
# ABB i-bus® KNX
# Weather Station WS/S 4.1.1.2
# Product Manual

Power and productivity
for a better world™

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# 1 General

A feeling of well-being in buildings, houses and rooms can be increased considerably through climate-dependent control. Outside influences such as wind, rain, brightness and temperature have a key role to play in many processes in intelligent building systems. A heating system controlled according to the outside temperature can provide, for example, a pleasant, comfortable temperature, along with energy-efficient boiler control. By recording the brightness level, it is possible to automatically adapt the lighting and shading of rooms to the individual needs of the user.

Monitoring and safety functions are related to weather data.

Blinds and awnings can be retracted in the event of strong wind, or skylights and fanlights can be closed when it starts to rain.

All of these events play a role when it comes to controlling complex installations in buildings and houses in a convenient and safe manner while minimizing energy consumption.

In making it possible to record and process four independent analogue input signals, this device can help you control your installations using ABB i-bus®.

## 1.1 Using the product manual

This manual provides detailed technical information on the function, installation and programming of the ABB i-bus® KNX device. The application is explained using examples.

This manual is divided into the following chapters:

| | |
|---|---|
| Chapter 1 | General |
| Chapter 2 | Device technology |
| Chapter 3 | Commissioning |
| Chapter 4 | Planning and application |
| Chapter A | Appendix |

### 1.1.1 Notes

Notes and safety instructions are represented as follows in this manual:

| **Note** |
| --- |
| Tips for usage and operation |

| **Examples** |
| --- |
| Application examples, installation examples, programming examples |

| **Important** |
| --- |
| These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury. |

| **Attention** |
| --- |
| These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury. |

|  **Danger** |
| --- |
| These safety instructions are used if there is a danger to life and limb with inappropriate use. |

|  **Danger** |
| --- |
| These safety instructions are used if there is an extreme danger to life with inappropriate use. |

## 1.2 Product and functional overview

The device is a modular installation device with a module width of 4 space units in Pro *M* design for installation in distribution boards. The connection to the ABB i-bus® is established using a bus connection terminal on the front side. The assignment of the physical address, as well as the setting of parameters, is carried out with Engineering Tool Software ETS.

- The device enables you to record and process four analog input signals in accordance with DIN IEC 60381, e.g. 0…1 V, 0…5 V, 0…10 V, 1…10 V, 0…20 mA, 4…20 mA. Furthermore, PT100 and PT1000 with 2 and 3-conductor technology, 0…1,000 ohm resistors and a selection of KTY sensors can be connected. It is possible to match the device to user-defined KTY sensors using a characteristic entry feature. Floating contacts can also be connected to the device.
- The processing of the input signals is carried out in the application *Weather Data 4f.*
- The object values can be set for each input separately in the application. The output value can be sent as a 1-bit value, or a 1, 2 or 4-byte value via the bus.
- Due to the flexibility allowing the measurement curve to be adapted, it is possible to mask out certain areas of the measurement curve or to even offset or correct them. Measured values can be averaged over 1, 4, 16 or 64 measurements using the *Filter* function. The output value is "smoothed" via the mean value. As one measurement is taken every second, the setting for 64 measurements per output means that the output value is sent after about 64 seconds.
- It is possible to set two thresholds per input. The thresholds each have an upper and lower limit which can be set independently. The thresholds themselves can be changed via the bus.
- There are four further calculation objects available. It is thus possible to compare two output values or calculate the arithmetic mean. The options less than, greater than, addition, subtraction and averaging are available.
- Any standard weather sensors can be connected, e.g. twilight sensor, humidity sensor, brightness sensor, air pressure sensor, pyranometer (light intensity), rain meter sensor, rain sensor, temperature sensor, wind speed sensor and wind direction sensor.
- The internal logic can be set as an AND or OR logic gate. The gate can be assigned a maximum of 4 inputs and one output. The inputs and outputs can be inverted. It is possible, for example, to link 2 Weather Stations together via the logic function. There are 2 external inputs available for this.

| **Important** |
| --- |
| To ensure that all programmable functions work correctly, be sure to observe the sensor manufacturer's technical data |

### 1.2.1 Integration in the i-bus® Tool

The device possesses an interface to the i-bus® Tool.

The i-bus® Tool can be used to change settings on the connected device.

The i-bus® Tool can be downloaded for free from our website (*www.abb.com/knx).*

ETS is not required for the i-bus® Tool. However, Falcon Runtime (version 1.6 or higher and version 1.8 or higher for Windows 7) must be installed to set up a connection between the PC and KNX.

A description of the functions can be found in the online help of the i-bus® Tool.

# 2 Device technology

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**WS/S4.1.1.2 Weather Station**

The device is used to record weather data. Four conventional sensors can be connected to the device. The connection to the bus is established via the bus connection terminal on the front of the device.

The device is ready for operation after connecting the bus voltage. Additional auxiliary voltage is required. The device is parameterized and programmed using ETS.

## 2.1 Technical data

| | | |
|---|---|---|
| **Supply** | Bus voltage | 21…32 V DC |
| | Current consumption, bus | < 10 mA |
| | Mains voltage $U_S$ | 85…265 V AC, 110…240 V DC, 50/60 Hz |
| | Power consumption | Max. 11 W at 230 V AC |
| | Power consumption, mains | 80/40 mA at 115/230 V AC |
| | Leakage loss, device | Max. 3 W at 230 V AC |
| **Auxiliary voltage supply for the sensors** | Rated voltage $U_n$ | 24 VDC |
| | Rated current $I_n$ | 300 mA |
| **Connections** | KNX | Via bus connection terminal, screwless |
| | Mains voltage | Via screw terminals |
| | Sensor supply | Via screw terminals |
| | Sensor inputs | Via screw terminals |
| | Screw terminals | 0.2…2.5 $mm^2$ fine stranded<br>0.2…4.0 $mm^2$ single core |
| | Tightening torque | Max. 0.6 Nm |
| **Cable length** | Between sensor and device input | Max. 100 m |
| **Operating and display elements** | *Programming* button/LED | For assignment of the physical address |
| **Protection** | IP 20 | To DIN EN 60 529 |
| **Protection class** | II | To DIN EN 61 140 |
| **Isolation category** | Overvoltage category | III to EN 60 664-1 |
| | Pollution degree | II to DIN EN 60 664-1 |
| **KNX safety voltage** | SELV 24 V DC | |

| | | |
|---|---|---|
| **Temperature range** | Mode | -5 °C…+45 °C |
| | Storage | -25…+55 °C |
| | Transport | -25…+70 °C |
| **Ambient conditions** | Maximum air humidity | 93 %, no condensation allowed |
| **Design** | Modular installation device (MDRC) | Modular installation device, Pro *M* |
| | Dimensions | 90 x 72 x 64.5 mm (H x W x D) |
| | Mounting width in space units | 4 x 18 mm modules |
| | Mounting depth | 64.5 mm |
| **Mounting** | On 35 mm mounting rail | To DIN EN 60 715 |
| **Installation position** | Any | |
| **Weight** | 0.270 kg | |
| **Housing/color** | Plastic housing, gray | |
| **Approvals** | KNX to EN 50 090-1, -2 | Certification |
| **CE mark** | In accordance with the EMC directive and low voltage directive | |

### 2.1.1 Inputs

| | | |
|---|---|---|
| **Rated values** | Number | 4 |
| | Voltage | 0…1 V, 0…5 V, 0…10 V, 1…10 V |
| | Maximum upper limit | 12 V |
| | Current | 0...20 mA, 4...20 mA |
| | Maximum upper limit | 25 mA |
| | Resistance | 0…1,000 ohms<br>PT100 2-conductor technology<br>PT100 3-conductor technology<br>PT1000 2-conductor technology<br>PT1000 3-conductor technology<br>Choice of KT/KTY 1,000/2,000, user-defined |
| | Contact | Floating |
| | Input resistance for voltage measurement | > 50 Mohms |
| | Input resistance for current measurement | 260 ohms |
| | Permitted cable length between sensor and device input | Max. 100 m |

| Device type | Application | Max. number of communication objects | Max. number of group addresses | Max. number of assignments |
|---|---|---|---|---|
| WS/S 4.1.1.2 | Weather Data 4f/…* | 50 | 100 | 100 |

* … = Current version number of the application. **Please refer to the software information on our website for this purpose.**

**Note**

ETS and the current version of the device application are required for programming.

The current application can be found with the corresponding software information for download on the Internet at *www.abb.com/knx*. After import into ETS, the application appears in the *Catalogs* window under *Manufacturers/ABB/Input/Weather Data 4f*.

The device does not support the locking function of a KNX device in ETS. If you use a BCU code to inhibit access to all the project devices, this has no effect on this device. Data can still be read and programmed.

## 2.2 Resolution and accuracy and tolerances

Please note that the tolerances of the sensors which are used will need to be added to the listed values.

With sensors based on resistance measurement, it is also necessary to consider the feeder cable errors.

In the supplied state of the device, the stated accuracies will not be initially achieved. After initial commissioning, the device performs an autonomous calibration of the analogue measurement circuit. This calibration takes about an hour and is performed in the background. It is undertaken regardless of whether or not the device is parameterized and is independent of the connected sensors. The normal function of the device is not affected. After calibration has been completed, the calibration values which have been determined will be stored in the non-volatile memory. Thereafter, the device will achieve this level of accuracy every time it is switched on. If the calibration is interrupted by programming or bus failure, it will recommence every time it is restarted. The ongoing calibration is displayed in the Status byte by a 1 in bit 4.

| **Important** |
| --- |
| The Weather Station has a $U_n$ = 24 V DC output voltage to power the sensors.<br>Make sure that the maximum output current is not exceeded. |

### 2.2.1 Voltage signals

| Sensor signal | Resolution | Accuracy at 25 °C $T_U$*1 | Accuracy at -5…45 °C $T_U$*1 | Accuracy at -20…70 °C $T_U$*1 | Remark |
|---|---|---|---|---|---|
| 0…1 V | 200 µV | ±0.2 %<br>±1 mV | ±0.5 %<br>±1 mV | ±0.8 %<br>±1 mV | |
| 0…5 V | 200 µV | ±0.2 %<br>±1 mV | ±0.5 %<br>±1 mV | ±0.8 %<br>±1 mV | |
| 0…10 V | 200 µV | ±0.2 %<br>±1 mV | ±0.5 %<br>±1 mV | ±0.8 %<br>±1 mV | |
| 1…10 V | 200 µV | ±0.2 %<br>±1 mV | ±0.5 %<br>±1 mV | ±0.8 %<br>±1 mV | |

*1 of current measured value at ambient temperature ($T_U$)

### 2.2.2 Current signals

| Sensor signal | Resolution | Accuracy at 25 °C $T_U$*2 | Accuracy at -5…45 °C $T_U$*2 | Accuracy at -20…70 °C $T_U$*2 | Remark |
|---|---|---|---|---|---|
| 0…20 mA | 2 µA | ±0.2 %<br>±4 µA | ±0.5 %<br>±4 µA | ±0.8 %<br>±4 µA | |
| 4…20 mA | 2 µA | ±0.2 %<br>±4 µA | ±0.5 %<br>±4 µA | ±0.8 %<br>±4 µA | |

*2 of current measured value at ambient temperature ($T_U$)

### 2.2.3 Resistance signals

| Sensor signal | Resolution | Accuracy at 25 °C $T_U$*3 | Accuracy at -5…45 °C $T_U$*3 | Accuracy at -20…70 °C $T_U$*3 | Remark |
|---|---|---|---|---|---|
| 0…1,000 ohms | 0.1 ohm | ±1.0 ohm | ±1.5 ohms | ±2 ohms | |
| PT100*4 | 0.01 ohm | ±0.15 ohm | ±0.2 ohm | ±0.25 ohm | 0.1 ohm = 0.25 °C |
| PT1000*4 | 0.1 ohm | ±1.5 ohms | ±2.0 ohms | ±2.5 ohms | 1 ohm = 0.25 °C |
| KT/KTY 1,000*4 | 1 ohm | ±2.5 ohms | ±3.0 ohms | ±3.5 ohms | 1 ohm = 0.125 °C/at 25 °C |
| KT/KTY 2,000*4 | 1 ohm | ±5 ohms | ±6.0 ohms | ±7.0 ohms | 1 ohm = 0.064 °C/at 25 °C |

*3 in addition to current measured value at ambient temperature ($T_U$)

*4 plus feeder cable and sensor faults

**PT100**

The PT100 is precise and exchangeable but subject to faults in the feeder cables (cable resistance and heating of the feeder cables). A terminal resistance of just 200 milliohm causes a temperature error of 0.5 °C.

**PT1000**

The PT1000 responds just like the PT100, but the influences of feeder cable errors are lower by a factor of 10. Use of this sensor is preferred.

**KT/KTY**

The KT/KTY has a low level of accuracy, can only be exchanged under certain circumstances and can only be used for very simple applications.

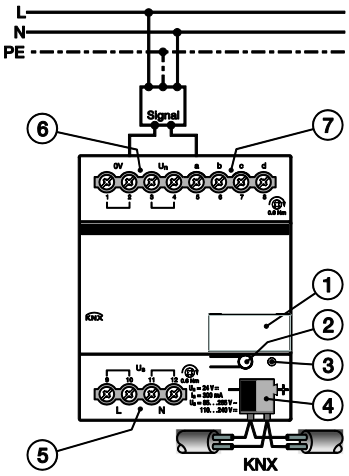
Please note that there are different tolerance classes for the sensors in the versions PT100 and PT1000.

The table indicates the individual classes:

| Description | Tolerance |
|---|---|
| DIN class A | 0.15 + (0.002 x t) |
| 1/3 DIN class B | 0.10 + (0.005 x t) |
| 1/2 DIN class B | 0.15 + (0.005 x t) |
| DIN class B | 0.30 + (0.005 x t) |
| 2 DIN class B | 0.60 + (0.005 x t) |
| 5 DIN class B | 1.50 + (0.005 x t) |
| t = Current temperature | |

## 2.3 Connection schematics

### Connecting sensor with an external supply

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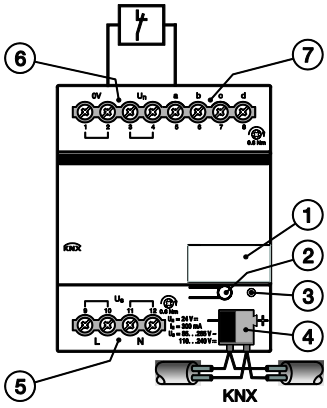
### Connecting a floating contact

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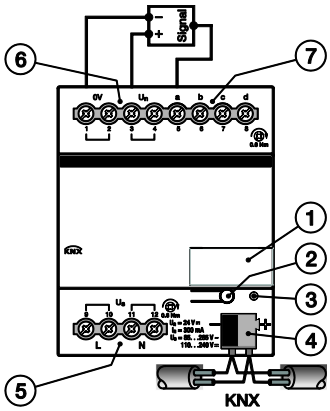
### Connecting a 3-conductor sensor with its own power supply

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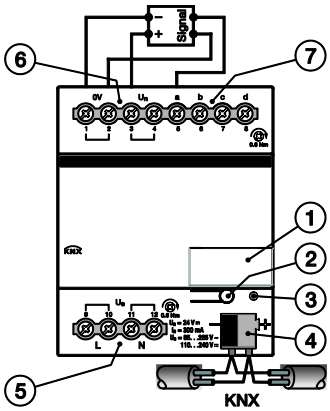
### Connecting a 4-conductor sensor with its own power supply

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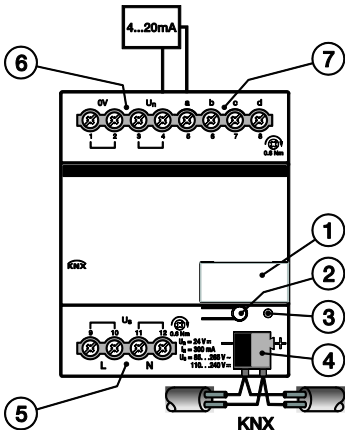
**Connecting a 4…20 mA sensor**

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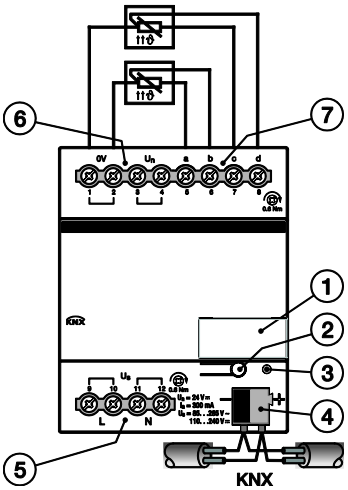
**Connecting a PT100/PT1000 3-conductor temperature sensor**

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**1** Label carrier

**2** *Programming* button

**3** *Programming* LED ● (red)

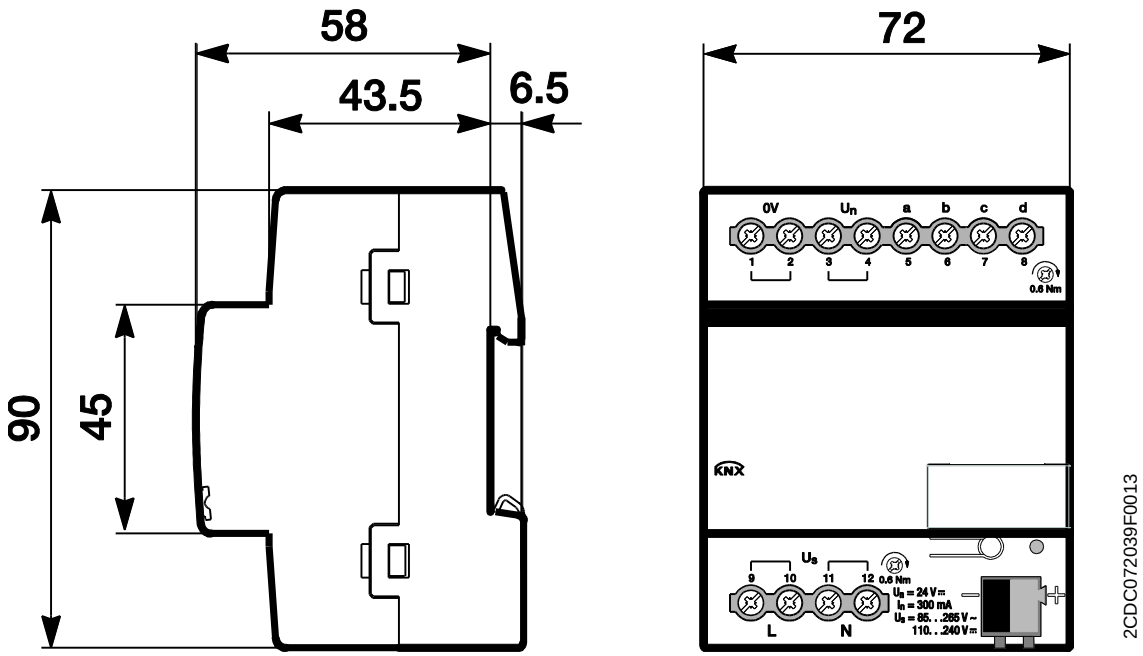
**4** Bus connection terminal

**5** Power supply

**6** Auxiliary voltage output for sensor supply

**7** Sensor input

## 2.4 Dimension drawing



## 2.5 Mounting and installation

The device is a modular installation device for quick installation in distribution boards on 35 mm mounting rails to DIN EN 60 715.

The installation position can be selected as required.

The electrical connection is implemented using screw terminals. The connection to the bus is implemented using the supplied bus connection terminal. The terminal assignment is located on the housing.

The device is ready for operation once the mains voltage and the bus voltage have been applied.

Accessibility to the device for the purpose of operation, testing, visual inspection, maintenance and repair must be provided compliant to DIN VDE 0100-520.

**Attention**

The sensor manufacturer's technical data must be observed for optimum measuring or monitoring values. The same applies to the specifications with regard to equipment for lightning protection.

**Commissioning requirement**

In order to commission the device, a PC with ETS as well as a connection to the ABB i-bus®, e.g. via a KNX interface, is required.

The device is ready for operation after connection to the bus voltage. Additional auxiliary voltage is required.

**Important**

The maximum permissible current of a KNX line must not be exceeded.
During planning and installation ensure that the KNX line is correctly dimensioned.
The device features a maximum current consumption of 12 mA.

Mounting and commissioning may only be carried out by electrical specialists. The appropriate standards, directives, regulations and specifications for the appropriate country should be observed when planning and setting up electrical installations and security systems for intrusion and fire detection.

- Protect the device from damp, dirt and damage during transport, storage and operation.
- Only operate the device within the specified technical data!
- The device should only be operated in an enclosed housing (distribution board)!
- The voltage supply to the device must be switched off before mounting work is performed.

**Danger**

All poles must be disconnected when expanding or modifying the electrical connections.

### Supplied state

The device is supplied with the physical address 15.15.255. The application is pre-installed. It is therefore only necessary to load group addresses and parameters during commissioning.

The complete application can be reloaded if required. Downloads may take longer after a change of application or a discharge.

### Assignment of the physical address

The assignment and programming of the physical address is carried out in ETS.

The device features a *Programming* button for assignment of the physical address. The red *Programming* LED lights up after the button has been pressed. It goes off as soon as ETS has assigned the physical address or the *Programming* button is pressed again.

### Download reaction

Depending on the PC which is used, the progress bar for the download may take up to one and a half minutes to appear, due to the complexity of the device.

### Cleaning

The voltage supply to the device must be switched off before cleaning. If devices become dirty, they can be cleaned using a dry cloth or a cloth dampened with a soapy solution. Corrosive agents or solutions should never be used.

### Maintenance

The device is maintenance-free. In the event of damage repairs should only be carried out by an authorized person, e.g. during transport and/or storage.

# 3 Commissioning

The *Weather Data 4f* application and ETS Engineering Tool Software are used to parameterize the device. The application provides the device with a comprehensive and flexible range of functions. The standard settings allow simple commissioning. The functions can be expanded if required.

