ABB i-bus® KNX
Analogue Input AE/A 2.1
Product Manual

Power and productivity
for a better world™

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1 General

It is becoming increasingly important to be able to control complex installations in a user-friendly manner. Sensors are used, for instance, in order to control supply air valves, exhaust air valves and air flow speeds in an air conditioning system. The heating is controlled using an outside temperature sensor. Container levels are scanned in order to obtain information about when the containers need filling. Pipeline temperatures are recorded and evaluated. Sensors to detect the presence of persons in a room are installed in order to optimise the use of energy. Monitoring and security functions rely on the data from sensors.

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

In making it possible to record and process two independent analogue input signals, our Analogue Input can help you control your installations using ABB i-bus®.

1.1 Using the product manual

This manual provides detailed technical information about the Analogue Input, installation, programming and explains the use of the device using examples.

This manual is subdivided 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.

Caution
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 for life and limb with inappropriate use.

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

1.2 Product and functional description

The Analogue Input AE/A 2.1 is a device intended for surface mounting and features IP54 degree of protection. The cable connections to the Analogue Input are introduced via four side apertures which can be removed. The generous dimensions of 117 x 117 mm allow sufficient room to undertake wiring within the housing. The low installation height of just 51 mm enables space-saving installation of the device. The connection to the bus is implemented using a pluggable screw terminal. The assignment of the physical address and the parameter settings are carried out using ETS3. If ETS2 is used, Version V1.3a is required. The device enables you to record and process two analogue 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 sensors in 2-conductor technology, 0-1000 ohm resistors and a selection of KTY sensors can be connected. It is possible to match the AE/A 2.1 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 program *Threshold Value Measurement 2f/….*

The object values can be freely set for each input separately in the application program. The output value can be sent as a 1 bit value, 1 byte value, 2 byte value 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 it. Measured values can be averaged over 1, 4, 16 or 64 measurements using the *Filter* function. The output value is “smoothened” 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 2 threshold values per input. The threshold values each have an upper and lower limit which can be set independently.. The threshold values themselves can be changed via the bus. There are 4 further calculation objects available. It is thus possible to compare 2 output values or calculate the arithmetic mean. The options less than, greater than, addition, subtraction or averaging are available.

Note
The illustrations of the parameter windows in this manual correspond to the ETS3 parameter windows. The user program is optimised for ETS3. In the ETS2 it is possible, however, that the parameter page is automatically split if all parameters are used.

2 Device technology

Analogue Input AE/A 2.1

Analogue Input AE/A 2.1 is used to record analogue data. Two conventional sensors can be connected to AE/A 2.1. The connection to the bus is established using a pluggable screw terminal. The device is ready for operation after connecting the bus voltage. No additional auxiliary voltage is required. Analogue Input AE/A 2.1 is parameterised and programmed using the ETS (from ETS2 V1.3a and higher).

2.1 Technical data

Supply	Bus voltage	21…32 V DC
	Current consumption, bus	< 10 mA
	Power consumption, bus	Max. 11 W at 230 V AC
Inputs	Number	2
	Input signals	
	Voltage	0-1 V, 0-5 V, 0-10 V, 1-10 V,
	Maximum upper threshold	12 V
	Current	0-20 mA, 4-20 mA,
	Maximum upper threshold	25 mA,
	Resistance	0-1000 ohms,
		PT 100 2-conductor technology,
		PT 1000 2-conductor technology,
		A selection of KT/KTY 1000/2000,
		User-defined
	Contact	Floating
	Resolution, accuracy and tolerances	See next page
	Input resistance to voltage measurement	> 1 Mohm
	Input resistance to current measurement	100 ohms
Cable length	Between sensor and device input	Maximum 30 m
Conductor introduction	Permissible external conductor diameter	Ø 6…12.5 mm
		4 pcs., one conductor per cable entry
Connections	KNX	Via green pluggable screw terminals
	Sensor inputs	Via green pluggable screw terminals
Connection terminals	Pluggable screw terminals, green	0.08...1.5 mm² Single core or stranded
		0.2...1.0 mm² Flexible with ferrules
		without/with plastic sleeves
	Multiple conductor connection	0.08...0.5 mm² Single core
	(2 conductors with identical cross-sections)	
		0.08...0.75 mm² Flexible
		0.25...0.34 mm² Flexible with ferrules
		without plastic sleeves
		0.5 mm² Flexible with TWIN ferrules
		with plastic sleeves
	Insulation strip length	7 mm
	Screw thread	M2
	Tightening torque	max. 0.25 Nm

Operating and display elements	Button/LED 	For assignment of the physical address
Enclosure	IP 54	to DIN EN 60 529
Safety class	II	to DIN EN 61 140

Overvoltage category	III to DIN EN 60 664-1	
Pollution degree	II to DIN EN 60 664-1	
Temperature range	Operation	-20…+70 °C
	Storage	-25…+70 °C
	Transport	-25…+70 °C
Ambient conditions	Maximum air humidity	93 %, no condensation allowed
Ambient temperature	Differential	Not exceeding 10 °C/hour
Design	Surface mounted	
	Dimensions	117 x 117 x 51 mm (H x W x D)
Installation	Surface mounted, screw mounted	
Mounting position	As required	
Weight	0.25 kg	
Housing/colour	Plastic housing, grey, halogen free	
Approvals	KNX to EN 50 090-1, -2	Certification
CE mark	in accordance with the EMC guideline and low voltage guideline	

Device type	**Application program**	**Max. number of Communication objects**	**Max. number of Group addresses**	**Max. number of Associations**
AE/A 2.1	Analogue Input/2-fold…*	24	50	50

* … = current version number of the application program. **Please observe the software information on our homepage for this purpose.**

Note

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

The current version of the application program is available for download on the internet at *www.abb.com/knx*. After import in the ETS, it is available in the ETS under *ABB/Inputs/Analogue Input 2-fold*.

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

2.2 Resolution and accuracy and tolerances

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

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

In the default delivery 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 if the device is, or is not parameterised, and is independent of the connected sensors. The normal function of the device is not affected in any way. After calibration has been completed, the calibration values which have been determined will be stored in 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 on bit 4.

2.2.1 Voltage signals

Sensor signal	Resolution	Accuracy at 25 °C AT*[1]	Accuracy at 0…50 °C AT*[1]	Accuracy at -20…70 °C AT*[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 (AT)

2.2.2 Current signals

Sensor signal	Resolution	Accuracy at 25 °C AT*[2]	Accuracy at 0…50 °C AT*[2]	Accuracy at -20…70 °C AT*[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 (AT)

2.2.3 Resistance signals

Sensor signal	Resolution	Accuracy at 25 °C AT*[3]	Accuracy at 0…50 °C AT*[3]	Accuracy at -20…70 °C AT*[3]	Remark
0-1000 ohms	0.1 ohms	+/-1.0 ohms	+/-1.5 ohms	+/-2 ohms	
PT100*[4]	0.01 ohms	+/-0.15 ohms	+/-0.2 ohms	+/-0.25 ohms	0.1 ohms = 0.25 °C
PT1000*[4]	0.1 ohms	+/-1.5 ohms	+/-2.0 ohms	+/-2.5 ohms	1 ohm = 0.25 °C
KT/KTY 1000*[4]	1 ohm	+/-2.5 ohms	+/-3.0 ohms	+/-3.5 ohms	1 ohm = 0.125 °C/at 25 °C
KT/KTY 2000*[4]	1 ohm	+/-5 ohms	+/-6.0 ohms	+/-7.0 ohms	1 ohm = 0.064 °C/at 25 °C

*[3] additional to current measured value at ambient temperature (AT)

*[4] incl. feeder cable and sensor faults

PT100

The PT100 is precise and exchangeable but subject to faults in the feeder cables (line resistance and heating of the feeder cables). A terminal resistance of just 200 milliohms 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 lower level of accuracy, can only be exchanged under certain circumstances and can only be used for very simple applications.

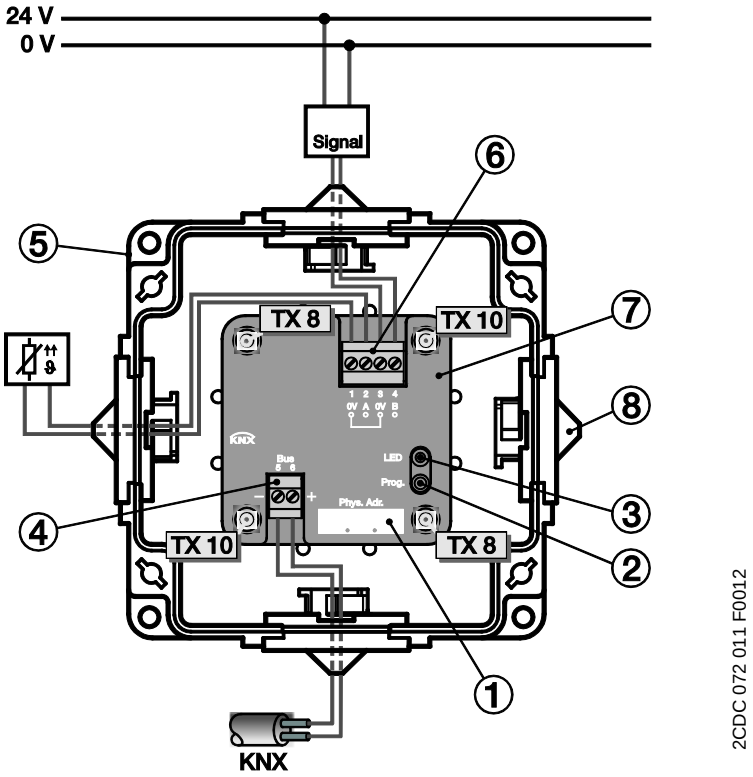
Please note that there are different tolerance classes for the sensors in the versions PT100 and PT1000.

The table indicates the individual classes

Designation	Tolerance
DIN class A	0.15 + (0.002 x t)
1/3 DIN class B	0.10 + (0.005 x t)
½ DIN class B	0.15 + (0.005 x t)
DIN class B	0.30 + (0.005 x t)
2 DIN class B	0.60 + (0.005 x t)
5 DIN class B	1.50 + (0.005 x t)
t = current temperature	

2.3 Circuit diagram

Connection example with temperature sensor and externally supplied sensor.



