



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



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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<sup>®</sup>.

### 1.1 Using the product manual

This manual provides detailed technical information on the function, installation and programming of the ABB i-bus<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> Tool

The device possesses an interface to the i-bus<sup>®</sup> Tool.

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

The i-bus<sup>®</sup> Tool can be downloaded for free from our website ([www.abb.com/knx](http://www.abb.com/knx)).

ETS is not required for the i-bus<sup>®</sup> 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<sup>®</sup> Tool.

## 2 Device technology




2CDC071017S0014

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

<b>Supply</b>	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
<b>Auxiliary voltage supply for the sensors</b>	Rated voltage $U_n$	24 VDC
	Rated current $I_n$	300 mA
<b>Connections</b>	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 <sup>2</sup> fine stranded 0.2...4.0 mm <sup>2</sup> single core
	Tightening torque	Max. 0.6 Nm
<b>Cable length</b>	Between sensor and device input	Max. 100 m
<b>Operating and display elements</b>	Programming button/LED 	For assignment of the physical address
<b>Protection</b>	IP 20	To DIN EN 60 529
<b>Protection class</b>	II	To DIN EN 61 140
<b>Isolation category</b>	Overvoltage category	III to EN 60 664-1
	Pollution degree	II to DIN EN 60 664-1
<b>KNX safety voltage</b>	SELV 24 V DC	

# ABB i-bus® KNX

## Device technology

<b>Temperature range</b>	Mode	-5 °C...+45 °C
	Storage	-25...+55 °C
	Transport	-25...+70 °C
<b>Ambient conditions</b>	Maximum air humidity	93 %, no condensation allowed
<b>Design</b>	Modular installation device (MDRC)	Modular installation device, Pro <i>M</i>
	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
<b>Mounting</b>	On 35 mm mounting rail	To DIN EN 60 715
<b>Installation position</b>	Any	
<b>Weight</b>	0.270 kg	
<b>Housing/color</b>	Plastic housing, gray	
<b>Approvals</b>	KNX to EN 50 090-1, -2	Certification
<b>CE mark</b>	In accordance with the EMC directive and low voltage directive	

# ABB i-bus<sup>®</sup> KNX

## Device technology

### 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 PT100 2-conductor technology PT100 3-conductor technology PT1000 2-conductor technology PT1000 3-conductor technology 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
<p>ETS and the current version of the device application are required for programming.</p> <p>The current application can be found with the corresponding software information for download on the Internet at <a href="http://www.abb.com/knx">www.abb.com/knx</a>. After import into ETS, the application appears in the <i>Catalogs</i> window under <i>Manufacturers/ABB/Input/Weather Data 4f</i>.</p> <p>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.</p>

## 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. Make sure that the maximum output current is not exceeded.

### 2.2.1 Voltage signals

Sensor signal	Resolution	Accuracy at 25 °C T <sub>U</sub> *1	Accuracy at -5...45 °C T <sub>U</sub> *1	Accuracy at -20...70 °C T <sub>U</sub> *1	Remark
0...1 V	200 µV	±0.2 % ±1 mV	±0.5 % ±1 mV	±0.8 % ±1 mV	
0...5 V	200 µV	±0.2 % ±1 mV	±0.5 % ±1 mV	±0.8 % ±1 mV	
0...10 V	200 µV	±0.2 % ±1 mV	±0.5 % ±1 mV	±0.8 % ±1 mV	
1...10 V	200 µV	±0.2 % ±1 mV	±0.5 % ±1 mV	±0.8 % ±1 mV	

\*1 of current measured value at ambient temperature (T<sub>U</sub>)

### 2.2.2 Current signals

Sensor signal	Resolution	Accuracy at 25 °C T <sub>U</sub> *2	Accuracy at -5...45 °C T <sub>U</sub> *2	Accuracy at -20...70 °C T <sub>U</sub> *2	Remark
0...20 mA	2 µA	±0.2 % ±4 µA	±0.5 % ±4 µA	±0.8 % ±4 µA	
4...20 mA	2 µA	±0.2 % ±4 µA	±0.5 % ±4 µA	±0.8 % ±4 µA	

\*2 of current measured value at ambient temperature (T<sub>U</sub>)

### 2.2.3 Resistance signals

Sensor signal	Resolution	Accuracy at 25 °C T <sub>U</sub> *3	Accuracy at -5...45 °C T <sub>U</sub> *3	Accuracy at -20...70 °C T <sub>U</sub> *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<sub>U</sub>)

\*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.

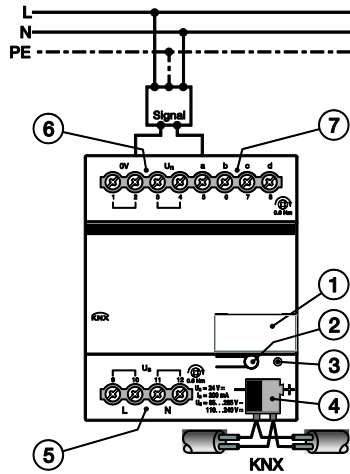
The table indicates the individual classes:

Description	Tolerance
DIN class A	$0.15 + (0.002 \times t)$
1/3 DIN class B	$0.10 + (0.005 \times t)$
1/2 DIN class B	$0.15 + (0.005 \times t)$
DIN class B	$0.30 + (0.005 \times t)$
2 DIN class B	$0.60 + (0.005 \times t)$
5 DIN class B	$1.50 + (0.005 \times t)$

