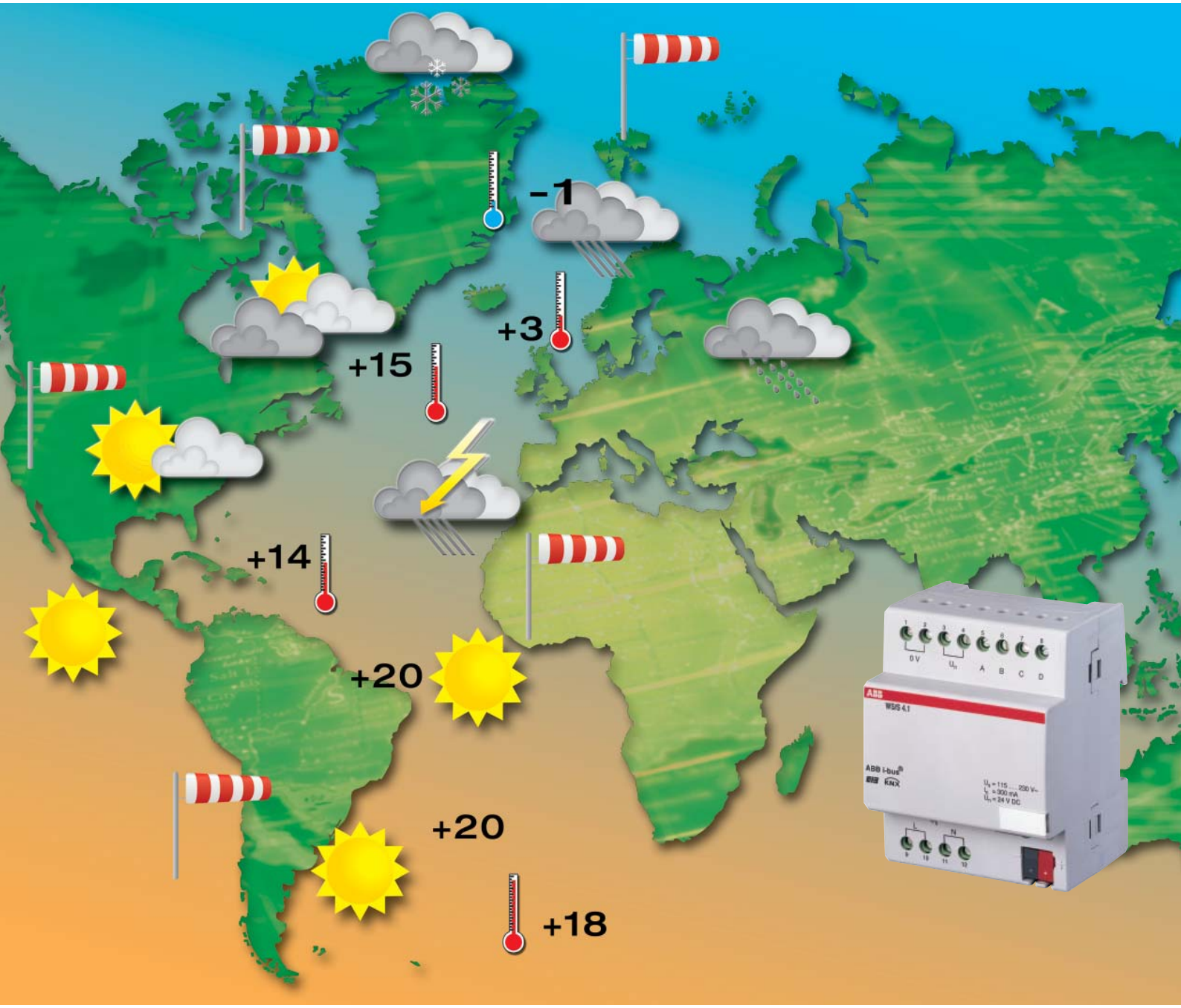
Product Manual

ABB i-bus® EIB / KNX
Weather Station
WS/S 4.1

Intelligent Installation Systems



This manual describes the function of the Weather station WS/S 4.1.
Subject to changes and errors excepted.

Exclusion of liability:
Despite checking that the contents of this document match the hardware and software, deviations cannot be completely excluded. We therefore cannot accept any liability for this. Any necessary corrections will be inserted in new versions of the manual.
Please inform us of any suggested improvements.

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1 General

The well-being of people in buildings, houses and rooms can be considerably improved via a climate-dependent control system. External influences such as wind, rain, brightness and temperature essentially determine many processes in intelligent building systems. A heating system which is controlled by an external temperature for example ensures a pleasant temperature as well as energy-efficient boiler control. By recording the brightness level, it is possible to adapt the lighting and shading of rooms fully automatically to the individual needs of the user. Monitoring and security functions are referred to weather data. Shutters and awnings can be retracted in the event of strong wind or skylights and fanlights can be closed when the rain comes in.

This manual provides you with detailed technical information about the Weather Station including installation and programming and explains the use of the WS/S 4.1 by way of examples.

The manual is divided into the following chapters:

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

1.1 Product and functional overview

The Weather Station WS/S 4.1 is a DIN rail mounted device for insertion in the distribution board. The connection to the bus is established via a bus connection terminal at the front of the device. The assignment of the physical address as well as the parameter settings is carried out with ETS 2 from version V1.3 onwards.

The device enables the recording and processing of four independent analogue input signals in accordance with DIN IEC 60381 (0 – 1 V, 0 – 5 V, 0 – 10 V, 1 – 10 V, 0 – 20 mA, 4 – 20 mA, 0 – 1000 ohm, PT 100 in 2-conductor technology and floating contact interrogation).

All the conventional weather sensors can be connected e.g. twilight sensor, humidity sensor, brightness sensor, air pressure sensor, pyranometer (light intensity), rainfall gauge, rain sensor, temperature sensor, wind speed sensor and wind direction sensor.

The device has an integrated power supply unit to supply the weather sensor with a 24 V DC voltage. The mains voltage is 115...230 V AC (+ 10 % – 15 % tolerance), 50/60 Hz.

A constant output current of maximum 300 mA is made available across the entire input voltage range (115...230 V AC).

The processing of the weather data is carried out in the application program *Weather data/1*.

The sensor output signals can be freely set for each channel in the application program. The measured 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 flexible setting options for the measuring range, depending on the transfer of the measured value, all the possibilities for depicting the expected measurement curve are possible. The sensor measurement curve can be corrected or adjusted, depending on the setting. This flexibility enables only a specific range of the expected measurement curve to be evaluated.

Measured values can be averaged over 4, 16 or 64 measurements.
A measurement is carried out every second.

It is possible to set 2 threshold values per channel, each with an upper and lower limit which can be set independently. The threshold values themselves can be modified via the bus.

It is possible to compare 2 output values, add them, subtract them or deduce the arithmetic mean.

The internal logic can be set as an AND or OR gate. The gate can be assigned a maximum of 4 inputs and one output. The inputs and outputs can be inverted. It is possible to link e.g. 2 Weather Stations together via the logic function. 2 external inputs are available for this purpose.

To guarantee all the programmable functions, the technical data of the sensor manufacturer must be observed.

2 Device technology

Fig. 1: WS/S 4.1

The Weather Station WS/S 4.1 is used for recording weather data.
Four conventional sensors can be connected to the WS/S 4.1.
The connection to the bus is established via the bus connection terminal at the front of the device. The device is ready for operation after connecting the mains voltage of 115...230 V AC and the bus voltage. The Weather Station WS/S 4.1 is parameterised via ETS2 V1.3 or higher.