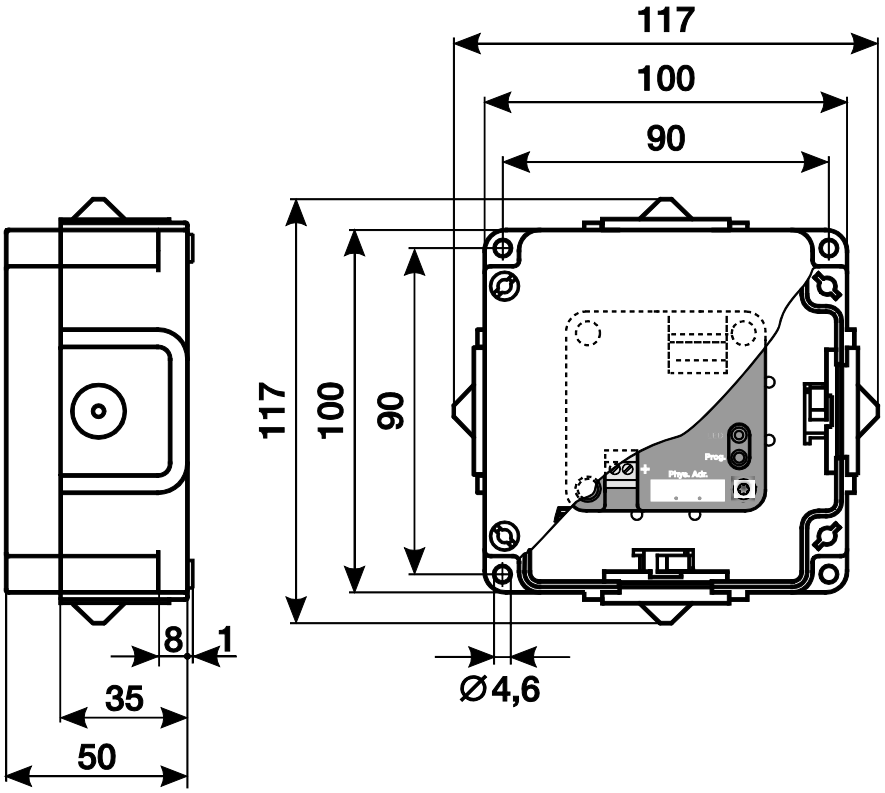
1 Label carrier
2 *Programming* button
3 *Programming* LED ● (red)
4 Bus connection
5 Housing
6 Sensor connections
7 Device cover
8 4 x cable entries

Caution

Degree of protection IP54 can be guaranteed only if the supplied blanking plugs are used.

If the plugs are not used, condensation and/or water can penetrate the housing and damage the device.

2.4 Dimension drawing



2.5 Assembly and installation

The Analogue Input is a surface mounted device.

The connection to the bus is implemented using a pluggable screw terminal.

Caution

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

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

Commissioning requirements

In order to commission the Analogue Input, a PC with ETS (from ETS2 V1.3a or higher) as well as an interface to the ABB i-bus®, e.g. via a KNX interface, is required.

The device is ready for operation after connection to the bus voltage. No additional auxiliary voltage is required.

The installation and commissioning may only be carried out by electrical specialists. The appropriate norms, guidelines, regulations and specifications should be observed when planning and setting up electrical installations.

- Protect the device from damp, dirt and damage during transport, storage and operation.
- Only operate the device within the specified technical data!
- Only operate the device in the enclosed housing!

Supplied state

The Analogue Input is supplied with the physical address 15.15.255. The application program is pre-installed. It is therefore only necessary to load group addresses and parameters during commissioning. However, the complete application program can be reloaded if required. A long download of several minutes may result if the application program is changed or after a discharge.

Assignment of the physical address

The physical address is assigned and programmed with the ETS and the programming button on the device.

Cleaning

If devices become dirty, they can be cleaned using a dry cloth. Should a dry cloth not remove the dirt, they can be cleaned using a slightly damp cloth and soap solution. Corrosive materials or solutions should never be used.

Maintenance

The device is maintenance-free. No repairs should be carried out by unauthorised personnel if damage occurs, e.g. during transport and/or storage. The right to claim under warranty expires if the device cover is opened.

3 Commissioning

3.1 Overview

Analogue Input AE/A 2.1 is loaded with the *Threshold Value Measurement 2f/1* application program. The programming requires ETS2 V 1.3a or higher. If ETS3 is used, a *.VD3 type file must be imported.

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

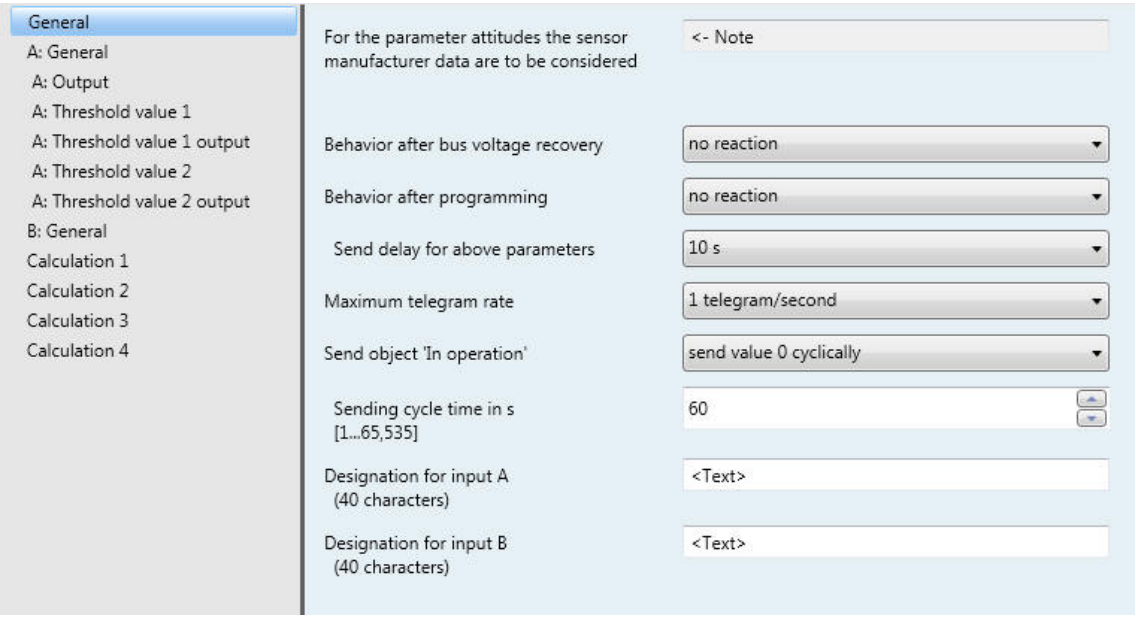
Sensor type (type of input signal)	All conventional sensors with a sensor output signal of 0-1 V, 0-5 V, 0-10 V, 1-10 V, 0-20 mA, 4-20 mA, 0-1000 ohms, PT100 in 2-conductor technology, PT1000 in 2-conductor technology or a range of KT/KTY sensors can be selected. Furthermore, user-defined KTY sensors can be matched to the Analogue Input. Floating contact interrogation can also be connected.
Measuring range	Flexible setting option for the upper and lower measuring thresholds dependent on the sensor's output signal.
Output value	Flexible setting options for the output value.
Data types of the output value	The output value can be sent as a 1 bit value [0/1], 1 byte value [0...+255], 1 byte value [-128...+127], 2 byte value [0...+65,535], 2-byte value [-32,768...+32,767], 2 byte value [EIB floating point] or 4 byte value [IEEE floating point].
Filter	The output value is "smoothed" via the mean value. The mean values can be averaged over 1, 4, 16 or 64 measurements. One measurement is made per second.
Threshold	2 threshold values can be set, each with an upper and lower limit. The limits can be modified via the bus.
Calculation	There are 4 calculation objects available. It is thus possible to compare 2 output values or calculate the arithmetic mean. The options less than, greater than, addition, subtraction or averaging are available.

3.2 Parameters

Note
The standard settings for the options are underlined, e.g. yes/<u>no</u>.

3.2.1 Parameter window *General*

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



For the parameter attitudes the sensor manufacturer data are to be considered

Important
The specifications of the sensor manufacturer must be observed to ensure perfect functioning of the Analogue Input. Furthermore, the manufacturer's specifications should be consulted for the parameter settings. On the connected sensors, ensure for example, that the upper thresholds of 12 V with voltage signals and 25 mA with current signals are not exceeded.

Behavior after bus voltage recovery,
Behavior after programming/ETS Reset

Options: no reaction
send object values immediately
send object values with a delay

The parameters are used to set the behaviour after *Bus voltage recovery* and *Programming* or *ETS Reset*.

- *no reaction*: No object values are sent. After bus voltage recovery, programming or ETS Reset, none of the object values: Output values, threshold values, calculation values, measured values out of range, the In operation and status byte are sent on the bus, i.e. a visualization is not refreshed. The object values are sent at the earliest after the parameterised settings are sent on the bus.
- *send object values immediately.* The object values are immediately sent. After bus voltage recovery, programming or ETS Reset, the individual object values: Output values, threshold values, calculation values, measured values out of range, the In operation and status byte are sent on the bus. This ensures, for example, the visualisation displays a current process map.
- *send object values with a delay:* The object values are sent after a delay. After bus voltage recovery, programming or ETS Reset, the individual object values: Output values, threshold values, calculation values, measured values out of range, the In operation and status byte are sent on the bus after a delay. Thus the process map is sent after a delay, e.g. to control the bus load in a KNX system.

The *Send delay* is set separately and applies for both the parameters *Behavior after bus voltage recovery* and *Behavior after programming/ETS Reset*.

What is an ETS Reset?

Generally an ETS Reset is defined as a reset of the device via the ETS. The ETS Reset is initiated in the ETS3 under the menu point *Commissioning* with the function *Reset device*. This stops the user program and it is restarted.

How does sending values function?

With the options in the parameters *Behavior after...*, it is possible to achieve after an event (bus voltage recovery, programming or ETS Reset) that the complete process map of the channels is sent immediately or after a defined send delay on the bus. This ensures that all information is guaranteed to be sent on the bus at least once after an event, e.g. for use by a visualization system.

