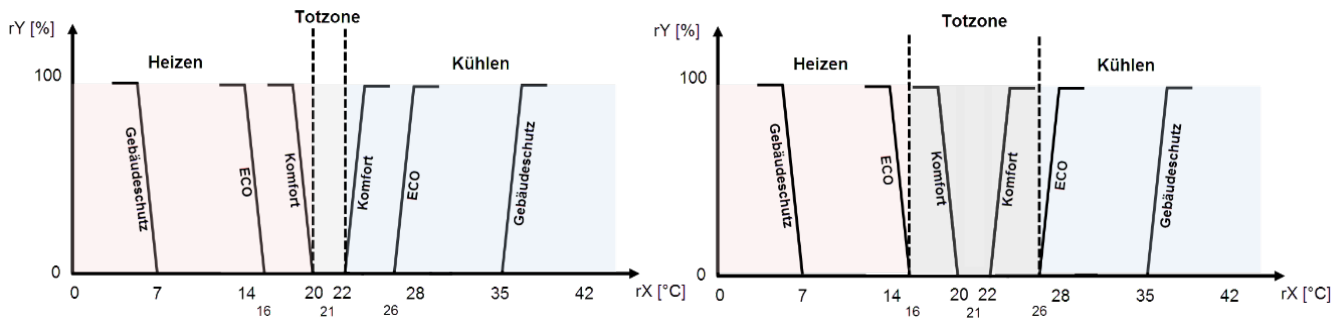


### Heating/ cooling with PI-controller (PWM) *(only HC AO2DO)*

The time response of the PI control loop depends on the control parameters xp for the proportional area and tn for the reset time of the integral range. In case of an error, the P portion immediately changes the position value proportionally to the error variable, while the integral portion takes effect after a certain time.
**The resulting actuating variable is output as a pulse-width-modulated signal directly to the outputs.**
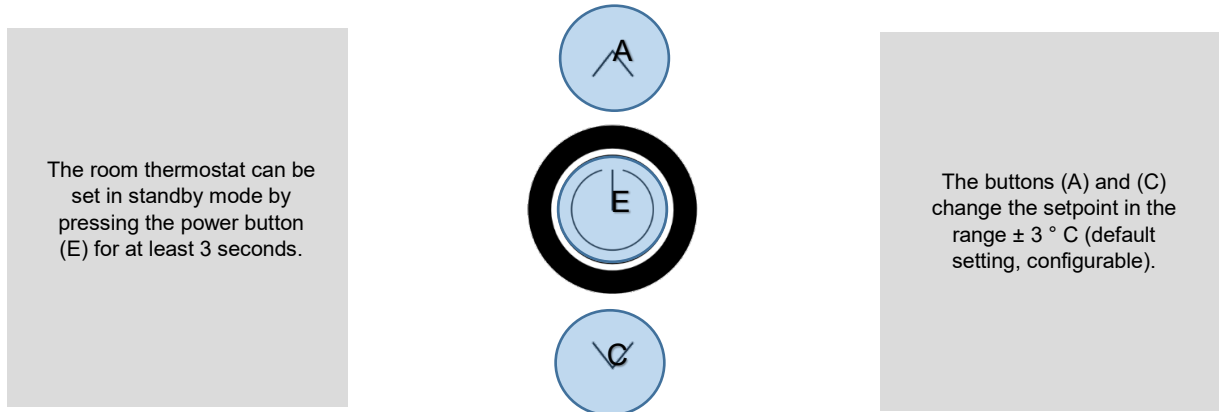
### Heating/ cooling with PI-controller (0..10 V) *(only HC 3AO)*

The time response of the PI control loop depends on the control parameters xp for the proportional area and tn for the reset time of the integral range. In case of an error variable, the P portion immediately changes the position value proportionally to the error variable, while the integral portion takes effect after a certain time.
**The resulting manipulated variable is output as an analogue 0..10 V signal directly to the outputs.**

## »FUNCTION DESCRIPTION - BUTTONS

On the touch-surface are the keys for setpoint adjustment. While pressing of these buttons, the white LED of the Power-button lights up for visual feedback.



The room thermostat can be set in standby mode by pressing the power button (E) for at least 3 seconds.

The buttons (A) and (C) change the setpoint in the range ± 3 ° C (default setting, configurable).