2.1 Technical data

Power supply	– Bus voltage – Power input, bus – Mains voltage Us – Power consumption – Power input, mains – Leakage loss	21 … 32 V DC < 10 mA 115 ... 230 V AC (+ 10 % – 15 %), 50/60 Hz max. 11 W, at 230 V AC 80/40 mA, at 115/230 V AC max. 3 W, at 230 V AC
Auxiliary voltage output for sensor supply	– Nominal voltage Un – Nominal current In	24 V DC 300 mA
Inputs	– Number – Input signal/resolution/accuracy – Input resistance to voltage measurement – Input resistance to current measurement	4 independent sensor inputs 0 – 1 V/1 mV/+/– 2 % from upper limit of effect. range 0 – 5 V/5 mV/+/– 2 % from upper limit of effect. range 0 – 10 V/10 mV/+/– 2 % from upper limit of effect. range 1 – 10 V/10 mV/+/– 2 % from upper limit of effect. range 0 – 20 mA/20 µA/+/– 2 % from upper limit of eff. range 4 – 20 mA/20 µA/+/– 2 % from upper limit of eff. range 0 – 1000 ohm resistance/2.5 ohm/+/– 2 % from upper limit of effect. range PT100 in 2-conductor technology/0.1 K/+/– 1 K Floating contact interrogation (pulse width min. 100 ms) > 50 kohm 260 ohm
Connections	– EIB / KNX – Mains voltage – Supply for the sensors – Sensor inputs	Via bus connection terminal, screwless Via screw terminals Via screw terminals Via screw terminals
Connecting terminals	– Screw terminals – Tightening torque	0.2 ... 2.5 mm² finely stranded 0.2 ... 4.0 mm² single-core max. 0.6 Nm
Operating and display elements	– Programming LED – Programming button	For assignment of the physical address For assignment of the physical address
Type of protection	– IP 20	In accordance with DIN EN 60 529
Protection class	– II	In accordance with DIN EN 61 140
Temperature range	– Operation – Storage – Transport	– 5 °C...+ 45 °C – 25 °C...+ 55 °C – 25 °C...+ 70 °C
Environment conditions	– max. humidity	93%, without bedewing

Table 1: Technical data part 1

Design	– DIN rail mounted device (MDRC) – Dimensions – Mounting depth in modules – Mounting depth	Modular installation device Pro*M* 90 x 72 x 64.5 mm (H x W x D) 4, 4 modules at 18mm 64.5 mm
Installation	– On 35 mm mounting rail	In accordance with DIN EN 60 715
Mounting position	– As required	
Weight	– 0.2 kg	
Housing, colour	– Plastic, grey	
Certification	– EIB / KNX in accordance with EN 50 090-1, -2	Certificate
CE mark	– In accordance with EMC and low-voltage guidelines	

Table 1: Technical data part 2

Application program

	Number of communication objects	Max. number of group addresses	Max. number of associations
Weather data/1	50	100	100

Table 2: Application program

Note

ETS2 V 1.3 or higher is required for programming. When using ETS3, a file of type ".VD3" must be imported. The application program is stored in ETS2/ETS3 under ABB/Input/Weather station, 4-fold.

2.2 Circuit diagrams

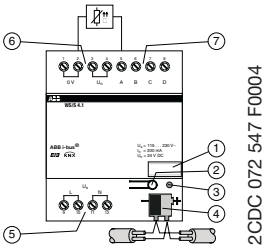


Fig. 2: Circuit diagram of a PT100 temperature sensor

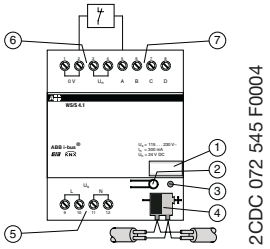


Fig. 3: Circuit diagram of a floating contact

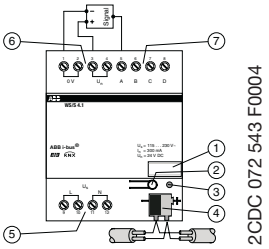


Fig. 4: Circuit diagram of a 3-conductor sensor with intrinsic supply

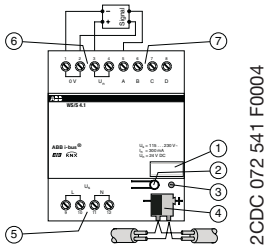


Fig. 5: Circuit diagram of a 4-conductor sensor with intrinsic supply

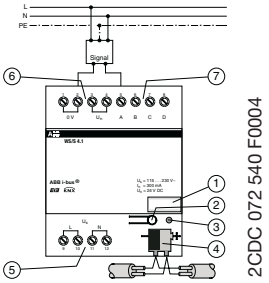


Fig. 6: Circuit diagram of a sensor with an external supply

1 Label carrier
2 Programming button
3 Programming LED
4 Bus connection terminal
5 Power supply
6 Auxiliary voltage output to supply the sensors
7 Sensor inputs

2.3 Dimension drawing

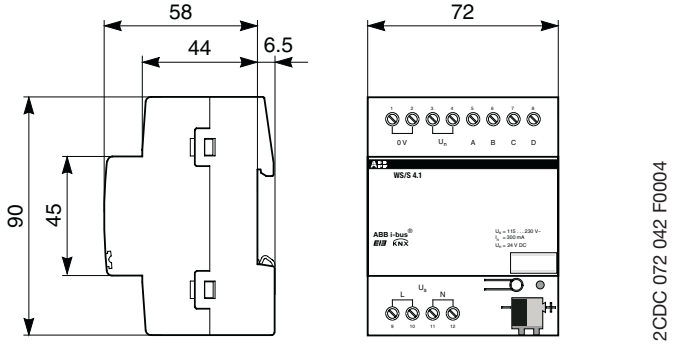


Fig. 7: Dimension drawing

2.4 Resolution and accuracy of the individual measuring ranges

Sensor signal	0 – 1 V	0 – 5 V	0 – 10 V	1 – 10 V	0 – 20 mA	4 – 20 mA	0 – 1000 ohm	PT100
Resolution	1 mV	5 mV	10 mV	10 mV	20 µA	20 µA	2,5 ohm	0.1 K
Accuracy of upper limit of effective range	+ /– 2 %	+ /– 2 %	+ /– 2 %	+ /– 2 %	+ /– 2 %	+ /– 2 %	+ /– 2 %	+ /– 1 K

Table 3: Resolution and accuracy of the individual measuring ranges

2.5 Selection of sensors

24 V DC sensors	**0 – 1 V**	**0 – 5 V**	**0 – 10 V**	**1 – 10 V**	**0 – 2 0 mA**	**4 – 20 mA**	**0 – 1000 ohm**	**Floating contact interrogation**
Rainfall gauge								x
Rain	x	x	x	x	x	x		x
Temperature PT100	via PT100 in 2-conductor technology with line fault compensation							
Floating contact interrogation								x
Other sensors	x	x	x	x	x	x	x	

Table 4: Selection of sensors

The Weather Station WS/S 4.1 makes an output voltage U_n = 24 V DC available to supply the sensors. It should be ensured that the maximum output current of 300 mA is not exceeded.

2.6 Assembly and installation

The Weather Station is a DIN rail mounted device for snap-on fixing on 35 mm mounting rails, in accordance with DIN EN 60 715.

The electrical connection is carried out via screw terminals. The connection to the bus is carried out via the bus connection terminal supplied.

The device is ready for operation once the mains voltage of U_s = 115...230 V AC 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 (conform to DIN VDE 0100-520).

Note

The Weather Station WS/S 4.1 may not be mounted outdoors. The technical data of the sensor manufacturers must be observed for optimum measuring or monitoring values. The same applies for the stipulations of the sensor manufacturers as regards equipment for lightning protection.

Commissioning
In order to commission the Weather Station WS/S 4.1, a PC with ETS2 from version V1.3 or higher is required as well as an interface to the bus e.g. via an RS232 interface or via a USB interface. The device is ready for operation when the mains voltage of 230 V AC and the bus voltage have been applied.

The installation and commissioning may only be carried out by skilled electricians. When planning and installing electrical installations, the relevant norms, guidelines, regulations and specifications must be observed.

– 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 enclosed housing (distribution board)!

Supplied state
The Weather Station is supplied with the physical address 15.15.255. The application program ***Weather data/1*** is preloaded. It is therefore only necessary to load parameters and group addresses. However the complete application program can be downloaded again, if required.

Download behaviour
Due to the complexity of the device, it can take up to 1.5 min. during a download until the progress bar appears, depending on the computer being used.

Assignment of the physical address
The assignment and programming of the physical address, group address and parameters in the ETS software.

Cleaning
Dirty devices can be cleaned with a dry cloth. If this is not sufficient, a cloth that has been dampened slightly with a soap solution can be used. Caustic agents or solvents may not be used under any circumstances.

Maintenance
The device is maintenance-free. In the event of damage (e.g. caused during transportation, storage), no repairs may be carried out. When the device is opened, the right to claim under guarantee expires. The maintenance schedule for the sensors must be requested from the sensor manufacturers.

3 Commissioning

3.1 Overview

The Weather Station is loaded with the application program ***"Weather data/1"***. The programming requires ETS2 V 1.3 or higher. When using ETS3, a file of type ".VD3" must be imported. A maximum of 50 communication objects, 100 group addresses and 100 associations can be linked.