Send delay for above parameters

Options: 5/10/2030/60 s

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

- The *In Operation – System* communication object sends an In operation telegram with the value 1 or 0 (adjustable).
- The *Status byte – System* communication object 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 *Behavior after bus voltage recovery* and *Behavior 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 initialisation phase. Value Read telegrams are also answered during the delay time. Incoming telegrams to the communication object, e.g. *Request measured value*, are not considered here. The send delay times should be co-ordinated 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 visualisation 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.

Maximum telegram rate

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

To control the bus load, this parameter can be used to limit the *Maximum telegram rate* per second.

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

Send object '*In operation*'

Options: no
<u>send value 0 cyclically</u>
send value 1 cyclically

Using the communication object '*In operation*' it is possible to check if the device is available. This cyclic telegram can be monitored by an external device.

The following parameters become visible with the options *send value 0 cyclically* or with *send value 1 cyclically*.

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

Options: 1...<u>60</u>...65,535

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

Designation for input A
(40 characters)

Designation for input B
(40 characters)

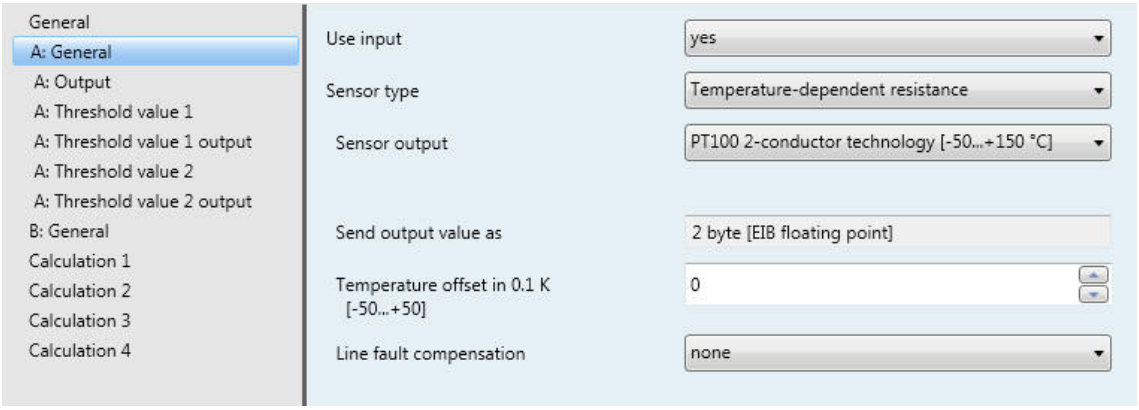
Option: <Text>

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

Note
This entered text is intended as user assistance to designate the functions assigned to each input. The text is purely for informative purposes and has no further function.

3.2.2 Parameter window *A: General – Temperature-dependent resistance*

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



The specifications in the following also apply for parameter window *B: General*.

Use input

Options: no
yes

The parameter enables input A, and further parameters and communication objects become visible.

Sensor type

Options: Current/Voltage/Resistance
Temperature-dependent resistance
Floating contact interrogation

The *Sensor type* is set with this parameter.

Sensor output

Options: PT 100 2-conductor technology [-50…+150 °C]
PT 1000 2-conductor technology [-50…+150 °C]
KT/KTY [-50…+150 °C]

The *Sensor output* is set with this parameter. The data can be found in the technical specifications of the sensor manufacturer.

Note
With option KT/KTY [-50…+150 °C] the following parameters change. For this reason they are described in the Parameter option Sensor output – KT/KTY [-50…+150 °C].

Send output value as

This parameter is fixed to 2 bytes [EIB 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.

Temperature offset in 0.1 K [-50...+50]

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

An additional maximum offset of +/-5 K (Kelvin) can be added to the recorded temperature with this parameter.

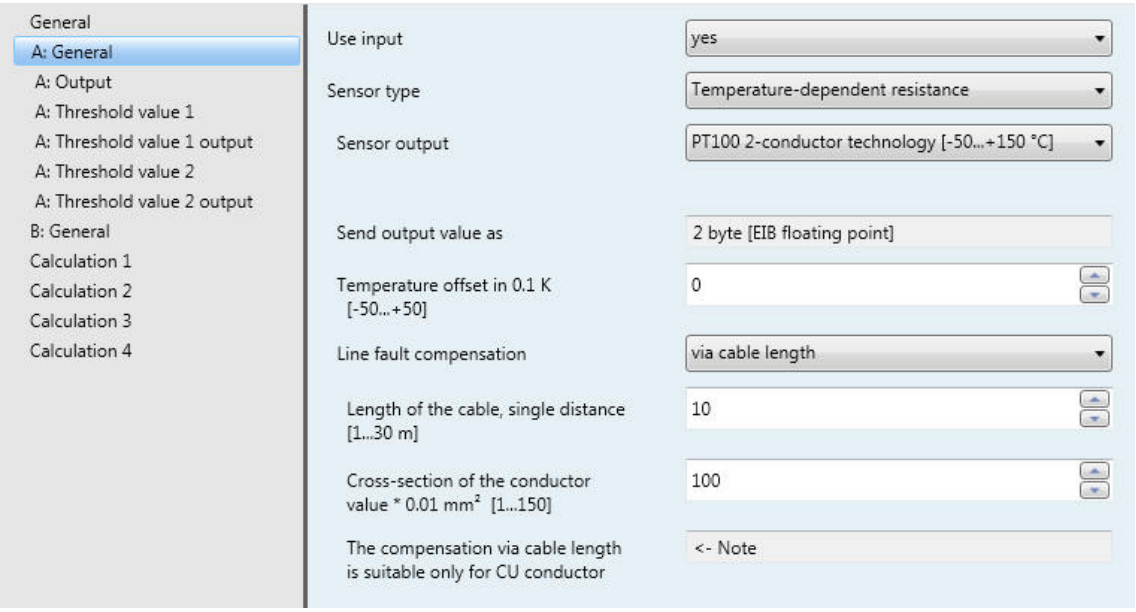
Line fault compensation

Options: none
via cable length
via cable resistance

This parameter is used for setting the *Line fault compensation*.

Further parameters appear with the options *via cable length* and *via cable resistance*.

3.2.2.1 Line fault compensation via *cable length*:



Length of the cable, single distance [1...30 m]

Options: 1...10...30

For setting the simple cable length to the connected temperature sensor.

Important
The maximum cable distance permitted between the sensor and device input is 30 m.

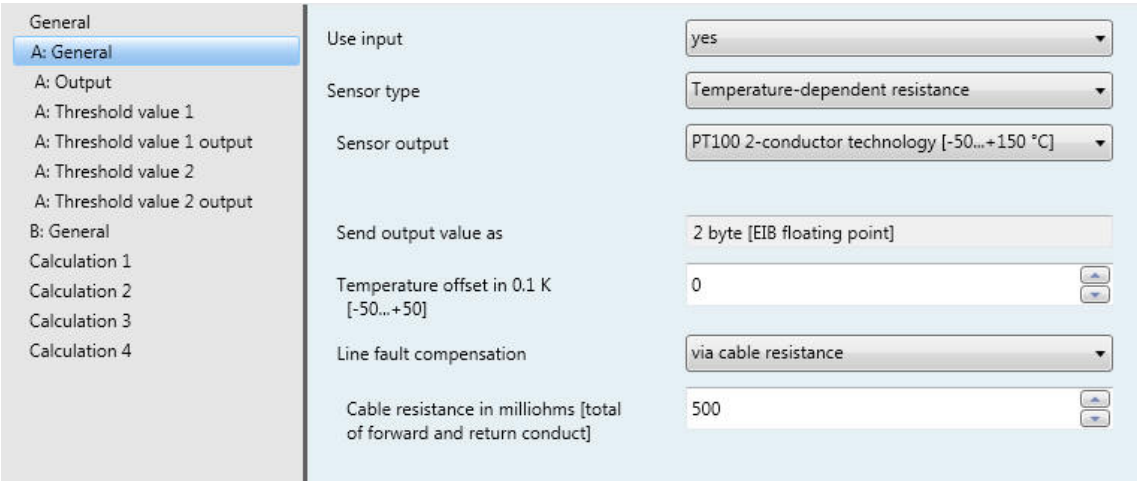
Cross-section of the conductor value * 0.01 mm² [1...150]

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

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

Important
Line fault compensation via cable length is only suitable for copper conductors.

3.2.2.2 Line fault compensation *via cable resistance*



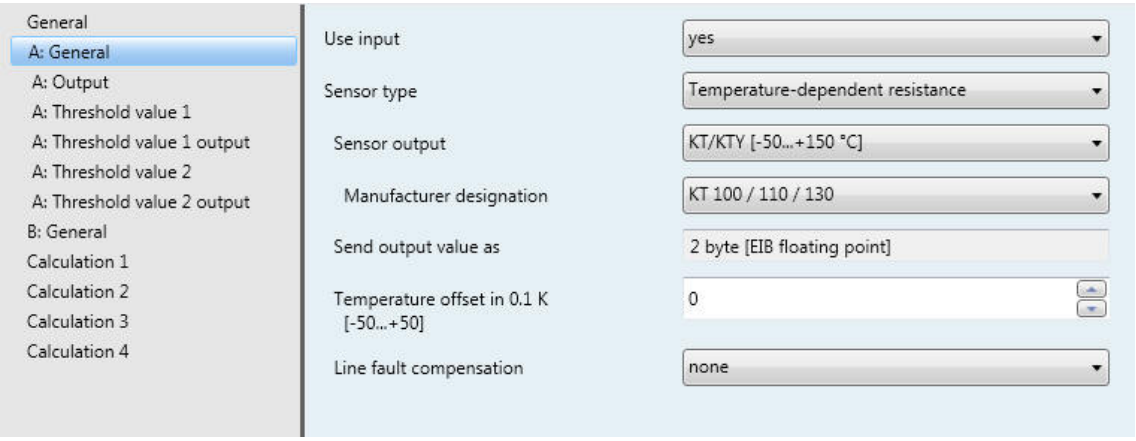
Cable resistance in milliohms [total of forward and return conduct]

Options: 0...<u>500</u>...10,000

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

Important
In order to correctly measure the cable resistance, the conductors must be shorted together at the end of the cable and should not be connected to the Analogue Input.