## 3.1 Overview

The following functions can be selected for each of the four inputs:

| | |
|---|---|
| **Sensor type (type of input signal)** | All conventional sensors with an output signal of 0…1 V, 0…5 V, 0…10 V, 1…10 V, 0…20 mA, 4…20 mA, 0…1,000 ohms, 2-conductor PT100s and 2 and 3-conductor PT1000s or a range of KT/KTY sensors can be connected. Furthermore, user-defined KTY sensors can be matched to the device. Floating contacts can also be processed. |
| **Signal correction/displacement** | The sensor signal can be corrected or displaced. |
| **Measurement range** | Flexible setting option for the upper and lower measuring limits dependent on the sensor's output signal. The measuring curve can be linearly adapted between the upper and lower measuring limits. |
| **Output value** | Flexible setting options for the output value. Upper and lower measuring limits dependent on the sensor's output signal. |
| **Data types of the output value** | The output value can be sent as a 1-bit value [0/1], 1-byte value [0...+255], 1-byte value [-128...+127], 2-byte value [0...+65,535], 2-byte value [-32,768...+32,767], 2-byte value (floating point) or 4-byte value (IEEE floating point). |
| **Filtering** | The output value is "smoothed" via the mean value. The mean values can be averaged over 1, 4, 16 or 64 measurements. One measurement is made per second. |
| **Threshold** | Two thresholds can be set, each with an upper and lower limit. The limits can be modified via the bus. |
| **Calculation** | There are four calculation objects available. It is thus possible to compare two output values or calculate the arithmetic mean. The options less than, greater than, addition, subtraction and averaging are available. |
| **Logic functions** | Logic functions such as AND and OR logic gates. There are 4 inputs available per logic function. These can be linked with 2 external inputs. The inputs and outputs can be inverted. |

## 3.2 Parameters

The ETS Engineering Tool Software is used for parameterizing the device.

The application is in the ETS *Catalogs* window under *Manufacturers/ABB/Input/Weather Data 4-fold*.

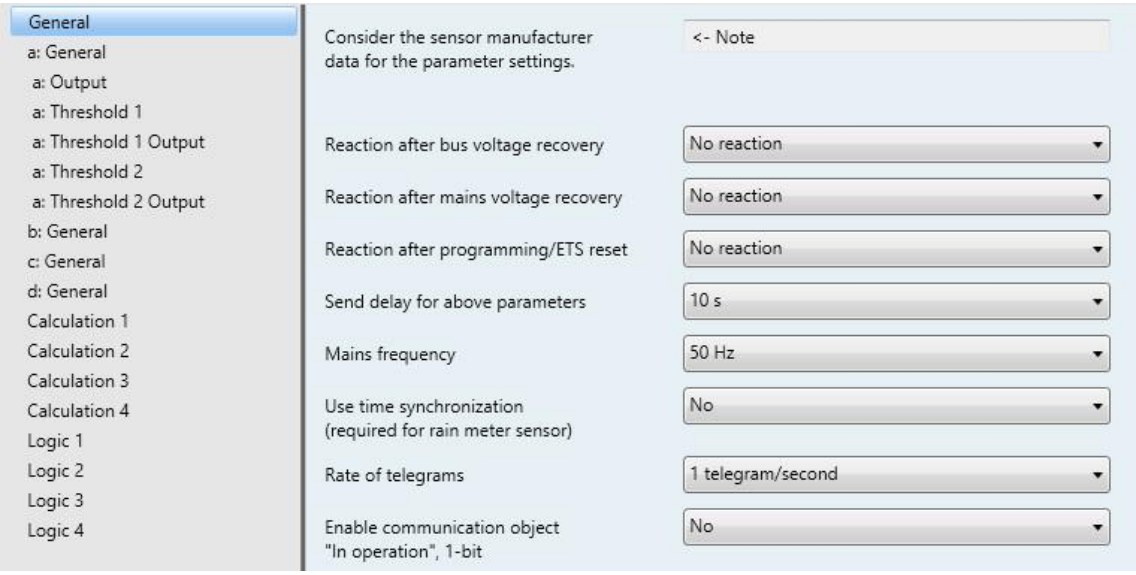
The following chapter describes the parameters of the device using the parameter windows. Parameter windows are structured dynamically so that further parameters may be enabled depending on the parameterization and the function.

The default values of the parameters are underlined, e.g.:

Options: Yes
No

### 3.2.1 Parameter window *General*

Higher level parameters can be set in the parameter window *General*.




**Consider the sensor manufacturer data for the parameter settings.**

| **Important** |
| --- |
| The specifications of the sensor manufacturer must be observed to ensure perfect functioning of the device. Furthermore, the manufacturer's specifications should be consulted for the parameter settings.<br>On the connected sensors, ensure, for example, that the upper limits of 12 V with voltage signals and 25 mA with current signals are not exceeded. |

**Reaction after bus voltage recovery**

**Reaction after mains voltage recovery**

**Reaction after programming/ETS reset**

Options: No reaction
Send object values immediately
Send object values with a delay

The parameters are used to set the reaction after bus voltage recovery, mains voltage recovery and programming or an ETS reset.

- *No reaction*: No object values are sent. After bus voltage recovery, mains voltage recovery, programming or an ETS reset, none of the object values (Output values, Thresholds, Calculation values, Measured value out of range, In operation and Status byte) are sent to the bus, i.e. a visualization is not refreshed. The object values are sent to the bus as early as possible according to the parameterized settings.
- *Send object values immediately:* The object values are sent immediately. After bus voltage recovery, mains voltage recovery, programming or an ETS reset, the individual object values (Output values, Thresholds, Calculation values, Measured value out of range, In operation and Status byte) are sent to the bus immediately. This ensures, for example, that visualizations display a current process map.
- *Send object values with a delay: The* object values are sent with a delay. After bus voltage recovery, mains voltage recovery, programming or an ETS reset, the individual object values (Output values, Thresholds, Calculation values, Measured value out of range, In operation and Status byte) are sent to the bus are a delay. Thus the process map is sent with a delay, e.g. to control the bus load in a KNX system.

The *Send delay* is set separately and applies to both the parameters *Reaction after bus voltage recovery* and *Reaction after programming/ETS reset*.

**How does the device react if the bus voltage recovers before the mains voltage?**

As the circuit is supplied with power from the mains voltage, it cannot react to the bus voltage recovery. The circuit cannot be activated yet.

If the mains voltage recovers and the bus voltage is already available then the reaction after mains voltage recovery is undertaken.

**How does the device react if the mains voltage recovers before the bus voltage?**

Case 1: Option *Send object values immediately*

The telegrams are sent immediately. As the bus voltage is still absent, no telegrams are visible. Should the bus voltage then recover, the reaction in accordance with the setting of the option for bus voltage recovery is applied.

Case 2: Option *Send object values with a delay*

The reaction depends on the option for bus voltage recovery.

Option *No reaction*

The ongoing send delay is not interrupted.

Option *Send object values immediately*

The ongoing send delay is interrupted and sending is implemented immediately.

Option *Send object values with a delay*

The ongoing send delay is retriggered. Sending is undertaken after the new send delay time.

**How does sending values function?**

Generally, the send options of the individual sensors tend to overlap with the options that are possible for mains voltage recovery or programming.

| **Example** |
| --- |
| Should a temperature sensor be parameterized to send cyclically every 5 seconds, it will do so after mains voltage recovery, regardless of the option selected for mains voltage recovery.<br>As a direct contrast, the rain sensor that is to send when there is a change might not send for weeks, provided that it does not rain during this time, because its object value has not changed. |

With the options in parameter *Reaction after...*, it is possible after an event (mains voltage recovery, programming and bus voltage recovery) that the complete process map of the sensor (output values and thresholds) is either sent immediately or after a defined send delay. This ensures that all relevant information is guaranteed to be sent at least once after an event (e.g. for use by a visualization system).

**What is an ETS reset?**

Generally an ETS reset is defined as a reset of the device via the ETS. The ETS reset is triggered in the ETS under the menu item *Commissioning* with the function *Reset device*. This stops and restarts the application.

**Send delay for above parameters**

Options: 5 s/10 s/20 s/30 s/60 s

The send delay time determines the time between bus voltage recovery, programming/ETS reset and the time from which the telegrams should be sent with a delay. When the device has been started, the following communication objects also send a telegram after the set delay.

- The communication object *In Operation – General* sends an *In operation* telegram with the value 1 or 0 (adjustable).
- The communication object *Status byte – General* sends a *Status byte* telegram with the current value (state). Each bit is assigned with information.

**For further information see: Appendix**

| **Note** |
| --- |
| The settings in the parameters only have an effect on the parameters *Reaction after bus voltage recovery* and *Reaction after programming/ETS reset*. If the option *No reaction* is set in each of the parameters, the selected send delay has no function.<br>No telegrams are sent during the send delay in progress in the initialization phase. Value Read telegrams are also answered during the delay time.<br>Incoming telegrams to the communication object, e.g. *Request output value*, are not considered here. The send delay times should be coordinated to the entire KNX system. |

**How does the send delay function?**

The sensor inputs are evaluated and telegrams are received during the send delay. The received telegrams are processed immediately, and the object values of the outputs change immediately if necessary. However, no telegrams are sent on the bus.

If during the Send delay objects are read via the Value Read telegrams, e.g. by visualization systems, immediately thereafter the corresponding Value Respond telegrams are sent and not just after the Send delay has timed out.

After the *Send delay* has timed out, all object values to be sent are sent on the bus.

**Mains frequency**

Options: 50 Hz
60 Hz

This parameter defines the mains frequency.

**Use time synchronization (required for rain meter sensor)**

Options: No
Yes

This parameter sets the time synchronization for the rain meter sensor.

| **Note** |
| --- |
| *Synchronization* is required for timely resetting of the pulses on the rain meter sensor. |

- *Yes*: External timer available. If the Weather Station has not received a time telegram in the last 25 hours, then bit 6 is set from 0 to 1 in the communication object *Status byte – General*.
- *No*: No external timer available. If no *Synchronization* is available, then the internal clock will be set to 00:00:00 when the device is started, i.e. the options *Daily* and *Hourly* in the parameter *Reset pulse counting* are not synchronous with real time.

**Rate of telegrams**

Options: 1/2/3/5/10/20 telegrams/second

To control the bus load, this parameter can be used to limit the rate of telegrams per second.

| **Example** |
| --- |
| With the setting *5 telegrams/second* a maximum of five telegrams can be sent in a second. |

**Enable communication object "In operation", 1-bit**

Options: No
Yes

- *Yes*: The 1-bit communication object *In operation* is enabled.

  Dependent parameter:

  **Send**

  Options: Value 0
  Value 1

  **Sending cycle time in s [1...65,535]**

  Options: 1...60...65,535

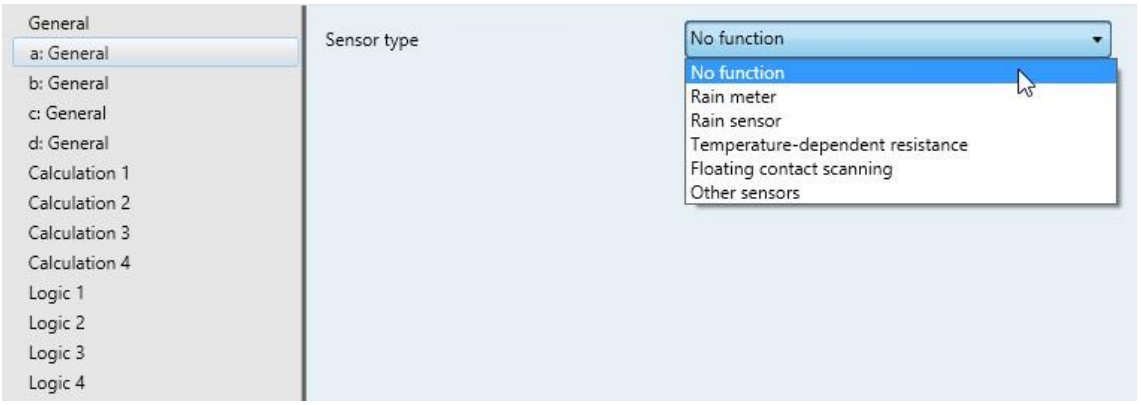
  Here a time interval is set, which the communication object *In operation* uses to cyclically send a telegram.

| **Note** |
| --- |
| After bus voltage recovery, the communication object sends its value after the set sending and switching delay time. |

### 3.2.2 Parameter window *a: General*

The sensor type is set in the parameter window *a: General*.

The specifications below also apply to parameter windows *b...d: General*.




**Sensor type**

Options: No function
Rain meter
Rain sensor
Temperature-dependent resistance
Floating contact scanning
Other sensors

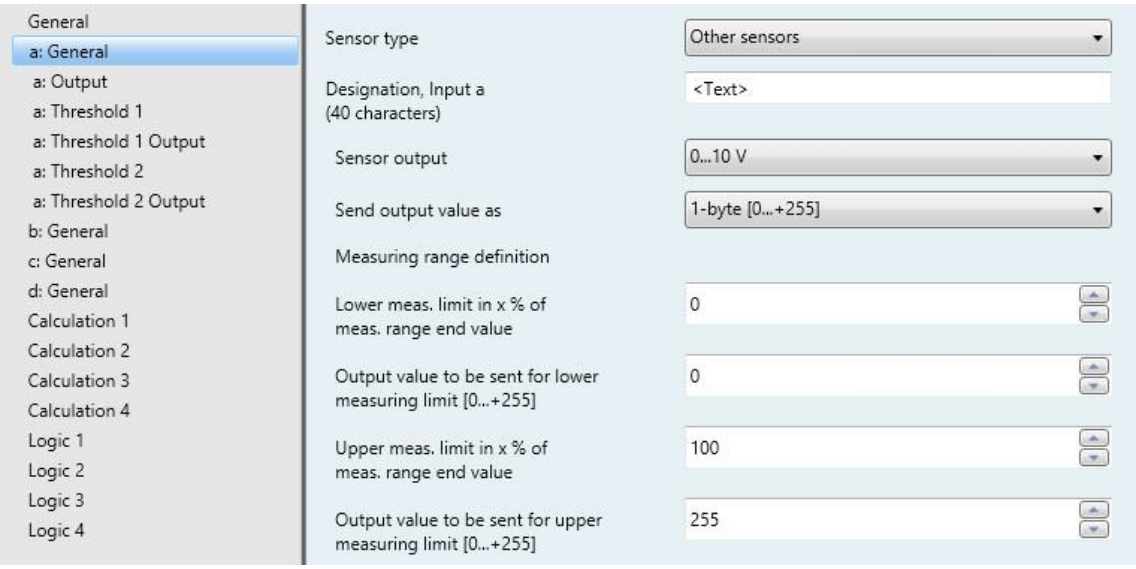
The sensor type is set with this parameter.

The appropriate parameters are enabled according to the selected sensor type.

### 3.2.3 Parameter window *a: General* with sensor type: *Other sensors*

Setting options for sensor type *Other sensors*.

The specifications below also apply to parameter windows *b...d: General*.




**Designation, Input a (40 characters)**

Options: < Text >

With this parameter, it is possible to enter a text of up to 40 characters in length for identification in the ETS.

Input, for example: twilight sensor, humidity sensor, brightness sensor, air pressure sensor, pyranometer (light intensity), wind speed sensor or wind direction sensor.

| **Note** |
| --- |
| The text field allows you to enter information such as which function is assigned to which input. The text is purely for informative purposes and has no further function. |

Selection of the option *Other sensors* in the parameter *Sensor type*.

Dependent parameters:

**Sensor output**

Options:
0…1 V
0…5 V
<u>0…10 V</u>
1…10 V
0…20 mA
4…20 mA
0…1,000 ohms

With this parameter the input range of the connected sensor is set to the sensor output.

**Send output value as**

Options:
<u>1-byte [0...+255]</u>
1-byte [-128...+127]
2-byte [0...+65,535]
2-byte [-32,768…+32,767]
2-byte (floating point)
4-byte (IEEE floating point)

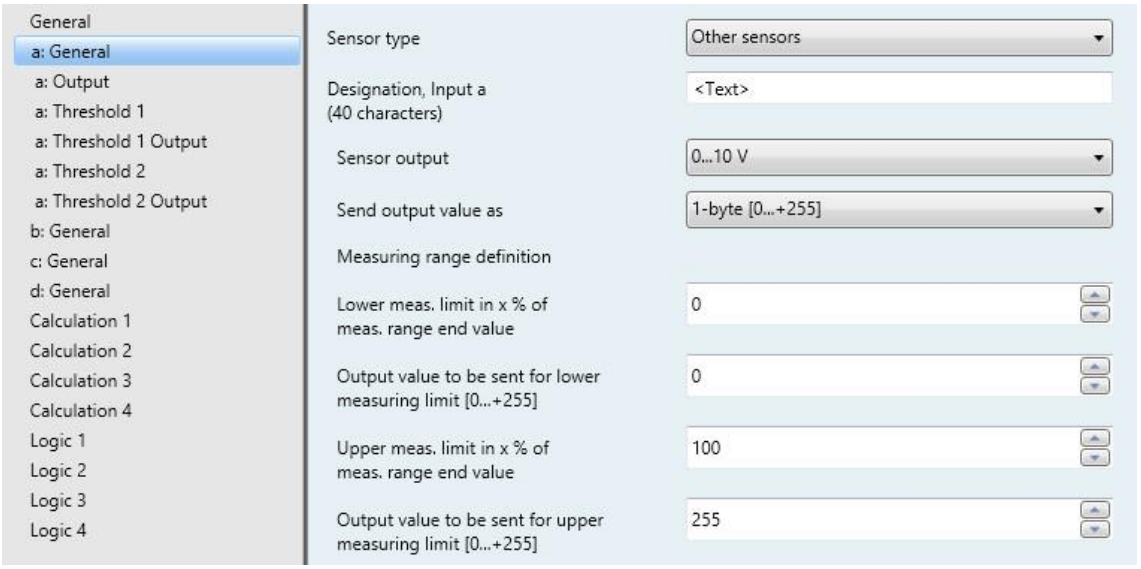
This parameter defines in which format the output value should be sent.

If the option *2-byte (floating point)* or *4-byte (IEEE floating point)* is set, then the *Factor for the output values and thresholds* parameter will also appear at the bottom of the parameter window.

**What is the output value?**

The device records a sensor measured value, converts it according to the set parameters and sends it on the bus. This sent value is designated as the output value.

**Measuring range definition**




The following four parameters are dependent on the parameter *Send output value as*.

The preset values change dependent on the selected option. With the options *2-byte (floating point)* or *4-byte (IEEE floating point)* the additional *Factor for the output values and thresholds* parameter appears.

The following description is an example for all adjustable options.

**Lower meas. limit in x % of meas. range end value**

Options: 0...100

**Upper meas. limit in x % of meas. range end value**

Options: 0...100

Using both of these parameters the lower and upper measuring limits in x % of the measuring range end value are set. If the set upper and lower measuring limits are exceeded or not achieved, the communication object *Measured value out of range – Input a* sends a 1. If the measured value is back between the limits, the communication object sends a 0.

**What is the measuring range end value?**

The measuring range end value is used to define the maximum voltage, current, resistance value or temperature value which is set in the *Sensor output* parameter, e.g. a sensor with signal output from 0...10 V has a measuring range end value of 10 V.

**Output value to be sent for lower measuring limit [0...+255]**

Options: 0...255

**Output value to be sent for upper measuring limit [0...+255]**

Options: 0...255

Using both these parameters the output values to be sent for upper and lower measuring limits [0...+255] are set. The measuring curve between the upper and lower measuring limits is linear.

**What is the measuring limit?**

Using the measuring limit, you define up to which set values the device is to evaluate the signal of the connected sensor. Both an upper and a lower measuring limit can be set.

| **Example** |
| --- |
| A sensor with a measuring range of 0...1,000 ohms is connected, but the measuring curve should only be evaluated between 10 and 90 % (100...900 ohms). In this case the measuring limits are between 100 and 900 ohms. |

Selection of option *2-byte (floating point)* for parameter *Send output value as*:

Dependent parameter:

**Factor for the output values and thresholds**

Options: 0.01
0.1
1
10
100

Selection of option *4-byte (IEEE floating point)* for parameter *Send output value as*:

Dependent parameter:

**Factor for the output values and thresholds**

Options: 0.000001
0.00001
0.0001
0.001
0.01
0.1
1
10
100
1,000
10,000
100,000
1,000,000

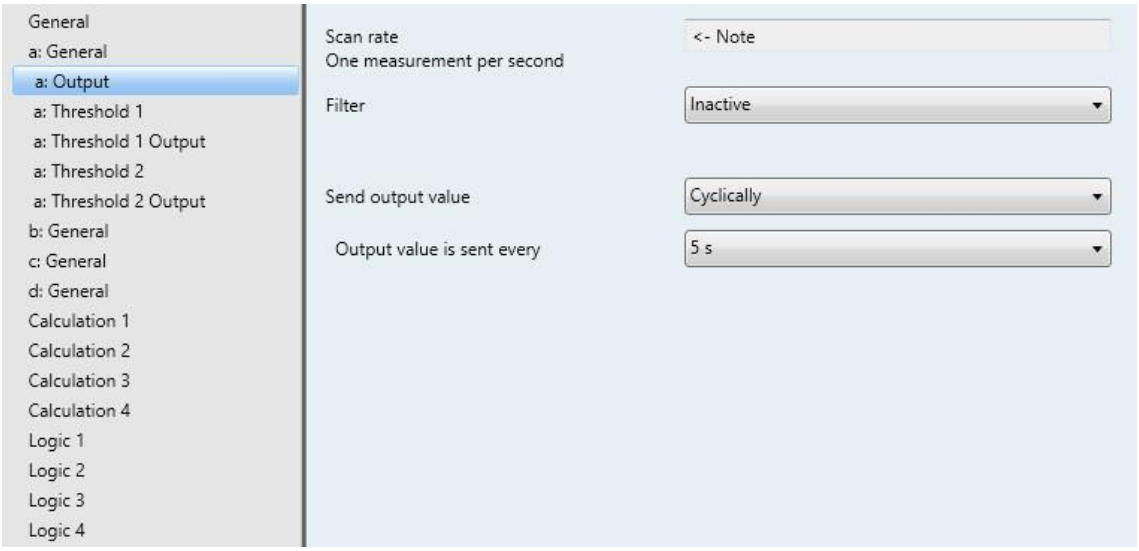
Using this parameter the factors for the output values and thresholds are set.

| **Example** |
| --- |
| Option *1*: The output value is transferred 1:1. |

By entering a factor, units can be converted, i.e. the output value corresponds to the output value to be sent multiplied by the set factor.