t = Current temperature

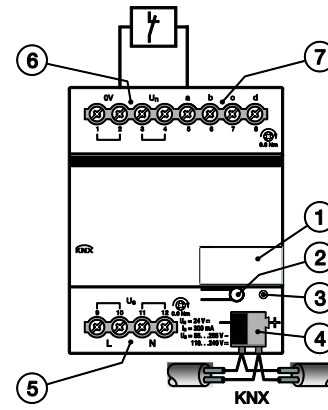
## 2.3 Connection schematics

Connecting sensor with an external supply



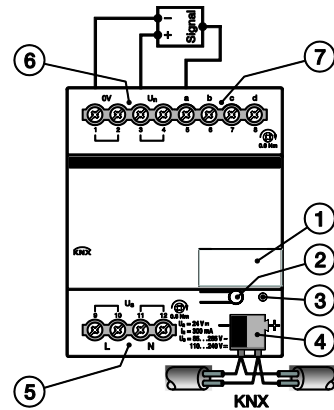
2CDC072034F0013

Connecting a floating contact



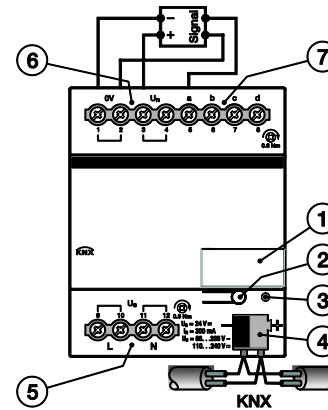
2CDC072037F0013

Connecting a 3-conductor sensor with its own power supply



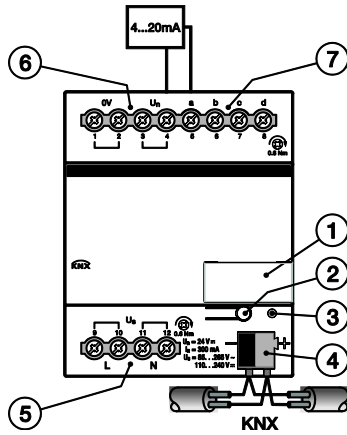
2CDC072036F0013

Connecting a 4-conductor sensor with its own power supply



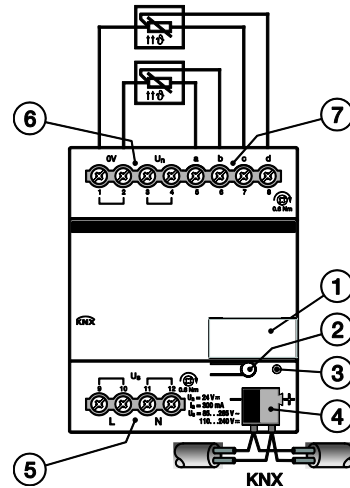
2CDC072035F0013

Connecting a 4...20 mA sensor





2CDC072031F0014

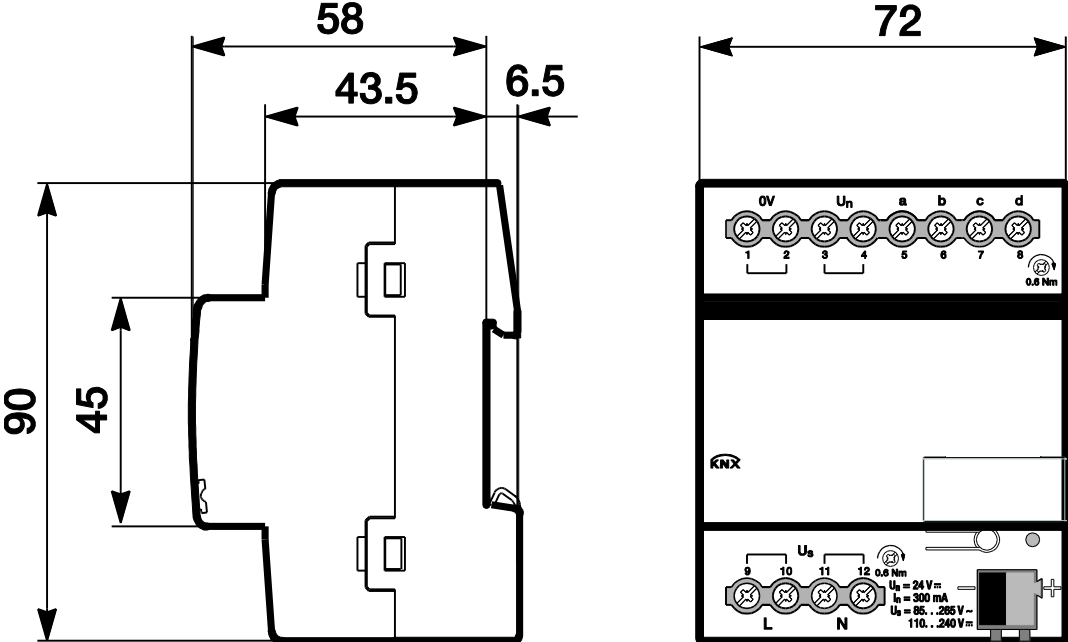
Connecting a PT100/PT1000  
3-conductor temperature sensor



2CDC072032F0014

- 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



2CDC072039F0013

### 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<sup>®</sup>, 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:

<b>Sensor type (type of input signal)</b>	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.
<b>Signal correction/displacement</b>	The sensor signal can be corrected or displaced.
<b>Measurement range</b>	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.
<b>Output value</b>	Flexible setting options for the output value. Upper and lower measuring limits dependent on the sensor's output signal.
<b>Data types of the output value</b>	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).
<b>Filtering</b>	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.
<b>Threshold</b>	Two thresholds can be set, each with an upper and lower limit. The limits can be modified via the bus.
<b>Calculation</b>	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.
<b>Logic functions</b>	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

# ABB i-bus<sup>®</sup> KNX Commissioning

## 3.2.1 Parameter window *General*

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

<b>General</b>	Consider the sensor manufacturer data for the parameter settings.	<- Note
a: General		
a: Output		
a: Threshold 1		
a: Threshold 1 Output	Reaction after bus voltage recovery	No reaction
a: Threshold 2	Reaction after mains voltage recovery	No reaction
a: Threshold 2 Output	Reaction after programming/ETS reset	No reaction
b: General	Send delay for above parameters	10 s
c: General	Mains frequency	50 Hz
d: General	Use time synchronization (required for rain meter sensor)	No
Calculation 1	Rate of telegrams	1 telegram/second
Calculation 2	Enable communication object "In operation", 1-bit	No
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

**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. 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 with 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.

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.

No telegrams are sent during the send delay in progress in the initialization phase. Value Read telegrams are also answered during the delay time.

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.

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## 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
<i>Synchronization</i> 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 <i>5 telegrams/second</i> a maximum of five telegrams can be sent in a second.

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## 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.

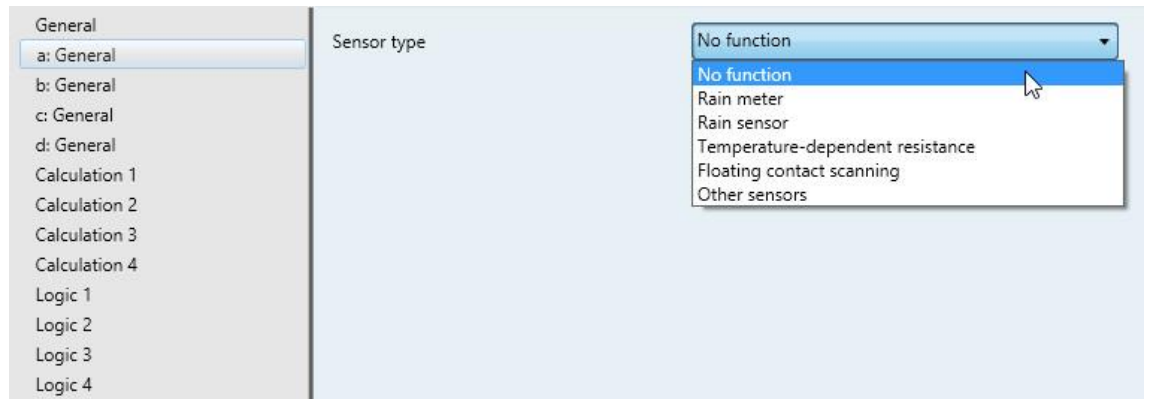
Note
After bus voltage recovery, the communication object sends its value after the set sending and switching delay time.