3.2.2.3 Parameter option Sensor output – *KT/KTY [-50…+150 °C]*



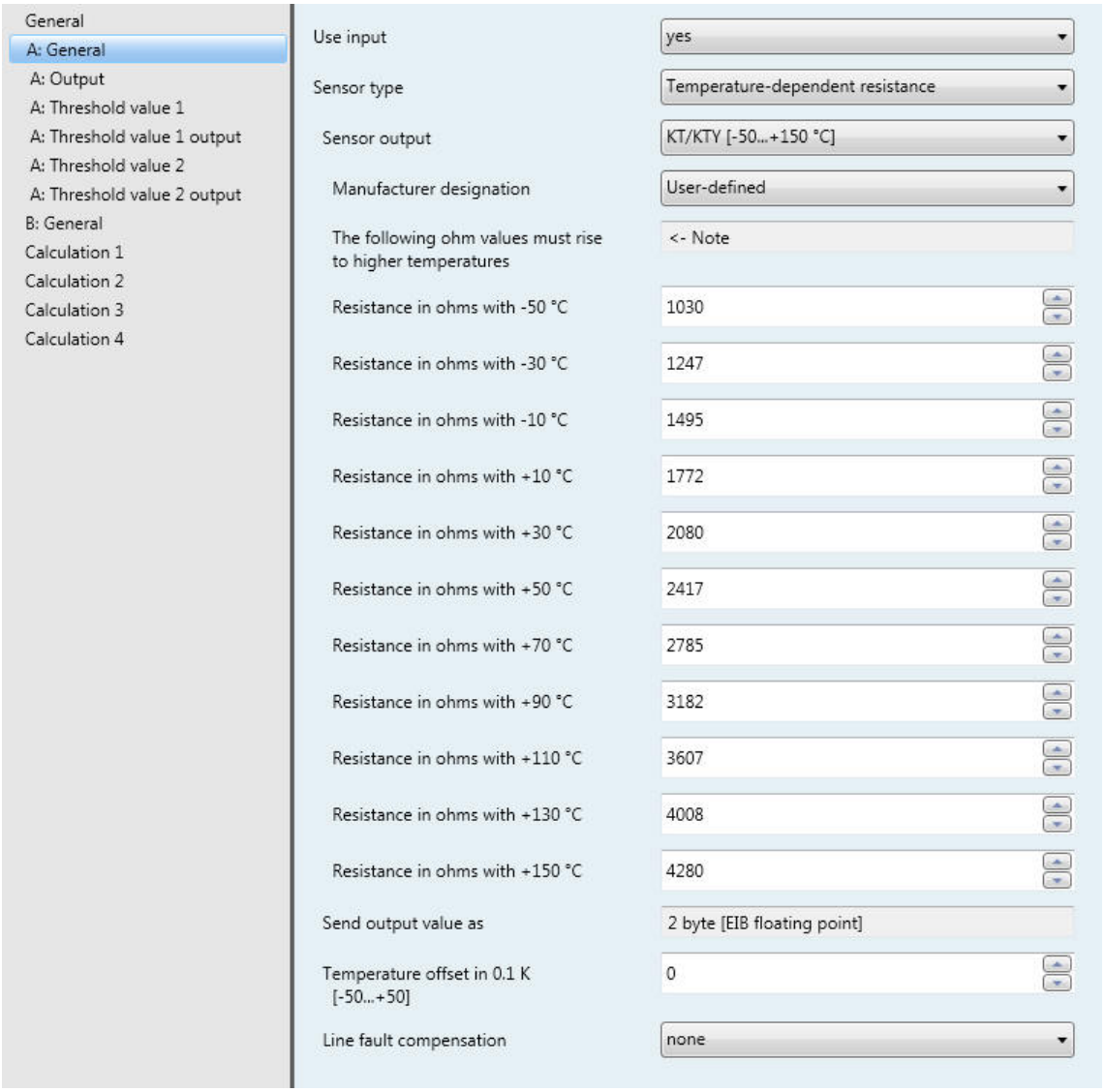
Manufacturer designation

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

For selection of a predefined KTY sensor.

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

***User-defined*:**



The following ohm 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 with -50…+150 °C

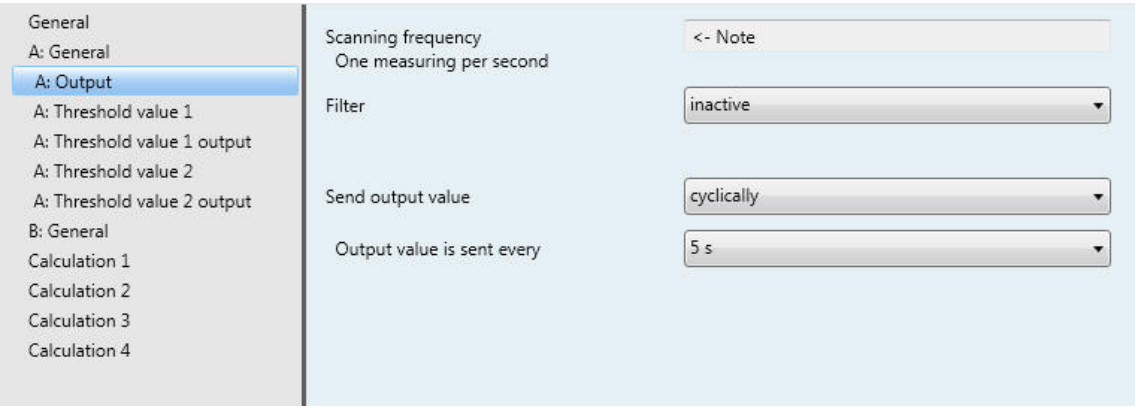
Options: 0…1,030…4,280…5,600

A resistance characteristic can be entered via these 11 parameters. The data can be found in the technical specifications of the sensor manufacturer.

Note
The description of the parameters Send output value as, Temperature offset and Line fault compensation can be found in the description Parameter window A: General – Temperature-dependent resistance.

3.2.3 Parameter window *A: Output*

This parameter window is enabled if in parameter window *A: General* the parameter *Use input* has been set to *yes*.



Scanning frequency

The sensor signal of channel A is measured once per second.

Filter

Options: inactive
low (mean value over 4 measurements)
average (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.

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 threshold values 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 *average* will take 16 seconds until the output value is through.

Send output value

Options: on request
after a change
cyclically
after a change and cyclically

This parameter defines how the *output value* should be 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*.

In the case of the options *after a change*, *cyclically* and *after a change and cyclically*, further parameters appear.

Output value is sent every

Options: 5/10/30 s
1/5/10/30 min
1/6//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]

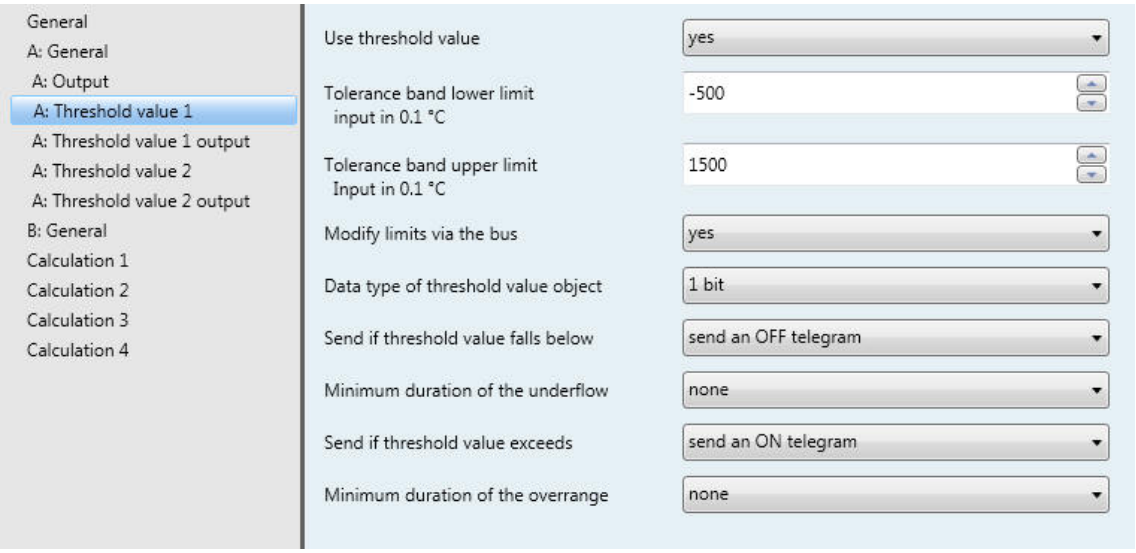
Options: 1…10...200

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

· *10:* The output value is sent from a change of 1 °C.

3.2.4 Parameter window *A: Threshold value 1*

The details in the following also apply for *A: Threshold value 2*.



Use threshold value

Options: no
yes

This parameter defines if *Threshold value 1* should be used. If *yes* is selected, the communication object *Threshold value – Input A - Thresh.v.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 limit of the tolerance band is 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

Modify limits via the bus

Options: no
yes

With this parameter you define whether *Modify limits via the bus* is permitted.

· *yes:* The following communication objects appear

Modify – Input A Threshold 1 lower limit and

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.

Data type of threshold value object

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

· *1 bit:* The following parameters appear:

Send if threshold value falls below

Options: do not send a telegram
send an ON telegram
send an OFF telegram

Send if threshold value exceeds

Options: do not send a telegram
send an ON telegram
send an OFF telegram

· *do not send a telegram:* There is no reaction.

· *send an ON telegram:* A telegram with the value 1 is sent.

· *send an OFF telegram:* A telegram with the value 0 is sent.

Minimum duration of the underflow
Minimum duration of the overrange

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

· *none:* the threshold value 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.