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

Sensor output (Type of input signal)	All the 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 ohm resistance, PT 100 in 2-conductor technology or floating contact interrogation can be connected.
Signal correction/adjustment	The sensor signal can be corrected or adjusted.
Measuring range	Flexible setting option for the upper and lower measuring limit dependent on the output signal of the sensor. The measurement curve is adapted linearly between the upper and lower measuring limit.
Output value	Flexible setting option for the output value. For the upper and lower measuring limit dependent on the output signal of the sensor.
Data types of the output value	The output value can be sent as a 1-bit value, 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 as a 4-byte value [IEE floating point].
Filtering	Measured values can be determined over 4, 16 or 64 measurements. A measurement is carried out every second.
Threshold value	2 threshold values can be set, each with an upper and lower limit. The limits can be modified via the bus.
Calculation	This enables 2 values to be compared or calculated mathematically. The options smaller than, larger than, addition, subtraction or mean-value generation are available.
Logic functions	Logic functions such as AND and OR gates can be created. There are 4 inputs available per logic function. These can be linked with 2 external inputs. The inputs and outputs can be inverted.

Fig. 8: Functions of the application program

3.2 Parameters

Note The default settings for the options are displayed as underlined, e.g. Options: no/yes

3.2.1 Parameter window “General”

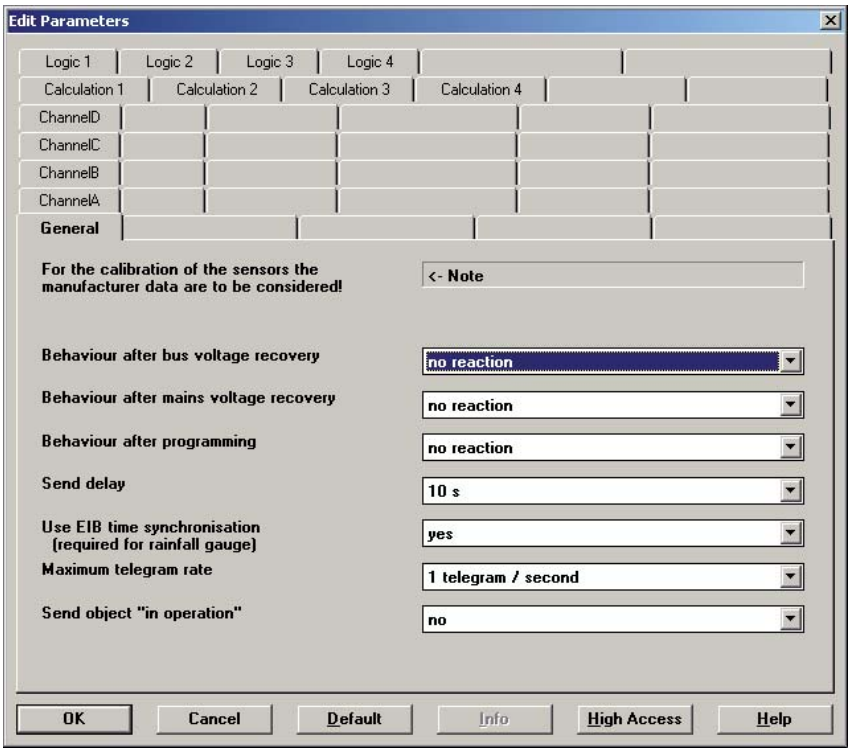


Fig. 9: Parameter window “General”

Behaviour after bus voltage recovery,
Behaviour after mains voltage recovery,
Behaviour after programming
Options: no reaction
send output and threshold values immediately
send output and threshold values with a delay

The parameters are used for setting the behaviour on *bus voltage recovery, mains voltage recovery* and after *programming*.

Option *no reaction* = Send no values

Option *send output and threshold values immediately* = Send values immediately

Option *send output and threshold values with a delay* = Send values with a delay

The *Send delay* is set separately and applies to all three parameters

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

The send delay determines the time between *bus voltage recovery, mains voltage recovery, programming* and the point from which the telegrams should be sent with a delay. Once the device is started, the following communication objects also send a telegram after the set delay.

– Communication object “Request time – Time synchronisation” sends a read telegram
– Communication object “In operation – System” sends an ‘In operation’ telegram
– Communication object “Status byte – System” sends a status byte telegram

Use EIB time synchronisation (required for rainfall gauge)
Options: no/yes

The EIB time synchronisation for the rainfall gauge is set via this parameter.

Note An *EIB time synchronisation* is required for the accurate reset of the pulses for the rainfall gauge.

Option *yes* = External time generator is available

If the Weather Station has not received any time telegrams for more than 25 hours, bit 6 in the communication object “Status byte – System” is set from “0” to “1”.

Option *no* = No external time generators are available

If *EIB time synchronisation* is not available, the internal clock is set to 00:00:00 when the device is started i.e. the options *daily* and *hourly* for the parameter *Reset the pulse counter to zero* are not synchronised with the real time.

Maximum telegram rate
Options: 1/2/3/5/10/20 telegrams/second

To control the bus load, it is possible to limit the *Maximum telegram rate per second* with this parameter.

Send object “in operation”
Options: no/yes

Option *yes* = Communication object “In operation – General” appears

If *yes* is selected, the parameter *“Sending cycle time”* is visible in the parameter window.

Sending cycle time
Options: 10 min/30 min/1 h/3h/6 h/12 h/24 h

The communication object “In operation – General” is sent on the BUS after the set sending cycle time.

It is therefore possible for the Weather Station to be monitored e.g. via a staircase lighting function in order to protect security-related installations.

3.2.2 Parameter window “Channel A - Other sensors”

The parameters for the “Other sensors” are described in the following. The explanations also apply for channels B, C and D.
Further parameter windows appear with the selection of a sensor type..

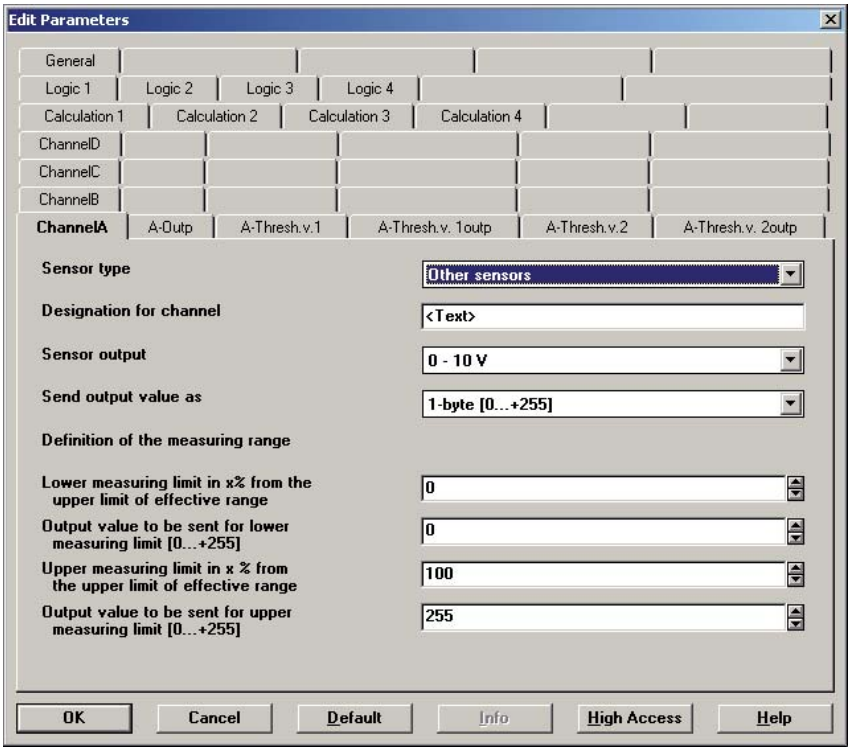


Fig. 10: Parameter window “Channel A - Other sensors”

Sensor type
Options: no function
Rainfall gauge
Rain sensor
Temperature sensor PT100
Floating contact interrogation
Other sensors

The parameter defines the assignment of channel A. Various sensor types can be selected.

Designation for channel
Option: < Text >

With this parameter it is possible to enter a text of up to 40 characters in length for identification purposes in the ETS..
For example, twilight sensor, air pressure sensor, humidity sensor, brightness sensor, pryanometer, windspeed sensor or wind direction sensor.

Note: The text enetered is intended as a means of providing an overview particularly when the channels are all assigned and indicates the function assigned to the channel. The text is purely for information purposes and serves no other function.

Sensor output
Options: 0 – 1 V/0 – 5 V/0 – 10 V/1 – 10 V
0 – 20 mA/4 – 20 mA/0 – 1000 Ohm

The *Sensor output* is set with this parameter. The data can be found in the technical documentation of the sensor manufacturer. It is possible to choose from several voltage and current output signals.

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]

It is defined via this parameter in which format the *Output value* should be sent. If e.g. the option “1 byte [0...+ 255]” is selected, the *Output value* is sent as a 1-byte value.