### 3.2.3.1 Parameter window *a: Output*

This parameter window is enabled if, in the Parameter window a: General, p. 27, a sensor type was selected.




**Scan rate**

The sensor signal of input a is measured once per second.

**Filter**

Options: Inactive
Low (mean value over 4 measurements)
Medium (mean value over 16 measurements)
High (mean value over 64 measurements)

This parameter is used for setting a filter (floating mean value filter). This can be used to set the output value as a mean value using three different options.

- *Inactive*: Filter is not active
- *Low*: Mean output value over 4 measurements
- *Medium*: Mean output value over 16 measurements
- *High*: Mean output value over 64 measurements

| **Important** |
| --- |
| By use of the filter the output value is “smoothed” via the mean value and is available for further processing. The filter thus has immediate effects on the thresholds and calculation values. The higher the degree of the filtering applied, the smoother the result. This means that the changes to the output values become slower.<br>Example: An erratic change of the sensor signal with the setting *Medium* will take 16 seconds until the output value is through. |

**Send output value**

Options: On request
On change
Cyclically
On change and cyclically

This parameter defines how the output value should be sent.

- *On request:* The output value is sent on request.

The *Request output value – Input a* communication object appears.

As soon as a 1 is received at this communication object, the current output value is sent once to the communication object *Output value – Input a*.

- *On change*: The output value is sent when a change occurs.
- *Cyclically*: The output value is sent cyclically.
- *On change and cyclically*: The output value is sent cyclically when a change occurs.

Selection of options *On change, cyclically* and *On change and cyclically*:

Dependent parameters:

**Output value is sent every**

Options: 5/10/30 s
1/5/10/30 min
1/6/12/24 h

The interval for cyclical sending is set with this additional parameter.

**Output value is sent from a x %
change in the output range**

Options: 1…2...200

Using this parameter you define from which percentage change of the output range the output value is to be sent.

With option 2 the output value is sent from a 2 % change in the output range.

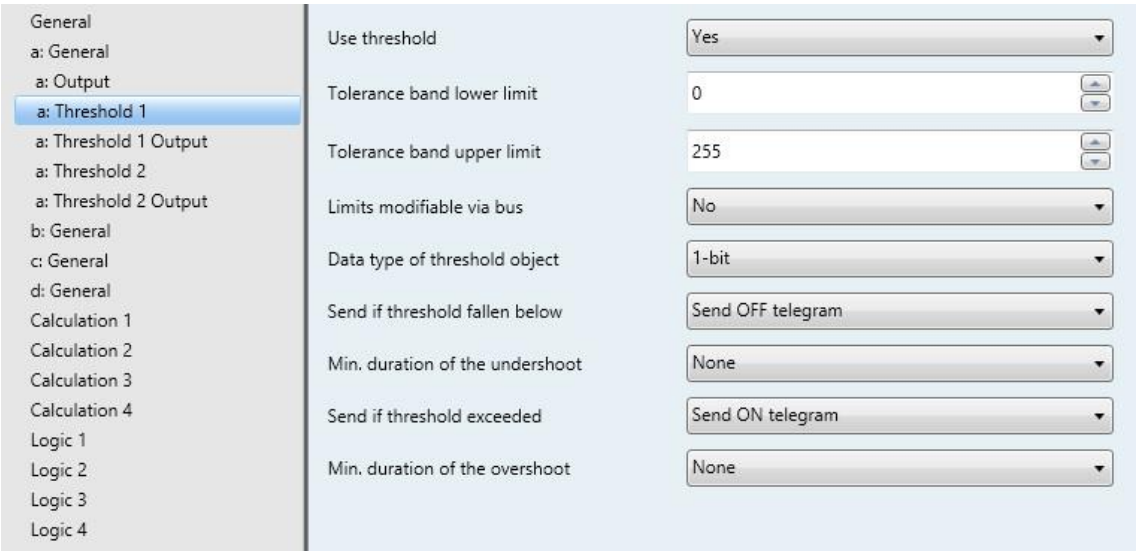
**What is the output range?**

The output range is determined by the setting options for the upper and lower measuring limits. The difference between the upper and lower measuring limits forms the output range.

| **Example** |
| --- |
| If the lower measuring limit of the sensor (0...1,000 ohms) is set to 10 % (100 ohms) and the upper measuring limit to 90 % (900 ohms), the output range is (900 ohms - 100 ohms) = 800 ohms. 2 % of 800 ohms = 16 ohms. |

### 3.2.3.2 Parameter window *a: Threshold 1*

The details in the following also apply to *b: Threshold 2 Output*.




**Use threshold**

Options: No
Yes

This parameter defines if threshold 1 should be used. If *Yes* is selected, the communication object *Threshold – Input a Threshold 1* appears.

**Tolerance band lower limit**

**Tolerance band upper limit**

Options: Dependent on parameter *Send output value as* in Parameter window a: General with sensor type: Other sensors

The upper and lower limits of the tolerance band are set via these two parameters.

**For further information see: Appendix**

| Note |
| --- |
| Depending on the setting of the parameter *Send output value as* in parameter window *a General*, different limit values are preselected (see Parameter window a: General with sensor type: Other sensors, p. 28). |

**Limits modifiable via bus**

Options: No
Yes

This parameter specifies whether the limits can be changed via the bus.

- *Yes:* The following communication objects appear:

  *Modify – Input a Threshold 1 lower limit*

  *Modify – Input a Threshold 1 upper limit.*

| **Important** |
| --- |
| The value formats of these communication objects are the same as the format set in parameter window *a: General,* under the parameter *Send output value as* (see Parameter window a: General with sensor type: Other sensors, p. 28). The value must be sent in the same format as the output value of the input. |

**Data type of threshold object**

Options: 1-bit
1-byte [0...+255]

Selection of option *1-bit:*

**Send if threshold fallen below**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

**Send if threshold exceeded**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

- *Do not send telegram:* There is no reaction.
- *Send ON telegram:* A telegram with the value 1 is sent.
- *Send OFF telegram:* A telegram with the value 0 is sent.

**Min. duration of the undershoot**

**Min. duration of the overshoot**

Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegrams are sent.

Selection of option *1-byte [0...+255]:*

**Send if threshold fallen below [0...+255]**

Options: 0...255

**Send if threshold exceeded [0...+255]**

Options: 0...255

A value of 0 to 255 can be entered in single steps.

**Min. duration of the undershoot**

**Min. duration of the overshoot**

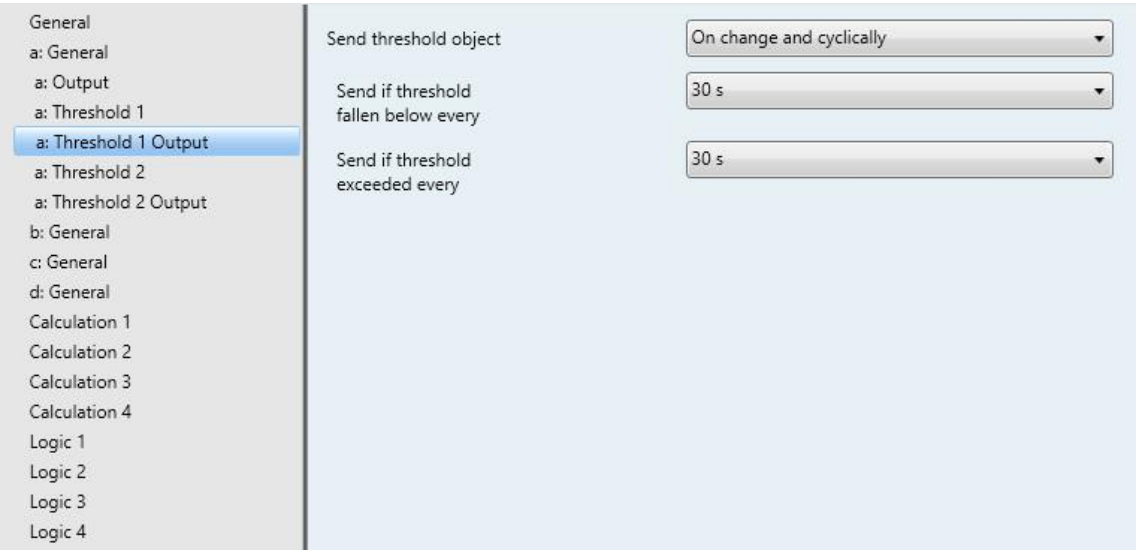
Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

### 3.2.3.3 Parameter window *a: Threshold 1 Output*

The details in the following also apply to *a: Threshold 2 Output.*




**Send threshold object**

Options: On change
<u>On change and cyclically</u>

This parameter is used to specify the send behavior of the threshold object.

- *On change*: The threshold object is sent when a change occurs.
- *On change and cyclically:* The threshold object is sent cyclically when a change occurs. The threshold object is sent cyclically until the value falls below or exceeds the other limit.

  Dependent parameters:

  **Send if threshold fallen below every**

  **Send if threshold exceeded every**

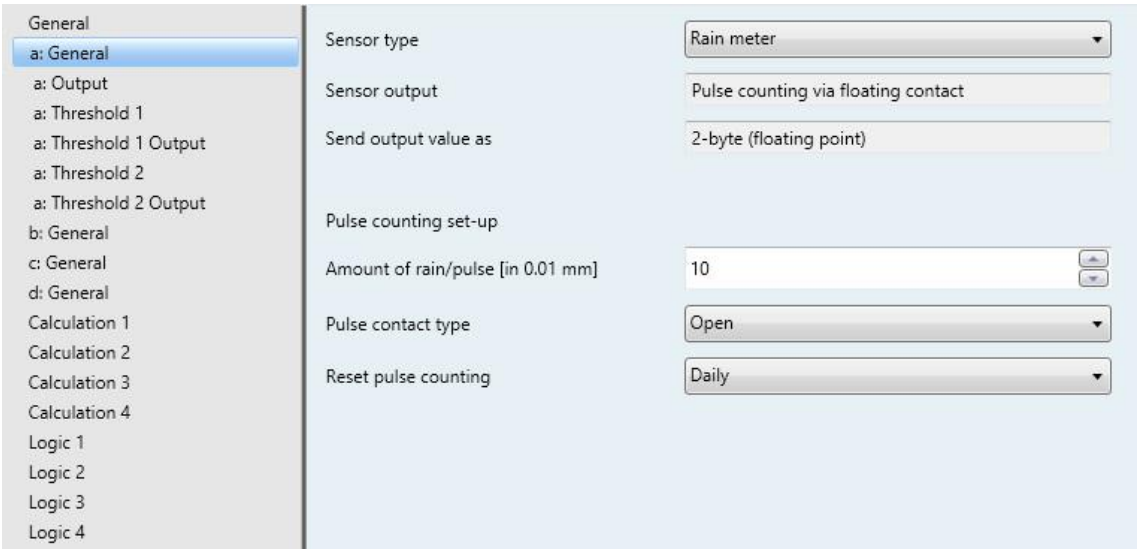
  Options: 5/10/<u>30 s</u>
  1/5/10/30 min
  1/6/12/24 h

  These two parameters are used to define the time at which cyclical sending should take place after an undershoot of the lower limit or an overshoot of the upper limit.

### 3.2.4 Parameter window *a: General* with sensor type: *Rain meter*

Setting options for sensor type *Rain meter.*

The specifications below also apply to parameter windows *b...d: General*.




Selection of the option *Rain meter* in the parameter *Sensor type*.

Dependent parameters:

**Sensor output**

This parameter is permanently set to *Pulse counting via floating contact*. The minimum pulse width is 100 ms.

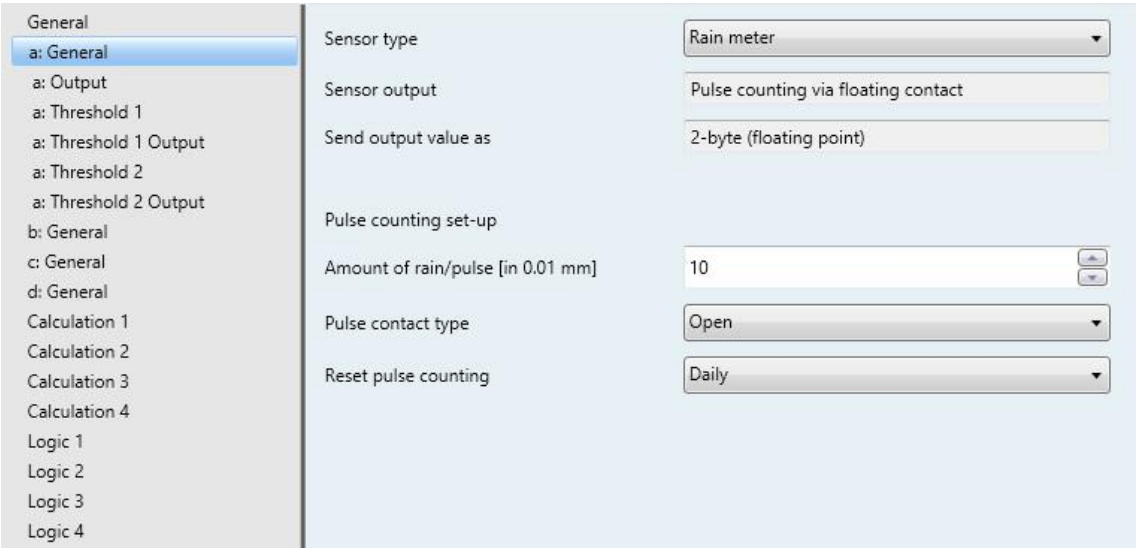
**Send output value as**

This parameter is fixed to *2-byte (floating point)*.

**What is the output value?**

The device records a sensor measured value, converts it according to the set parameters and sends it on the bus. This sent value is designated as the output value.

### Pulse counting set-up




**Amount of rain/pulse [in 0.01 mm]**

Options: 0...10...255

The amount of rain per pulse is set using this parameter.

Amount of rain = Option multiplied by 0.01

| Note |
| --- |
| Amount of rain = Option multiplied by 0.01<br>1 mm = 1 l/m$^2$ |

**Pulse contact type**

Options: Closed
Open

With this parameter, the contact is set with a pulse.

- *Closed*: Contact is closed with a pulse
- *Opened*: Contact is opened with a pulse

**Reset pulse counting**

Options: Hourly
Daily

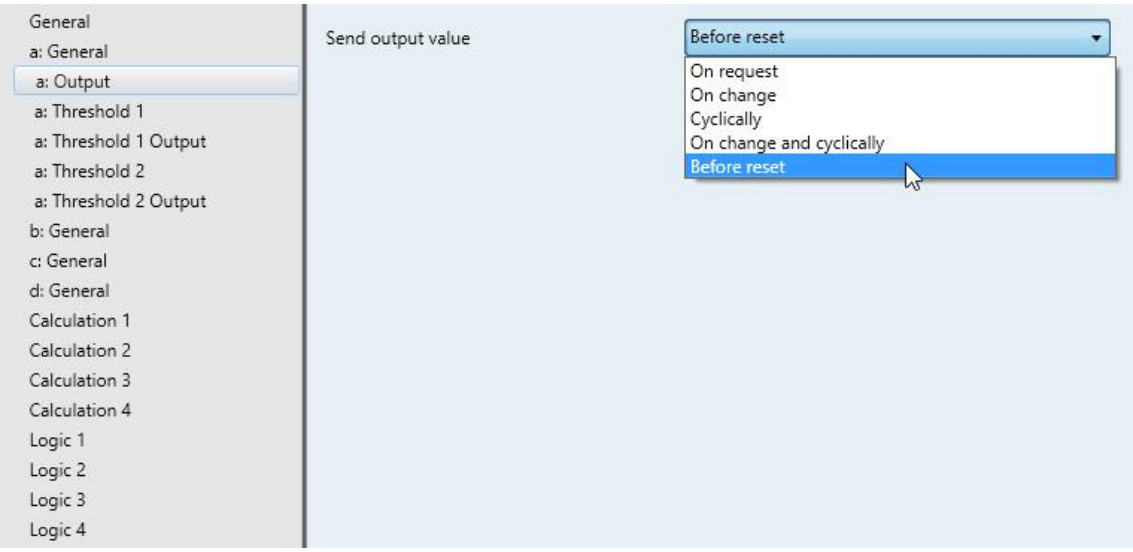
The pulse counting reset is set using these parameters.

- *Hourly*: Reset to zero at the top of each hour
- *Daily*: Reset to zero at midnight

| **Note** |
| --- |
| Time synchronization is required for timely resetting of the pulses on the rain meter sensor.<br>If no time synchronization is available, then the internal clock will be set to 00:00:00 when the device is started, i.e. the options *Daily* and *Hourly* in the parameter *Reset pulse counting* are not synchronous with real time.<br>See also the communication object *Input time - Synchronization* and the parameter *Use time synchronization*.<br>If the Weather Station has not received a time telegram in the last 25 hours, then bit 6 is set from 0 to 1 in the communication object *Status byte – General*. |

### 3.2.4.1 Parameter window *a: Output*

This parameter window is enabled if, in the Parameter window a: General, p. 27, a sensor type was selected.




**Send output value**

Options: On request
On change
Cyclically
On change and cyclically
Before reset

This parameter defines how the output value should be sent.

- *On request:* The output value is sent on request.

The *Request output value – Input a* communication object appears.

As soon as a 1 is received at this communication object, the current output value is sent once to the communication object *Output value – Input a*.

- *On change*: The output value is sent when a change occurs.
- *Cyclically*: The output value is sent cyclically.
- *On change and cyclically*: The output value is sent cyclically when a change occurs.
- *Before reset:* The output is sent before the reset.

Selection of options *On change, cyclically* and *On change and cyclically*:

Dependent parameters:

**Output value is sent every**

Options: 5/10/30 s
1/5/10/30 min
1/6/12/24 h

The interval for cyclical sending is set with this additional parameter.

**Output value is sent on a change of more than [0.1 mm]**

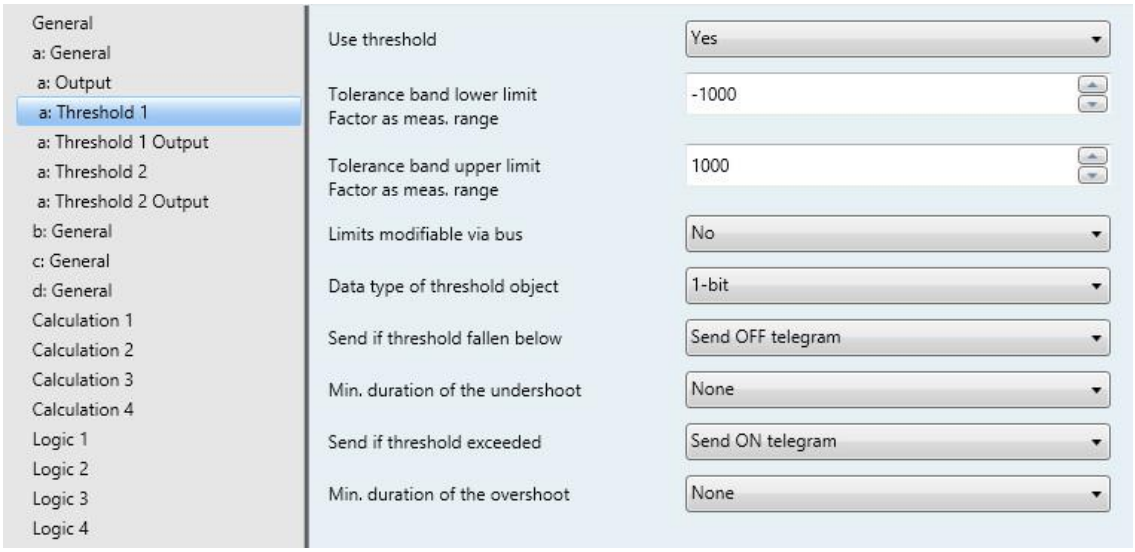
Options: 1…10...100

This parameter defines from which change in steps of 0.1 mm the output value is to be sent.

- *10*: The output value is sent after a change of 1 mm.

### 3.2.4.2 Parameter window *a: Threshold 1*

The details in the following also apply to *b: Threshold 2 Output*.




**Use threshold**

Options: No
Yes

This parameter defines if threshold 1 should be used. If *Yes* is selected, the communication object *Threshold – Input a Threshold 1* appears.

**Tolerance band lower limit**
**Factor as meas. range**

Options: -1000…1000

**Tolerance band upper limit**
**Factor as meas. range**

Options: 1000…-1000

The upper and lower limits of the tolerance band are set via these two parameters.

**For further information, see: Appendix**

**Limits modifiable via bus**

Options: No
Yes

This parameter specifies whether the limits can be changed via the bus.

- *Yes:* The following communication objects appear:

  *Modify – Input a Threshold 1 lower limit*

  *Modify – Input a Threshold 1 upper limit.*

| **Important** |
| --- |
| The value formats of these communication objects are the same as the format set in parameter window *a: General,* under the parameter *Send output value as* (see Parameter window a: General with sensor type: Rain meter, p. 39). |

**Data type of threshold object**

Options: 1-bit
1-byte [0...+255]

Selection of option *1-bit:*

**Send if threshold fallen below**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

**Send if threshold exceeded**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

- *Do not send telegram:* There is no reaction.
- *Send ON telegram:* A telegram with the value 1 is sent.
- *Send OFF telegram:* A telegram with the value 0 is sent.