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## 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*.

General	Sensor type	Other sensors
a: General	Designation, Input a (40 characters)	<Text>
a: Output	Sensor output	0...10 V
a: Threshold 1	Send output value as	1-byte [0...+255]
a: Threshold 1 Output	Measuring range definition	
a: Threshold 2	Lower meas. limit in x % of meas. range end value	0
a: Threshold 2 Output	Output value to be sent for lower measuring limit [0...+255]	0
b: General	Upper meas. limit in x % of meas. range end value	100
c: General	Output value to be sent for upper measuring limit [0...+255]	255
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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.

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

Dependent parameters:

## Sensor output

Options:      0...1 V  
                 0...5 V  
                 0...10 V  
                 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:      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.

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

General	Sensor type	Other sensors
a: General	Designation, Input a (40 characters)	<Text>
a: Output	Sensor output	0...10 V
a: Threshold 1	Send output value as	1-byte [0...+255]
a: Threshold 1 Output	Measuring range definition	
a: Threshold 2	Lower meas. limit in x % of meas. range end value	0
a: Threshold 2 Output	Output value to be sent for lower measuring limit [0...+255]	0
b: General	Upper meas. limit in x % of meas. range end value	100
c: General	Output value to be sent for upper measuring limit [0...+255]	255
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

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.

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## 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.

General	Scan rate	<- Note
a: General	One measurement per second	
a: Output	Filter	Inactive
a: Threshold 1		
a: Threshold 1 Output		
a: Threshold 2		
a: Threshold 2 Output	Send output value	Cyclically
b: General	Output value is sent every	5 s
c: General		
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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.

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*.

General	Use threshold	Yes
a: General	Tolerance band lower limit	0
a: Output	Tolerance band upper limit	255
<b>a: Threshold 1</b>	Limits modifiable via bus	No
a: Threshold 1 Output	Data type of threshold object	1-bit
a: Threshold 2	Send if threshold fallen below	Send OFF telegram
a: Threshold 2 Output	Min. duration of the undershoot	None
b: General	Send if threshold exceeded	Send ON telegram
c: General	Min. duration of the overshoot	None
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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.

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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**

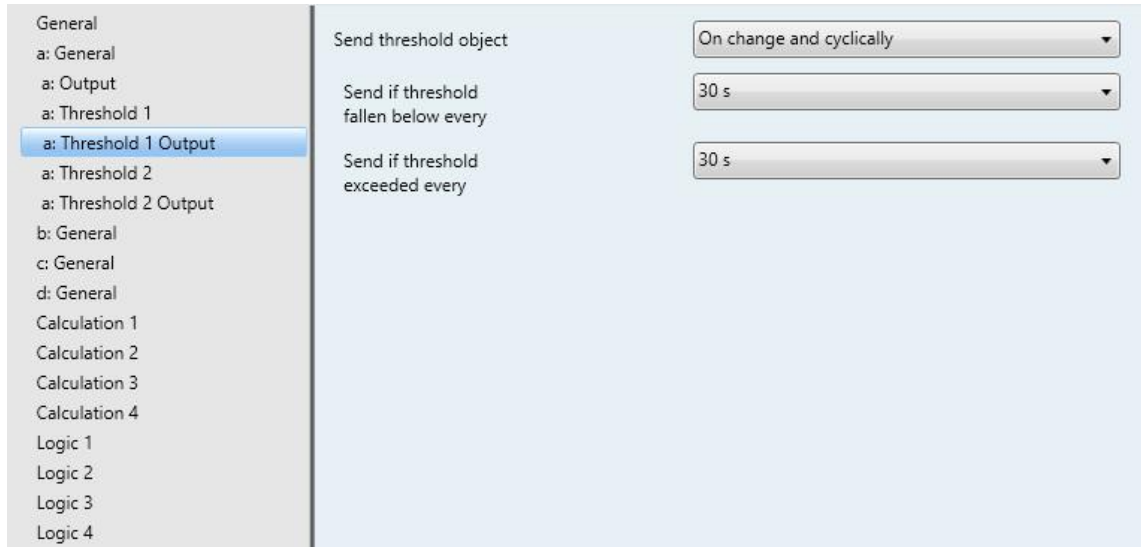
Options:        None  
                  5/10/30 s  
                  1/5/10/30 min  
                  1/6/12/24 h

- *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  
                  On change and cyclically

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.

## 3.2.4 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*.

The screenshot shows a software interface for configuring a sensor. On the left is a tree view with the following items: General, a: General (highlighted), a: Output, a: Threshold 1, a: Threshold 1 Output, a: Threshold 2, a: Threshold 2 Output, b: General, c: General, d: General, Calculation 1, Calculation 2, Calculation 3, Calculation 4, Logic 1, Logic 2, Logic 3, and Logic 4. The main area displays the configuration for the selected 'a: General' window. The 'Sensor type' dropdown is set to 'Rain meter'. The 'Sensor output' dropdown is set to 'Pulse counting via floating contact'. The 'Send output value as' dropdown is set to '2-byte (floating point)'. The 'Pulse counting set-up' section includes a numeric input field for 'Amount of rain/pulse [in 0.01 mm]' set to '10'. The 'Pulse contact type' dropdown is set to 'Open'. The 'Reset pulse counting' dropdown is set to 'Daily'.

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.

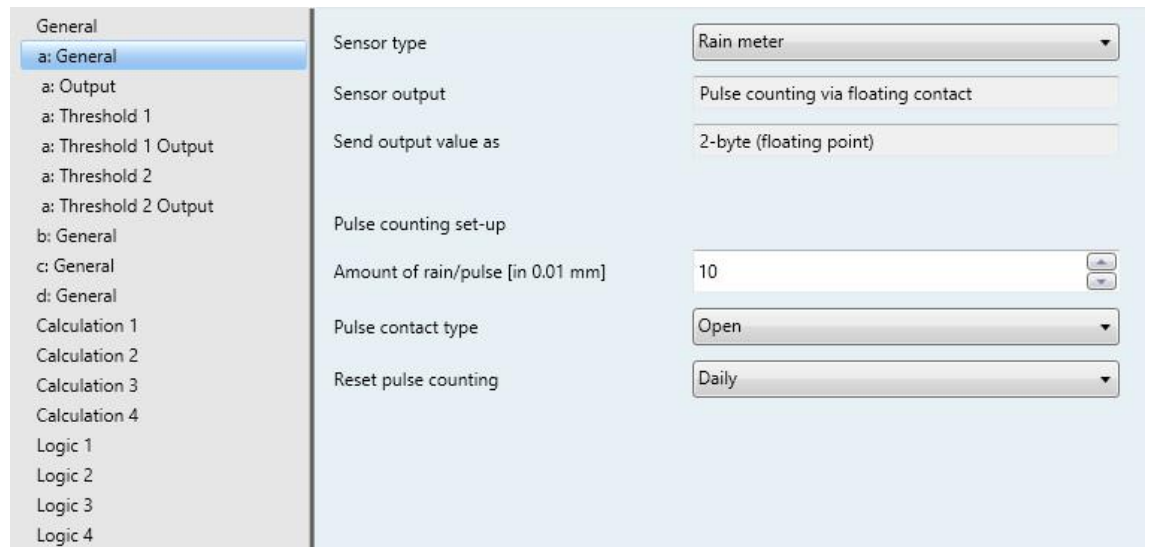
### **Send output value as**

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



General	Sensor type	Rain meter
a: General	Sensor output	Pulse counting via floating contact
a: Output	Send output value as	2-byte (floating point)
a: Threshold 1	Pulse counting set-up	
a: Threshold 1 Output	Amount of rain/pulse [in 0.01 mm]	10
a: Threshold 2	Pulse contact type	Open
a: Threshold 2 Output	Reset pulse counting	Daily
b: General		
c: General		
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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  
1 mm = 1 l/m<sup>2</sup>