The Power button (E) can be used to switch the room thermostat to standby mode (not possible if the Keycard switch function is used!) If the key is used as a presence key at the same time, the key must be pressed for at least 3s, in all other cases a short press is sufficient. In standby mode the display and all outputs are switched off (controller deactivated). The frost and heat protection monitoring remains active. **Modbus registers can still be read (e.g. room temperature).**

### Main screen/ Value display

The Display shows the measured value of the internal sensor. The value of an external sensor will be shown if connected and configured accordingly. The room thermostat controls in this case according to the external sensor.

**Header**            **Value display**



**Footer**
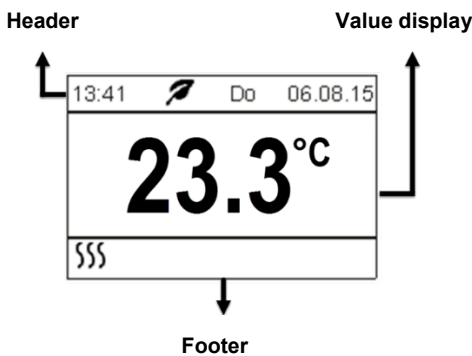
### Header

In the header line, the time, weekday and date are displayed. In addition, the ECO info symbol (sheet) is displayed here when the ECO mode is switched on. It is possible to show an alarm symbol (exclamation mark) in the display. This symbol is located at the same position as the ECO symbol. Since the alarm symbol has a higher priority, it overwrites the ECO symbol.

### Footer

Depending upon the heating or cooling mode, occupancy or window contact status, the corresponding symbols will be shown in the footer. The symbol "active timechannel" will be shown only if active.
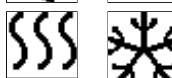
### Symbols

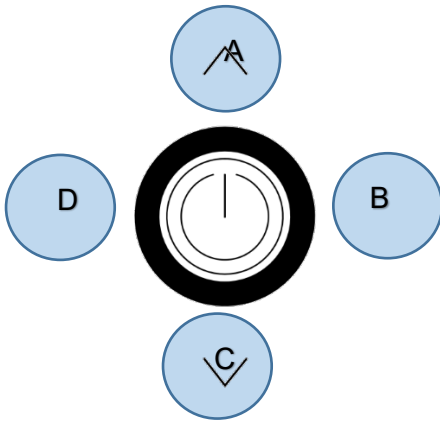| | |
|---|---|
| Occupancy |  |
| Window contact/dewpoint |  |
| Heating/Cooling |  |
| Active timechannel |  |

## » CONFIGURATION VIA THE DISPLAY MENU

**Buttons**



**The configuration menu is called up by simultaneously pressing the buttons "up" (A), "left" (D) and "right" (B) for at least 3 seconds.**

Menu navigation on the touch-surface is performed by pressing the buttons "up" (A), "down" (C), "left" (D), "right" (B) or the power button. Choose the desired parameter and press "right" (B) to open up the submenu. If no entry is made for 8 minutes, the parameter menu is left automatically. To exit the menu select the header line and press "left" (D)

| Menu | |
|---|---|
| Timechannel | ▷ |
| Time/Date | ▷ |
| Sensor settings | ▷ |
| Common settings | ▷ |
| EnOcean list | ▷ |
| **EnOcean configuration** | ► |

## » MENU → TIME CHANNELS

In the Time Channels menu, setpoint and timer can be set. Up to 3 time channels with 4 time periods each can be parameterized. The time channels are prioritised. Channel 3 has the highest priority. After selecting the line of the time channel to be edited, the next submenu is called up with the "Right" key. It is possible to set any time period within one week in the first two lines with the "Left" (-)/ "Right"(+) keys. In addition, the ECO mode is available in the menu sections. In ECO mode, the dead zone between heating and cooling is automatically set to the ECO dead zone configured in the "General Settings" menu (default: 10 K).

| Timechannels | | |
|---|---|---|
| **Timechannel 1** | **Mo - Fr** | **►** |
| Timechannel 2 | | ▷ |
| Timechannel 3 | | ▷ |

| Timechannels/Timer1 | | |
|---|---|---|
| from day | ◁-/+▷ | Mo |
| to day | ◁-/+▷ | Fr |
| 1: 06:00h - A - 22.0° | | ✓► |
| 2: 08:30h - 1 - 20.0° | | ✓▷ |
| 3: 16:00h - A - 22.0° | | ✓▷ |
| 4: 22:30h - 0 - 22.0°ECO | | ✓▷ |

| Periods/Period1 | | |
|---|---|---|
| Start | ◁-/+▷ | 06:00h |
| Temp | ◁-/+▷ | 22.0° |
| ECO-Mode | | ✓ |