- *1 byte [0...+255]:* The following parameters appear:

  Send if threshold value falls below [0...+255]

  Options: 0...255

  Send if threshold value exceeds [0...+255]

  Options: 0...255

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

  Minimum duration of the underflow
  Minimum duration of the overrange

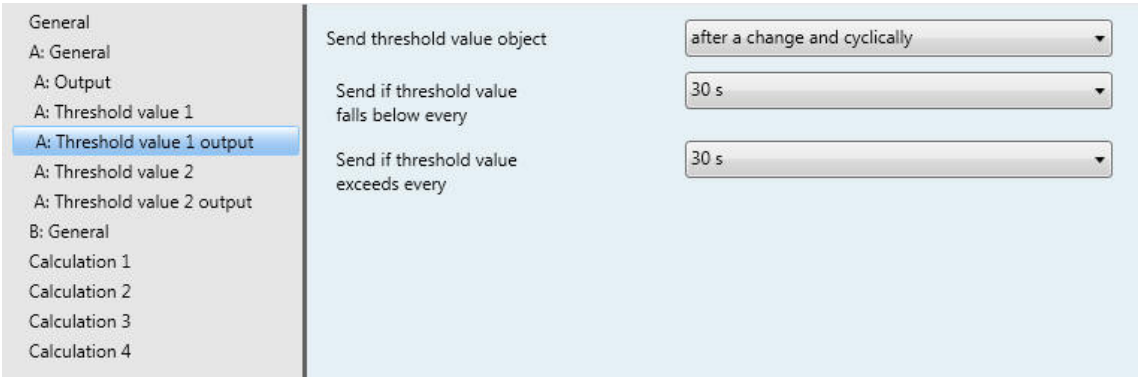
  Options: none
  5/10/30 s
  1/5/10/30 min
  1/6/12/24 h

  - *none:* The threshold value is sent directly.

  With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, nothing is sent.

3.2.5 Parameter window *A: Threshold value 1 output*

The details in the following also apply for *A: Threshold value 2 output.*



Send threshold value object

Options: after a change
<u>after a change and cyclically</u>

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

- *after a change:* The threshold value object is sent with changes.
- *after a change and cyclically:* The threshold value object is sent cyclically with changes. The threshold value object is sent cyclically until the value falls below or exceeds the other limit.

The following parameters appear with this option:

Send if threshold value falls below every
Send if threshold value exceeds every

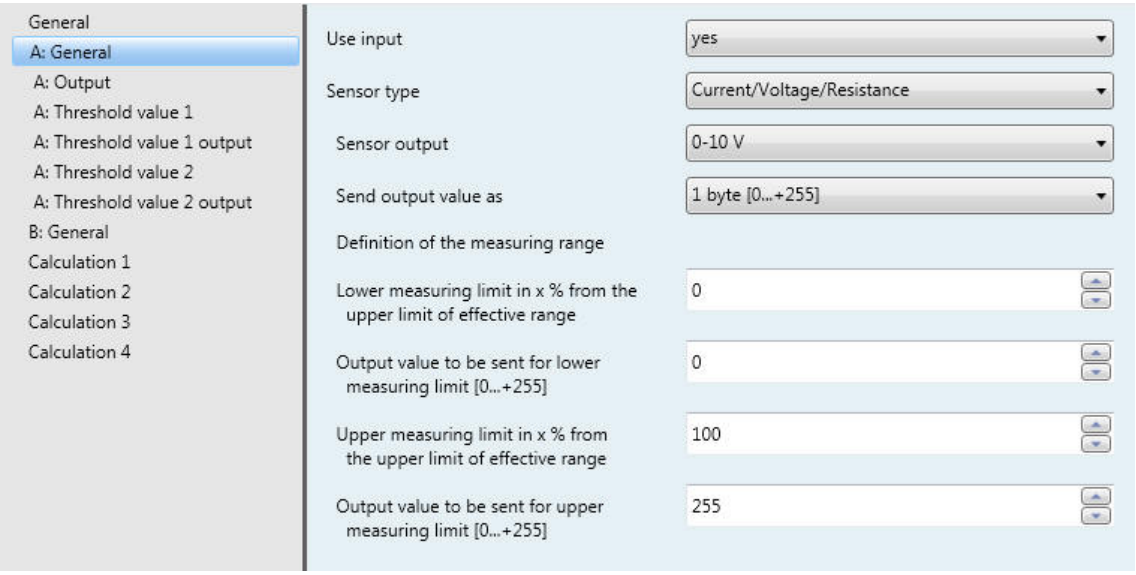
Options: none
5/10/<u>30 s</u>
1/5/10/30 min
1/6/12/24 h

These two parameters are used to define the point to which cyclical sending should take place after an underflow in the lower limit or an overrange in the upper limit.

3.2.6 Parameter window *A: General – Current/Voltage/Resistance*

Setting options with sensor type *Current/Voltage/Resistance*.

The specifications in the following also apply for parameter window *B: General*.



Use input

Options: no
<u>yes</u>

This parameter defines the use of input A.

Sensor type

Options: <u>Current/Voltage/Resistance</u>
Temperature-dependent resistance
Floating contact interrogation

The *Sensor type* is set with this parameter.

Sensor output

Option:
- 0-1 V
- 0-5 V
- 0-10 V
- 1-10 V
- 0-20 mA
- 4-20 mA
- 0-1000 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 [EIB floating point]
- 4 byte [IEEE floating point]

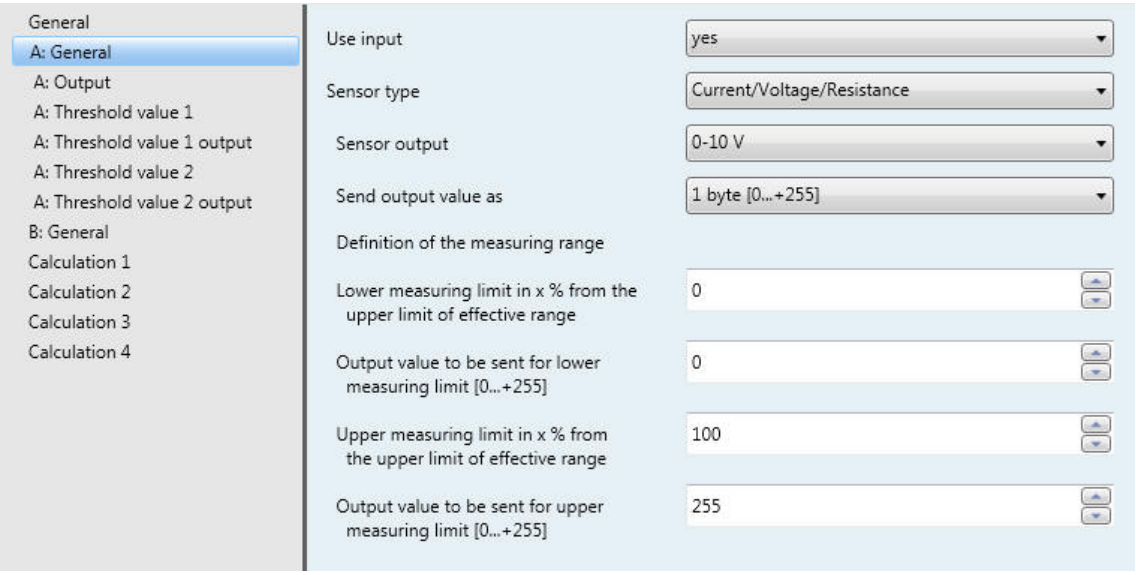
This parameter defines in which format the *Output value* should be sent.

If the option *2 byte [EIB floating point]* or *4 byte [IEEE floating point]* is set, a further parameter will also appear at the bottom of the parameter window.

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.

Definition of the measuring range



The following 4 parameters are dependent on the parameter Send output value as.

The preset values change dependent on the selected option. With the options *2 byte [EIB floating point]* or *4 byte [IEEE floating point]* the additional *Factor* parameter appears.

The following description is an example for all adjustable options.

Lower measuring limit in x % from the upper limit of effective range

Options: 0...100

Upper measuring limit in x % from the upper limit of effective range

Options: 100...0

Using both of these parameters the *lower and upper measuring limit in x % from the upper limit of effective range* is set. If the set upper and lower measuring limits are exceeded or not achieved, the communication object *Measured value outside range – Input A* sends a 1. if the measured value is again between both limits, the communication object sends a 0.

What is the effective range upper limit?

The effective range upper limit 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 an effective range upper limit 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 limit [0...+255]* are set. The measuring curve between the upper and lower measuring limit is linear.

What is the measuring limit?

Using the measuring limit, you define up to which set values the Analogue Input 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...1000 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.

With the option *2 byte [EIB floating point]* the following parameter appears.

Factor for the output and threshold values

Options: 0.01
0.1
1
10
100

With the option *4 byte [IEEE floating point]* the following parameter appears.

Factor for the output and threshold values

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

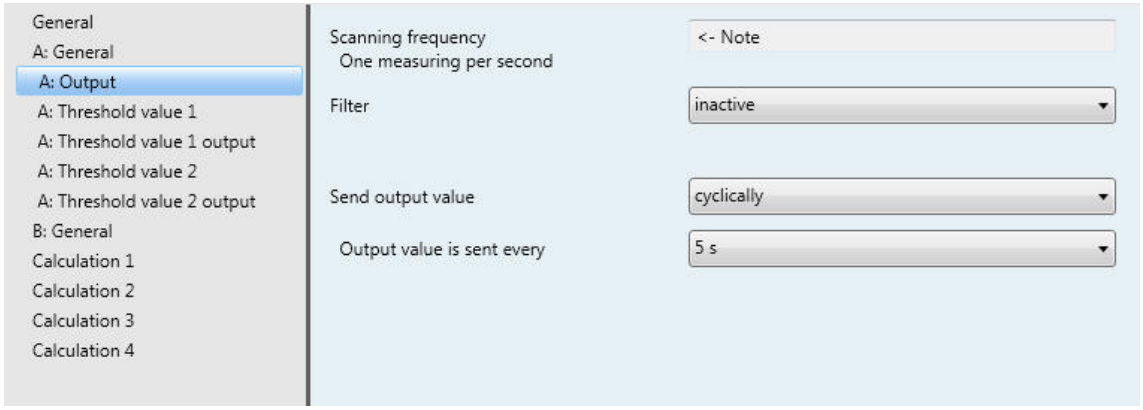
Using this parameter the *Factor for the output and threshold values* is set.

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.

3.2.7 Parameter window *A: Output*

This parameter window is enabled if in parameter window *A*: *General* the parameter *Use input* has been set to *yes*.



Scanning frequency

The sensor signal of channel A is measured once per second.