### 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

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## Reset pulse counting

Options:        Hourly  
                  Daily

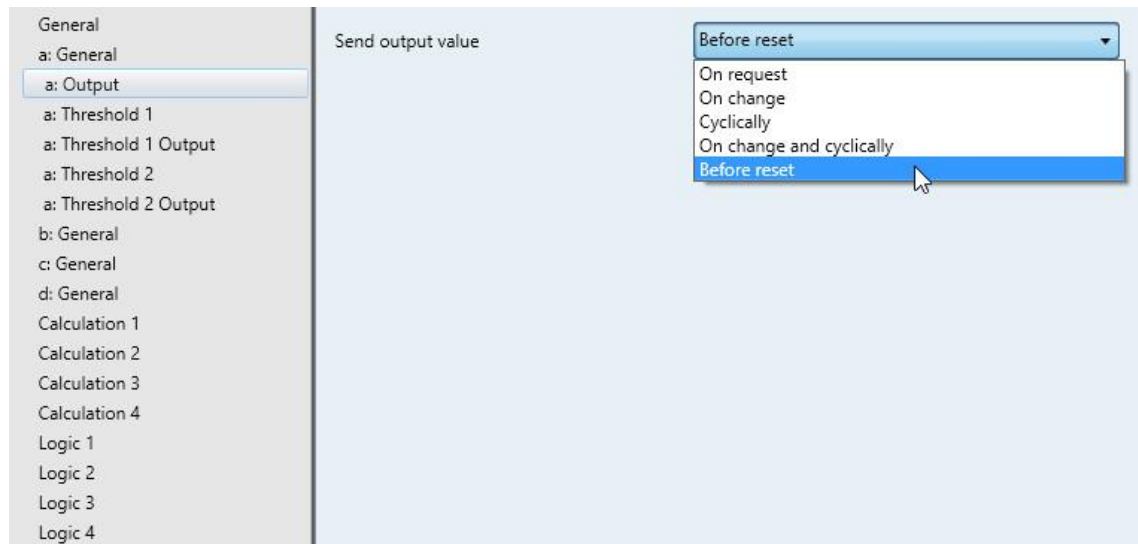
The pulse counting reset is set using these parameters.

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

Note
<p>Time synchronization is required for timely resetting of the pulses on the rain meter sensor. 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 <i>Daily</i> and <i>Hourly</i> in the parameter <i>Reset pulse counting</i> are not synchronous with real time.</p> <p>See also the communication object <i>Input time - Synchronization</i> and the parameter <i>Use time synchronization</i>.</p> <p>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 <i>Status byte – General</i>.</p>

## 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.

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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*.

General	Use threshold	Yes
a: General	Tolerance band lower limit Factor as meas. range	-1000
a: Output	Tolerance band upper limit Factor as meas. range	1000
a: Threshold 1	Limits modifiable via bus	No
a: Threshold 1 Output	Data type of threshold object	1-bit
a: Threshold 2	Send if threshold fallen below	Send OFF telegram
a: Threshold 2 Output	Min. duration of the undershoot	None
b: General	Send if threshold exceeded	Send ON telegram
c: General	Min. duration of the overshoot	None
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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](#)

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## 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.

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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*.

General	Send threshold object	On change and cyclically
a: General		
a: Output		
a: Threshold 1	Send if threshold fallen below every	30 s
<b>a: Threshold 1 Output</b>		
a: Threshold 2	Send if threshold exceeded every	30 s
a: Threshold 2 Output		
b: General		
c: General		
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### Send threshold object

Options:        On change  
                  On change and cyclically

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*.

The screenshot shows the 'General' parameter window for a 'Rain sensor'. The left sidebar lists various parameter windows, with 'a: General' selected. The main area contains four parameters, each with a dropdown menu:

- Sensor type:** Rain sensor
- Sensor output:** Floating contact scanning
- Rain if contact:** Open
- Output value is sent as:** 1-bit

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.

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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**

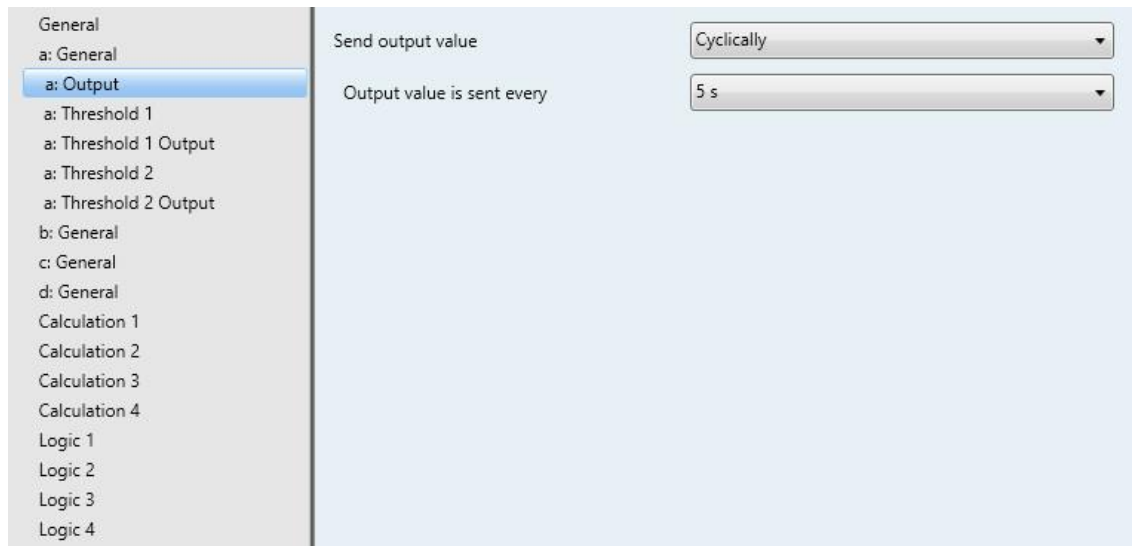
This parameter preset to 1-bit.

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.