What is the output value?
The output value designates the value which the Weather Station sends on the bus. The Weather Station records a sensor value, converts it according to the set parameters and sends it on the bus.

If the option *2 byte [EIB floating point]* or *4 byte [IEEE floating point]* is set, a further parameter appears in the parameter window.

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/
1/10/100/1000/10000/100000/1000000

The *Factors for entering the output and threshold values* are set via these parameters.

e.g. Option *1* = Output value is transferred 1:1

By entering the factor, units can be converted approximately i.e. the output value corresponds to the transmitted output value multiplied by the selected factor.

3.2.2.1 Definition of the measuring range

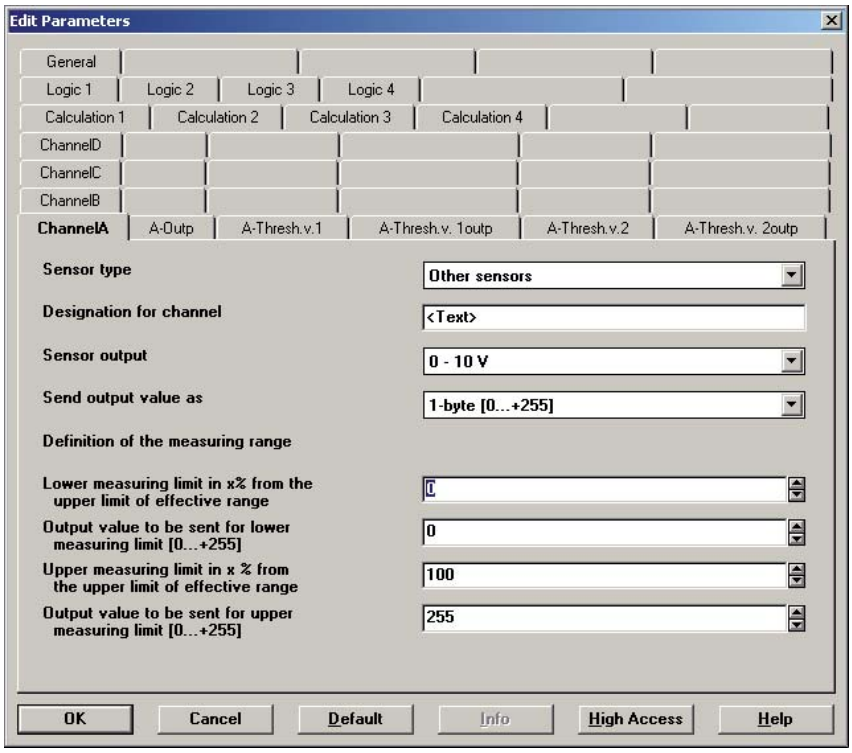


Fig. 11: Parameter window “Channel A - Definition of the measuring range”

The following 4 parameters are dependent on the parameter *Send output value* as. The preset values change depending on which byte value is set. The following description is an example for all the byte values that can be set.

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

The *Lower and upper measuring limit in x % from the upper limit of effective range* are set via these two parameters. When the value exceeds or falls below the set lower and upper measuring limit, the communication object “Measured value outside range – Channel A” sends a “1”. When the measured value is between the two limits again, the communication object sends a “0”.

What is the upper limit of effective range?
The upper limit of effective range is the maximum voltage, current or resistance value which is set in the parameter “Sensor output” e.g. sensor with a signal output of 0 – 10 V has an upper limit of effective range 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

The *Output values to be sent for the lower and upper measuring limits [0...+ 255]* are set via these two parameters. The measurement curve runs linearly between the upper and lower measuring limit.

What is the measuring limit?
Using measuring limits, it is defined up to which set values the weather station should evaluate the signal of the connected sensor. An upper and lower measuring limit can be set.

Example: A sensor with a measuring range of 0...1000 lux is connected but the measurement curve should only be evaluated between 10 and 90 % (100...900 lux). In this case, the measuring limits are set at 100 and 900 lux.

3.2.2.2 Parameter window “A-Output”

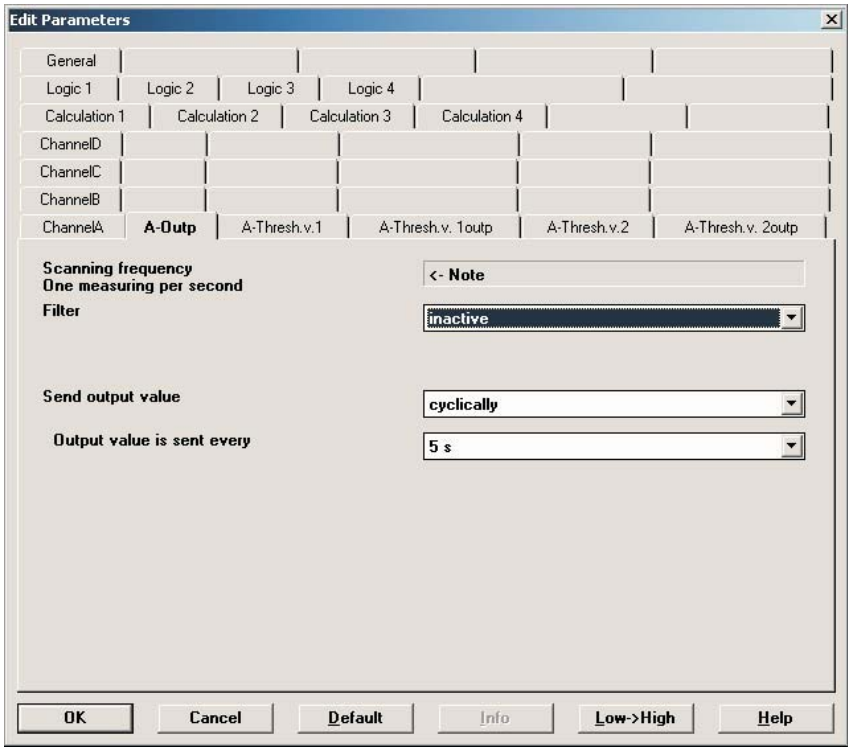


Fig. 12: Parameter window “Channel A - Output”

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. The output value can thus be set as a mean value via three different options.

Option *inactive* = Filter is not active
Option *low* = Output value as *mean value over 4 measurements*
Option *average* = Output value as *mean value over 16 measurements*
Option *high* = Output value as *mean value over 64 measurements*

Note After an immediate change in the sensor signal, it takes 16 seconds e.g. in the average setting until the output value arrives.

Send output value
Options: on request
after a change
cyclically
after a change and cyclically

It is defined via this parameter how the *Output value* should be sent.

If the option *on request* is selected, the communication object “Request output value - Channel A” 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 – Channel A”.

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

Output value is sent every
Options: 5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/12 h/24 h

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

Output value is sent after x % deviation from the output range
Options: 1/2...100

It is defined via this parameter which percentage change in the output range causes the output value to be sent.

If option 2 is selected, the output value is sent after a 2 % change in the output range.

What is the output range?
The output range is determined by the setting options of the upper and lower measuring limits. The difference between the upper and lower measuring limit forms the output range.

Example: If the lower measuring limit of the sensor (0...1000 lux) is set at 10 % (100 lux) and the upper measuring limit is set at 90 % (900 lux), the output range (900 lux – 100 lux) = 800 lux. 2 % of 800 lux = 16 lux.

3.2.2.3 Parameter window “A-Threshold 1”

The following section describes the parameters for threshold 1. These also apply for threshold 2.