**Min. duration of the undershoot**

**Min. duration of the overshoot**

Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegrams are sent.

Selection of option *1-byte [0...+255]:*

**Send if threshold fallen below [0...+255]**

Options: 0...255

**Send if threshold exceeded [0...+255]**

Options: 0...255

A value of 0 to 255 can be entered in single steps.

**Min. duration of the undershoot**

**Min. duration of the overshoot**

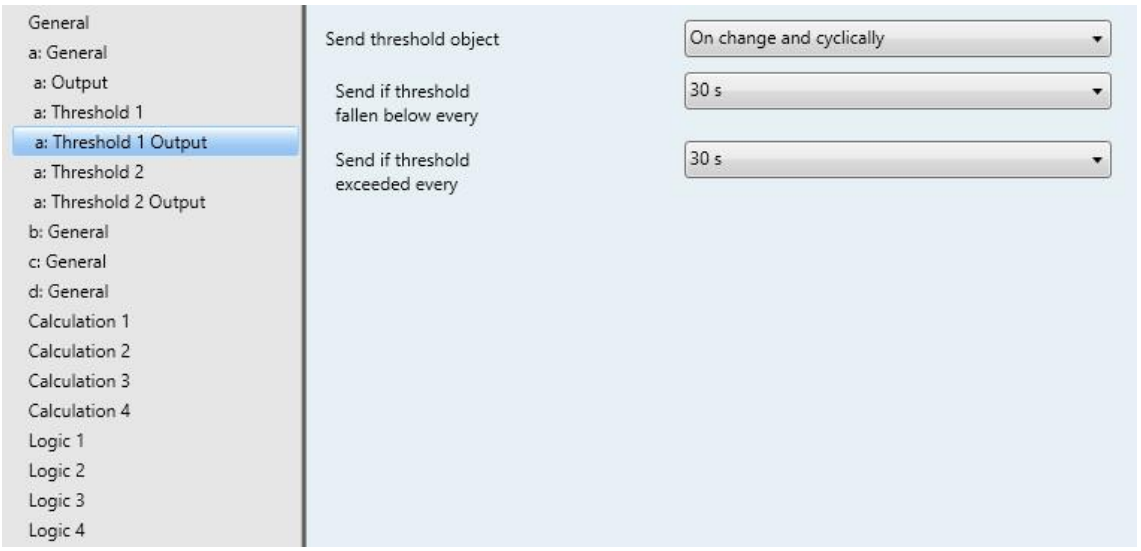
Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

### 3.2.4.3 Parameter window *a: Threshold 1 Output*

The details in the following also apply to *a: Threshold 2 Output.*




**Send threshold object**

Options: On change
<u>On change and cyclically</u>

This parameter is used to specify the send behavior of the threshold object.

- *On change*: The threshold object is sent when a change occurs.
- *On change and cyclically:* The threshold object is sent cyclically when a change occurs. The threshold object is sent cyclically until the value falls below or exceeds the other limit.

  Dependent parameters:

  **Send if threshold fallen below every**

  **Send if threshold exceeded every**

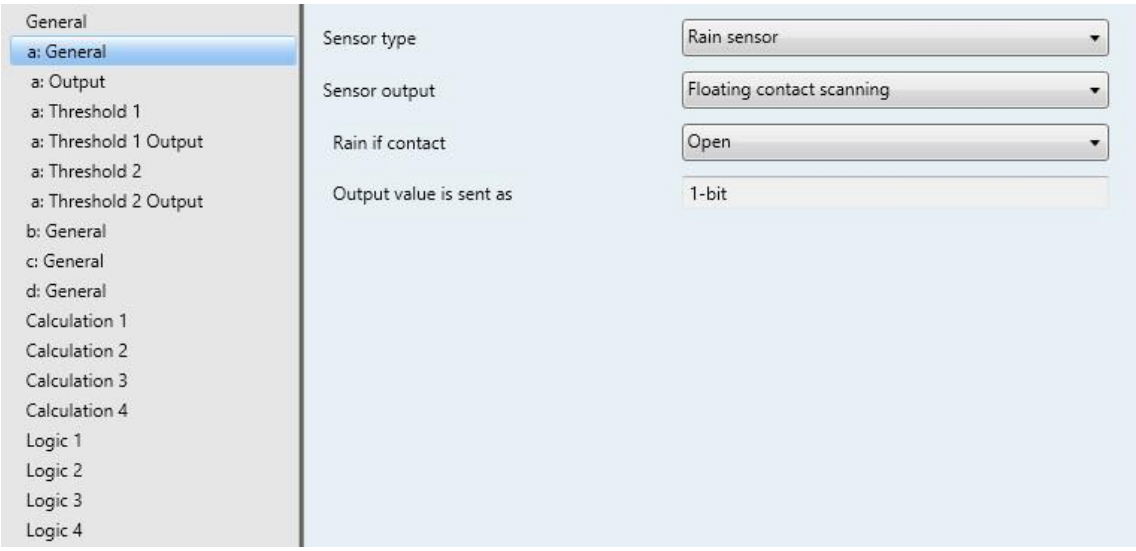
  Options: 5/10/30 s
  1/5/10/30 min
  1/6/12/24 h

  These two parameters are used to define the time at which cyclical sending should take place after an undershoot of the lower limit or an overshoot of the upper limit.

### 3.2.5 Parameter window *a: General* with sensor type: *Rain sensor*

Setting options for sensor type *Rain sensor.*

The specifications below also apply to parameter windows *b...d: General*.




Selection of the option *Rain sensor* in the parameter *Sensor type*.

**Sensor output**

Options:
0…1 V
0…5 V
0…10 V
1…10 V
0…20 mA
4…20 mA
Floating contact scanning

The *Sensor output* is set with this parameter.

Select from several voltage and current output signals and a floating contact.

The minimum pulse width is 100 ms.

The data can be found in the sensor manufacturer's technical documentation.

Selection of option *Floating contact scanning*:

Dependent parameters:

**Rain if contact**

Options: Closed
Open

With this parameter the contact, is set with a rain signal.

- *Closed:* The contact is closed when it rains.
- *Opened:* The contact is opened when it rains.

**Output value is sent as**

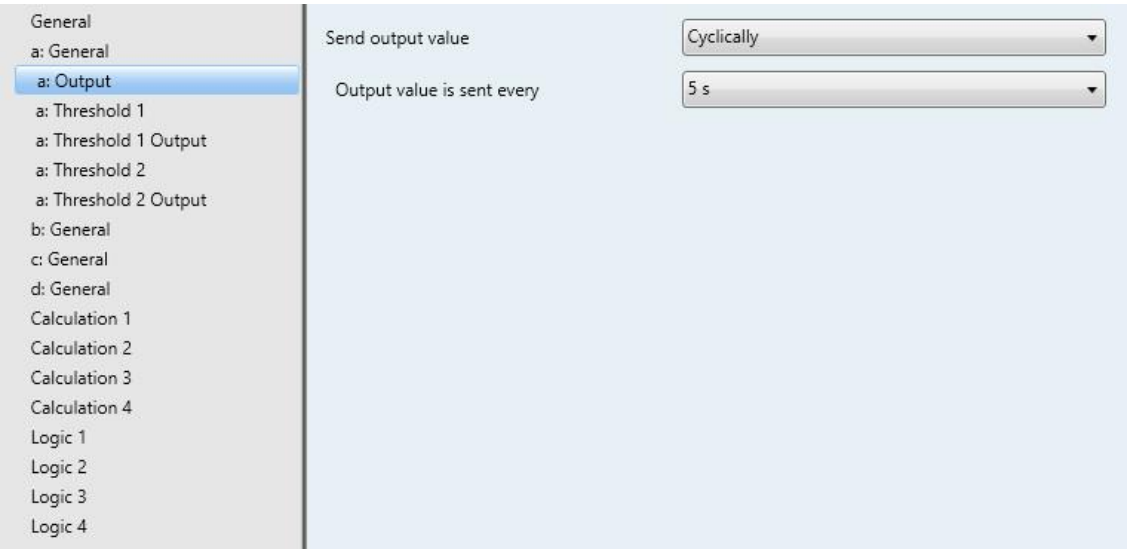
This parameter preset to 1-bit.

Bit value 0 = No rain

Bit value 1 = Rain

### 3.2.5.1 Parameter window *a: Output*

This parameter window is enabled if, in the Parameter window a: General, p. 27, a sensor type was selected.




**Send output value**

Options: On request
On change
Cyclically
On change and cyclically

This parameter defines how the output value should be sent.

- *On request:* The output value is sent on request.

The *Request output value – Input a* communication object appears.

As soon as a 1 is received at this communication object, the current output value is sent once to the communication object *Output value – Input a*.

- *On change*: The output value is sent when a change occurs.
- *Cyclically*: The output value is sent cyclically.
- *On change and cyclically*: The output value is sent cyclically when a change occurs.

Selection of options *On change, cyclically* and *On change and cyclically*:

Dependent parameters:

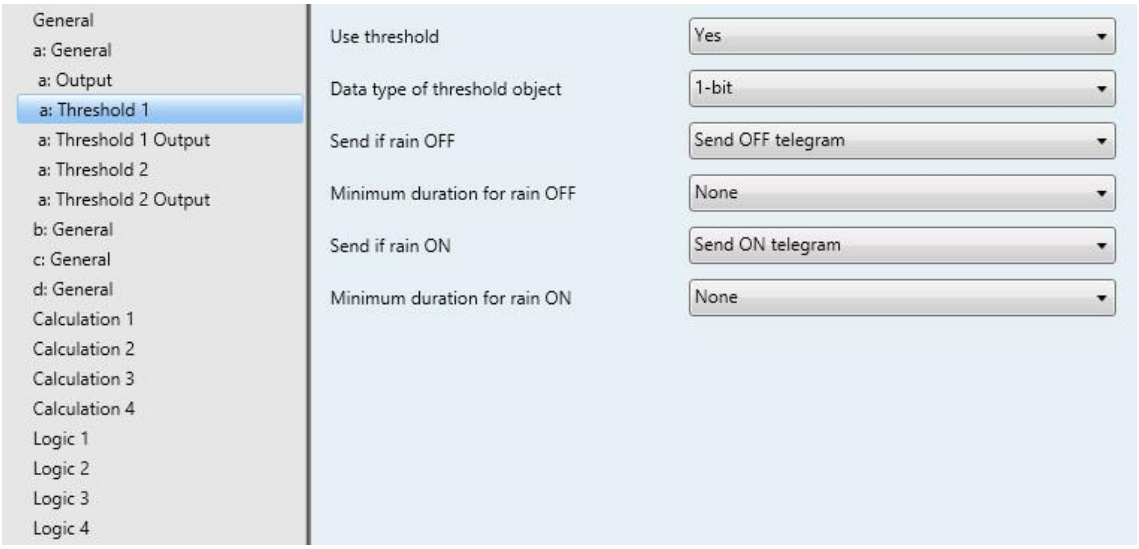
**Output value is sent every**

Options: 5/10/30 s
1/5/10/30 min
1/6/12/24 h

The interval for cyclical sending is set with this additional parameter.

### 3.2.5.2 Parameter window *a: Threshold 1*

The details in the following also apply to *b: Threshold 2 Output*.




**Use threshold**

Options: No
Yes

This parameter defines if threshold 1 should be used. If *Yes* is selected, the communication object *Threshold – Input a Threshold 1* appears.

**Data type of threshold object**

Options: 1-bit
1-byte [0...+255]

Selection of option *1-bit:*

**Send if rain OFF**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

**Send if rain ON**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

- *Do not send telegram:* There is no reaction.
- *Send ON telegram:* A telegram with the value 1 is sent.
- *Send OFF telegram:* A telegram with the value 0 is sent.

**Minimum duration for rain OFF**

**Minimum duration for rain ON**

Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None:* the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

Selection of option *1-byte [0...+255]:*

**Send if rain OFF [0…+255]**

Options: 0...255

**Send if rain ON [0…+255]**

Options: 0...255

A value of 0 to 255 can be entered in single steps.

**Minimum duration for rain OFF**

**Minimum duration for rain ON**

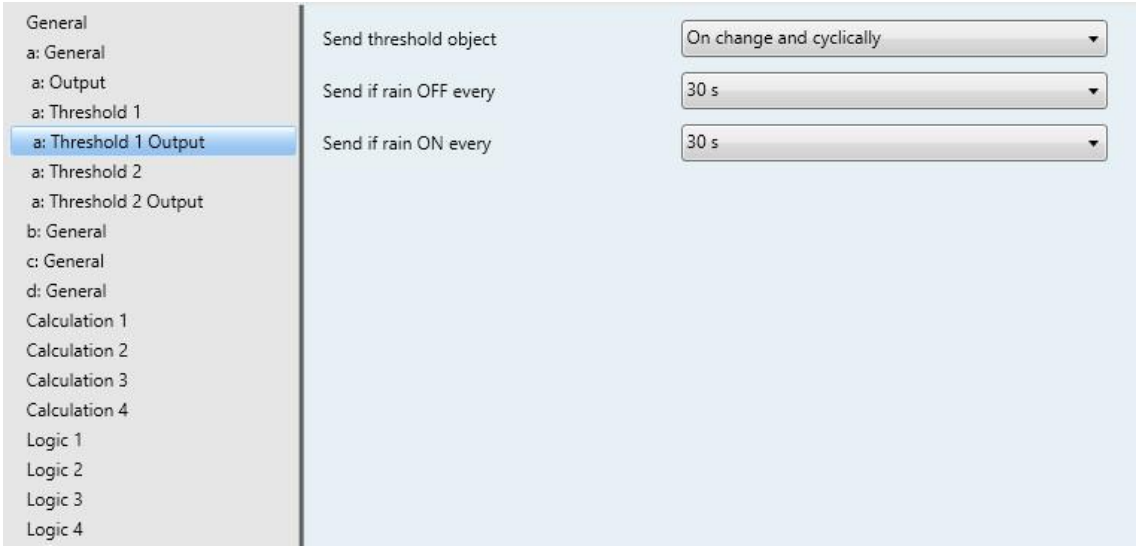
Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None:* the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

### 3.2.5.3 Parameter window *a: Threshold 1 Output*

The details in the following also apply to *a: Threshold 2 Output.*




**Send threshold object**

Options: On change
<u>On change and cyclically</u>

This parameter is used to specify the send behavior of the threshold object.

- *On change*: The threshold object is sent when a change occurs.
- *On change and cyclically:* The threshold object is sent cyclically when a change occurs. The threshold object is sent cyclically until the value falls below or exceeds the other limit.

  Dependent parameters:

  **Send if rain OFF every**

  **Send if rain ON every**

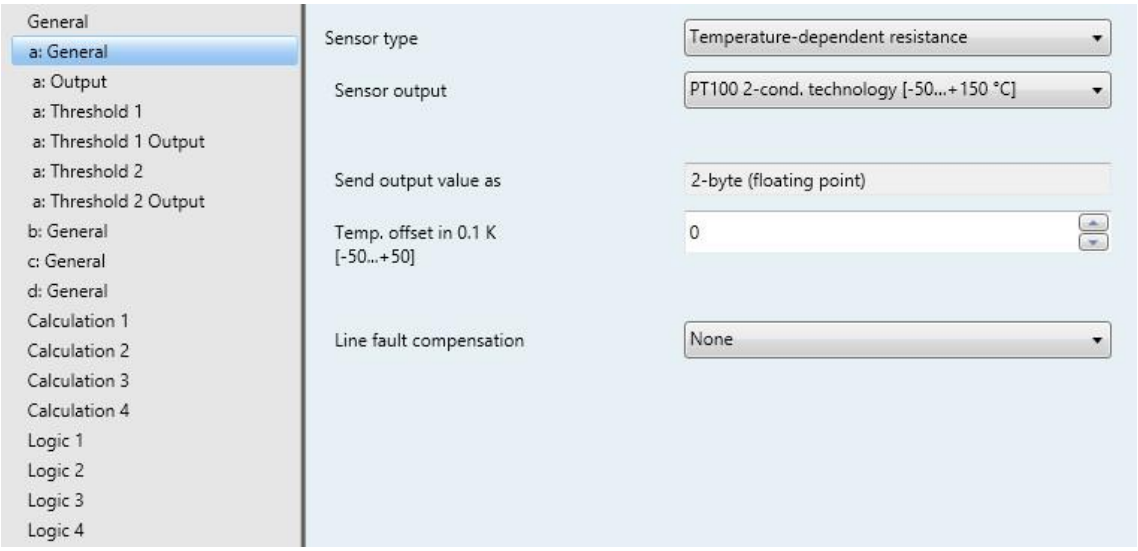
  Options: 5/10/<u>30 s</u>
  1/5/10/30 min
  1/6/12/24 h

  These two parameters are used to define the point at which cyclical sending should take place after an undershoot of the lower limit or an overshoot of the upper limit.

### 3.2.6 Parameter window *a: General* with sensor type: *Temperature-dependent resistance*

Setting options with sensor type *Temperature-dependent resistance*.

The specifications below also apply to parameter windows *b...d: General*.




Selection of option *Temperature-dependent resistance* in the parameter *Sensor type*.

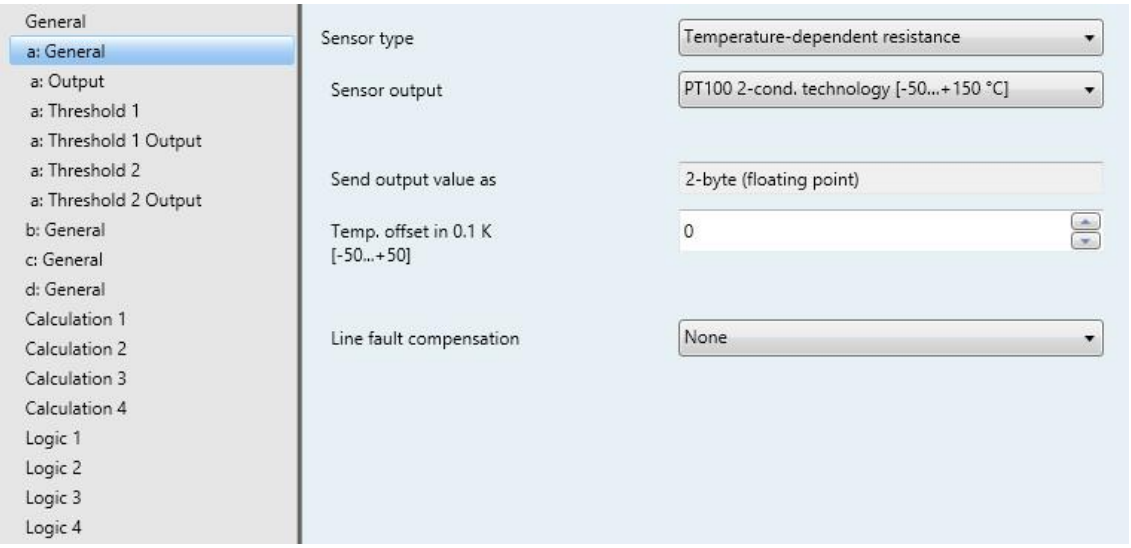
Dependent parameters:

**Sensor output**

Options: PT100 2-cond. technology [-50…+150 °C]
PT1000 2-cond. technology [-50…+150 °C]
PT100 3-cond. technology [-50…+150 °C]
PT1000 3-cond. technology [-50…+150 °C]
KT/KTY [-50…+150 °C]

The Sensor output is set with this parameter. The data can be found in the sensor manufacturer's technical documentation.

### 3.2.6.1 Sensor output parameter option: *2-conductor PT100/PT1000*




**Send output value as**

This parameter is fixed to *2-byte (floating point)*.

**What is the output value?**

The Analogue Input records a sensor measured value, converts it according to the set parameters and sends it on the bus. This sent value is designated as the output value.

**Temp. offset in 0.1 K**
**[-50...+50]**

Options: -50...0...+50

A maximum offset of ± 5 K (Kelvin) can be added to the recorded temperature with this parameter.

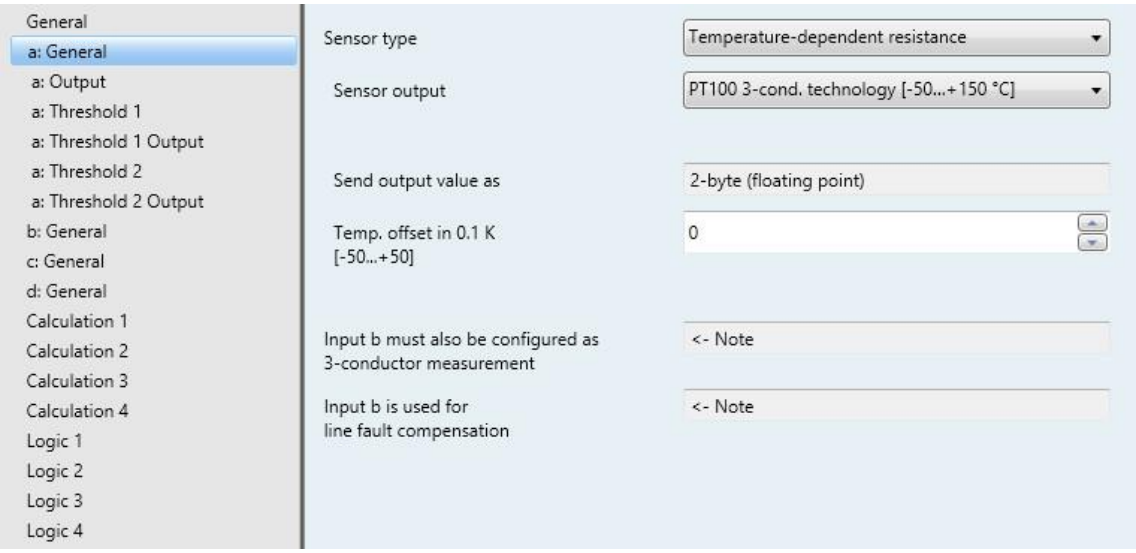
**Line fault compensation**

Options: None
Via cable length
Via cable resistance

This parameter is used for setting the line fault compensation.