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## 3.2.5.2 Parameter window *a: Threshold 1*

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

General	Use threshold	Yes
a: General	Data type of threshold object	1-bit
a: Output	Send if rain OFF	Send OFF telegram
<b>a: Threshold 1</b>	Minimum duration for rain OFF	None
a: Threshold 1 Output	Send if rain ON	Send ON telegram
a: Threshold 2	Minimum duration for rain ON	None
a: Threshold 2 Output		
b: General		
c: General		
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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*.

General	Send threshold object	On change and cyclically
a: General		
a: Output	Send if rain OFF every	30 s
a: Threshold 1		
a: Threshold 1 Output	Send if rain ON every	30 s
a: Threshold 2		
a: Threshold 2 Output		
b: General		
c: General		
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### Send threshold object

Options:        On change  
                  On change and cyclically

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:        5/10/30 s  
                  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*.

The screenshot shows a software interface for configuring a sensor. On the left is a navigation tree with the following items: General, a: General (highlighted), a: Output, a: Threshold 1, a: Threshold 1 Output, a: Threshold 2, a: Threshold 2 Output, b: General, c: General, d: General, Calculation 1, Calculation 2, Calculation 3, Calculation 4, Logic 1, Logic 2, Logic 3, and Logic 4. The main area displays the following parameters:

- Sensor type:** Temperature-dependent resistance (dropdown menu)
- Sensor output:** PT100 2-cond. technology [-50...+150 °C] (dropdown menu)
- Send output value as:** 2-byte (floating point) (text field)
- Temp. offset in 0.1 K [-50...+50]:** 0 (text field with up/down arrows)
- Line fault compensation:** None (dropdown menu)

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

General	
a: General	Sensor type: Temperature-dependent resistance
a: Output	Sensor output: PT100 2-cond. technology [-50...+150 °C]
a: Threshold 1	Send output value as: 2-byte (floating point)
a: Threshold 1 Output	Temp. offset in 0.1 K [-50...+50]: 0
a: Threshold 2	Line fault compensation: None
a: Threshold 2 Output	
b: General	
c: General	
d: General	
Calculation 1	
Calculation 2	
Calculation 3	
Calculation 4	
Logic 1	
Logic 2	
Logic 3	
Logic 4	

#### 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  $\pm 5$  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 *Via cable length* and *Via 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

General		
a: General	Sensor type	Temperature-dependent resistance
a: Output	Sensor output	PT100 3-cond. technology [-50...+150 °C]
a: Threshold 1	Send output value as	2-byte (floating point)
a: Threshold 1 Output	Temp. offset in 0.1 K [-50...+50]	0
a: Threshold 2		
a: Threshold 2 Output		
b: General	Input b must also be configured as 3-conductor measurement	<- Note
c: General	Input b is used for line fault compensation	<- Note
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

#### 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



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

<ul style="list-style-type: none"> <li>General</li> <li style="background-color: #e0e0e0;">a: General</li> <li>a: Output</li> <li>a: Threshold 1</li> <li>a: Threshold 1 Output</li> <li>a: Threshold 2</li> <li>a: Threshold 2 Output</li> <li>b: General</li> <li>c: General</li> <li>d: General</li> <li>Calculation 1</li> <li>Calculation 2</li> <li>Calculation 3</li> <li>Calculation 4</li> <li>Logic 1</li> <li>Logic 2</li> <li>Logic 3</li> <li>Logic 4</li> </ul>	<p>Sensor type: <input type="text" value="Temperature-dependent resistance"/></p> <p>Sensor output: <input type="text" value="KT/KTY [-50...+150 °C]"/></p> <p>Manufacturer designation: <input type="text" value="KT 100 / 110 / 130"/></p> <p>Send output value as: <input type="text" value="2-byte (floating point)"/></p> <p>Temp. offset in 0.1 K [-50...+50]: <input type="text" value="0"/></p> <p>Line fault compensation: <input type="text" value="None"/></p>
---	---

### 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

<ul style="list-style-type: none"> <li>General</li> <li><b>a: General</b></li> <li>a: Output</li> <li>a: Threshold 1</li> <li>a: Threshold 1 Output</li> <li>a: Threshold 2</li> <li>a: Threshold 2 Output</li> <li>b: General</li> <li>c: General</li> <li>d: General</li> <li>Calculation 1</li> <li>Calculation 2</li> <li>Calculation 3</li> <li>Calculation 4</li> <li>Logic 1</li> <li>Logic 2</li> <li>Logic 3</li> <li>Logic 4</li> </ul>	<p>Sensor type <span style="float: right;">Temperature-dependent resistance ▼</span></p> <p>Sensor output <span style="float: right;">KT/KTY [-50...+150 °C] ▼</span></p> <p>Manufacturer designation <span style="float: right;">User-defined ▼</span></p> <p>&lt;- Note</p> <p>Resistance in ohms at -50 °C <span style="float: right;">1030 ▲▼</span></p> <p>Resistance in ohms at -30 °C <span style="float: right;">1247 ▲▼</span></p> <p>Resistance in ohms at -10 °C <span style="float: right;">1495 ▲▼</span></p> <p>Resistance in ohms at +10 °C <span style="float: right;">1772 ▲▼</span></p> <p>Resistance in ohms at +30 °C <span style="float: right;">2080 ▲▼</span></p> <p>Resistance in ohms at +50 °C <span style="float: right;">2417 ▲▼</span></p> <p>Resistance in ohms at +70 °C <span style="float: right;">2785 ▲▼</span></p> <p>Resistance in ohms at +90 °C <span style="float: right;">3182 ▲▼</span></p> <p>Resistance in ohms at +110 °C <span style="float: right;">3607 ▲▼</span></p> <p>Resistance in ohms at +130 °C <span style="float: right;">4008 ▲▼</span></p> <p>Resistance in ohms at +150 °C <span style="float: right;">4280 ▲▼</span></p> <p>Send output value as <span style="float: right;">2-byte (floating point)</span></p> <p>Temp. offset in 0.1 K [-50...+50] <span style="float: right;">0 ▲▼</span></p> <p>Line fault compensation <span style="float: right;">None ▼</span></p>
---	--

### 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:*

<ul style="list-style-type: none"> <li>General</li> <li><b>a: General</b></li> <li>a: Output</li> <li>a: Threshold 1</li> <li>a: Threshold 1 Output</li> <li>a: Threshold 2</li> <li>a: Threshold 2 Output</li> <li>b: General</li> <li>c: General</li> <li>d: General</li> <li>Calculation 1</li> <li>Calculation 2</li> <li>Calculation 3</li> <li>Calculation 4</li> <li>Logic 1</li> <li>Logic 2</li> <li>Logic 3</li> <li>Logic 4</li> </ul>	<p>Sensor type: Temperature-dependent resistance</p> <p>Sensor output: PT1000 2-cond. technology [-50...+150 °C]</p> <p>Send output value as: 2-byte (floating point)</p> <p>Temp. offset in 0.1 K [-50...+50]: 0</p> <p>Line fault compensation: Via cable length</p> <p>Cable length, single distance [1...30 m]: 10</p> <p>Cross-section of conductor Value * 0.01 mm<sup>2</sup> [1...150]: 100</p> <p>Line fault comp. via cable length suitable only f. copper conductors: &lt;- Note</p>
---	---

### 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 mm<sup>2</sup> [1...150]

Options: 1...100...150 (150 = 1.5 mm<sup>2</sup>)

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 *Via cable resistance*

General		
a: General	Sensor type	Temperature-dependent resistance
a: Output	Sensor output	PT1000 2-cond. technology [-50...+150 °C]
a: Threshold 1	Send output value as	2-byte (floating point)
a: Threshold 1 Output	Temp. offset in 0.1 K [-50...+50]	0
a: Threshold 2	Line fault compensation	Via cable resistance
a: Threshold 2 Output	Cable resistance in milliohms (total of forw. and ret. conduct.)	500
b: General		
c: General		
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### **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.