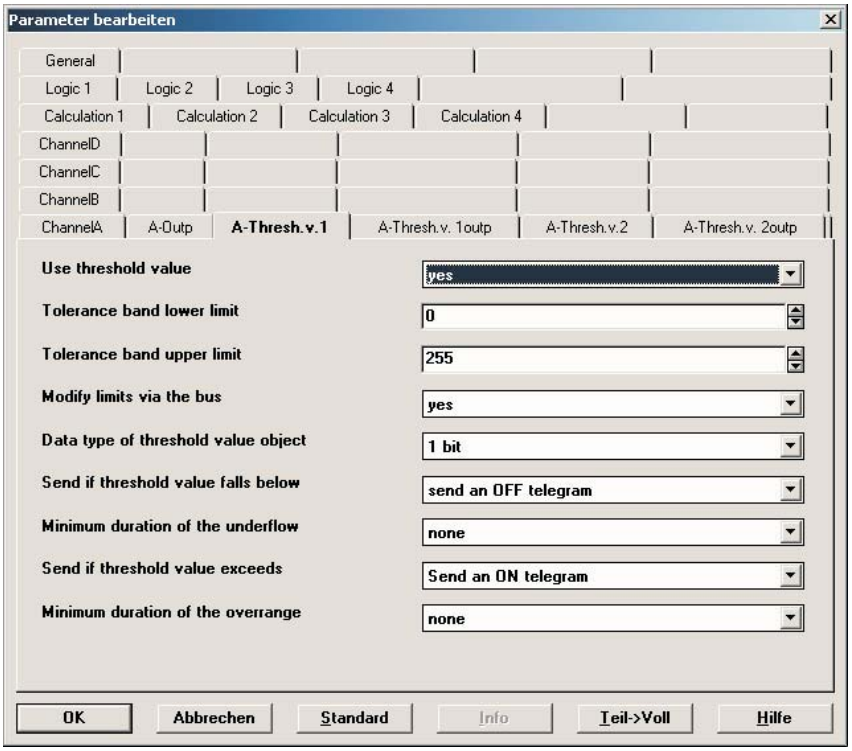


Fig. 13: Parameter window “Channel A - Threshold 1”

Use threshold value
Options: no/yes

It is defined via this parameter whether *Threshold 1* should be used.
If *yes* is selected, the communication object “Threshold value - Channel A Threshold 1” appears.

Tolerance band lower limit
Tolerance band upper limit
Options: Dependent on the parameter “Send output value as” in the parameter window “Channel A”

The upper and lower limit is set via these two parameters.

Note: Depending on the setting of the parameter “Send output value as” in the parameter window “Channel A”, different limit values are preset.

Modify limits via the bus
Options: no/yes

It is defined with this parameter whether the limits can be modified via the bus. When yes is selected, the communication objects “Modify – Channel A Threshold 1 lower limit” and “Modify – Channel A Threshold 1 upper limit” also appear.

Note: The value formats of these communication objects are identical to the format set under the parameter *Send output value as* in the parameter window *Channel A*. The value must be sent in the same format as the output value of the channel.

Data type of threshold value object
Options: 1 bit/1 byte [0...255]

If the option *1 bit* is set for the parameter *Data type of threshold value object*, 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

Option *do not send a telegram* = No reaction occurs

Option *send an ON telegram* = Send telegram value “1”

Option *send an OFF telegram* = Send telegram value “0”

Minimum duration of the underflow
Minimum duration of the overrange
Options: none/5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/ 12 h/24 h

Option *none* = Send threshold value 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 the option *1 byte [0…255]* is set for the parameter *Data type of threshold value object*, 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 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/ 6 h/12 h/24 h

Option *none* = Send threshold value directly

A minimum duration can be selected with the further time options. If the send condition reverts within the minimum duration, no telegrams are sent.

3.2.2.4 Parameter window “A-Threshold 1 Output”

The parameters for the output of threshold 1 are described in the following section. They also apply to the output of threshold 2.

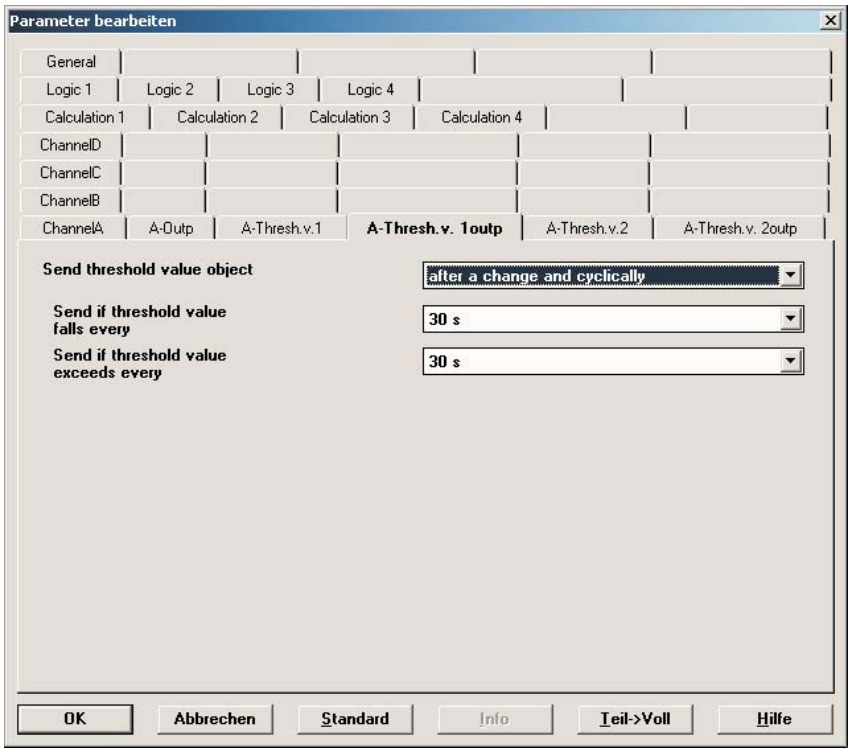


Fig. 14: Parameter window “Channel A - Threshold 1 Output”

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.

Option *after a change* = Send threshold value object after a change
Option *after a change and cyclically* = Send threshold value object after a change and cyclically.

Note The threshold value object is sent until the value falls below or exceeds the other limit.

The following parameters appear when this option is selected.

Send if threshold value falls below every
Send if threshold value exceeds every
Options: 5 s/10 s/<u>30 s</u>/1 min/5 min/10 min/30 min/1 h/6 h/ 12 h/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.

3.2.3 Parameter window “Channel A - Rainfall gauge”

The following section displays and describes the parameters which differ from the description of the “Other sensors”.

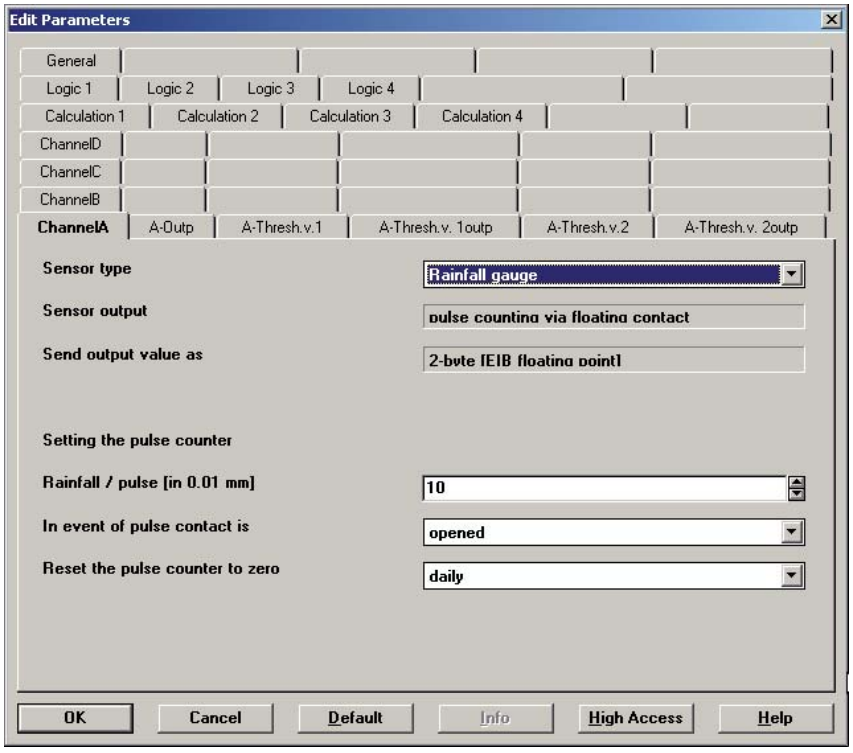


Fig. 15: Parameter window “Channel A - Rainfall gauge”

Sensor output
This parameter is permanently set to “pulse counting via floating contact”. The minimum pulse width is 100 ms.

3.2.3.1 Setting the pulse counter

Rainfall/pulse [in 0.01 mm]
Options: 0...10...255

The rainfall per pulse is set via this parameter. Rainfall = option multiplied by 0.01.

Note 1 mm = 1 l/m²

In event of pulse, contact is
Options: closed/opened

The contact position in the event of a pulse is set with this parameter.

Option *closed* = Contact is closed in the event of a pulse
Option *opened* = Contact is opened in the event of a pulse

Reset the pulse counter to zero
Options: hourly/daily

The reset of the pulse counter is set via this parameter.

Option *hourly* = Reset to zero at every full hour
Option *daily* = Reset to zero at 24:00

Note An *EIB time synchronisation* is required for the accurate reset of the pulses when using a rainfall gauge.