## » MENU → TIME/DATE

Time, Date and display format can be configured in the menu settings. The room thermostat is equipped with a real-time clock so that it automatically adjusts for daylight-saving time. This function can be disabled in the datetime settings.

| Menu | |
|---|---|
| Timechannels | ▷ |
| **Time/Date** | **►** |
| Sensor settings | ▷ |
| Common settings | ▷ |
| EnOcean list | ▷ |
| EnOcean configuration | ▷ |

| Datetime setting/Time | | |
|---|---|---|
| **Hour** | **◄-/+►** | **13** |
| Minute | ◁-/+▷ | 07 |
| 12h/24h | ◁-/+▷ | 24h |
| Daylight saving | ◁-/+▷ | CET |
| Date | | ▷ |

| Datetime setting/Date | | |
|---|---|---|
| **Day** | **◄-/+►** | **12** |
| Month | ◁-/+▷ | 08 |
| Year | ◁-/+▷ | 15 |
| Presentation | ◁-/+▷ | T.M.J |

## » MENU → SENSOR SETTINGS

Offset correction for internal and external sensor value. The temperature display can also be changed from °C to °F.

```
Sensor settings
Offset int.    ◄ -/+ ►    0.6 K
Value int.                22.1°C
Offset ext.    ◄ -/+ ▷    0.2 K
Value ext.                22.1°C

Unit           ◄ -/+ ▷    Celsius
```

## » MENU → COMMON SETTINGS

The common settings includes the brightness of the background lighting and the LED. Valve protection prevents the valves becoming ceased when they are switched off for long periods. If the valve protection function is activated, a valve-check is carried out every Friday at 11:00 am for the heating valve and 11:15 am for the cooling valve. The corresponding valve is triggered for 5 minutes, if not activated during the last 96 hours. The dead band can be adjusted (default 10.0 K, see timechannels).

```
Menu                            Settings/Common                 Settings/Common                      Settings/Language
Timechannels         ▷          Brightness LCD ◄-/+► 100%       Valve protect   ◄-/+►   ON           Deutsch              √
Time/Date            ▷          Brightness LED ◄-/+▷ 100%       ECO deadband ◄-/+▷    10.0K          English
Sensor settings      ▷                                          heat load max  ◄-/+▷   2A
Common settings      ►                                          cool load max  ◄-/+▷   2A
EnOcean list         ▷
EnOcean configuration ▷         Common              ►           Language            ►                Factory setting      ►
```

**Heat / Cool load**

The maximum heating and cooling load can be set by the user for the best compensation of the sensor self-heating. This method ensures the accuracy of the internal temperature measurement.

**Factory settings**

By selecting "Factory setting", the room thermostat will be reset and restore the device to factory default settings.

## » PARAMETER MENU – MODBUS INTERFACE

The configuration menu is activated by simultaneously pressing the buttons "up" (A) and "down" (C) for at least 5 seconds.

The menu is enabled during the first 60 minutes after switching on the supply voltage as long as the device is not actively involved in Modbus communication. As soon as the device receives a valid request addressed to the device from a DDC, access to the menu is blocked. Without valid communication, access is blocked after 60 minutes!
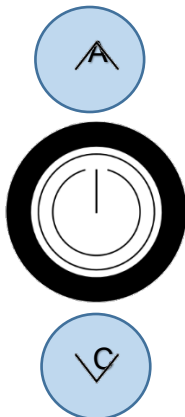
```
Modbus settings
Address     ◄ -/+ ▷        32
Baudrate    ◄ -/+ ▷     19200
Parity      ◄ -/+ ▷      Even
```