General	Scan rate	<- Note
a: General	One measurement per second	
a: Output	Filter	Inactive
a: Threshold 1		
a: Threshold 1 Output		
a: Threshold 2		
a: Threshold 2 Output		
b: General	Send output value	Cyclically
c: General	Output value is sent every	5 s
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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.

Example: An erratic change of the sensor signal with the setting *Medium* will take 16 seconds until the output value is through.

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## 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*.

General	Use threshold	Yes
a: General		
a: Output	Tolerance band lower limit Input in 0.1 °C	-500
<b>a: Threshold 1</b>	Tolerance band upper limit Input in 0.1 °C	1500
a: Threshold 2	Limits modifiable via bus	No
a: Threshold 2 Output	Data type of threshold object	1-bit
b: General	Send if threshold fallen below	Send OFF telegram
c: General	Min. duration of the undershoot	None
d: General	Send if threshold exceeded	Send ON telegram
Calculation 1	Min. duration of the overshoot	None
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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](#)

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## 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.

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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**

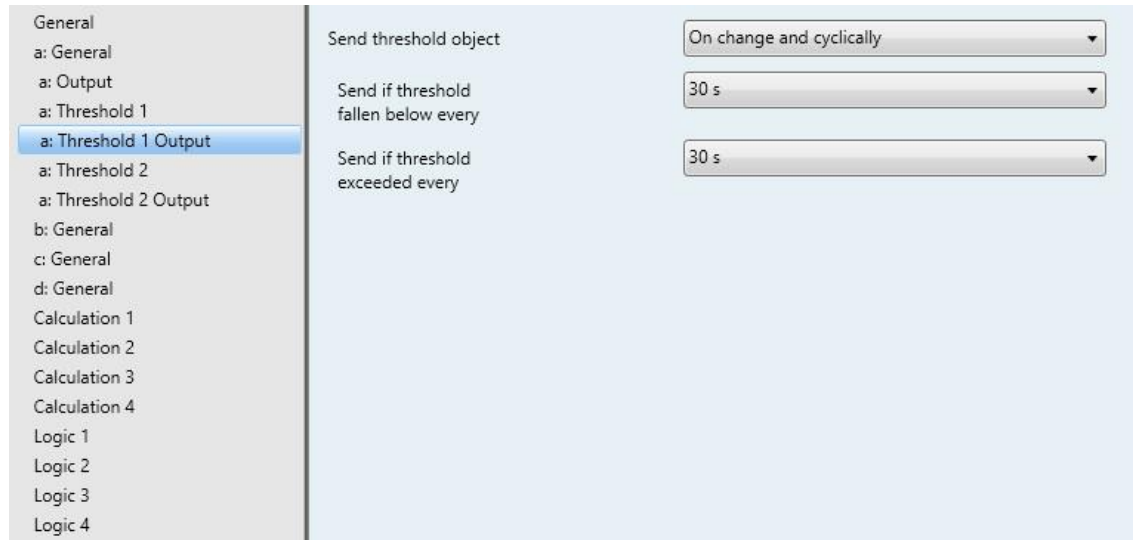
Options:     None  
              5/10/30 s  
              1/5/10/30 min  
              1/6/12/24 h

- *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  
                  On change and cyclically

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**

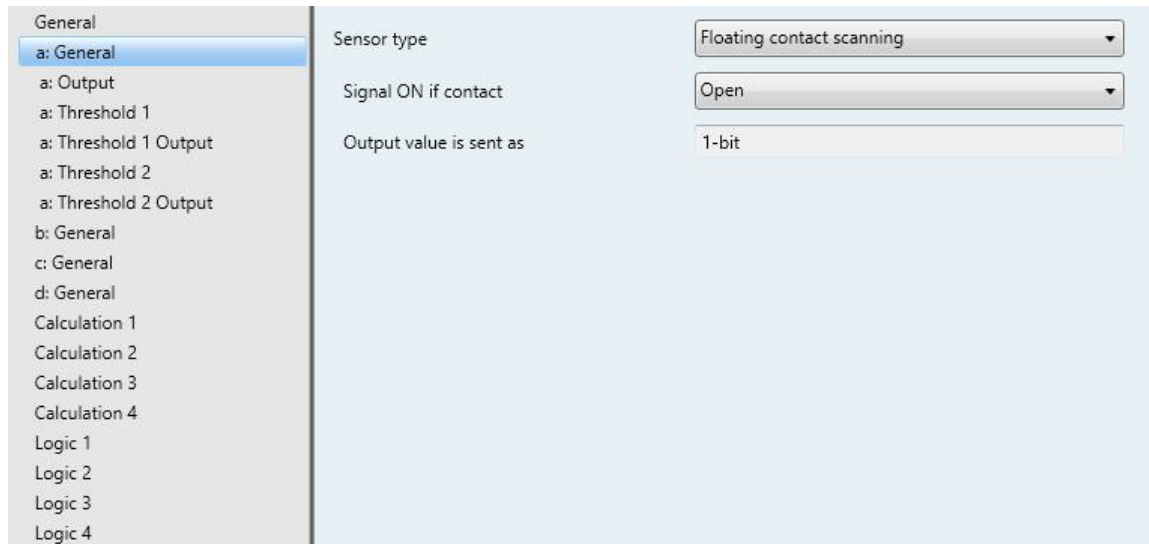
Options:        None  
                  5/10/30 s  
                  1/5/10/30 min  
                  1/6/12/24 h