If *EIB time synchronisation* is not available, the internal clock is set to 00:00:00 when the device is started i.e. the options daily and hourly for the parameter Reset the pulse counter to zero are not synchronised with the real time.

See also the communication object description for “Input time – Time synchronisation” and the parameter description for *Use EIB time synchronisation*.

If the Weather Station has not received a time telegram for more than 25 h, bit 6 in the communication object “Status byte – System” is set from “0” to “1”.

3.2.3.2 Parameter window “A-Output”

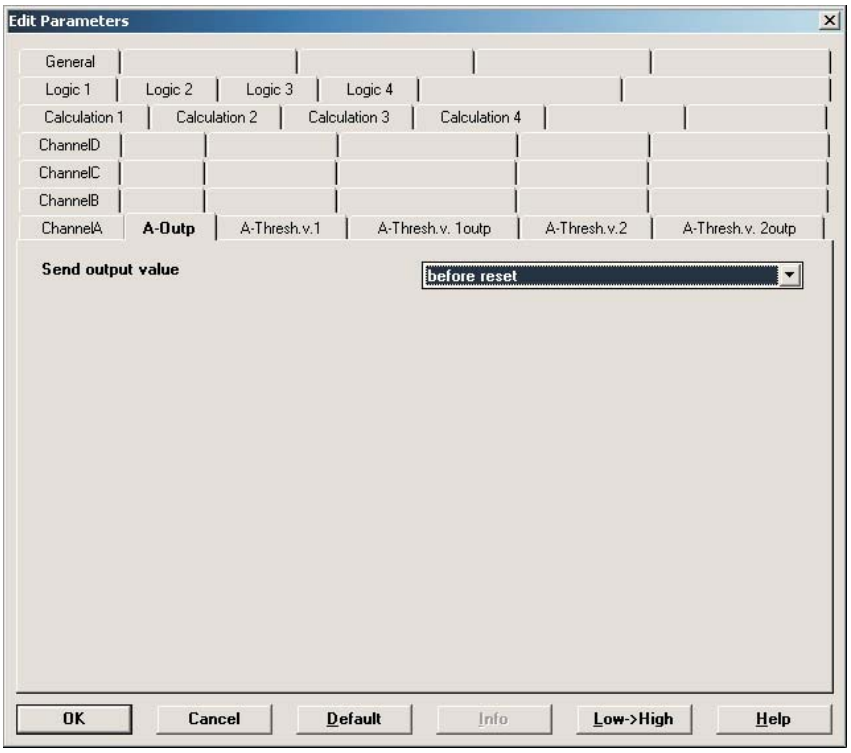


Fig. 16: Parameter window “Channel A-Output”

Send output value
Options: on request
after a change
cyclically
after a change and cyclically
before reset

It is defined via this parameter how the output value should be sent.

Option *before reset* = Send output value before a reset
Option *on request* = Send output value on request

When this option is selected, the communication object “Request object value – Channel A” 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 – Channel A”.

Option *after a change* = Send output value after a change
Option *cyclically* = Send output value cyclically
Option *after a change and cyclically* = Send output value after a change and cyclically.

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

Output value is sent after change of more than [in 0.1 mm]
Options: 0...10...100

This parameter defines after which change in 0.1 mm steps the output value should be sent.

Option *10* = Send output value after a change of 1 mm

Output value is sent every
Options: 5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/12 h/24 h

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

Note Please take all further parameters from the description of the “Other sensors”.

3.2.4 Parameter window “Channel A - Rain sensor”

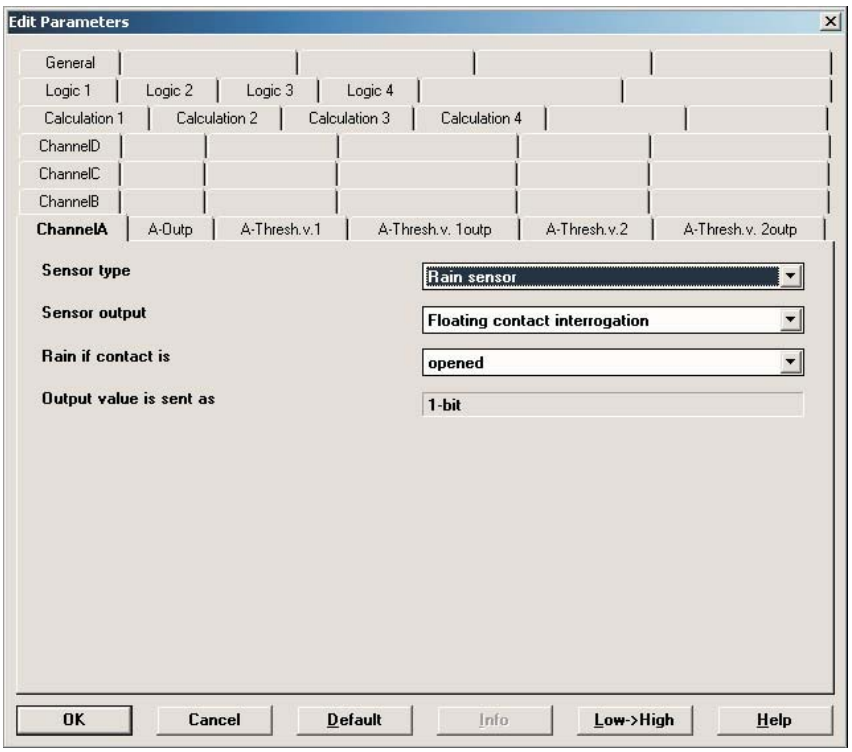


Fig. 17: Parameter window “Channel A - Rain sensor”

Sensor output
Options: 0 – 1 V/0 – 5 V/0 – 10 V/1 – 10 V
0 – 20 mA/4 – 20 mA/floating contact interrogation

The *Sensor output* is set with this parameter. The data can be found in the technical documentation of the sensor manufacturer. It is possible to choose from several voltage and current output signals as well as a floating contact. The minimum pulse width is 100 ms.

Rain if contact is
Options: closed/opened

The contact position in the event of rain is set with this parameter.

Option *closed* = Contact is closed in the event of rain
Option *opened* = Contact is opened in the event of rain

Output value is sent as
This parameter is fixed at 1 bit.

bit value “0” = No rain
bit value “1” = Rain

3.2.4.1 Parameter window “A-Output”

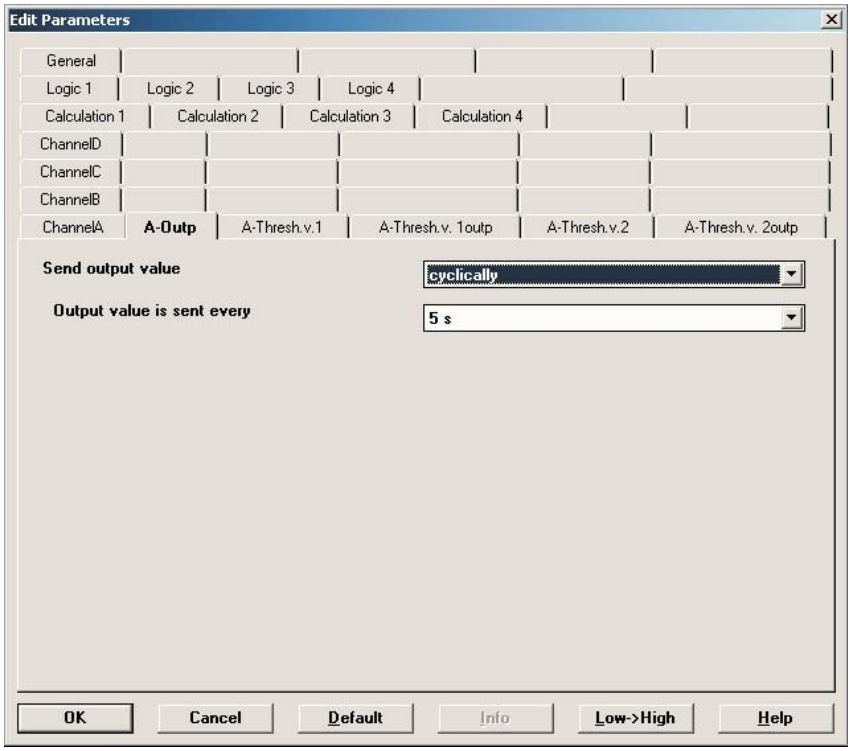


Fig. 18: Parameter window “Channel A - Output”

Send output value
Options: on request
after a change
cyclically
after a change and cyclically

It is defined via this parameter how the output value should be sent.

Option *on request* = Send output value on request

When this option is selected, the communication object “Output value – Channel A” 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 – Channel A”.