**Address (default: 32)**
Adjustable address (1-247)

**Baud rate (default: 19200)**
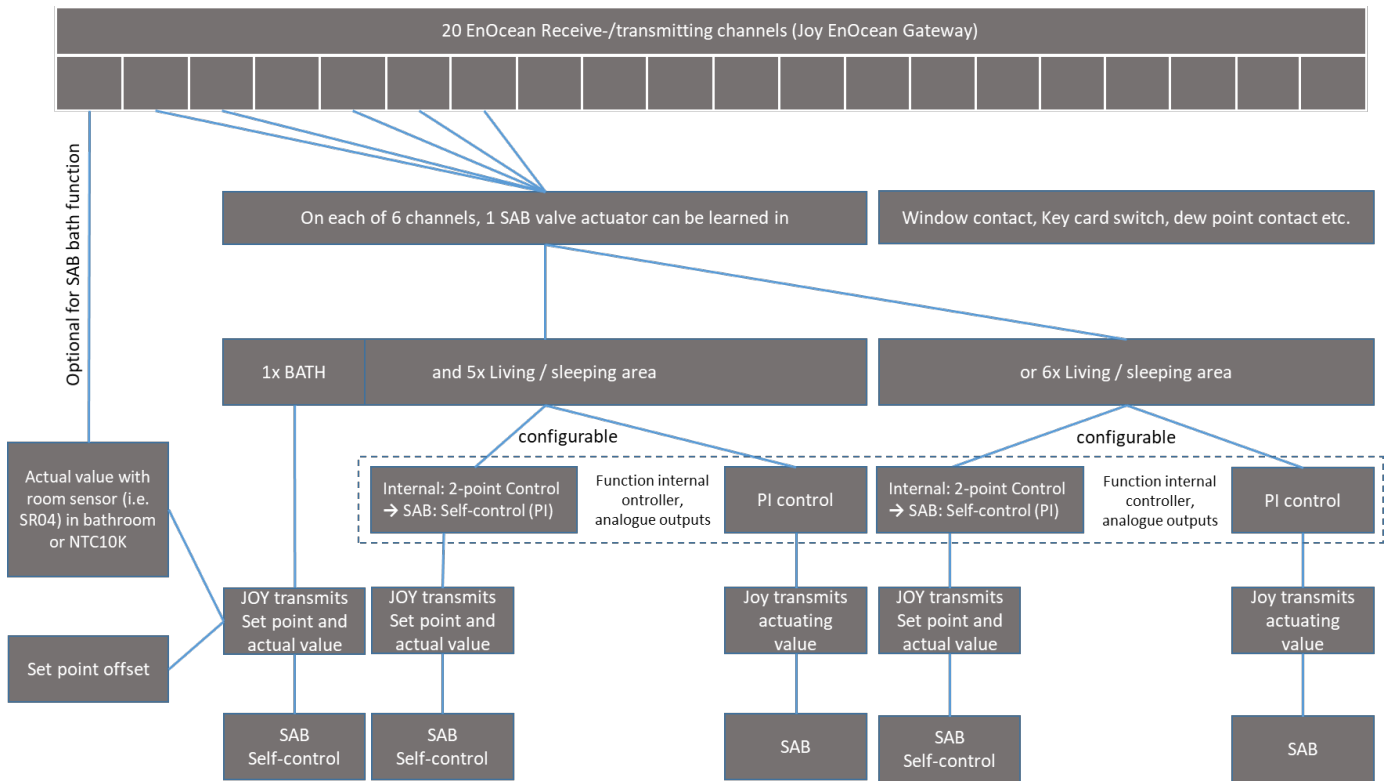9600Bd | 19200Bd | 38400Bd | 57600Bd

**Parity (default: even)**
Non | odd | even

## » ENOCEAN

There are 20 channels available that can be assigned different functions. A channel can be configured as a receive channel, as a send channel or as a message server (SAB communication).

6 channels can be configured with SAB valve actuator, one of these can be set with the bath function. For the SAB with the bath function, an additional setpoint offset can be set. If SAB valve actuators are learned in, the analogue outputs to the internal controller remain active and can also be used.

**Functional Overview SAB**



**The profiles used are divided into functional groups**

| SRW/SRG | Window contact and window handle. Both have an influence on the window contact function and are linked to the digital inputs or the Modbus default. Up to five sensors can be learned-in. |
|---|---|
| VFG | Sensor for changeover control. Only one changeover sensor can be learned in. |
| EXT/WRF | Receiving channel: Temperature preset by an external room temperature sensor. Overrides the internal temperature sensor. Max. one sensor can be learned in. An EnOcean room operating unit is displayed on the send channel. |
| OCC | Up to 3 motion sensors can be learned in and affect the occupancy function. The last changed value (Modbus,EnOcean, Button) will be accepted. If several EnOcean motion sensors have been learned-in, the "ROOM UNOCCUPIED" value will only be accepted once all sensors have signaled "ROOM UNOCCUPIED". |
| KEY | Controls the internal keycard function. When learning a key card switch, the card must not be plugged in AND pulled immediately during the learn-in process. It is necessary to wait at least 5 seconds until the second action is performed with the card. Only then will the switch be assigned as key card switch, otherwise it will be learned in as a radio rocker switch (function group RPS). |
| SUP | A superior control unit to override the internal functions. |
| SAB (5+1 Bath) | Up to 6 SAB´s can be learned in. One pcs. can be assigned with the „Bath" function. The other channels can be used optionally for heating or cooling. For each SAB channel, an offset for the setpoint can be configured via Modbus. |
| OUT | Only in direction of transmission. A controller status (A5-11-02) every 15 minutes (configurable) and with every change of any value. |