Filter

Options: inactive
low (mean value over 4 measurements)
average (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.

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

Send output value

Options: on request
after a change
cyclically
after a change and cyclically

This parameter defines how the *output value* should be 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 from the communication object *Output value – Input A*.

In the case of the options *after a change*, *cyclically* and *after a change and cyclically*, further parameters appear.

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...100

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

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

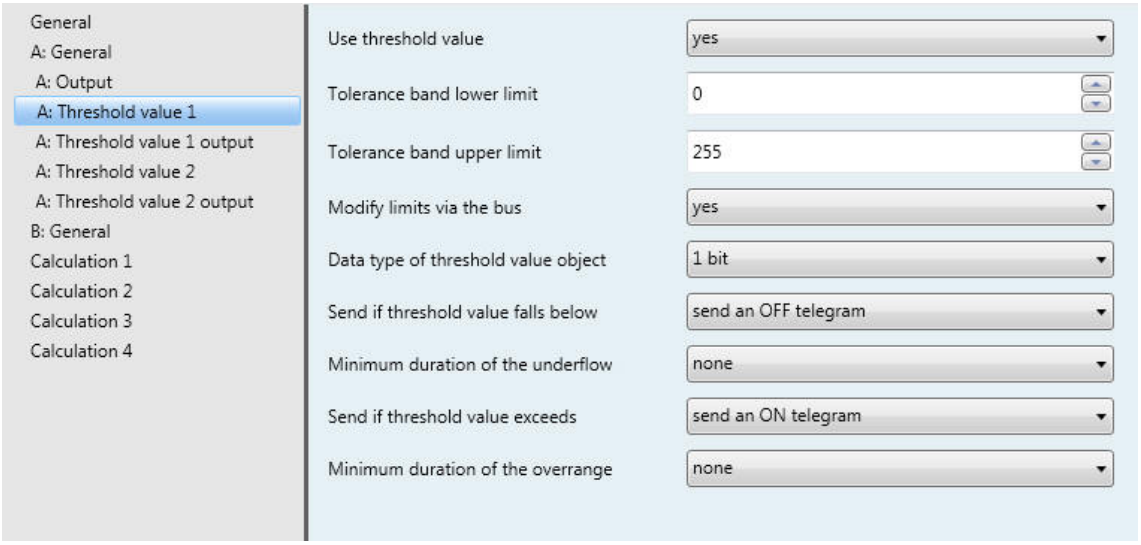
What is the output range?

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

Example
If the lower measuring limit of the sensor (0...1000 ohms) is se 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.

3.2.8 Parameter window *A: Threshold value 1*

The details in the following also apply for *A: Threshold value 2*.



Use threshold value

Options: no
yes

This parameter defines if *Threshold value 1* should be used. If *yes* is selected, the communication object *Threshold value – Input A Thresh.v.1* appears.

Tolerance band lower limit
Tolerance band upper limit

Options: Dependent on parameter Send output value as in parameter window *A: General*.

The upper and lower limit of the tolerance band is 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.

Modify limits via the bus

Options: no
<u>yes</u>

The parameter defines whether *Modify limits via the bus* is permitted With option *yes, the following additional communication objects* appear

Modify – Input A Threshold 1 lower limit and *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*. The value must be sent in the same format as the output value of the input.

Data type of threshold value object

Options: <u>1 bit</u>
1 byte [0...255]

If in parameter *Data type of threshold value object* the option *1 bit* is selected, the following parameters appear:

Send if threshold value falls below

Options: do not send a telegram
send an ON telegram
<u>send an OFF telegram</u>

Send if threshold value exceeds

Options: do not send a telegram
<u>send an ON telegram</u>
send an OFF telegram

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

Minimum duration of the underflow
Minimum duration of the overrange

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

- *none:* the threshold value 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.

If in parameter *Data type of threshold value object* the option *1 byte* [0…255] is selected, the following parameters appear.

Send if threshold value falls below [0...+255]

Options: 0...255

Send if threshold value exceeds [0...+255]

Options: 0...255

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

Minimum duration of the underflow
Minimum duration of the overrange

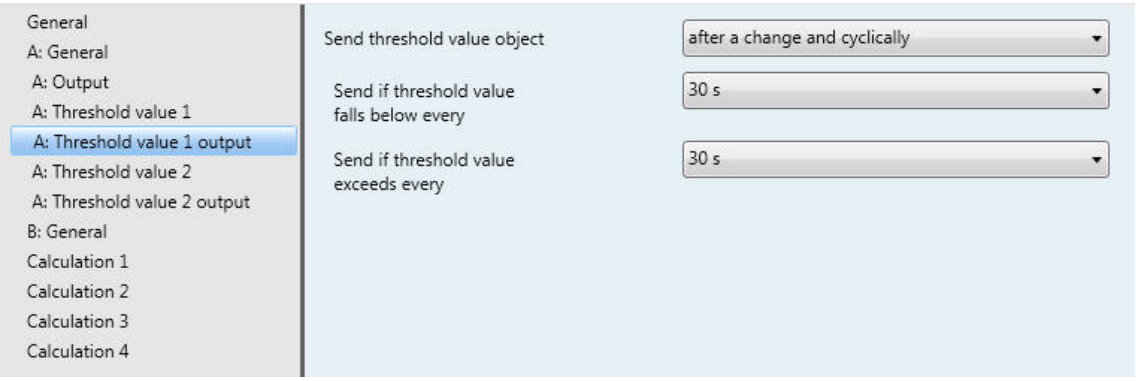
Options: none
5/10/30 s
1/5/10/30 min
1/6/12/24 h

- *none:* the threshold value is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, nothing is sent.

3.2.9 Parameter window *A: Threshold value 1 output*

The details in the following also apply for *A: Threshold value 2*.



Send threshold value object

Options: after a change
<u>after a change and cyclically</u>

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

- *after a change:* The value of the threshold value object is sent after a change.
- *after a change and cyclically:* The value of the threshold value object is sent cyclically after a change. The value of the threshold value object is sent cyclically until the value it falls below or exceeds the other limit.

  The following parameters appear with this option:

  Send if threshold value falls below every
  Send if threshold value exceeds every

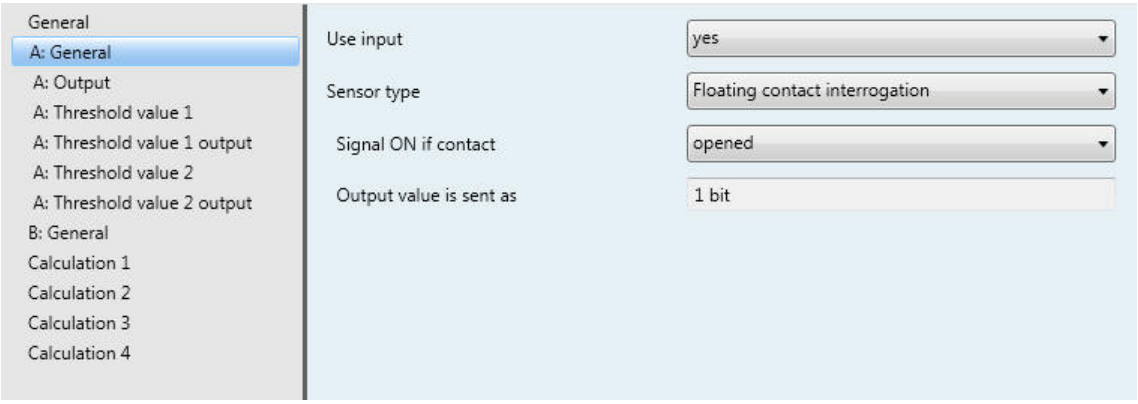
  Options: none
  5/10/<u>30 s</u>
  1/5/10/30 min
  1/6/12/24 h

These two parameters are used to define the point at which cyclical sending should take place after an underflow in the lower limit or an overrange in the upper limit.

3.2.10 Parameter window *A: General – Floating contact interrogation*

Setting options with sensor type *Floating contact interrogation*.

The specifications in the following also apply for parameter window *B: General*.



Use input

Options: no
yes

This parameter defines the use of input A.

Sensor type

Options: Current/Voltage/Resistance
Temperature-dependent resistance
Floating contact interrogation

The *Sensor type* is set with this parameter.

Signal ON if contact

Options: closed
opened

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

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

Output value is sent as

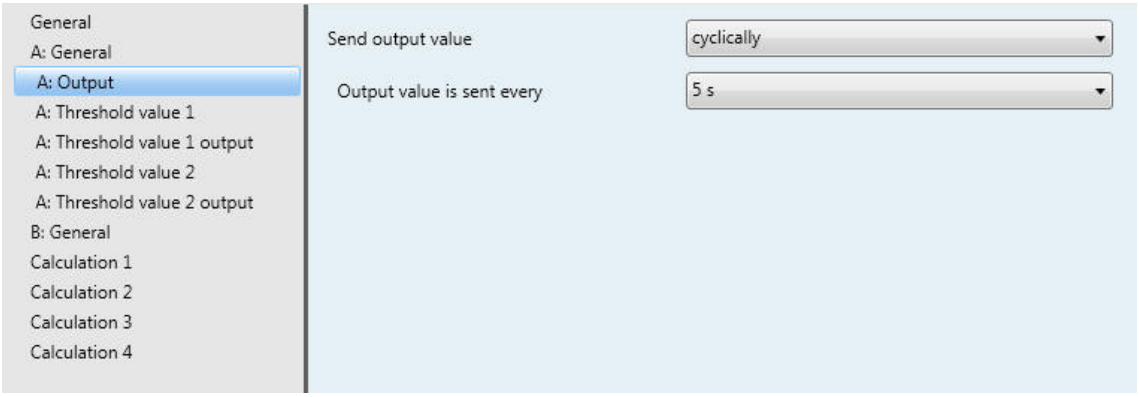
This parameter fixed to a preset 1 bit.

Bit value 0 = Signal OFF

Bit value 1 = Signal ON

3.2.11 Parameter window *A: Output*

This parameter window is enabled if in parameter window *A*: *General* the parameter *Use input* has been set to *yes*.



Send output value

Options: on request
after a change
cyclically
after a change and cyclically

This parameter defines how the output value should be sent.

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

  With this option the communication object

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

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

In the case of the options *after a change*, *cyclically* and *after a change and cyclically*, further parameters appear.