Option *after a change* = Send output value after a change

Option *cyclically* = Send output value cyclically

Option *after a change and cyclically* = Send output value after a change and cyclically.

In the options *after a change, cyclically* and *after a change and cyclically*, further parameters appear – see next page.

Output value is sent every
Options: 5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/12 h/24 h

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

3.2.4.2 Parameter window “A-Threshold 1”

The parameters for threshold 1 are described in the following section. They also apply for threshold 2.

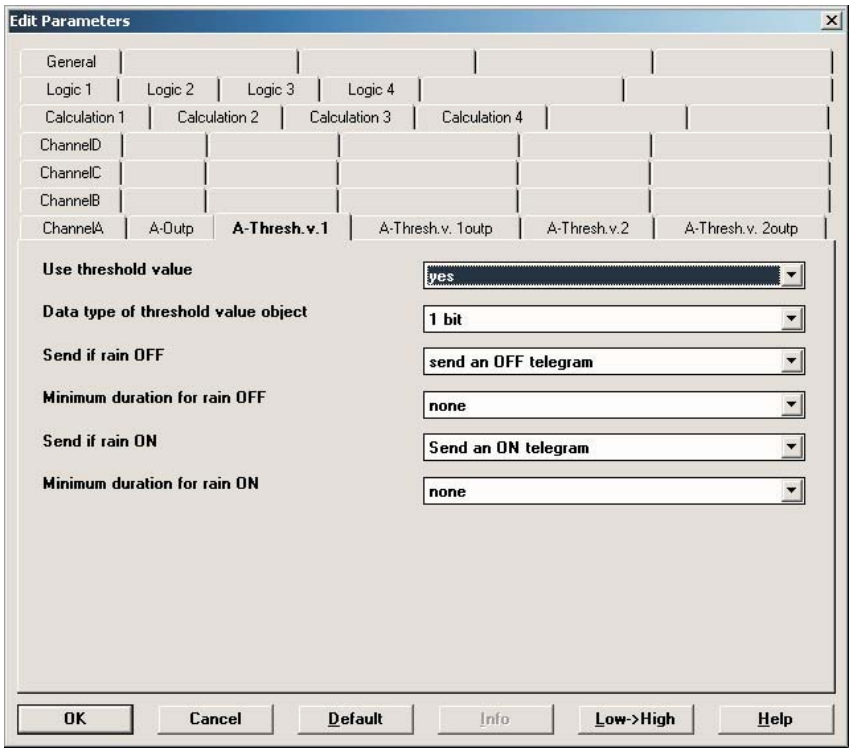


Fig. 19: Parameter window “Channel A - Threshold 1”

Use threshold value
Options: no/yes

It is defined via this parameter whether *Threshold 1* should be used.
If *yes* is selected, the communication object “Threshold value - Channel A Threshold 1” appears.

Data type of threshold value object
Options: 1 bit/1 byte [0...255]

If the option *1 bit* is set for the parameter *Data type of threshold value object*, the following parameters appear.

Send if rain OFF
Options: do not send a telegram
send an ON telegram
send an OFF telegram
Send if rain ON
Options: do not send a telegram
send an ON telegram
send an OFF telegram

Option *do not send a telegram* = No reaction occurs
Option *send an ON telegram* = Send telegram value “1”
Option *send an OFF telegram* = Send telegram value “0”

Minimum duration for rain OFF
Minimum duration for rain ON
Options: none/5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/ 12 h/24 h

Option *none* = Send threshold value directly

A minimum duration can be set with the further time options. If the send condition reverts within the minimum duration, no telegrams are sent.

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

Send if rain OFF [0...255]
Options: 0...255
Send if rain ON [0...255]
Options: 0...255

A value between 0 and 255 can be entered in single steps.

Minimum duration for rain OFF
Minimum duration for rain ON
Options: none/5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/12 h/24 h

Option *none* = Send threshold value directly

A minimum duration can be set with the further time options. If the send condition reverts within the minimum duration, no telegrams are sent.

3.2.4.3 Parameter window “A-Threshold 1 Output”

The parameters for the output of threshold 1 are described in the following section. They also apply to the output of threshold 2.

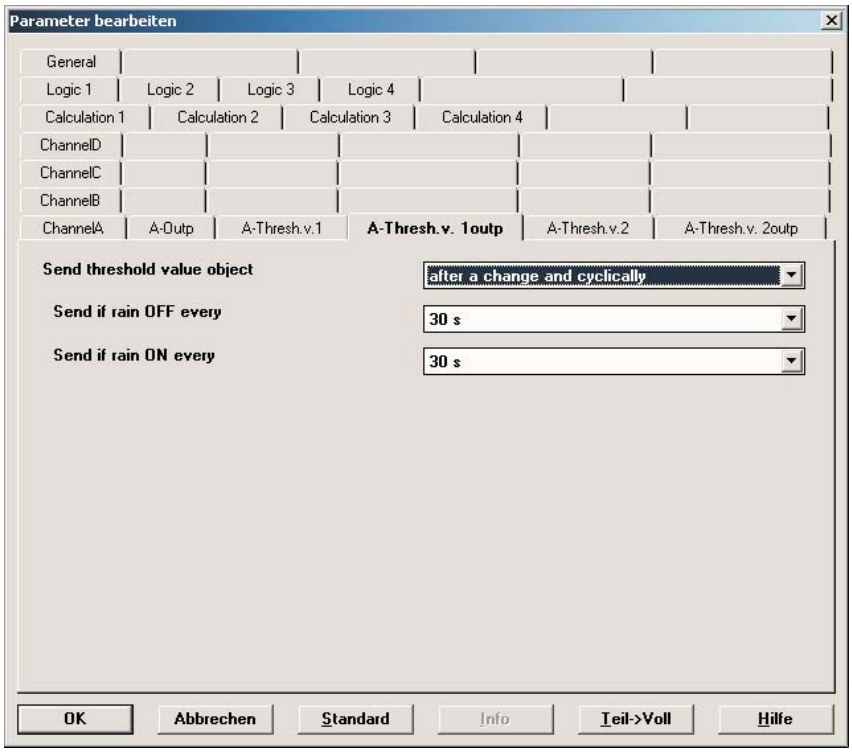


Fig. 20: Parameter window “Channel A - Threshold 1 Output”

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.

Option *after a change* = Send threshold value object after a change
Option *after a change and cyclically* = Send threshold value object after a change and cyclically.

Note The threshold value object is sent until the value falls below or exceeds the other limit.

The following parameters appear when this option is selected.

Send if rain OFF every
Send if rain ON every
Options: 5 s/10 s/<u>30 s</u>/1 min/5 min/10 min/30 min/1 h/6 h/ 12 h/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.

3.2.5 Parameter window “Channel A - Temperature sensor PT100”

The following section displays and describes the parameters which differ from the description of the “Other sensors”.

So that the measurement is not corrupted, the return conductor of a PT100 sensor must be led separately to the 0 V terminal and may not be used as a return conductor for other sensors.

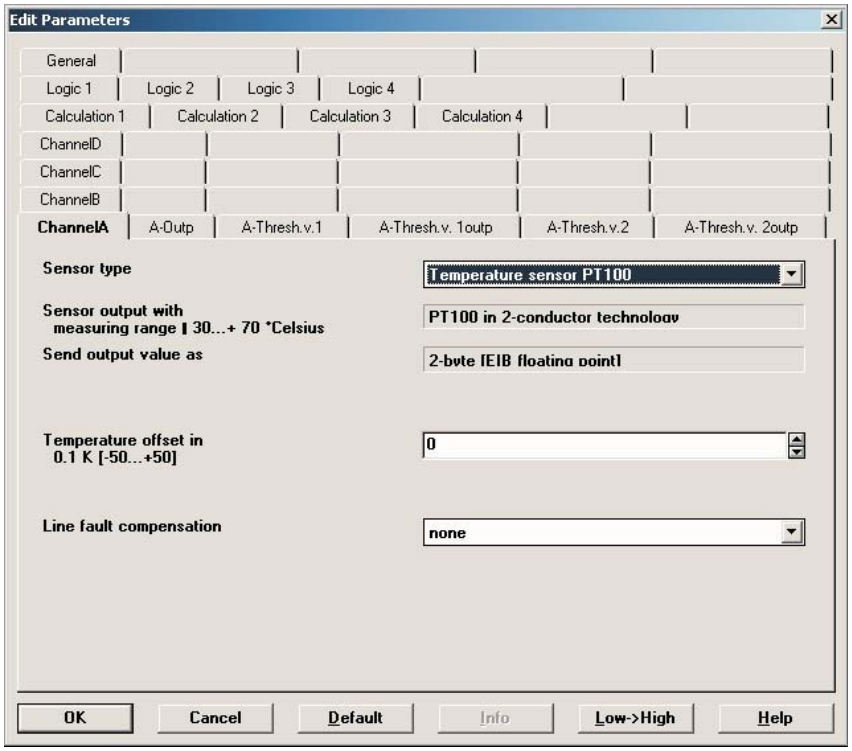


Fig. 21: Parameter window “Channel A – Temperature sensor PT100”

Sensor output with measuring range – 30...+ 70 °Celsius
This parameter is fixed at PT100 in 2-conductor technology.
The measuring range lies between – 30 °C and + 70 °C.