Selection of options V*ia cable length* and V*ia cable resistance*: For a description, see Chapter Line fault compensation Via cable length:, p. 60 and Chapter Line fault compensation Via cable resistance, p. 61.

### 3.2.6.2 Parameter option Sensor output: *3-conductor PT100/PT1000*



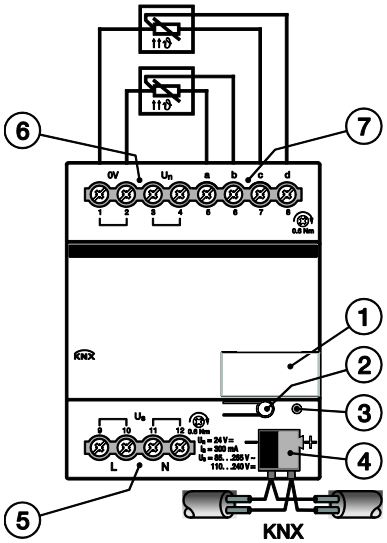

| Note |
| --- |
| For a description of the parameters, see Chapter Sensor output parameter option: 2-conductor PT100/PT1000, p. 55. |

On selecting a 3-conductor PT100 or PT1000 the following information also appears:

Input b must also be configured as 3-conductor measurement

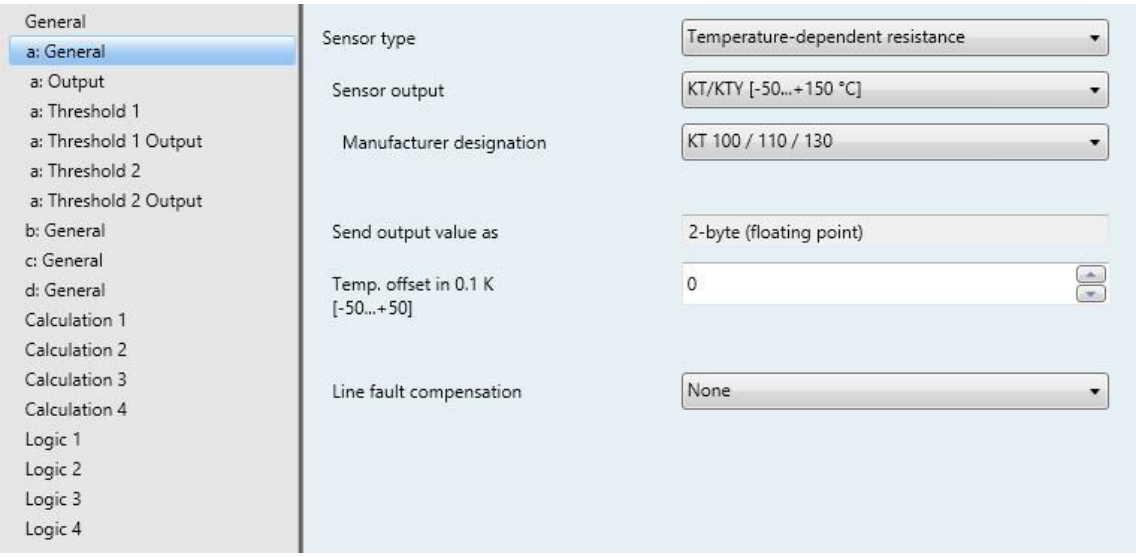
Input b is used for line fault compensation

**3-conductor connection:**




| Note |
| --- |
| With the 3-conductor connection the following applies:<br>• Input a or c always measures the measuring resistor.<br>• Input b or d always measures the cable resistance.<br><br>When a 3-conductor connection is selected, inputs b and d are visible in the communication objects. If a group address is linked to these inputs, then the measured cable resistance is transmitted. It should be noted that the temperature value must be converted with the DPT 9.001, so that the resistance value remains intact. |

### 3.2.6.3 Parameter option Sensor output: *KT/KTY [-50…+150 °C]*



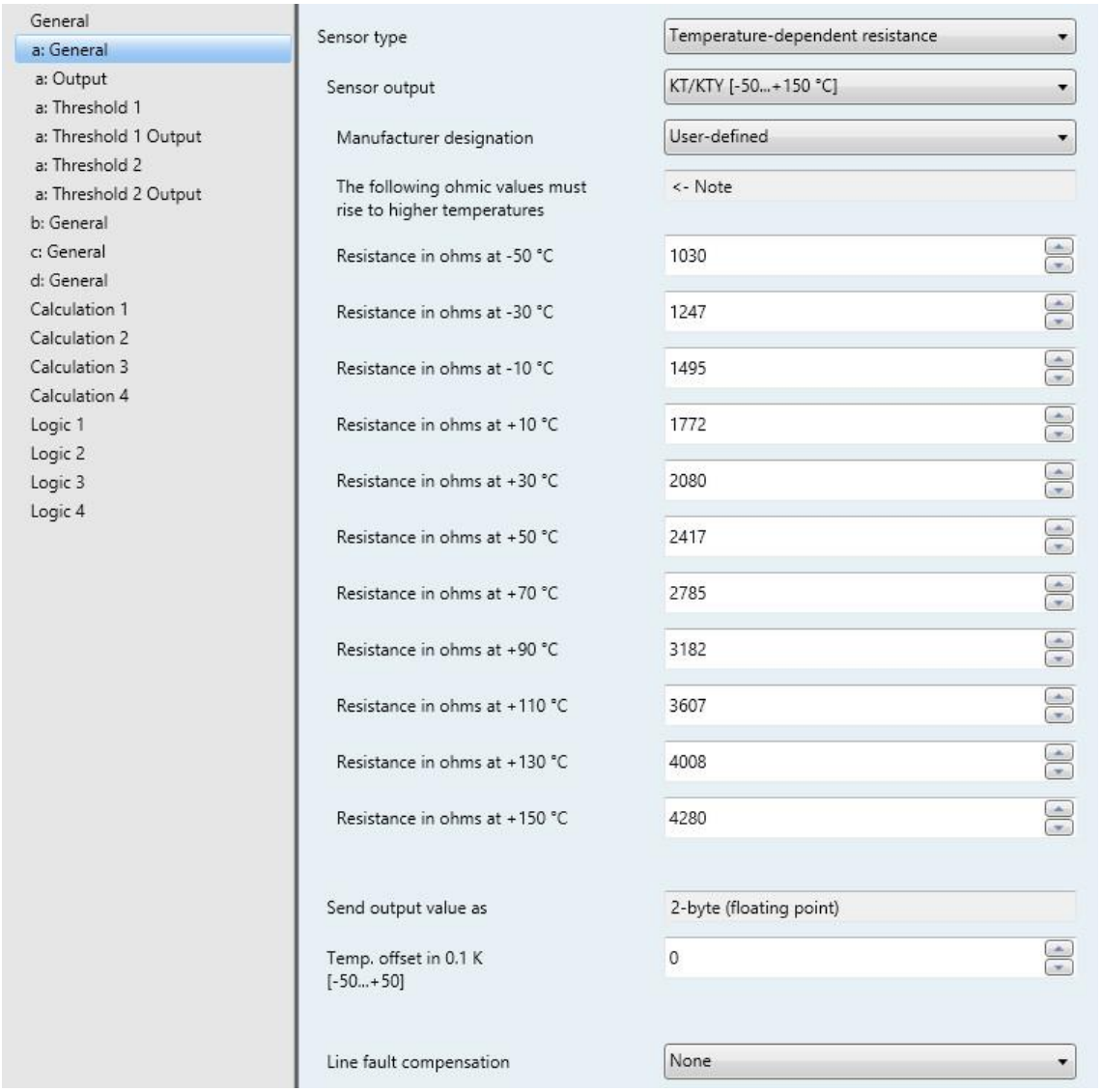

**Manufacturer designation**

Options:
KT 100 / 110 / 130
KT 210 / 230
KTY 10-5 / 11-5 / 13-5
KTY 10-6 / 10-62 / 11-6 / 13-6 / 16-6 / 19-6
KTY 10-7 / 11-7 / 13-7
KTY 21-5 / 23-5
KTY 21-6 / 23-6
KTY 21-7 / 23-7
KTY 81-110 / 81-120 / 81-150
KTY 82-110 / 82-120 / 82-150
KTY 81-121 / 82-121
KTY 81-122 / 82-122
KTY 81-151 / 82-151
KTY 81-152 / 82-152
KTY 81-210 / 81-220 / 81-250
KTY 82-210 / 82-220 / 82-250
KTY 81-221 / 82-221
KTY 81-222 / 82-222
KTY 81-251 / 82-251
KTY 81-252 / 82-252
KTY 83-110 / 83-120 / 83-150
KTY 83-121
KTY 83-122
KTY 83-151
User-defined

For selection of a predefined KTY sensor

| **Note** |
| --- |
| If a KTY sensor which is not in the list is used, the option *User-defined* can be used to enter its characteristic, see following page. |

***User-defined***




**The following ohmic values must rise to higher temperatures**

<- Note

To ensure correct functioning of the Analogue Input with respect to the user-defined entries, the ohm (resistance) values as visible for the preset values must be in ascending order.

An incorrect entry can lead to unrealistic output values!

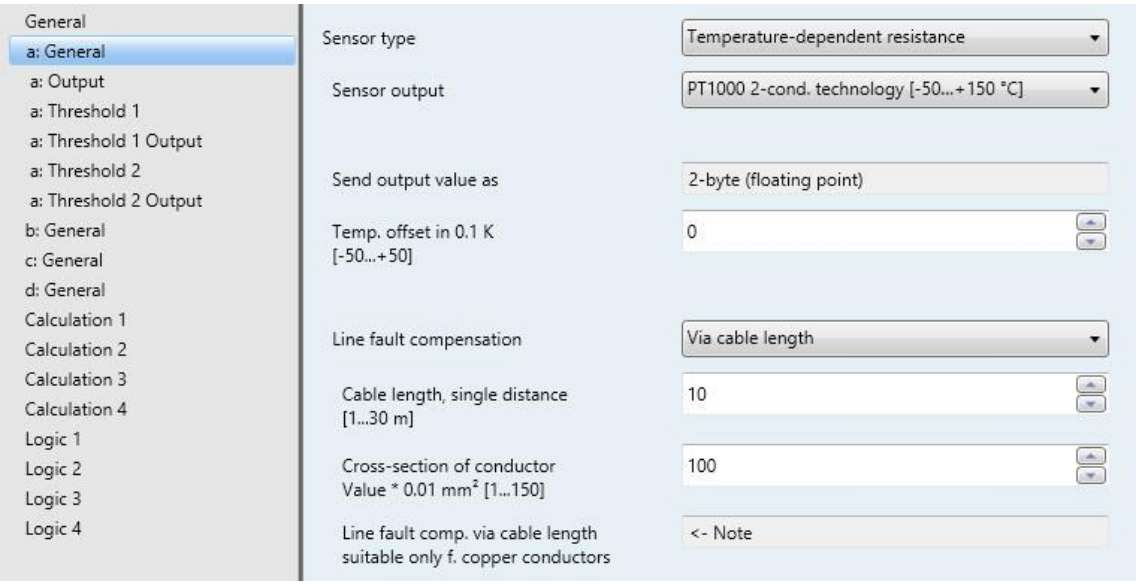
**Resistance in ohms at -50…+150 °C**

Options: 0…1,030…4,280…5,600

A resistance characteristic can be entered via these 11 parameters. The data can be found in the sensor manufacturer's technical documentation.

| **Note** |
| --- |
| The description of the parameters *Send output value as*, *Temp. offset* and *Line fault compensation* can be found in Parameter window a: General with sensor type: Temperature-dependent resistance. |

### 3.2.6.4 Line fault compensation *Via cable length*:




**Cable length, single distance [1...30 m]**

Options: 1...10...30

For setting the single cable length of the connected temperature sensor.

| **Important** |
|---|
| The maximum cable length permitted between the sensor and device input is 30 m. |

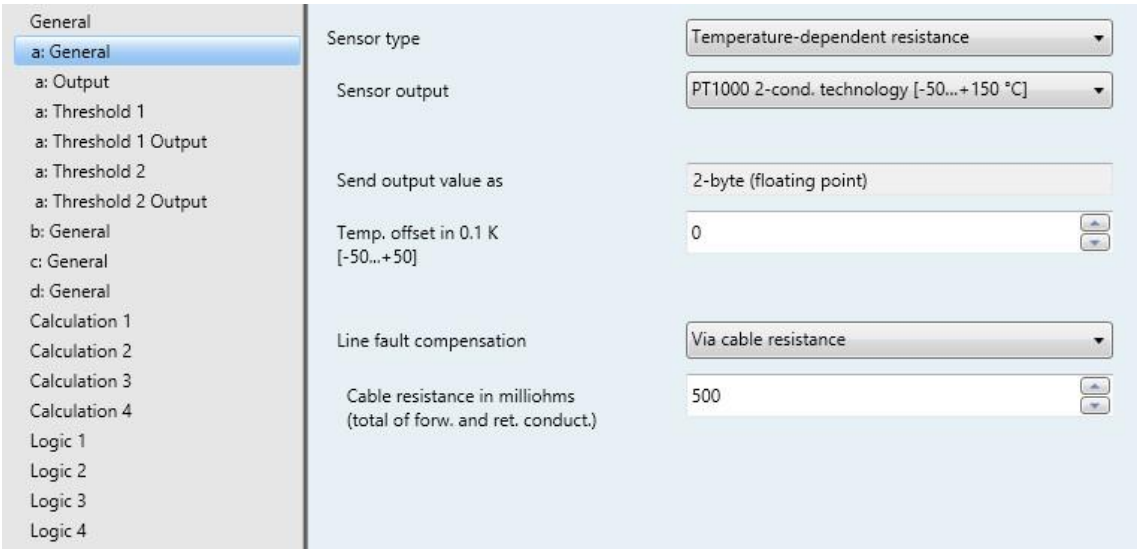
**Cross-section of conductor Value * 0.01 mm² [1...150]**

Options: 1...100...150 (150 = 1.5 mm²)

The cross-section of the conductor to which the temperature sensor is connected is entered using this parameter.

| **Note** |
|---|
| Line fault compensation via cable length is only suitable for copper conductors. |

### 3.2.6.5 Line fault compensation V*ia cable resistance*




**Cable resistance in milliohms**
**(total of forw. and ret. conduct.)**

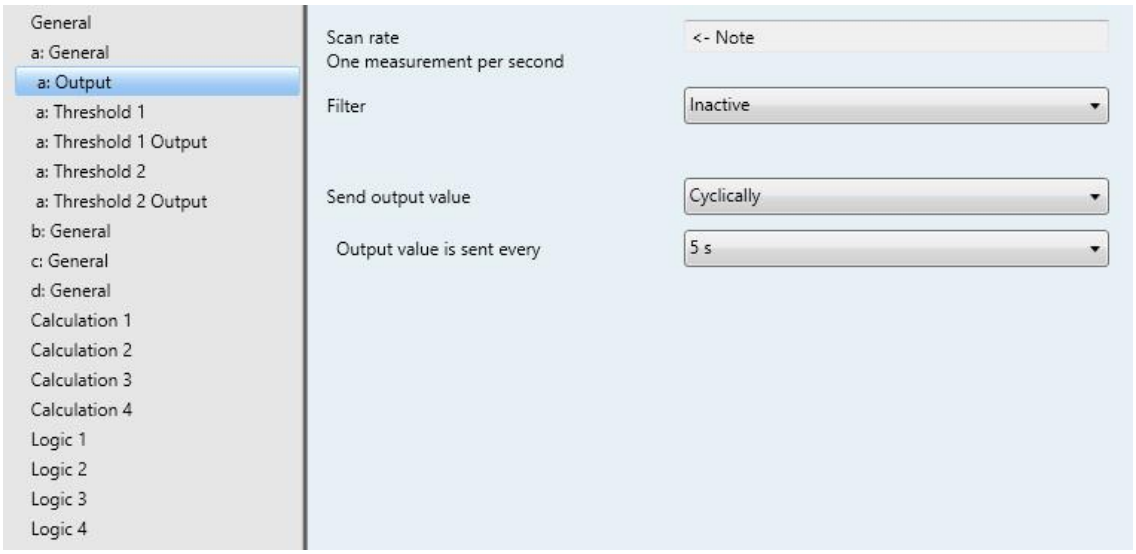
Options: 0...500...10,000

Using this parameter the level of cable resistance of the connected temperature sensor is set.

| **Important** |
| --- |
| In order to measure the cable resistance correctly, the conductors must be shorted together at the end of the cable and should not be connected to the device. |

### 3.2.6.6 Parameter window *a: Output*

This parameter window is enabled if, in the Parameter window a: General, p. 27, a sensor type was selected.




**Scan rate**

The sensor signal of input a is measured once per second.

**Filter**

Options: Inactive
Low (mean value over 4 measurements)
Medium (mean value over 16 measurements)
High (mean value over 64 measurements)

This parameter is used for setting a filter (floating mean value filter). This can be used to set the output value as a mean value using three different options.

- *Inactive*: Filter is not active
- *Low*: Mean output value over 4 measurements
- *Medium*: Mean output value over 16 measurements
- *High*: Mean output value over 64 measurements

| **Important** |
| --- |
| By use of the filter the output value is “smoothed” via the mean value and is available for further processing. The filter thus has immediate effects on the thresholds and calculation values. The higher the degree of the filtering applied, the smoother the result. This means that the changes to the output values become slower.<br>Example: An erratic change of the sensor signal with the setting *Medium* will take 16 seconds until the output value is through. |

**Send output value**

Options: On request
On change
Cyclically
On change and cyclically

This parameter defines how the output value should be sent.

- *On request:* The output value is sent on request.

The *Request output value – Input a* communication object appears.

As soon as a 1 is received at this communication object, the current output value is sent once to the communication object *Output value – Input a*.

- *On change*: The output value is sent when a change occurs.
- *Cyclically*: The output value is sent cyclically.
- *On change and cyclically*: The output value is sent cyclically when a change occurs.

Selection of options *On change, cyclically* and *On change and cyclically*:

Dependent parameters:

**Output value is sent every**

Options: 5/10/30 s
1/5/10/30 min
1/6/12/24 h

The interval for cyclical sending is set with this additional parameter.

**Output value is sent from a change of [x 0.1 °C]**

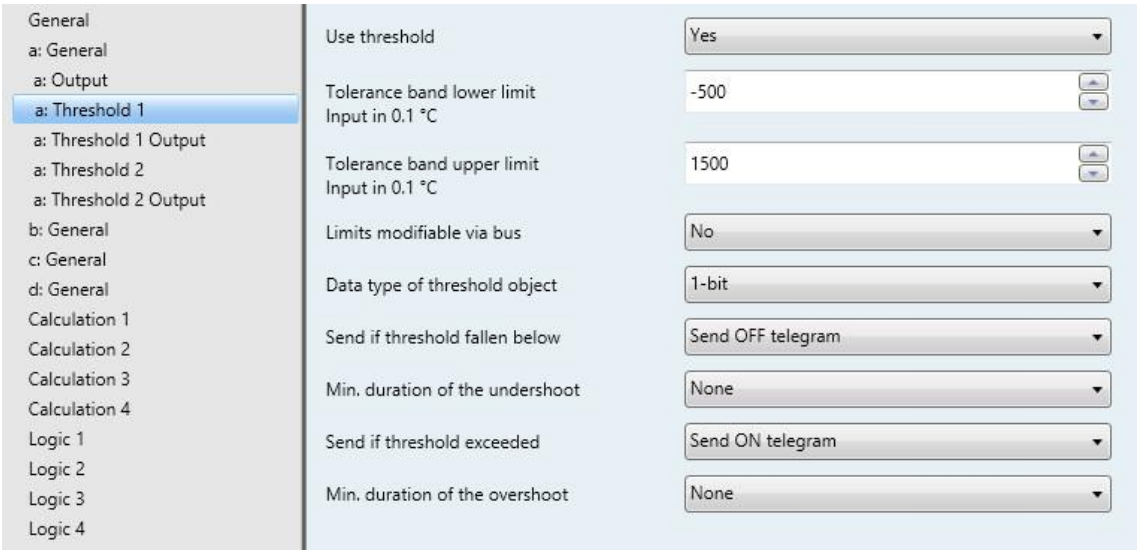
Options: 1…10...200

This parameter defines from which temperature change the output value should be sent.

- *10*: The output value is sent after a change of 1 °C.

### 3.2.6.7 Parameter window *a: Threshold 1*

The details in the following also apply to *b: Threshold 2 Output*.




**Use threshold**

Options: No
Yes

This parameter defines if threshold 1 should be used. If *Yes* is selected, the communication object *Threshold – Input a Threshold 1* appears.

**Tolerance band lower limit**
**Input in 0.1 °C**

Options: -500…1500

**Tolerance band upper limit**
**Input in 0.1 °C**

Options: -500…1500

The upper and lower limits of the tolerance band are set via these two parameters.

The entry is made in steps of 0.1 °C, i.e. an entry of 1500 means 150 °C.

**For further information see: Appendix**

**Limits modifiable via bus**

Options: No
Yes

This parameter specifies whether the limits can be changed via the bus.

- *Yes:* The following communication objects appear:

  *Modify – Input a Threshold 1 lower limit*

  *Modify – Input a Threshold 1 upper limit.*

| **Important** |
| --- |
| The value formats of these communication objects are the same as the format set in parameter window *a: General,* under the parameter *Send output value as* (see Parameter window a: General with sensor type: Temperature-dependent resistance, p. 54). |

**Data type of threshold object**

Options: 1-bit
1-byte [0...+255]

Selection of option *1-bit:*

**Send if threshold fallen below**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

**Send if threshold exceeded**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

- *Do not send telegram:* There is no reaction.
- *Send ON telegram:* A telegram with the value 1 is sent.
- *Send OFF telegram:* A telegram with the value 0 is sent.