### Commissioning

Two additional selection menus appear in the menu, <**EnOcean list**> and <**EnOcean configuration**>. The EnOcean list is a simple list display of the EnOcean sensors that have been taught in, in addition to the list, further information on the individual sensors can be called up.

### EnOcean list

All channels with the learned sensors or actuators are displayed in this list.

With <**Selection**>, detailed information are displayed:

```
1 Rx  01-8C-03-98    EXT  !!        Index: 2      ID: FF-81-CC-01
2 Rx  FF-81-CC-01    OCC            Dir: Rx       Typ: SAB
3     FF-FF-FF-FF                   EEP: A5-20-01_B  SAB-Ch: 2
4 RxFtx FF-81-CC-03   SAB           RSSI: -67dB   Time: 340s
5 Rx  FF-81-CC-00    VFG  !!        Errors: 00001  Pending: Y
6 Rx  00-8B-CE-DA    KEY            Sensor Channel: 2
◁          Selection        ▷          ENTER to acknowledge
```

### EnOcean configuration

In this menu item, the radio channels can be configured and individual information can be called up.

In the footer, various menu items can be selected with the LEFT / RIGHT keys and the corresponding menu item is selected with the ENTER key.

SAB valve actuators are learned in with the function <**SET ACTOR**>.

```
1     FF-FF-FF-FF
2     FF-FF-FF-FF
3     FF-FF-FF-FF
4     FF-FF-FF-FF
5     FF-FF-FF-FF
6     FF-FF-FF-FF
```

EXIT            DELETE CHANNEL    ◁   LEARN SENSOR   ▷    SET ACTOR    SHOW CHANNEL

The access to the menu <**EnOcean configuration**> can be protected with a password via Modbus. The login remains unlocked in the EnOcean menu until 10 minutes after the last key press. Default password: 2030.

More detailed information for the configuration of the EnOcean channels can be found in the specification.

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## »INPUTS

Up to 2 inputs are configurable for functions such as windows contact, dew point, occupancy, change-over or external sensor option.

**The overview of possible combinations can be found in the software specification of the JOY.**

### Sensor (NTC10K)

The value of an external sensor will be shown if connected and configured accordingly. In this case, the room thermostat controls according to the external sensor.

### Change-Over DI

Which controller is active depends on the state of the Change-Over contact. (Factory default: contact open heating controller active, contact closed cooling controller active). The terminals 4 and 5 are used as outputs for heating rsp. cooling.

### Change-Over Sensor

The Change-Over Sensor is used for switching between heating and cooling mode automatically. If the temperature is below 22 ° C, the controller is in cooling mode. If it is above 25 ° C, it is a heating mode.

If an input is configured as a change-over, the room thermostat is automatically in 2-pipe operating mode and both outputs (terminals 4 and 5) are used as outputs for heating rsp. cooling.

### Window contact/Energy hold off

If a window contact is enabled via the digital input, the reference will switch to a setback set point (Heat SP/Cool SP).

### Dewpoint

An active dewpoint contact locks the cooling controller.

### Occupancy

If occupancy-function is active, the symbol will be displayed automatically. In state of "unoccupied" the heating set point is reduced by 2K (default setting) rsp. the cooling set point raised by 2K.

**Keycard-Switch**

When the card is not inserted, the device is switched in sleep mode. Operation of the keys is locked, the display is switched off and the controller adjusts to the nominal values of the "unoccupied"-State.

**Alarm contact**

An alarm symbol can be shown in the header of the display. The backlight flashes when the alarm is active. This symbol is in the same position as the ECO symbol. The alarm symbol has a higher priority and overwrites the ECO symbol!