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**

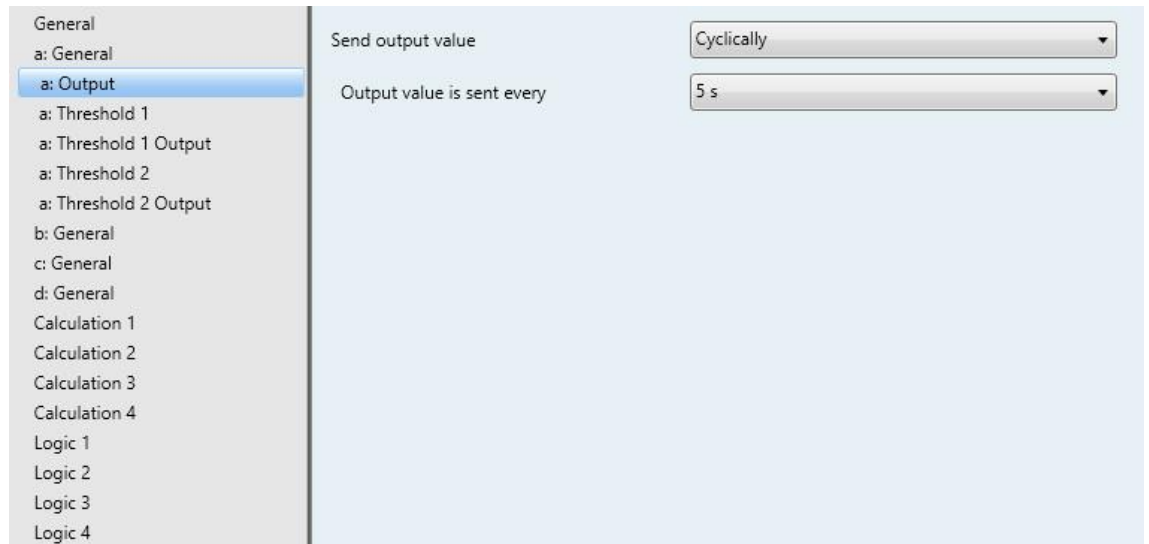
This parameter preset to 1-bit.

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*.

General	Use threshold	Yes
a: General		
a: Output	Data type of threshold object	1-bit
a: Threshold 1	Send if signal OFF	Send OFF telegram
a: Threshold 1 Output	Min. duration for signal OFF	None
a: Threshold 2	Send if signal ON	Send ON telegram
a: Threshold 2 Output	Min. duration for signal ON	None
b: General		
c: General		
d: General		
Calculation 1		
Calculation 2		
Calculation 3		
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 4		

### 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]

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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*.

The screenshot shows a software interface for configuring parameters. On the left is a tree view with the following items: General, a: General, a: Output, a: Threshold 1, **a: Threshold 1 Output** (highlighted), a: Threshold 2, a: Threshold 2 Output, b: General, c: General, d: General, Calculation 1, Calculation 2, Calculation 3, Calculation 4, Logic 1, Logic 2, Logic 3, and Logic 4. The main area on the right is titled 'a: Threshold 1 Output' and contains three settings: 'Send threshold object' with a dropdown menu set to 'On change and cyclically', 'Send if signal OFF every' with a dropdown menu set to '30 s', and 'Send if signal ON every' with a dropdown menu set to '30 s'.

### Send threshold object

Options:        On change  
                  On change and cyclically

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:        5/10/30 s  
                  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*.

General	Use calculation	Yes
a: General	Calculation type	Compare
b: General	Input 1	Input a Output value
c: General	Input 2	Input b Output value
d: General	Function	Input 1 < Input 2
<b>Calculation 1</b>	Hysteresis (in x % from outp. range of input 1)	5
Calculation 2	Condition met	Send ON telegram
Calculation 3	Condition not met	Send OFF telegram
Calculation 4	Send output value	On change and cyclically
Logic 1	Output value is sent every	5 s
Logic 2		
Logic 3		
Logic 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*.

General	Use calculation	Yes
a: General	Calculation type	Arithmetic
b: General	Input 1	Input a Output value
c: General	Input 2	Input b Output value
d: General	Function	Input 1 + Input 2
<b>Calculation 1</b>	Send output value as	1-byte [0...+255]
Calculation 2	Send output value	Cyclically
Calculation 3	Output value is sent every	5 s
Calculation 4		
Logic 1		
Logic 2		
Logic 3		
Logic 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.

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!

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## 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.

General	Use logic	Yes
a: General	Logical connection	AND
b: General	Input 1	Not used
c: General	Input 2	Not used
d: General	Input 3	Not used
Calculation 1	Input 4	Not used
Calculation 2	Invert output	No
Calculation 3	Send output	On change
Calculation 4		
<b>Logic 1</b>		
Logic 2		
Logic 3		
Logic 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.  
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	

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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 DPT variable	C, R, T																					
<p>This communication object is used to send the output value to the bus. The following values can be sent:</p> <table> <tr> <td>1-bit value [0/1]</td> <td>DPT</td> <td>1.001</td> </tr> <tr> <td>1-byte value [0...+255]</td> <td>DPT</td> <td>5.010</td> </tr> <tr> <td>1-byte value [-128...+127]</td> <td>DPT</td> <td>6.010</td> </tr> <tr> <td>2-byte value [0...+65,535]</td> <td>DPT</td> <td>7.001</td> </tr> <tr> <td>2-byte value [-32,768...+32,767]</td> <td>DPT</td> <td>8.001</td> </tr> <tr> <td>2-byte value (floating point)</td> <td>DPT</td> <td>9.001</td> </tr> <tr> <td>4-byte value (IEEE floating point)</td> <td>DPT</td> <td>14.068</td> </tr> </table> <p><b>What is sent at an undershoot or overshoot of 10 %?</b> 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 <i>Measured value +10 %</i>. 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.</p>					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
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																							
1	Request output value	Input a	1-bit DPT 1.009	C, W																					
<p>This communication object appears if the output value <i>On request</i> is to be sent If a 1 is received at this communication object, the current output value is sent once from the communication object <i>Output value – Input a</i>.</p>																									

2	Measured value out of range	Input a	1-bit DPT 1.001	C, W
<p>Telegram value:    1 = Measured value out of range                           0 = Measured value in range</p> <p>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.</p> <div data-bbox="341 517 1406 636" style="border: 1px solid black; padding: 5px;"> <p><b>Example</b></p> <p>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)</p> </div> <p><b>Upper measuring limit:</b> The communication object <i>Measured value outside range</i> is sent when the upper measuring limit is exceeded by 5 %, i.e. 16.8 mA (16 mA + 5 %).</p> <p><b>Lower measuring limit:</b> The communication object <i>Measured value out of range</i> is sent when the lower measuring limit is undershot by 5 %, i.e. 3.8 mA (4 mA - 5 %).</p> <p><b>When is the value of the communication object sent?</b> <i>Measured value out of range</i> 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.</p> <p><b>Behavior with PT100 or PT1000?</b> 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.</p> <div data-bbox="341 1202 1406 1449" style="border: 1px solid black; padding: 5px;"> <p><b>Important</b></p> <p>The programmable feeder line resistance is subtracted from the measured resistance. Thereafter, a programmable temperature offset is added. Depending on the programming of the feeder line resistances and the temperature offset, different minimum and maximum values result. 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.</p> </div> <p><b>Behavior with a floating contact?</b> The communication object has no function with the selection.</p>				