**Min. duration of the undershoot**

**Min. duration of the overshoot**

Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegrams are sent.

Selection of option *1-byte [0...+255]:*

**Send if threshold fallen below [0...+255]**

Options: 0...255

**Send if threshold exceeded [0...+255]**

Options: 0...255

A value of 0 to 255 can be entered in single steps.

**Min. duration of the undershoot**

**Min. duration of the overshoot**

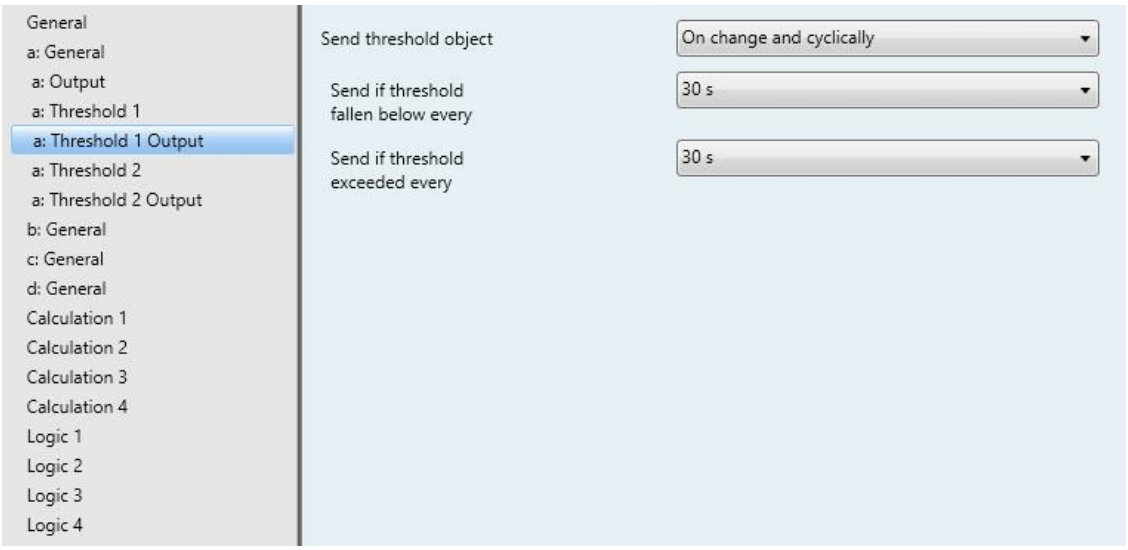
Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None*: the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

### 3.2.6.8 Parameter window *a: Threshold 1 Output*

The details in the following also apply to *a: Threshold 2 Output.*




**Send threshold object**

Options: On change
<u>On change and cyclically</u>

This parameter is used to specify the send behavior of the threshold object.

- *On change*: The threshold object is sent when a change occurs.
- *On change and cyclically:* The threshold object is sent cyclically when a change occurs. The threshold object is sent cyclically until the value falls below or exceeds the other limit.

  Dependent parameters:

  **Send if threshold fallen below every**

  **Send if threshold exceeded every**

  Options: None
  5/10/<u>30 s</u>
  1/5/10/30 min
  1/6/12/24 h

  These two parameters are used to define the point to which cyclical sending should take place after an undershoot of the lower limit or an overshoot of the upper limit.

### 3.2.7 Parameter window *a: General* with sensor type: *Floating contact scanning*

Setting options with sensor type *Floating contact scanning*.

The specifications below also apply to parameter windows *b...d: General*.


Selection of option *Floating contact scanning* in the parameter *Sensor type*.

Dependent parameters:

**Signal ON if contact**

Options: Closed
Open

With this parameter the contact is set with an ON signal.

- *Closed*: The contact is closed with an ON signal.
- *Open:* The contact is opened with an ON signal.

**Output value is sent as**

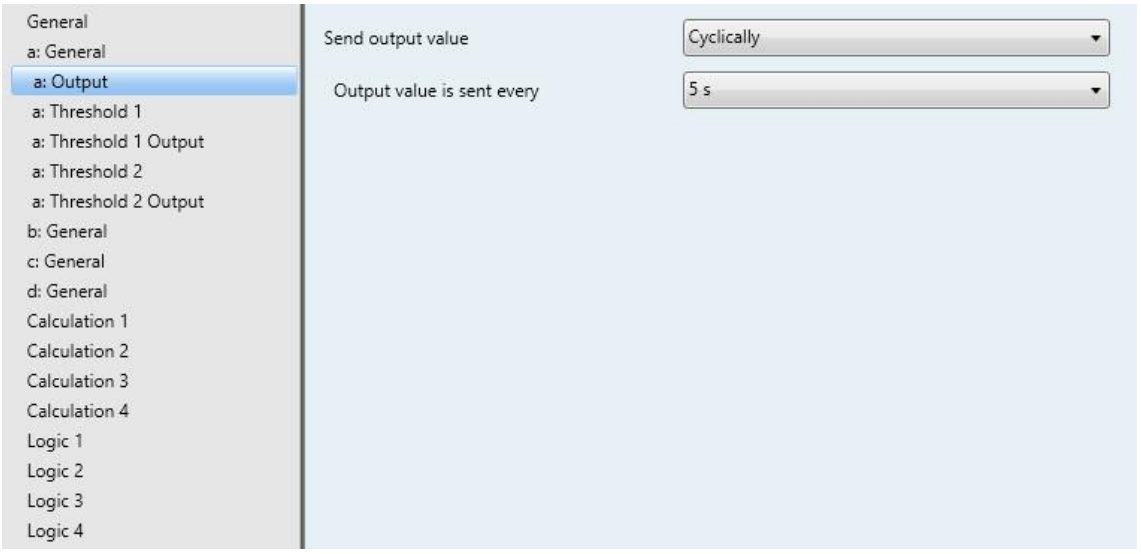
This parameter preset to 1-bit.

Bit value 0 = Signal OFF

Bit value 1 = Signal ON

### 3.2.7.1 Parameter window *a: Output*

This parameter window is enabled if, in the Parameter window a: General, p. 27, a sensor type was selected.




**Send output value**

Options: On request
On change
Cyclically
On change and cyclically

This parameter defines how the output value should be sent.

- *On request:* The output value is sent on request.

The *Request output value – Input a* communication object appears.

As soon as a 1 is received at this communication object, the current output value is sent once to the communication object *Output value – Input a*.

- *On change*: The output value is sent when a change occurs.
- *Cyclically*: The output value is sent cyclically.
- *On change and cyclically*: The output value is sent cyclically when a change occurs.

Selection of options *On change, cyclically* and *On change and cyclically*:

Dependent parameters:

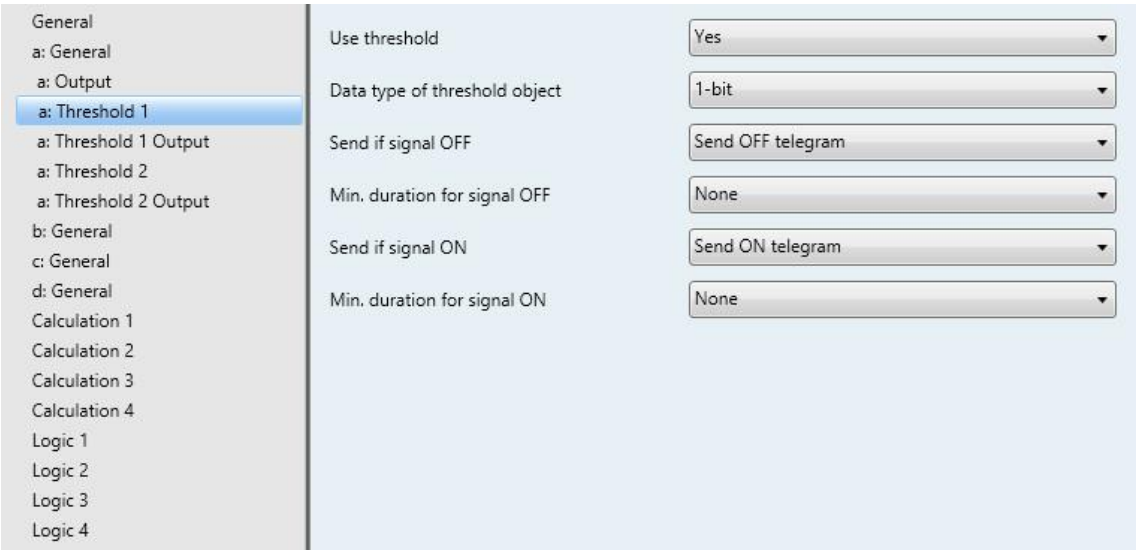
**Output value is sent every**

Options: 5/10/30 s
1/5/10/30 min
1/6/12/24 h

The interval for cyclical sending is set with this additional parameter.

### 3.2.7.2 Parameter window *a: Threshold 1*

The details in the following also apply to *b: Threshold 2 Output*.




**Use threshold**

Options: No
Yes

This parameter defines if threshold 1 should be used. If *Yes* is selected, the communication object *Threshold – Input a Threshold 1* appears.

**Data type of threshold object**

Options: 1-bit
1-byte [0...+255]

Selection of option *1-bit:*

**Send if signal OFF**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

**Send if signal ON**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

- *Do not send telegram:* There is no reaction.
- *Send ON telegram:* A telegram with the value 1 is sent.
- *Send OFF telegram:* A telegram with the value 0 is sent.

**Min. duration for signal OFF**

**Min. duration for signal ON**

Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None:* the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

Selection of option *1-byte [0...+255]:*

**Send if signal OFF**
**[0...+255]**

Options: 0...255

**Send if signal ON**
**[0...+255]**

Options: 0...255

A value of 0 to 255 can be entered in single steps.

**Min. duration for signal OFF**

**Min. duration for signal ON**

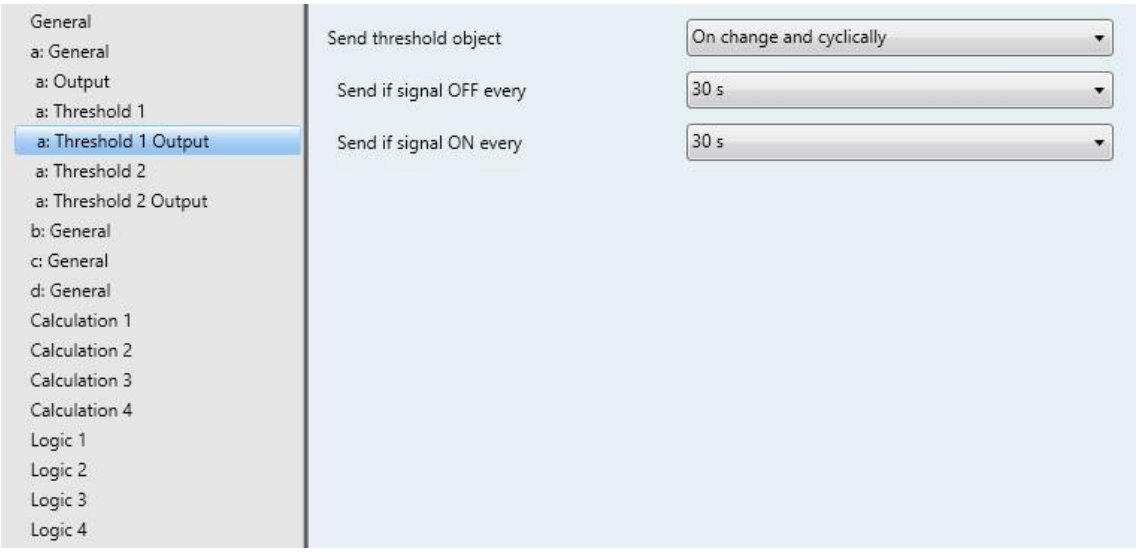
Options: None
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *None:* the threshold is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, no telegram is sent.

### 3.2.7.3 Parameter window *a: Threshold 1 Output*

The details in the following also apply to *a: Threshold 2 Output.*




**Send threshold object**

Options: On change
<u>On change and cyclically</u>

This parameter is used to specify the send behavior of the threshold object.

- *On change*: The threshold object is sent when a change occurs.
- *On change and cyclically:* The threshold object is sent cyclically when a change occurs. The threshold object is sent cyclically until the value falls below or exceeds the other limit.

  Dependent parameters:

  **Send if signal OFF every**

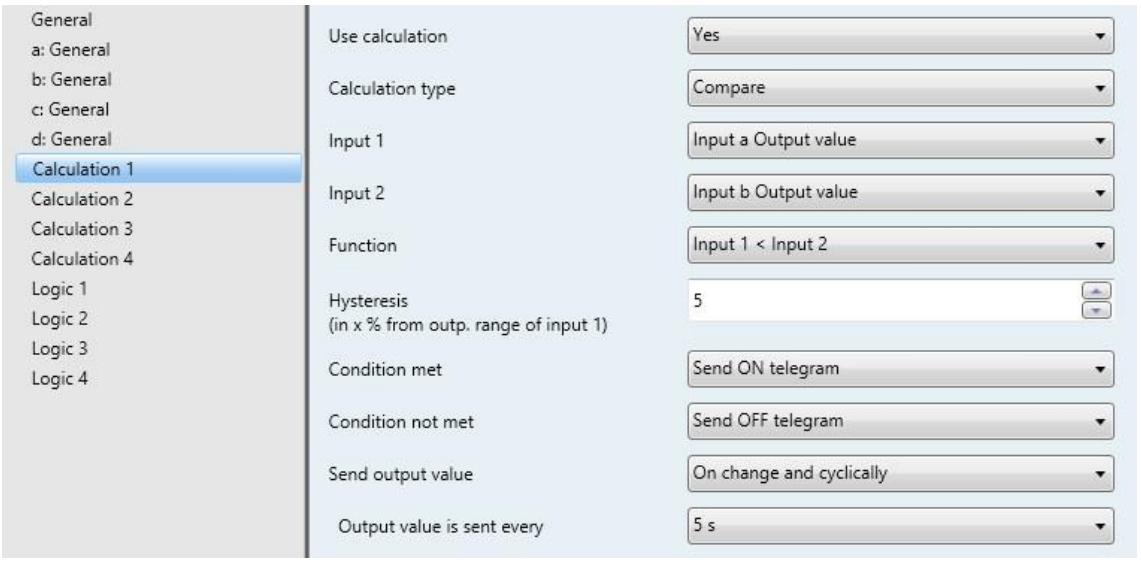
  **Send if signal ON every**

  Options: 5/10/<u>30 s</u>
  1/5/10/30 min
  1/6/12/24 h

  These two parameters are used to define the point at which cyclical sending should take place after an undershoot of the lower limit or an overshoot of the upper limit.

### 3.2.8 Parameter window *Calculation 1* – Calculation type: *Compare*

The specifications below also apply to the parameter windows *Calculation 2*, *3* and *4*.




**Use calculation**

Options: No
Yes

This parameter is used to determine if Calculation 1 is to be used.

- With the selection *Yes* the communication object *Send output value – Calculation 1* appears.

**Calculation type**

Options: Compare
Arithmetic

The calculation type is set with this parameter.

- *Compare*: Comparison of two output values
- *Arithmetic:* Arithmetic logic of two output values

**Input 1**

Options: Input a Output value
Input b Output value
Input c Output value
Input d Output value

**Input 2**

Options: Input a Output value
Input b Output value
Input c Output value
Input d Output value

With both these parameters the inputs 1 and 2 are assigned the comparative object values.

**Function**

Options: Input 1 < Input 2
Input 1 > Input 2
Input 1 = Input 2

Using this parameter, one of three selectable comparative functions is defined. Input 1 less than input 2, input 1 greater than input 2 or input 1 equal to input 2.

**Hysteresis**
**(in x % from outp. range of input 1)**

Options: 1...5...100

With the setting for this parameter the hysteresis band is defined dependent on the output range of input 1.

**Condition met**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

**Condition not met**

Options: Do not send telegram
Send ON telegram
Send OFF telegram

Using both these parameters, the telegrams which are to be sent when the comparative function is met (condition) or not met are defined. The telegram is sent on the bus via the communication object *Send output value – Calculation 1*.

**Send output value**

Options: On change
On change and cyclically

This parameter defines how the output value should be sent.

- *On change*: The output value is sent when a change occurs.
- *On change and cyclically*: The output value is sent cyclically when a change occurs.

  Dependent parameter:

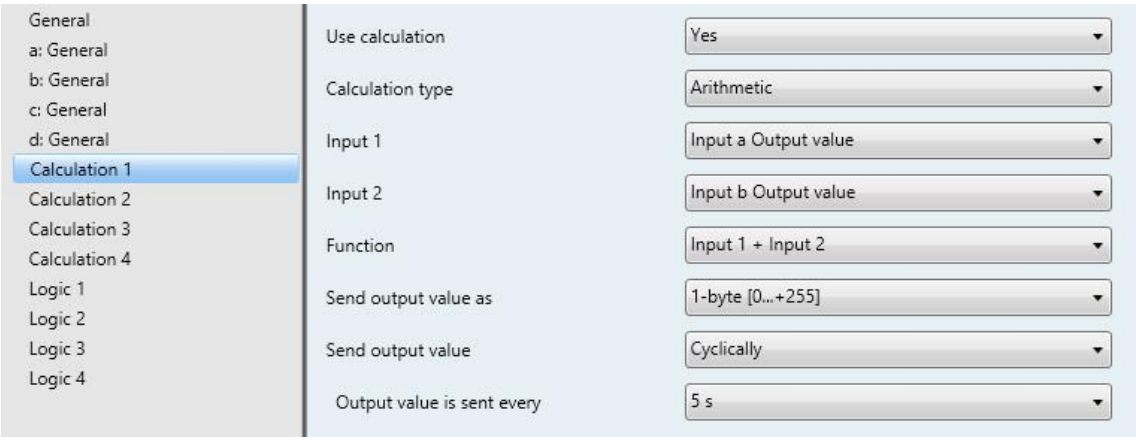
  **Output value is sent every**

  Options: 5/10/30 s
  1/5/10/30 min
  1/6/12/24 h

  The interval for cyclical sending is set with this additional parameter.

### 3.2.9 *Parameter window Calculation 1* – Calculation type: *Arithmetic*

The specifications in the following also apply to the parameter windows *Calculation 2, 3* and *4*.




**Use calculation**

Options: No
Yes

This parameter is used to determine if Calculation 1 is to be used.

- With the selection *Yes* the communication object *Send output value – Calculation 1* appears.

**Calculation type**

Options: Compare
Arithmetic

The calculation type is set with this parameter.

- *Compare*: Comparison of two output values
- *Arithmetic:* Arithmetic logic of two output values

**Input 1**

Options: Input a Output value
Input b Output value
Input c Output value
Input d Output value

**Input 2**

Options: Input a Output value
Input b Output value
Input c Output value
Input d Output value

With both these parameters the inputs 1 and 2 are assigned the comparative object values.

**Function**

Options: Input 1 + Input 2
Input 1 - Input 2
Arithmetic mean value

- *Input 1 + Input 2*: Input 1 and input 2 are added.
- *Input 1 - Input 2*: Input 2 is subtracted from input 1.
- *Arithmetic mean value:* The arithmetic mean value is calculated between input 1 and input 2.

**Send output value as**

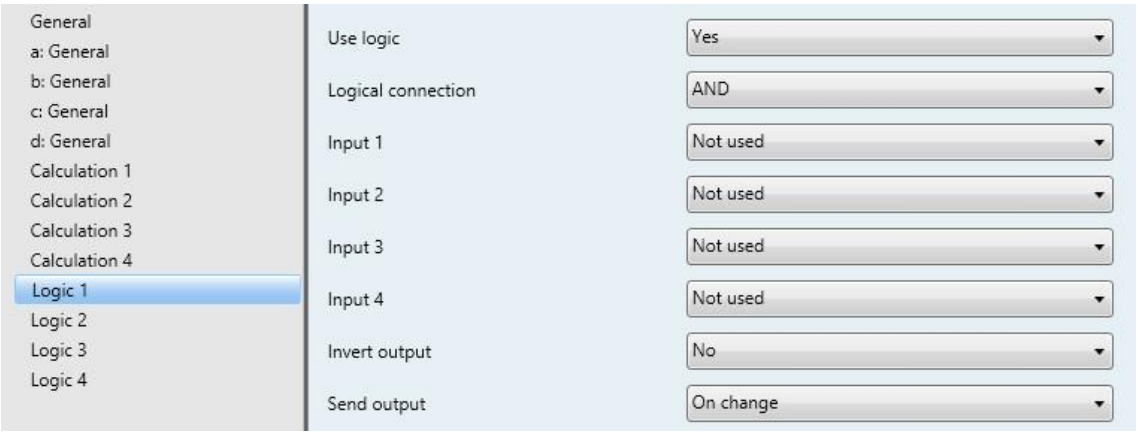
Options: 1-byte [0...+255]
1-byte [-128...+127]
2-byte [0...+65,535]
2-byte [-32,768…+32,767]
2-byte (floating point)
4-byte (IEEE floating point)

This parameter defines in which format the *Output value* should be sent.

| **Important** |
| --- |
| The setting assumes that the result of the calculation matches the set format. Otherwise the result is capped.<br>In order to guarantee full interoperability to other KNX devices, only a data type should be selected for the output which according to KONNEX is permissible for the calculated physical value! |

### 3.2.10 Parameter window *Logic 1*

In the following section, the parameters for Logic 1 are described, which also apply for Logic 2, 3 and 4.




**Use logic**

Options: No
Yes

This parameter is used to determine if Logic 1 is used. With the *Yes* selection, the communication object *Send output - Logic 1* appears.