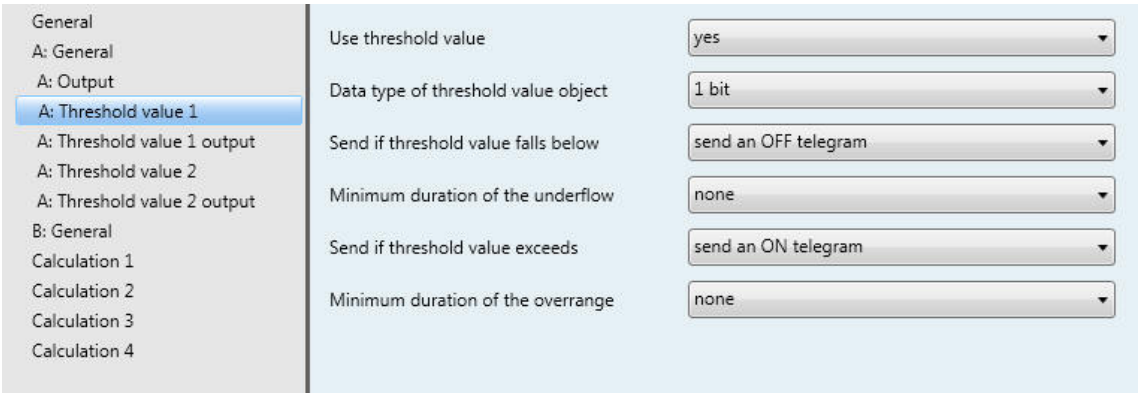
Output value is sent every

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.

3.2.12 Parameter window *A: Threshold value 1*

The details in the following also apply for *A: Threshold value 2*.



Use threshold value

Options: no
yes

This parameter defines if *Threshold value 1* should be used. If *yes* is selected, the communication object *Threshold value – Input A - Thresh.v.1* appears.

Data type of threshold value object

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

If in parameter *Data type of threshold value object* the option *1 bit* is selected, the following parameters appear:

Send if signal OFF

Options: do not send a telegram
send an ON telegram
send an OFF telegram

Send if signal ON

Options: do not send a telegram
send an ON telegram
send an OFF telegram

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

Minimum duration for signal OFF
Minimum duration for signal ON

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

· *none:* the threshold value is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, nothing is sent.

If in parameter *Data type of threshold value object* the option *1 byte [0…255]* is selected, the following parameters appear:

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.

Minimum duration for signal OFF
Minimum duration for signal ON

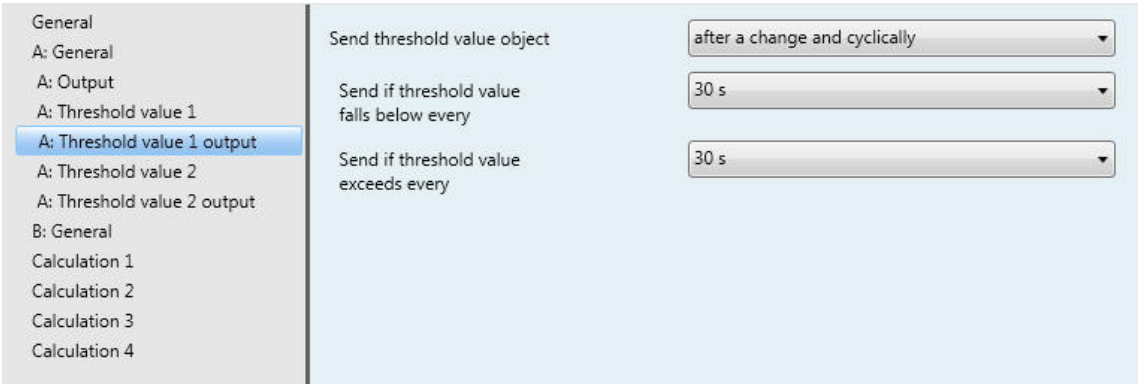
Options: none
5/10/30 s
1/5/10/30 min
1/6/12/24 h

· *none:* the threshold value is sent directly.

With the further time options, a minimum duration can be selected. If the send condition reverts during the minimum duration, nothing is sent.

3.2.13 Parameter window *A: Threshold value 1 output*

The details in the following also apply for *A: Threshold value 2*.



Send threshold value object

Options: after a change
<u>after a change and cyclically</u>

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

- *after a change:* The threshold value object is sent with changes.
- *after a change and cyclically:* The threshold value object is sent cyclically with changes. The threshold value object is sent cyclically until the value falls below or exceeds the other limit.

The following parameters appear with this option:

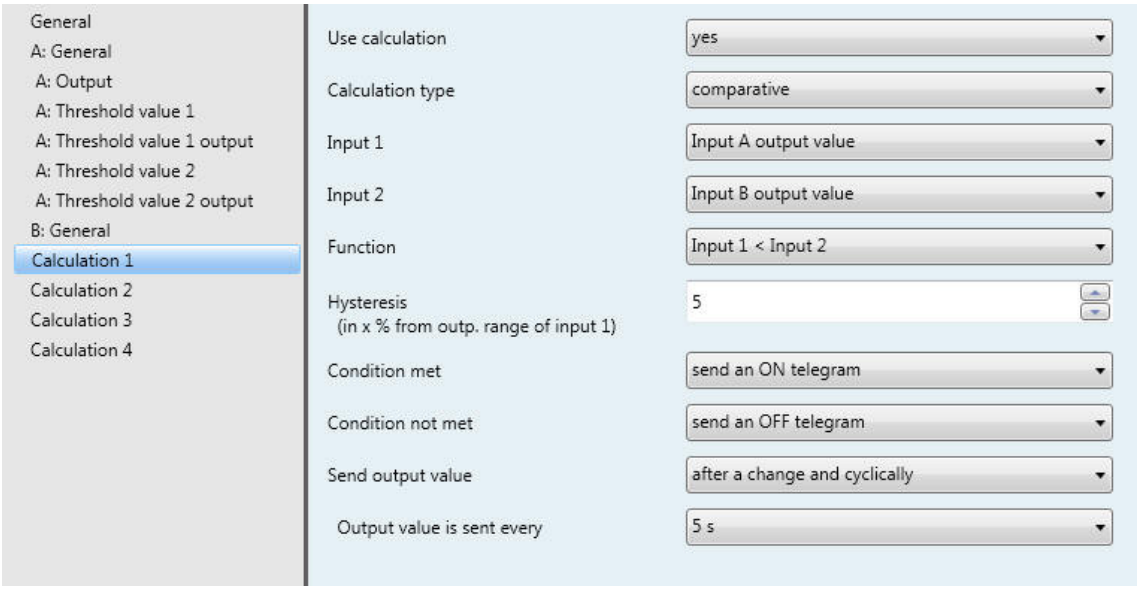
Send if threshold value falls below every
Send if threshold value exceeds every

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

These two parameters are used to define the point at which cyclical sending should take place after an underflow in the lower limit or an overrange in the upper limit.

3.2.14 Parameter window *Calculation 1 – Calculation type comparative*

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



Use calculation

Options: no
<u>yes</u>

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: <u>comparative</u>
arithmetic

The calculation type is set with this parameter.

- *comparative:* Comparison of two output values.
- *arithmetic:* Arithmetic logic of two output values.

Input 1

Options: <u>Input A output value</u>
Input B output value

Input 2

Options: Input A output value
<u>Input B output value</u>

With both these parameters the inputs 1 and 2 are assigned to 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 a telegram
send an ON telegram
send an OFF telegram

Condition not met

Options: do not send a telegram
send an ON telegram
send an 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: after a change
after a change and cyclically

This parameter defines how the *output value* should be sent.

- *after a change:* The output value is sent when a change occurs.
- *after a change and cyclically:* The output value is sent cyclically when a change occurs. A further parameter appears with this option:

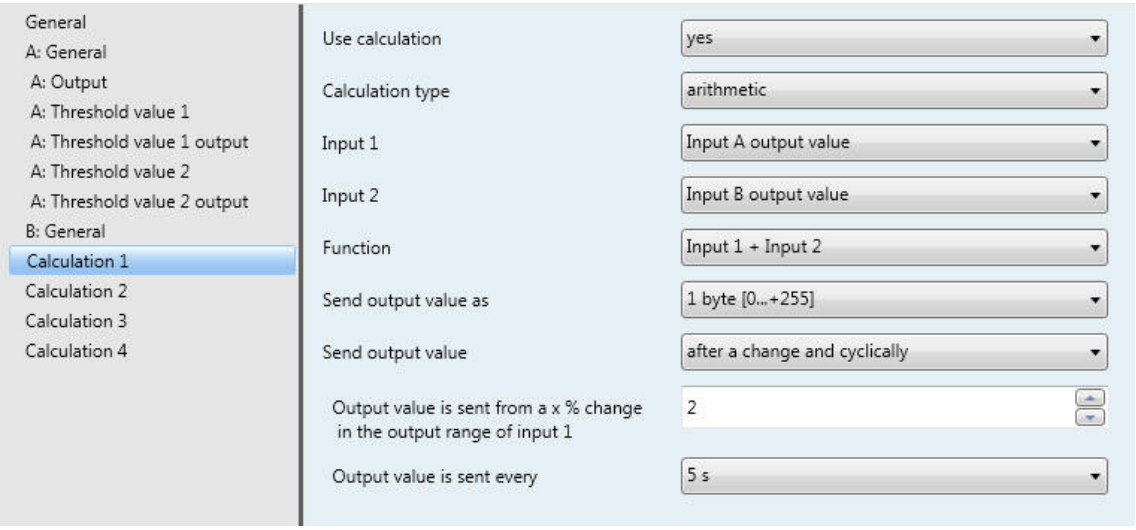
  Output value is sent every

  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.

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

3.2.15 Parameter window *Calculation 1 – Calculation type arithmetic*



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: comparative
arithmetic

The calculation type is set with this parameter.

- *comparative*: Comparison of two output values
- *arithmetic:* Arithmetic logic of two output values

Input 1

Options: Input A output value
Input B output value

Input 2

Options: Input A output value
Input B output value

With both these parameters the inputs 1 and 2 are assigned to 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 means 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 [EIB 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!

Send output value

Options: after a change
cyclically
after a change and cyclically

This parameter defines how the output value should be sent.