## » APPLICATION NOTICE

**Boot Loader**

A bootloader integrated in the device, makes it possible to install a new application (update, upgrade) using a MicroSD card. To insert the SD card, the upper part must be removed. If the boot loader is activated, the ring illumination blinks in a 1s cycle, while display is not triggered! After recognition of a MicroSD card with a valid application the update process is started. Now, ring illumination blinks fast in a 300ms cycle. After a successful update process (Duration approx. 20-30 seconds!), the new application is started automatically. Afterwards, SD card have to be removed! A firmware update can also performed via the Modbus interface. In this case, the program "Thermokon Bootloader" (as of version 2.0.0) and the corresponding firmware file are needed.

**SD-Card**

The parameterization of the receive channels for EasySens transmitter (i.e. SRW0x window contact) and the configuration of the device can be done with a MicroSD card. You can create a configuration file with the Thermokon tool uConfig. This means that sensors can be learned-in without having to press the LRN buttons of the relevant sensors.

The MicroSD card can also be used to read a configuration from the JOY. The MicroSD card can be plugged in during the current configuration or it can be used after the configuration has been completed. If a MicroSD card is inserted during the configuration, each learn / learn process is wrote directly into the file. If the MicroSD card is inserted after the configuration, the configuration file is automatically created on the card after a restart.

Note: EasySens receivers such as SAB or actuators need the ID of the transmitter (Joy) via manually initiated teach-in telegram. Only MicroSD cards formatted in the FAT file system can be used! NTFS and exFAT file systems are not supported.

**Software uConfig**

A detailed description of the parameter and the configuration software uConfig can be downloaded from our website.

## » DIMENSIONS (MM)
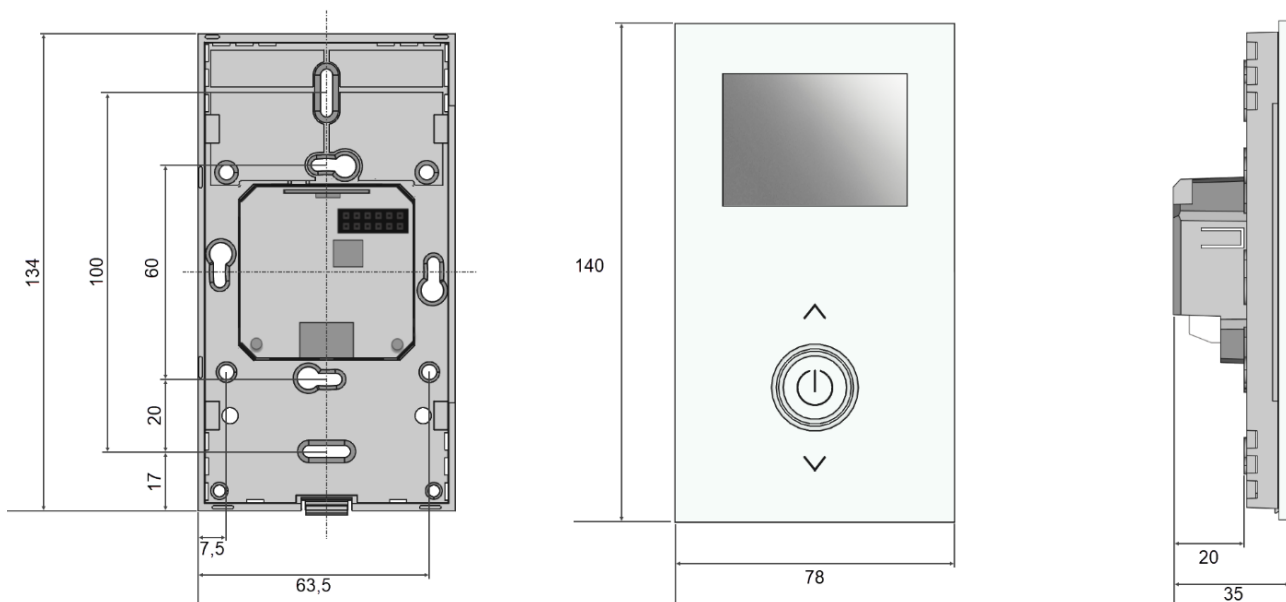


## » ACCESSORIES (OPTIONAL)

| | |
|---|---|
| Converter RS485 Modbus - USB | Item No. 668293 |
| Decorative frame pure white for JOY | Item No. 614771 |
| MicroSD card 2GB | Item No. 500098 |