**Logical connection**

Options: AND
OR

- *AND*: Logic as AND gate
- *OR*: Logic as OR gate

| **Note** |
| --- |
| Each logic input can be assigned to different group addresses. It is also possible to assign individual logic links to logical inputs.<br>However, if a group address, which has been assigned to an internal function, is assigned to a logic input, then this group address shall have no function for the logic input. |

**Input 1...4**

Options: Not used
Input a Threshold x fallen below*
Input a Threshold x exceeded*
…
Input d Threshold x fallen below*
Input d Threshold x exceeded*
Calculation 1 Condition met*
Calculation 1 Condition not met*
…
Calculation 4 Condition met*
Calculation 4 Condition not met*
Communication object Input 1*
Communication object Input 1 inverted*
Communication object Input 2*
Communication object Input 2 inverted*

* This condition is "true", i.e. the logical value is 1, if the value is above or below the threshold, irrespective of whether the allocated threshold object sends a 0 or a 1 should the value be above or below a threshold.

Up to four different inputs can be assigned to logic 1 via these four parameters.

Two external inputs are available with the communication objects *Input 1* and *Input 2*.

**Invert output**

Options: No
Yes

The inversion of the output is defined via this parameter.

**Send output**

Options: On change
Cyclically
On change and cyclically

This parameter defines how the output should be sent.

- *On change*: Output sends on a change
- *On change and cyclically*: Output sends on a change and cyclically

Selection of *On change and cyclically* option:

Dependent parameter:

**Output is sent every**

Options: 5/10/30 s
1/5/10/30 min
1/6/12/24 h

The interval for cyclical sending is set with this additional parameter.

## 3.3 Communication objects

### 3.3.1 Summary of communication objects

| No. | Function | Name | Data Point Type (DPT) | Length | Flags | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | C | R | S | T | U |
| 0 | Output value | Input a | Variable | Variable | x | x | | x | |
| 1 | Request output value | Input a | 1.009 | 1-bit | x | | x | | |
| 2 | Measured value out of range | Input a | 1.001 | 1-bit | x | | x | | |
| 3 | Threshold | Input a Threshold 1 | Variable | Variable | x | x | | x | |
| 4 | Modify | Input a Threshold 1 lower limit | Variable | Variable | x | x | | x | |
| 5 | Modify | Input a Threshold 1 upper limit | Variable | Variable | x | x | | x | |
| 6 | Threshold | Input a Threshold 2 | Variable | Variable | x | x | | x | |
| 7 | Modify | Input a Threshold 2 lower limit | Variable | Variable | x | x | | x | |
| 8 | Modify | Input a Threshold 2 upper limit | Variable | Variable | x | x | | x | |
| 9 | Output value | Input b | Variable | Variable | x | x | | x | |
| 10 | Request output value | Input b | 1.009 | 1-bit | x | | x | | |
| 11 | Measured value out of range | Input b | 1.001 | 1-bit | x | | x | | |
| 12 | Threshold | Input b Threshold 1 | Variable | Variable | x | x | | x | |
| 13 | Modify | Input b Threshold 1 lower limit | Variable | Variable | x | x | | x | |
| 14 | Modify | Input b Threshold 1 upper limit | Variable | Variable | x | x | | x | |
| 15 | Threshold | Input b Threshold 2 | Variable | Variable | x | x | | x | |
| 16 | Modify | Input b Threshold 2 lower limit | Variable | Variable | x | x | | x | |
| 17 | Modify | Input b Threshold 2 upper limit | Variable | Variable | x | x | | x | |
| 18 | Output value | Input c | Variable | Variable | x | x | | x | |
| 19 | Request output value | Input c | 1.009 | 1-bit | x | | x | | |
| 20 | Measured value out of range | Input c | 1.001 | 1-bit | x | | x | | |
| 21 | Threshold | Input c Threshold 1 | Variable | Variable | x | x | | x | |
| 22 | Modify | Input c Threshold 1 lower limit | Variable | Variable | x | x | | x | |
| 23 | Modify | Input c Threshold 1 upper limit | Variable | Variable | x | x | | x | |
| 24 | Threshold | Input c Threshold 2 | Variable | Variable | x | x | | x | |
| 25 | Modify | Input c Threshold 2 lower limit | Variable | Variable | x | x | | x | |
| 26 | Modify | Input c Threshold 2 upper limit | Variable | Variable | x | x | | x | |

| No. | Function | Name | Data Point Type (DPT) | Length | Flags | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | C | R | S | T | U |
| 27 | Output value | Input d | Variable | Variable | x | x | | x | |
| 28 | Request output value | Input d | 1.009 | 1-bit | x | | x | | |
| 29 | Measured value out of range | Input d | 1.001 | 1-bit | x | | x | | |
| 30 | Threshold | Input d Threshold 1 | Variable | Variable | x | x | | x | |
| 31 | Modify | Input d Threshold 1 lower limit | Variable | Variable | x | x | | x | |
| 32 | Modify | Input d Threshold 1 upper limit | Variable | Variable | x | x | | x | |
| 33 | Threshold | Input d Threshold 2 | Variable | Variable | x | x | | x | |
| 34 | Modify | Input d Threshold 2 lower limit | Variable | Variable | x | x | | x | |
| 35 | Modify | Input d Threshold 2 upper limit | Variable | Variable | x | x | | x | |
| 36 | Send output value | Calculation 1 | Variable | 1-bit | x | | | x | |
| 37 | Send output value | Calculation 2 | Variable | 1-bit | x | | | x | |
| 38 | Send output value | Calculation 3 | Variable | 1-bit | x | | | x | |
| 39 | Send output value | Calculation 4 | Variable | 1-bit | x | | | x | |
| 40 | Send output | Logic 1 | 1.002 | 1-bit | x | x | | x | |
| 41 | Send output | Logic 2 | 1.002 | 1-bit | x | x | | x | |
| 42 | Send output | Logic 3 | 1.002 | 1-bit | x | x | | x | |
| 43 | Send output | Logic 4 | 1.002 | 1-bit | x | x | | x | |
| 44 | Input 1 | Logic | 1.002 | 1-bit | x | | x | | x |
| 45 | Input 2 | Logic | 1.002 | 1-bit | x | | x | | x |
| 46 | Input time | Synchronization | 10.001 | 3 byte | x | | x | | x |
| 47 | Request time | Synchronization | 1.001 | 1-bit | x | | | x | |
| 48 | In operation | General | 1.003 | 1-bit | x | x | | x | |
| 49 | Status byte | General | - | 1 byte | x | x | | x | |

### 3.3.2 Communication objects *Input a*

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **0** | **Output value** | **Input a** | **Variable**<br>**DPT variable** | **C, R, T** |

This communication object is used to send the output value to the bus.

The following values can be sent:

| | | |
|---|---|---|
| 1-bit value [0/1] | DPT | 1.001 |
| 1-byte value [0...+255] | DPT | 5.010 |
| 1-byte value [-128...+127] | DPT | 6.010 |
| 2-byte value [0...+65,535] | DPT | 7.001 |
| 2-byte value [-32,768...+32,767] | DPT | 8.001 |
| 2-byte value (floating point) | DPT | 9.001 |
| 4-byte value (IEEE floating point) | DPT | 14.068 |

**What is sent at an undershoot or overshoot of 10 %?**

Up to an overshoot of 10 % the measured value is shown and sent. This applies to both the upper and lower limits. Furthermore, the measured value continues to be sent as a *Measured value +10 %*.

The following must be observed, particularly with the lower limit:

This only applies if the lower limit of 0 is different. If the lower limit is 0, it is not possible to determine an undershoot.

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **1** | **Request output value** | **Input a** | **1-bit**<br>**DPT 1.009** | **C, W** |

This communication object appears if the output value *On request* is to be sent

If a 1 is received at this communication object, the current output value is sent once from the communication object *Output value – Input a*.

| 2 | Measured value out of range | Input a | 1-bit<br>DPT 1.001 | C, W |
|---|---|---|---|---|

Telegram value: 1 = Measured value out of range
0 = Measured value in range

The communication object can be used to check the plausibility of the sensor, e.g. wire breakage at 1–10 V or at 4–20 mA. The check is carried out after each measurement.

| Example |
|---|
| A wind sensor with a sensor signal of 4...20 mA and a measuring range of 0…40 m/s is connected to the device. Output range is 16 mA (20...4 mA) |

**Upper measuring limit:**

The communication object *Measured value outside range* is sent when the upper measuring limit is exceeded by 5 %, i.e. 16.8 mA (16 mA + 5 %).

**Lower measuring limit:**

The communication object *Measured value out of range* is sent when the lower measuring limit is undershot by 5 %, i.e. 3.8 mA (4 mA - 5 %).

**When is the value of the communication object sent?**

*Measured value out of range* is sent if the measured value exceeds the lower or upper limit by more than 5 %.

The following must be observed, particularly with the lower limit:

This only applies if the lower limit of 0 is different. If the lower limit is 0, it is not possible to determine an undershoot.

**Behavior with PT100 or PT1000?**

The following applies with the calculation of the maximum and minimum output values with the PT100/1000:

The lowest measurable resistance with the PT100 is about 80 ohms (with the PT1000 800 ohms) and corresponds to about -50 °C.

The highest measurable resistance with the PT100 is about 157 ohms (with the PT1000 1570 ohms) and corresponds to about +150 °C.

| Important |
|---|
| The programmable feeder line resistance is subtracted from the measured resistance. Thereafter, a programmable temperature offset is added.<br>Depending on the programming of the feeder line resistances and the temperature offset, different minimum and maximum values result.<br>If the sensor goes open circuit, the highest possible positive temperature value in °C is sent. If the sensor goes short circuit, the lowest possible negative temperature value in °C is sent. The sent temperature values are dependent, for example, on the temperature sensor used, on line faults, ambient temperatures, etc. |

**Behavior with a floating contact?**

The communication object has no function with the selection.

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **3** | **Threshold** | **Input a Threshold 1** | **Variable**<br>**DPT variable** | **C, R, T** |
| As soon as the set threshold is exceeded or fallen below, it is possible to send the following values:<br>1-bit value [0/1] DPT 1.001<br>1-byte value [0...+255] DPT 5.010<br>The object value depends on the parameter *Data type of threshold object* (1-bit, 1-byte). The parameter can be found in the parameter window *a: Threshold 1*. | | | | |
| **4…5** | **Modify** | **Input a Threshold 1 lower limit**<br>**Input a Threshold 1 upper limit** | **Variable**<br>**DPT variable** | **C, R, T** |
| The upper and lower limits of threshold 1 can be changed via the bus.<br>The data type of these communication objects depends on the set data type of the communication object *Output value – Input a*.<br>**Important**<br>The lower limit should be selected to be lower than the upper limit. | | | | |
| **6** | **See communication object 3** | **Input a Threshold 2** | | |
| | | | | |
| **7…8** | **See communication objects 4 and 5** | **Input a Threshold 2 lower limit**<br>**Input a Threshold 2 upper limit** | | |

### 3.3.3 Communication objects *Input b, c and d*

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **9…17** | **See communication objects 0...8** | **Input b** | | |
| **18…26** | **See communication objects 0...8** | **Input c** | | |
| **27…35** | **See communication objects 0...8** | **Input d** | | |

**Note**

With the 3-conductor connection the following applies:

- Input a or c always measures the measuring resistor.
- Input b or d always measures the cable resistance.

When a 3-conductor connection is selected, inputs b and d are visible in the communication objects. If a group address is linked to these inputs, then the measured cable resistance is transmitted. It should be noted that the temperature value must be converted with the DPT 9.001, so that the resistance value remains intact.

### 3.3.4 Communication objects *Calculation 1*

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **36** | **Send output value** | **Calculation 1** | **1-bit**<br>**DPT variable** | **C, T** |

The result of calculation 1 is sent with this communication object.
Depending on the calculation type which has been selected, the following values are sent:

| | | |
|---|---|---|
| 1-bit value [0/1] | DPT | 1.001 |
| 1-byte value [0...+255] | DPT | 5.010 |
| 1-byte value [-128...+127] | DPT | 6.010 |
| 2-byte value [0...+65,535] | DPT | 7.001 |
| 2-byte value [-32,768...+32,767] | DPT | 8.001 |
| 2-byte value (floating point) | DPT | 9.001 |
| 4-byte value (IEEE floating point) | DPT | 14.068 |

**Important**

In order to guarantee full interoperability to other KNX devices, only a data type should be selected for the output which according to KONNEX is permissible for the calculated physical value!

### 3.3.5 Communication objects *Calculation 2, 3, and 4*

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **37** | **See communication object 36.** | **Calculation 2** | | |
| | | | | |
| **38** | **See communication object 36.** | **Calculation 3** | | |
| | | | | |
| **39** | **See communication object 36.** | **Calculation 4** | | |

### 3.3.6 Communication object *Logic 1*

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **40** | **Send output** | **Logic 1** | **1-bit**<br>**DPT 1.001** | **C, R, T** |
| The logical result of logic 1 is sent with this communication object. | | | | |

### 3.3.7 Communication objects *Logic 2, 3* and *4*

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **41** | **See communication object 40** | **Logic 2** | | |
| | | | | |
| **42** | **See communication object 40** | **Logic 3** | | |
| | | | | |
| **43** | **See communication object 40** | **Logic 4** | | |

### 3.3.8 Communication objects *General*

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **44**<br>**45** | **Input 1**<br>**Input 2** | **Logic**<br>**Logic** | **1-bit**<br>**DPT 1.002** | **C, W, U** |
| Both of these communication objects can be used as external inputs for the internal logic.<br>If a telegram with the value 0 or 1 is received on these communication objects, the internal logic is assigned the value 0 or 1. | | | | |
| **46** | **Input time** | **Synchronization** | **3-byte**<br>**DPT 10.001** | **C, W, U** |
| This communication object only appears if, in the Parameter window General, p. 21, the parameter *Use time synchronization* was selected.<br>Synchronization is monitored internally. If the time between 2 synchronizations > 25 hours, Bit 6 is set 1 in the communication object *Status byte - General*.<br>This allows a check of whether an external time signal of the Weather Station is present. | | | | |
| **47** | **Request time** | **Synchronization** | **1-bit**<br>**DPT 1.001** | **C, T** |
| This communication object only appears if, in the Parameter window General, p. 21, the parameter *Use time synchronization* was selected.<br>After the set send delay, this communication object sends a time request to the bus once.<br>In addition, for temporal synchronization of the rain quantity reset, a time request is sent on the bus every 5 hours.<br>The required for sending the time takes place via the value "1". | | | | |

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **48** | **In operation** | **General** | **1-bit**<br>**DPT 1.003** | **C, R, T** |

This communication object appears if, in the Parameter window General, p. 21, *Enable communication object "In operation", 1-bit* has been selected and set to *Value 0* or *Value 1.*

A 0 or a 1 is sent cyclically on the bus depending on the setting.

| No. | Function | Object name | Data type | Flags |
|---|---|---|---|---|
| **49** | **Status byte** | **General** | **1 byte**<br>**DPT none** | **C, R, T** |

The status byte reflects the current state of the device.

Different states are indicated here, e.g.

- Status Input a – Measured value out of range
- Status Input a – Measured value out of range and self calibration

Bit sequence: 76543210

Bit 7: Not assigned — Always 0

Bit 6: Mains voltage failure:

0: Mains available

1: Mains voltage failure, no measured values

Bit 5: No synchronization after the start or more than 25 hours (only used if, in the parameter window *General*, the option *Yes* was selected for the parameter *Use time synchronization*)

0: Time available

1: Time not available

Bit 4: Status of internal calibration

0: Calibration completed

1: Calibration running

Bit 3: Status Input d Measured value out of range

0: In range

1: Out of range

Bit 2: Status Input c Measured value out of range

0: In range

1: Out of range

Bit 1: Status Input b Measured value out of range

0: In range

1: Out of range

Bit 0: Status Input a Measured value out of range

0: In range

1: Out of range

The value of the communication object is sent when a change occurs or can be read out via a Value Read command. The value of the communication object is sent automatically once after the device has started after the set send delay.

**For further information see: Value table of communication object Status byte – General**

# 4 Planning and application

## 4.1 Weather Station

The Weather Station can be used wherever installations need to be protected against weather.

The recorded data can, for example, be displayed on a visualization, meaning that the operating personnel always has accurate information about the weather conditions.

The following sensors are used to protect, monitor and control a building:

- Twilight sensor for switching external and interior lighting systems on and off and for targeted use as an energy-saving measure through the detection of the sunrise and sunset
- Humidity sensor to control skylights and ventilation systems. In open spaces, to record the current weather conditions quickly.
- Brightness sensor for shading windows and facades (if necessary, a direction-dependent brightness sensor for controlling several facades and for lighting control)
- Air pressure sensor for recording the atmospheric air pressure
- Pyranometer to control blinds and interior lighting
- Rain meter to record the amount of rain
- Rain sensor for protecting awnings, roller shutters and blinds as well as skylights and ventilation flaps
- Temperature sensor for regulating heating and air conditioning systems
- Wind speed sensor to protect blind systems
- Wind direction sensor for direction-dependent control of blind systems

## 4.2 Weather Sensors

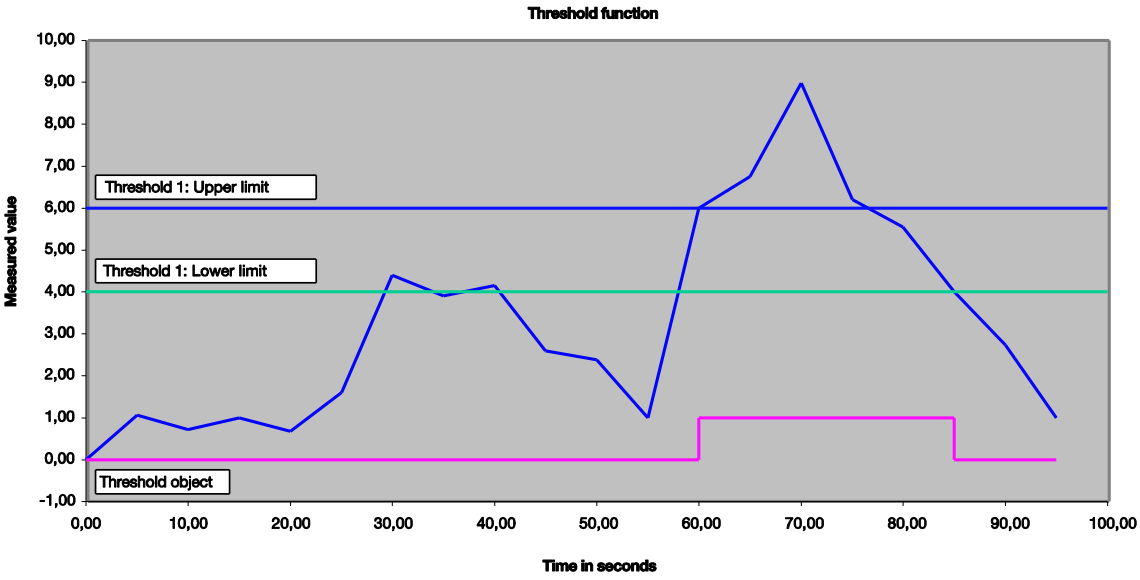
When planning a Weather Station with the sensors, specific requirements should be taken into account and checked on site:

- Where can the Weather Sensors be fixed on the building, e.g. on roof structures of elevators or air-conditioning systems?
- Can the sensors be "disrupted" by the structures, e.g. by a waste air blower?
- Is the mounting and installation position of the weather sensors free of shadows, e.g. caused by a tree?
- Are additional items required for fixing?
- Very high forces can occur on the mast, depending on the wind speed.
- Does the mounting of the Weather Sensors impede any other structures?
- Is an installation of the cables on the building guaranteed?
- Is the cable routing from the Weather Station to the sensors ensured, e.g. are the cables protected from UV rays?
- If there external lightning protection and must this be taken into account?
- Does the height of the mast for fastening the sensors not go above the external lightning protection area?
- Where is the mounting of the Weather Station possible?
- For safety reasons, the Weather Station should be installed in the building, as the bus is otherwise "openly" accessible.
- Can sensors be exchanged without excessive work?

| **Note** |
| --- |
| The points above are a selection of the criteria required to erect Weather sensors, without claiming to be fully comprehensive. |

## 4.3 Description of the Threshold function

### How does the threshold function work?




### Settings

- Communication object *Threshold* is set to a 1-bit value.
- An OFF telegram is sent with an undershoot of the threshold, and an ON telegram is sent with an overshoot of the threshold.

In the example diagram above, it can be seen that the measured value begins "somewhere", in this example with a 0 value. The communication object for *Threshold 1* has the value 0 and is sent cyclically as per application settings.

As long as the measured value does not exceed the upper limit of threshold 1, the communication object *Threshold* will remain at value 0.

As soon as the measured value exceeds the upper limit of threshold 1, the communication object *Threshold* will change value to 1.

The communication object *Threshold 1* will remain 1 until the measured value falls back below the lower limit of threshold 1.

# A Appendix

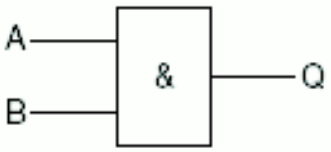
## A.1 Scope of delivery

The device is supplied together with the following components. Please check the items received using the following list:

- 1 (one) WS/S 4.1.1.2, Weather Station, 4-fold, MDRC
- 1 (one) set of installation and operating instructions
- 1 (one) bus connection terminal (red/black)

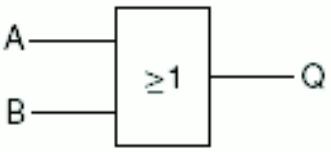
## A.2 Truth table for logical operations

AND




| A | B | Q |
|---|---|---|
| 0 | 0 | 0 |
| 1 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 1 | 1 |

OR




| A | B | Q |
|---|---|---|
| 0 | 0 | 0 |
| 1 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 1 | 1 |

The logic gates and tables above describe the input and output states for 2 inputs. For multiple inputs, the tables must be extended accordingly.