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

Further parameters appear with the option *after a change and cyclically*:

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 Input 1

Options: 1...2...100

Using this parameter, you define from which percentage change of the output range of input 1 that the *Output value calculation x* is to be sent.

With option 2, the output value is sent from a 2% change of the *Output value calculation x*.

Important
The output range of a PT100 sensor on input A is -50…+150 °C. This means that the output range is 200 °C, 2 % of which is 4 °C, i.e. with a change of +/-4 °C the Output value calculation x is sent.

3.3 Communication objects

3.3.1 Input A

Nu...	Objektfunktion	Name	Länge	K	L	S	Ü
0	Output value	Input A	2 Byte	K	L	-	Ü
1	Request output value	Input A	1 bit	K	-	S	-
2	Measured value outside range	Input A	1 bit	K	L	-	Ü
3	Threshold value	Input A Thresh.v.1	1 bit	K	L	-	Ü
4	Modify	Input A Threshold 1 lower limit	2 Byte	K	L	S	-
5	Modify	Input A Threshold 1 upper limit	2 Byte	K	L	S	-
6	Threshold value	Input A Thresh.v.2	1 bit	K	L	-	Ü
7	Modify	Input A Threshold 2 lower limit	2 Byte	K	L	S	-
8	Modify	Input A Threshold 2 upper limit	2 Byte	K	L	S	-
23	Status byte	System	1 Byte	K	L	-	Ü

No.	Function	Object name	Data type	Flags
0	**Output value**	**Input A**	**variable** **DPT variable**	**C, R, T**

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

The output value can be sent as

1 bit value [0/1]	EIS 1	DPT	1.001
1 byte value [0...+255]	EIS 6	DPT	5.001
1 byte value [-128...+127]	EIS 14	DPT	6.010
2 byte value [0...+65,535]	EIS 10	DPT	8.001
2 byte value [-32,768...+32,767]	EIS 10	DPT	7.001
2 byte value [EIB floating point]	EIS 5	DPT	9.001
4 byte value [IEEE floating point]	EIS 9	DPT	14.000

.

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

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

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

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

1	**Request output value**	**Input A**	**1 bit** **DPT 1.009**	**C, W**

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

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

2	Measured value out of range	Input A	1 bit DPT 1.001	C, W

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

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

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

Upper measuring limit:

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

Lower measuring limit:

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

When is the value of the communication object sent?

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

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

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

Behaviour with PT100 or PT1000?

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

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

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

Important
The programmable feeder line resistance is subtracted from the measured resistance. Thereafter, a programmable temperature offset is added. 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 the line error, ambient temperatures, etc.

Behaviour with a floating contact?

The communication object has no function with the selection.

No.	Function	Object name	Data type	Flags
3	**Threshold**	**Input A Threshold 1**	**variable** **DPT variable**	**C, R, T**
As soon as the set threshold value is exceeded or below the limit, it is possible to send a 1 bit value [0/1] EIS 1 DPT 1.001 1 byte value [0...+255] EIS 6 DPT 5.001 . The object value depends on the parameter *Data type of threshold value object* (1 bit, 1 byte). The parameter can be found in the parameter window *A – Threshold value 1*.				
4…5	**Modify**	**Input A Threshold 1** **lower limit** **Input A Threshold 1** **upper limit**	**variable** **DPT variable**	**C, R, T**
The upper and lower limit of threshold value 1 can be changed via the bus. The data type and communication objects depend on the set data type of the communication object *Output value – Input A*. **Important** The lower limit should be selected to be lower than the upper limit.				
6	**See communication object 3.**	**Input A Threshold 2**		
7…8	**See communication objects 4 and 5**	**Input A Threshold 2** **lower limit** **Input A Threshold 2** **upper limit**		

3.3.2 Input B

No.	Function	Object name	Data type	Flags
9…17	**See communication objects 0...8**	**Input B**		

3.3.3 Calculation 1

Nu...	Objektfunktion	Name	Länge	K	L	S	Ü
18	Send output value	Calculation 1	1 Byte	K	L	-	Ü

No.	Function	Object name	Data type	Flags
18	**Send output value**	**Calculation 1**	**1 bit** **DPT variable**	**C, R, T**

The result of calculation 1 is sent with this communication object.

Depending on the calculation type which has been selected the result is sent as:

1 bit value [0/1]	EIS 1	DPT	1.001
1 byte value [0...+255]	EIS 6	DPT	5.001
1 byte value [-128...+127]	EIS 14	DPT	6.010
2 byte value [0...+65,535]	EIS 10	DPT	8.001
2 byte value [-32,768...+32,767]	EIS 10	DPT	7.001
2 byte value [EIB floating point]	EIS 5	DPT	9.001
4 byte value [IEEE floating point]	EIS 9	DPT	14.000

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!

3.3.4 Calculation 2, 3 and 4

No.	Function	Object name	Data type	Flags
19	**See communication object 18.**	**Calculation 2**		
20	**See communication object 18.**	**Calculation 3**		
21	**See communication object 18.**	**Calculation 4**		

3.3.5 General

	Nu...	Objektfunktion	Name	Länge	K	L	S	Ü
	22	In operation	System	1 bit	K	L	-	Ü
	23	Status byte	System	1 Byte	K	L	-	Ü

No.	Function	Object name	Data type	Flags
22	**In operation**	**System**	**1 bit** **DPT 1.003**	**C, R, T**

This communication object appears when on the parameter window *General*, the setting *Send object* '*In operation'* is selected with the option *send value 0 cyclically* or *send value 1 cyclically*.

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

No.	Function	Object name	Data type	Flags
23	**Status byte**	**System**	**1 byte** **DPT none**	**C, R, T**

The status byte reflects the current state of the Analogue Input.

Different states are indicated here, e.g.

- Status Input A – Measured value outside range,
- Status Input A – Measured value outside range and self calibration

Bit sequence: 76543210

Bit 7:	not assigned	always 0
Bit 6:	not assigned	always 0
Bit 5:	not assigned	always 0
Bit 4:	Self calibration	0: Self calibration completed 1: Self calibration running
Bit 3:	not assigned	always 0
Bit 2:	not assigned	always 0
Bit 1:	Status Input B Measured value outside of range	0: in range 1: out of range
Bit 0:	Status Input A Measured value outside of range	0: in range 1: out of range

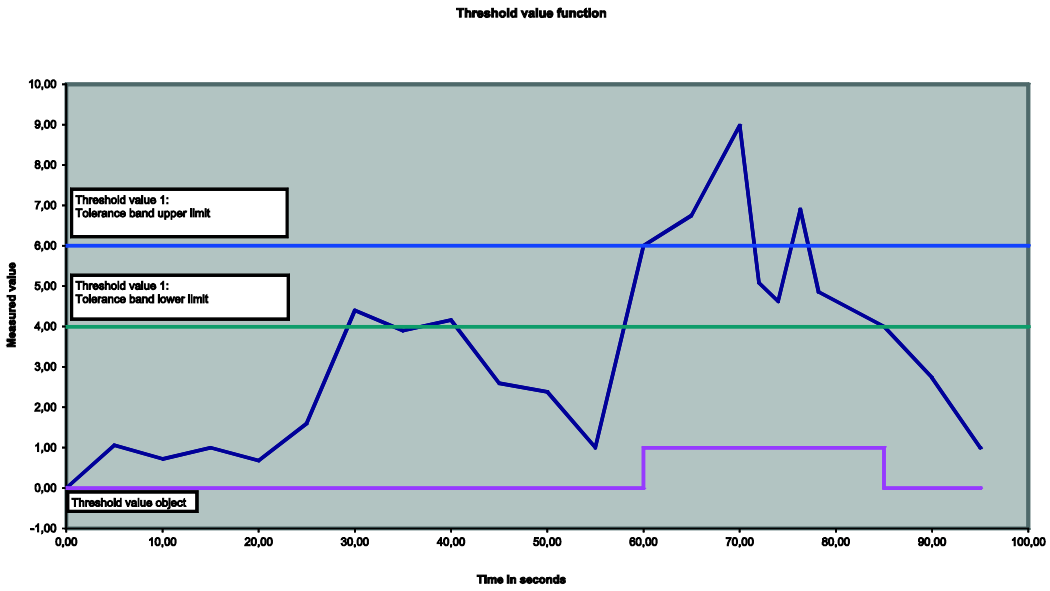
The value of the communication object is sent with the change or can be read out via a Value Read command. The value of the communication object is sent automatically once after the device has started after the set send delay.

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

4 Planning and application

4.1 Description of the threshold value function

How does the threshold value function work?



Settings

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

In the example diagram above, it can be seen that the measured value begins with a 0 value.
The communication object for the *threshold value 1* has the value 0 and is sent cyclically onto the bus when set in the user program.

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

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

The communication object threshold value 1 will remain 1, until the measured value once again falls below the lower limit of the threshold value 1.

A Appendix

A.1 Scope of delivery

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

- 1 pc. AE/A 2.1, Analogue Input, SM, incl.
  - 2 pcs. blanking plug No. 1, opened, GHQ5006611P1
  - 2 pcs. blanking plug No. 2, closed, GHQ5006611P2
- 1 pc. Installation and operating instructions
- 1 pc. bus connection terminal
- 1 pc. sensor connection terminal
- 4 pcs. cable ties for strain relief
- 2 pcs. blanking plug No. 1, opened, GHQ5006611P1
- 1 pack with 4 x screws and 4 x S6 dowels, 2CDG 924 002 B001

Caution

Degree of protection IP54 can be guaranteed only if the supplied blanking plugs are used.

If the plugs are not used, condensation and/or water can penetrate the housing and damage the device.

A.2 Value table of communication object *Status byte – System*

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

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

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

empty = value 0

n = value 1, applicable

A.3 Conversion between °C and °F

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

Conversion formula

Celsius to Fahrenheit

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

Fahrenheit to Celsius

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

A.4 Ordering information

Short description	Designation	Order No.	bbn 40 16779 EAN	Price group	Weight 1 pc. [kg]	Packaging [pc.]
AE/A 2.1	Analogue Input, 2-fold, SM	2CDG 110 086 R0011	**66401 1**	P2	0.25	1

Contact

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Publication Number 2CDC 504 065 D0201 (03.12)

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