## 3.3.4 Communication objects *Calculation 1*

No.	Function	Object name	Data type	Flags																					
36	Send output value	Calculation 1	1-bit DPT variable	C, T																					
<p>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:</p> <table> <tbody> <tr> <td>1-bit value [0/1]</td> <td>DPT</td> <td>1.001</td> </tr> <tr> <td>1-byte value [0...+255]</td> <td>DPT</td> <td>5.010</td> </tr> <tr> <td>1-byte value [-128...+127]</td> <td>DPT</td> <td>6.010</td> </tr> <tr> <td>2-byte value [0...+65,535]</td> <td>DPT</td> <td>7.001</td> </tr> <tr> <td>2-byte value [-32,768...+32,767]</td> <td>DPT</td> <td>8.001</td> </tr> <tr> <td>2-byte value (floating point)</td> <td>DPT</td> <td>9.001</td> </tr> <tr> <td>4-byte value (IEEE floating point)</td> <td>DPT</td> <td>14.068</td> </tr> </tbody> </table>					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
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																							
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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 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	Input 1	Logic	1-bit DPT 1.002	C, W, U
45	Input 2	Logic		
Both of these communication objects can be used as external inputs for the internal logic. 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 DPT 10.001	C, W, U
This communication object only appears if, in the <a href="#">Parameter window General</a> , p. 21, the parameter <i>Use time synchronization</i> was selected. Synchronization is monitored internally. If the time between 2 synchronizations > 25 hours, Bit 6 is set 1 in the communication object <i>Status byte - General</i> . This allows a check of whether an external time signal of the Weather Station is present.				
47	Request time	Synchronization	1-bit DPT 1.001	C, T
This communication object only appears if, in the <a href="#">Parameter window General</a> , p. 21, the parameter <i>Use time synchronization</i> was selected. After the set send delay, this communication object sends a time request to the bus once. In addition, for temporal synchronization of the rain quantity reset, a time request is sent on the bus every 5 hours. The required for sending the time takes place via the value "1".				

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No.	Function	Object name	Data type	Flags
<b>48</b>	<b>In operation</b>	<b>General</b>	<b>1-bit DPT 1.003</b>	<b>C, R, T</b>
<p>This communication object appears if, in the <a href="#">Parameter window General</a>, p. 21, <i>Enable communication object "In operation"</i>, <i>1-bit</i> has been selected and set to <i>Value 0</i> or <i>Value 1</i>. A 0 or a 1 is sent cyclically on the bus depending on the setting.</p>				
<b>49</b>	<b>Status byte</b>	<b>General</b>	<b>1 byte DPT none</b>	<b>C, R, T</b>
<p>The status byte reflects the current state of the device. Different states are indicated here, e.g.</p> <ul style="list-style-type: none"> <li>• Status Input a – Measured value out of range</li> <li>• Status Input a – Measured value out of range and self calibration</li> </ul> <p>Bit sequence: 76543210</p> <p>Bit 7: Not assigned Always 0</p> <p>Bit 6: Mains voltage failure: 0: Mains available 1: Mains voltage failure, no measured values</p> <p>Bit 5: No synchronization after the start or more than 25 hours (only used if, in the parameter window <i>General</i>, the option <i>Yes</i> was selected for the parameter <i>Use time synchronization</i>) 0: Time available 1: Time not available</p> <p>Bit 4: Status of internal calibration 0: Calibration completed 1: Calibration running</p> <p>Bit 3: Status Input d Measured value out of range 0: In range 1: Out of range</p> <p>Bit 2: Status Input c Measured value out of range 0: In range 1: Out of range</p> <p>Bit 1: Status Input b Measured value out of range 0: In range 1: Out of range</p> <p>Bit 0: Status Input a Measured value out of range 0: In range 1: Out of range</p> <p>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. <b>For further information see: <a href="#">Value table of communication object Status byte – General</a></b></p>				

## 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:

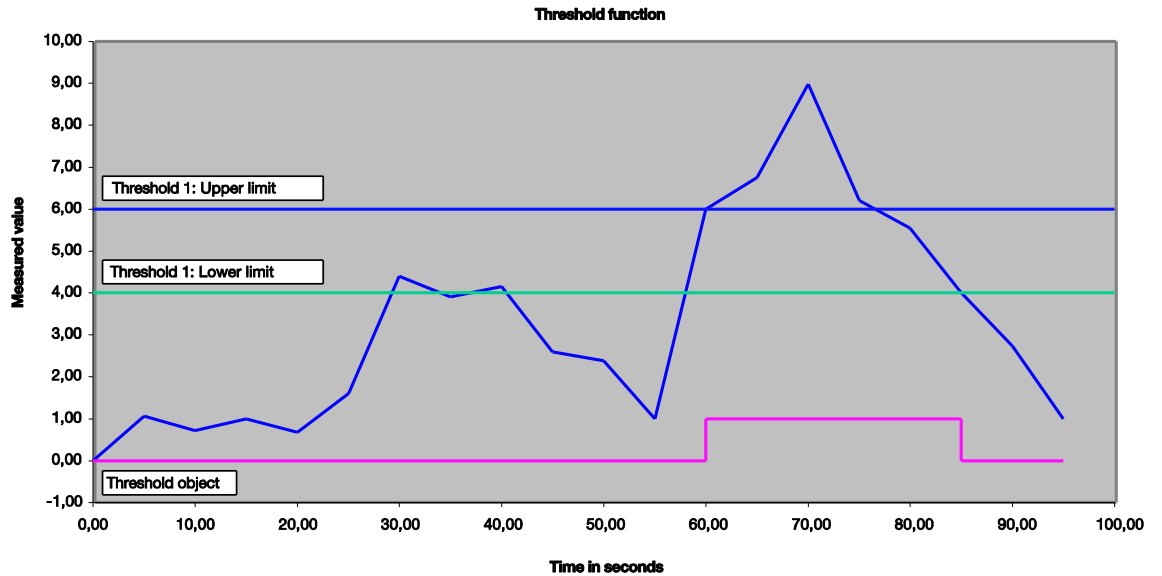
- Where can the Weather Sensors be fixed on the building, e.g. on roof structures of elevators or air-conditioning systems?
- Can the sensors be "disrupted" by the structures, e.g. by a waste air blower?
- Is the mounting and installation position of the weather sensors free of shadows, e.g. caused by 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**

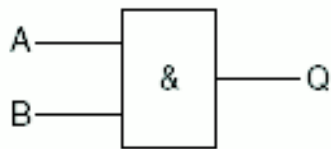
#### **A.1**            **Scope of delivery**

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)

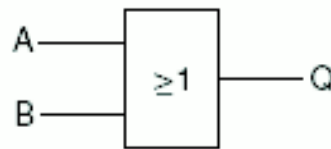
## A.2 Truth table for logical operations

### 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.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

$$\text{Temperature in } ^\circ\text{F} = ((\text{T } ^\circ\text{Celsius} \times 9) / 5) + 32$$

Fahrenheit to Celsius

$$\text{Temperature in } ^\circ\text{C} = (\text{T } ^\circ\text{Fahrenheit} - 32) \times 5 / 9$$

**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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