## A.3 Wind speeds overview

| Wind speed (Beaufort) | m/s | | km/h | | Knots (nm/h) | | mi/h | | ft/min | |
|---|---|---|---|---|---|---|---|---|---|---|
| | from | up to | from | up to | from | up to | from | up to | from | up to |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.3 | 1.5 | 1 | 5 | 1 | 3 | 1 | 4 | 59 | 295 |
| 2 | 1.6 | 3.3 | 6 | 11 | 4 | 6 | 4 | 7 | 315 | 650 |
| 3 | 3.4 | 5.4 | 12 | 19 | 7 | 10 | 8 | 12 | 669 | 1,063 |
| 4 | 5.5 | 7.9 | 20 | 28 | 11 | 15 | 12 | 18 | 1,083 | 1,555 |
| 5 | 8 | 10.7 | 29 | 38 | 16 | 21 | 18 | 25 | 1,575 | 2,106 |
| 6 | 10.8 | 13.8 | 39 | 49 | 22 | 27 | 25 | 32 | 2,126 | 2,717 |
| 7 | 13.9 | 17.1 | 50 | 61 | 28 | 33 | 32 | 38 | 2,736 | 3,366 |
| 8 | 17.2 | 20.7 | 62 | 74 | 34 | 40 | 39 | 47 | 3,386 | 4,075 |
| 9 | 20.8 | 24.4 | 75 | 87 | 41 | 47 | 47 | 55 | 4,094 | 4,803 |
| 10 | 24.5 | 28.4 | 88 | 102 | 48 | 55 | 55 | 64 | 4,823 | 5,591 |
| 11 | 28.5 | 32.6 | 103 | 117 | 56 | 63 | 64 | 73 | 5,610 | 6,417 |
| 12 | 32.7 | 36.9 | 118 | 132 | 64 | 72 | 74 | 83 | 6,437 | 7,264 |
| 13 | 37 | 41.4 | 133 | 149 | 73 | 80 | 85 | 93 | 7,283 | 8,150 |
| 14 | 41.5 | 46.1 | 149 | 165 | 81 | 90 | 94 | 104 | 8,169 | 9,075 |
| 15 | 46.2 | 50.9 | 166 | 183 | 90 | 99 | 104 | 114 | 6,094 | 10,020 |
| 16 | 51 | 56 | 184 | 201 | 99 | 109 | 114 | 126 | 10,039 | 11,024 |
| 17 | 56 | | 202 | | 109 | | 126 | | 11,024 | |

## A.4 Value table of communication object *Status byte – General*

| Bit No. | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| 8-bit value | Hexadecimal | Not assigned | Mains voltage failure | Synchronization | Status of internal calibration | Status Input d | Status Input c | Status Input b | Status Input a |
| 0 | 00 | | | | | | | | |
| 1 | 01 | | | | | | | | ■ |
| 2 | 02 | | | | | | | ■ | |
| 3 | 03 | | | | | | | ■ | ■ |
| 4 | 04 | | | | | | ■ | | |
| 5 | 05 | | | | | | ■ | | ■ |
| 6 | 06 | | | | | | ■ | ■ | |
| 7 | 07 | | | | | | ■ | ■ | ■ |
| 8 | 08 | | | | | ■ | | | |
| 9 | 09 | | | | | ■ | | | ■ |
| 10 | 0A | | | | | ■ | | ■ | |
| 11 | 0B | | | | | ■ | | ■ | ■ |
| 12 | 0C | | | | | ■ | ■ | | |
| 13 | 0D | | | | | ■ | ■ | | ■ |
| 14 | 0E | | | | | ■ | ■ | ■ | |
| 15 | 0F | | | | | ■ | ■ | ■ | ■ |
| 16 | 10 | | | | ■ | | | | |
| 17 | 11 | | | | ■ | | | | ■ |
| 18 | 12 | | | | ■ | | | ■ | |
| 19 | 13 | | | | ■ | | | ■ | ■ |
| 20 | 14 | | | | ■ | | ■ | | |
| 21 | 15 | | | | ■ | | ■ | | ■ |
| 22 | 16 | | | | ■ | | ■ | ■ | |
| 23 | 17 | | | | ■ | | ■ | ■ | ■ |
| 24 | 18 | | | | ■ | ■ | | | |
| 25 | 19 | | | | ■ | ■ | | | ■ |
| 26 | 1A | | | | ■ | ■ | | ■ | |
| 27 | 1B | | | | ■ | ■ | | ■ | ■ |
| 28 | 1C | | | | ■ | ■ | ■ | | |
| 29 | 1D | | | | ■ | ■ | ■ | | ■ |
| 30 | 1E | | | | ■ | ■ | ■ | ■ | |
| 31 | 1F | | | | ■ | ■ | ■ | ■ | ■ |
| 32 | 20 | | | ■ | | | | | |
| 33 | 21 | | | ■ | | | | | ■ |
| 34 | 22 | | | ■ | | | | ■ | |
| 35 | 23 | | | ■ | | | | ■ | ■ |
| 36 | 24 | | | ■ | | | ■ | | |
| 37 | 25 | | | ■ | | | ■ | | ■ |
| 38 | 26 | | | ■ | | | ■ | ■ | |
| 39 | 27 | | | ■ | | | ■ | ■ | ■ |
| 40 | 28 | | | ■ | | ■ | | | |
| 41 | 29 | | | ■ | | ■ | | | ■ |
| 42 | 2A | | | ■ | | ■ | | ■ | |
| 43 | 2B | | | ■ | | ■ | | ■ | ■ |
| 44 | 2C | | | ■ | | ■ | ■ | | |
| 45 | 2D | | | ■ | | ■ | ■ | | ■ |
| 46 | 2E | | | ■ | | ■ | ■ | ■ | |
| 47 | 2F | | | ■ | | ■ | ■ | ■ | ■ |
| 48 | 30 | | | ■ | ■ | | | | |
| 49 | 31 | | | ■ | ■ | | | | ■ |
| 50 | 32 | | | ■ | ■ | | | ■ | |
| 51 | 33 | | | ■ | ■ | | | ■ | ■ |
| 52 | 34 | | | ■ | ■ | | ■ | | |
| 53 | 35 | | | ■ | ■ | | ■ | | ■ |
| 54 | 36 | | | ■ | ■ | | ■ | ■ | |
| 55 | 37 | | | ■ | ■ | | ■ | ■ | ■ |
| 56 | 38 | | | ■ | ■ | ■ | | | |
| 57 | 39 | | | ■ | ■ | ■ | | | ■ |
| 58 | 3A | | | ■ | ■ | ■ | | ■ | |
| 59 | 3B | | | ■ | ■ | ■ | | ■ | ■ |
| 60 | 3C | | | ■ | ■ | ■ | ■ | | |
| 61 | 3D | | | ■ | ■ | ■ | ■ | | ■ |
| 62 | 3E | | | ■ | ■ | ■ | ■ | ■ | |
| 63 | 3F | | | ■ | ■ | ■ | ■ | ■ | ■ |
| 64 | 40 | | ■ | | | | | | |
| 65 | 41 | | ■ | | | | | | ■ |
| 66 | 42 | | ■ | | | | | ■ | |
| 67 | 43 | | ■ | | | | | ■ | ■ |
| 68 | 44 | | ■ | | | | ■ | | |
| 69 | 45 | | ■ | | | | ■ | | ■ |
| 70 | 46 | | ■ | | | | ■ | ■ | |
| 71 | 47 | | ■ | | | | ■ | ■ | ■ |
| 72 | 48 | | ■ | | | ■ | | | |
| 73 | 49 | | ■ | | | ■ | | | ■ |
| 74 | 4A | | ■ | | | ■ | | ■ | |
| 75 | 4B | | ■ | | | ■ | | ■ | ■ |
| 76 | 4C | | ■ | | | ■ | ■ | | |
| 77 | 4D | | ■ | | | ■ | ■ | | ■ |
| 78 | 4E | | ■ | | | ■ | ■ | ■ | |
| 79 | 4F | | ■ | | | ■ | ■ | ■ | ■ |
| 80 | 50 | | ■ | | ■ | | | | |
| 81 | 51 | | ■ | | ■ | | | | ■ |
| 82 | 52 | | ■ | | ■ | | | ■ | |
| 83 | 53 | | ■ | | ■ | | | ■ | ■ |
| 84 | 54 | | ■ | | ■ | | ■ | | |
| 85 | 55 | | ■ | | ■ | | ■ | | ■ |

| Bit No. | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| 8-bit value | Hexadecimal | Not assigned | Mains voltage failure | Synchronization | Status of internal calibration | Status Input d | Status Input c | Status Input b | Status Input a |
| 86 | 56 | | ■ | | ■ | | ■ | ■ | |
| 87 | 57 | | ■ | | ■ | | ■ | ■ | ■ |
| 88 | 58 | | ■ | | ■ | ■ | | | |
| 89 | 59 | | ■ | | ■ | ■ | | | ■ |
| 90 | 5A | | ■ | | ■ | ■ | | ■ | |
| 91 | 5B | | ■ | | ■ | ■ | | ■ | ■ |
| 92 | 5C | | ■ | | ■ | ■ | ■ | | |
| 93 | 5D | | ■ | | ■ | ■ | ■ | | ■ |
| 94 | 5E | | ■ | | ■ | ■ | ■ | ■ | |
| 95 | 5F | | ■ | | ■ | ■ | ■ | ■ | ■ |
| 96 | 60 | | ■ | ■ | | | | | |
| 97 | 61 | | ■ | ■ | | | | | ■ |
| 98 | 62 | | ■ | ■ | | | | ■ | |
| 99 | 63 | | ■ | ■ | | | | ■ | ■ |
| 100 | 64 | | ■ | ■ | | | ■ | | |
| 101 | 65 | | ■ | ■ | | | ■ | | ■ |
| 102 | 66 | | ■ | ■ | | | ■ | ■ | |
| 103 | 67 | | ■ | ■ | | | ■ | ■ | ■ |
| 104 | 68 | | ■ | ■ | | ■ | | | |
| 105 | 69 | | ■ | ■ | | ■ | | | ■ |
| 106 | 6A | | ■ | ■ | | ■ | | ■ | |
| 107 | 6B | | ■ | ■ | | ■ | | ■ | ■ |
| 108 | 6C | | ■ | ■ | | ■ | ■ | | |
| 109 | 6D | | ■ | ■ | | ■ | ■ | | ■ |
| 110 | 6E | | ■ | ■ | | ■ | ■ | ■ | |
| 111 | 6F | | ■ | ■ | | ■ | ■ | ■ | ■ |
| 112 | 70 | | ■ | ■ | ■ | | | | |
| 113 | 71 | | ■ | ■ | ■ | | | | ■ |
| 114 | 72 | | ■ | ■ | ■ | | | ■ | |
| 115 | 73 | | ■ | ■ | ■ | | | ■ | ■ |
| 116 | 74 | | ■ | ■ | ■ | | ■ | | |
| 117 | 75 | | ■ | ■ | ■ | | ■ | | ■ |
| 118 | 76 | | ■ | ■ | ■ | | ■ | ■ | |
| 119 | 77 | | ■ | ■ | ■ | | ■ | ■ | ■ |
| 120 | 78 | | ■ | ■ | ■ | ■ | | | |
| 121 | 79 | | ■ | ■ | ■ | ■ | | | ■ |
| 122 | 7A | | ■ | ■ | ■ | ■ | | ■ | |
| 123 | 7B | | ■ | ■ | ■ | ■ | | ■ | ■ |
| 124 | 7C | | ■ | ■ | ■ | ■ | ■ | | |
| 125 | 7D | | ■ | ■ | ■ | ■ | ■ | | ■ |
| 126 | 7E | | ■ | ■ | ■ | ■ | ■ | ■ | |
| 127 | 7F | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 128 | 80 | | | | | | | | |
| 129 | 81 | | | | | | | | ■ |
| 130 | 82 | | | | | | | ■ | |
| 131 | 83 | | | | | | | ■ | ■ |
| 132 | 84 | | | | | | ■ | | |
| 133 | 85 | | | | | | ■ | | ■ |
| 134 | 86 | | | | | | ■ | ■ | |
| 135 | 87 | | | | | | ■ | ■ | ■ |
| 136 | 88 | | | | | ■ | | | |
| 137 | 89 | | | | | ■ | | | ■ |
| 138 | 8A | | | | | ■ | | ■ | |
| 139 | 8B | | | | | ■ | | ■ | ■ |
| 140 | 8C | | | | | ■ | ■ | | |
| 141 | 8D | | | | | ■ | ■ | | ■ |
| 142 | 8E | | | | | ■ | ■ | ■ | |
| 143 | 8F | | | | | ■ | ■ | ■ | ■ |
| 144 | 90 | | | | ■ | | | | |
| 145 | 91 | | | | ■ | | | | ■ |
| 146 | 92 | | | | ■ | | | ■ | |
| 147 | 93 | | | | ■ | | | ■ | ■ |
| 148 | 94 | | | | ■ | | ■ | | |
| 149 | 95 | | | | ■ | | ■ | | ■ |
| 150 | 96 | | | | ■ | | ■ | ■ | |
| 151 | 97 | | | | ■ | | ■ | ■ | ■ |
| 152 | 98 | | | | ■ | ■ | | | |
| 153 | 99 | | | | ■ | ■ | | | ■ |
| 154 | 9A | | | | ■ | ■ | | ■ | |
| 155 | 9B | | | | ■ | ■ | | ■ | ■ |
| 156 | 9C | | | | ■ | ■ | ■ | | |
| 157 | 9D | | | | ■ | ■ | ■ | | ■ |
| 158 | 9E | | | | ■ | ■ | ■ | ■ | |
| 159 | 9F | | | | ■ | ■ | ■ | ■ | ■ |
| 160 | A0 | | | ■ | | | | | |
| 161 | A1 | | | ■ | | | | | ■ |
| 162 | A2 | | | ■ | | | | ■ | |
| 163 | A3 | | | ■ | | | | ■ | ■ |
| 164 | A4 | | | ■ | | | ■ | | |
| 165 | A5 | | | ■ | | | ■ | | ■ |
| 166 | A6 | | | ■ | | | ■ | ■ | |
| 167 | A7 | | | ■ | | | ■ | ■ | ■ |
| 168 | A8 | | | ■ | | ■ | | | |
| 169 | A9 | | | ■ | | ■ | | | ■ |
| 170 | AA | | | ■ | | ■ | | ■ | |
| 171 | AB | | | ■ | | ■ | | ■ | ■ |

| Bit No. | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|
| 8-bit value | Hexadecimal | Not assigned | Mains voltage failure | Synchronization | Status of internal calibration | Status Input d | Status Input c | Status Input b | Status Input a |
| 172 | AC | | | ■ | | ■ | ■ | | |
| 173 | AD | | | ■ | | ■ | ■ | | ■ |
| 174 | AE | | | ■ | | ■ | ■ | ■ | |
| 175 | AF | | | ■ | | ■ | ■ | ■ | ■ |
| 176 | B0 | | | ■ | ■ | | | | |
| 177 | B1 | | | ■ | ■ | | | | ■ |
| 178 | B2 | | | ■ | ■ | | | ■ | |
| 179 | B3 | | | ■ | ■ | | | ■ | ■ |
| 180 | B4 | | | ■ | ■ | | ■ | | |
| 181 | B5 | | | ■ | ■ | | ■ | | ■ |
| 182 | B6 | | | ■ | ■ | | ■ | ■ | |
| 183 | B7 | | | ■ | ■ | | ■ | ■ | ■ |
| 184 | B8 | | | ■ | ■ | ■ | | | |
| 185 | B9 | | | ■ | ■ | ■ | | | ■ |
| 186 | BA | | | ■ | ■ | ■ | | ■ | |
| 187 | BB | | | ■ | ■ | ■ | | ■ | ■ |
| 188 | BC | | | ■ | ■ | ■ | ■ | | |
| 189 | BD | | | ■ | ■ | ■ | ■ | | ■ |
| 190 | BE | | | ■ | ■ | ■ | ■ | ■ | |
| 191 | BF | | | ■ | ■ | ■ | ■ | ■ | ■ |
| 192 | C0 | | ■ | | | | | | |
| 193 | C1 | | ■ | | | | | | ■ |
| 194 | C2 | | ■ | | | | | ■ | |
| 195 | C3 | | ■ | | | | | ■ | ■ |
| 196 | C4 | | ■ | | | | ■ | | |
| 197 | C5 | | ■ | | | | ■ | | ■ |
| 198 | C6 | | ■ | | | | ■ | ■ | |
| 199 | C7 | | ■ | | | | ■ | ■ | ■ |
| 200 | C8 | | ■ | | | ■ | | | |
| 201 | C9 | | ■ | | | ■ | | | ■ |
| 202 | CA | | ■ | | | ■ | | ■ | |
| 203 | CB | | ■ | | | ■ | | ■ | ■ |
| 204 | CC | | ■ | | | ■ | ■ | | |
| 205 | CD | | ■ | | | ■ | ■ | | ■ |
| 206 | CE | | ■ | | | ■ | ■ | ■ | |
| 207 | CF | | ■ | | | ■ | ■ | ■ | ■ |
| 208 | D0 | | ■ | | ■ | | | | |
| 209 | D1 | | ■ | | ■ | | | | ■ |
| 210 | D2 | | ■ | | ■ | | | ■ | |
| 211 | D3 | | ■ | | ■ | | | ■ | ■ |
| 212 | D4 | | ■ | | ■ | | ■ | | |
| 213 | D5 | | ■ | | ■ | | ■ | | ■ |
| 214 | D6 | | ■ | | ■ | | ■ | ■ | |
| 215 | D7 | | ■ | | ■ | | ■ | ■ | ■ |
| 216 | D8 | | ■ | | ■ | ■ | | | |
| 217 | D9 | | ■ | | ■ | ■ | | | ■ |
| 218 | DA | | ■ | | ■ | ■ | | ■ | |
| 219 | DB | | ■ | | ■ | ■ | | ■ | ■ |
| 220 | DC | | ■ | | ■ | ■ | ■ | | |
| 221 | DD | | ■ | | ■ | ■ | ■ | | ■ |
| 222 | DE | | ■ | | ■ | ■ | ■ | ■ | |
| 223 | DF | | ■ | | ■ | ■ | ■ | ■ | ■ |
| 224 | E0 | | ■ | ■ | | | | | |
| 225 | E1 | | ■ | ■ | | | | | ■ |
| 226 | E2 | | ■ | ■ | | | | ■ | |
| 227 | E3 | | ■ | ■ | | | | ■ | ■ |
| 228 | E4 | | ■ | ■ | | | ■ | | |
| 229 | E5 | | ■ | ■ | | | ■ | | ■ |
| 230 | E6 | | ■ | ■ | | | ■ | ■ | |
| 231 | E7 | | ■ | ■ | | | ■ | ■ | ■ |
| 232 | E8 | | ■ | ■ | | ■ | | | |
| 233 | E9 | | ■ | ■ | | ■ | | | ■ |
| 234 | EA | | ■ | ■ | | ■ | | ■ | |
| 235 | EB | | ■ | ■ | | ■ | | ■ | ■ |
| 236 | EC | | ■ | ■ | | ■ | ■ | | |
| 237 | ED | | ■ | ■ | | ■ | ■ | | ■ |
| 238 | EE | | ■ | ■ | | ■ | ■ | ■ | |
| 239 | EF | | ■ | ■ | | ■ | ■ | ■ | ■ |
| 240 | F0 | | ■ | ■ | ■ | | | | |
| 241 | F1 | | ■ | ■ | ■ | | | | ■ |
| 242 | F2 | | ■ | ■ | ■ | | | ■ | |
| 243 | F3 | | ■ | ■ | ■ | | | ■ | ■ |
| 244 | F4 | | ■ | ■ | ■ | | ■ | | |
| 245 | F5 | | ■ | ■ | ■ | | ■ | | ■ |
| 246 | F6 | | ■ | ■ | ■ | | ■ | ■ | |
| 247 | F7 | | ■ | ■ | ■ | | ■ | ■ | ■ |
| 248 | F8 | | ■ | ■ | ■ | ■ | | | |
| 249 | F9 | | ■ | ■ | ■ | ■ | | | ■ |
| 250 | FA | | ■ | ■ | ■ | ■ | | ■ | |
| 251 | FB | | ■ | ■ | ■ | ■ | | ■ | ■ |
| 252 | FC | | ■ | ■ | ■ | ■ | ■ | | |
| 253 | FD | | ■ | ■ | ■ | ■ | ■ | | ■ |
| 254 | FE | | ■ | ■ | ■ | ■ | ■ | ■ | |
| 255 | FF | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Empty = Value 0

■ = Value 1, applicable

## A.5 Conversion between °C and °F

| No.: | °C | °F |
|---|---|---|
| 1 | -50 | -58 |
| 2 | -40 | -40 |
| 3 | -30 | -22 |
| 4 | -17.8 | **0** |
| 5 | -20 | -4 |
| 6 | -10 | +14 |
| 7 | **0** | +32 |
| 8 | +10 | +50 |
| 9 | +20 | +68 |
| 10 | +30 | +86 |
| 11 | +50 | +122 |
| 12 | +60 | +140 |
| 13 | +70 | +158 |
| 14 | +80 | +176 |
| 15 | +90 | +194 |
| 16 | +100 | +212 |
| 17 | +110 | +230 |
| 18 | +120 | +248 |
| 19 | +130 | +266 |
| 20 | +140 | +284 |
| 21 | +150 | +302 |

**Conversion formula**

Celsius to Fahrenheit

Temperature in °F = ((T °Celsius x 9) / 5) + 32

Fahrenheit to Celsius

Temperature in °C = (T °Fahrenheit - 32) x 5 / 9

## A.6 Order details

| Short description | Description | Order No. | bbn 40 16779 EAN | Weight 1 pc [kg] | Packaging [pcs.] |
|---|---|---|---|---|---|
| **WS/S 4.1.1.2** | Weather Station, 4-fold, MDRC | 2CDG110191R0011 | **92 9370** | 0.270 | 1 |

# Contact

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