Send output value as
This parameter is fixed at 2 byte [EIB floating point].

Temperature offset in 0.1 K [– 50...+ 50]
Options: – 50...<u>0</u>...+ 50

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

Line fault compensation
Options: <u>none</u>/via cable length/via cable resistance

This parameter is used for setting a *Line fault compensation* to compensate for the measuring error caused by the cable resistance.

In the options *via cable length* and *via cable resistance*, further parameters appear – see next page.

3.2.5.1 Line fault compensation via cable length

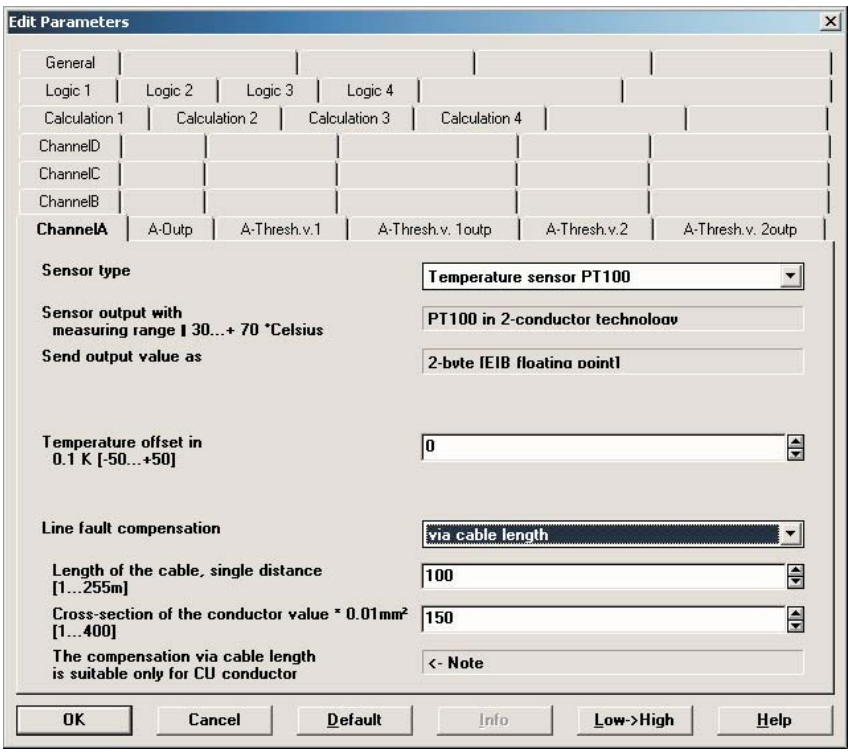


Fig. 22: Parameter Line fault compensation “via cable length”

Length of the cable, single distance [1...255 m]
Options: 1...<u>100</u>...255

For setting the single cable length of the connected temperature sensor PT100.

Cross-section of the conductor value * 0.01 mm^2 [1...400]
Options: 1...<u>150</u>...400 (150 = 1.5 mm^2)

The cross-section of the conductor to which the PT100 is connected, is entered via this parameter.

3.2.5.2 Line fault compensation via cable resistance

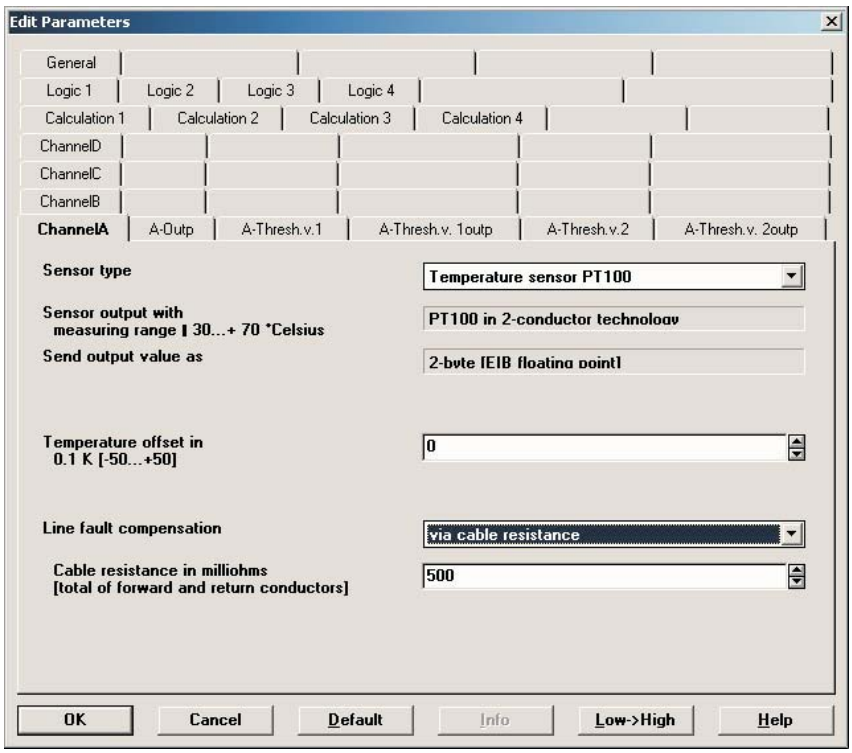


Fig. 23: Parameter Line fault compensation “via cable resistance”

Cable resistance in milliohms [total of forward and return conductors]
Options: 0...500...10000

For setting the cable resistance of the connected temperature sensor PT100.

Note

To avoid incorrect measurements when setting the cable resistance, neither forward nor return conductors may be connected to the Weather Station during the measurement.

Please take all further parameters from the description of the “Other sensors”.

3.2.6 Parameter window “Channel A – Floating contact interrogation”

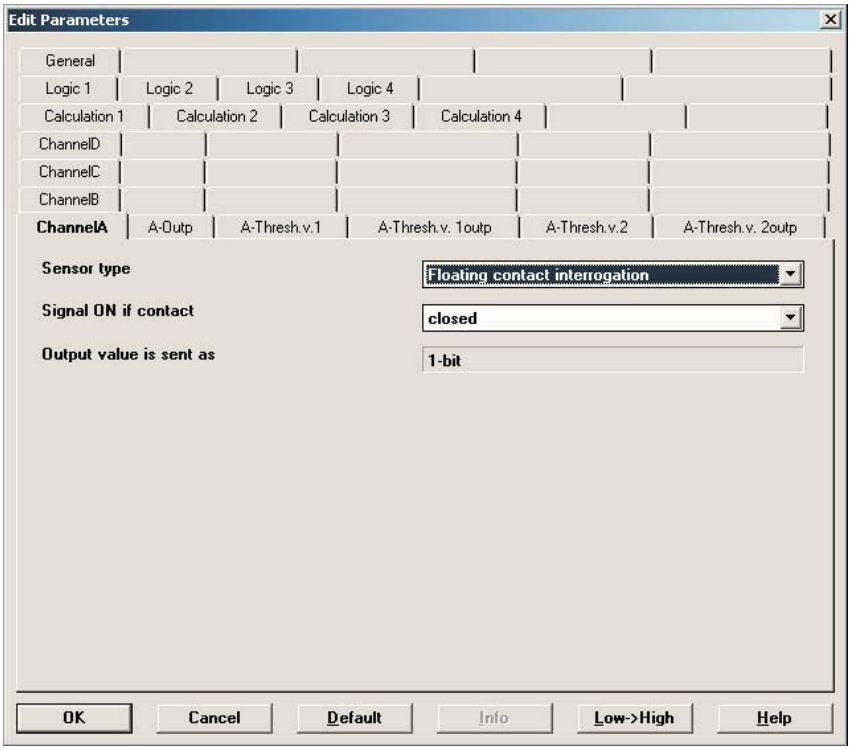


Fig. 24: Parameter window Channel A – Floating contact interrogation”

Note Please take all further parameters from the description of the “Rain sensor”.

3.2.7 Parameter window “Calculation 1” with “comparative” calculation

The following section describes the parameters for “Calculation 1, comparative”. The explanations also apply for calculations 2, 3 and 4.

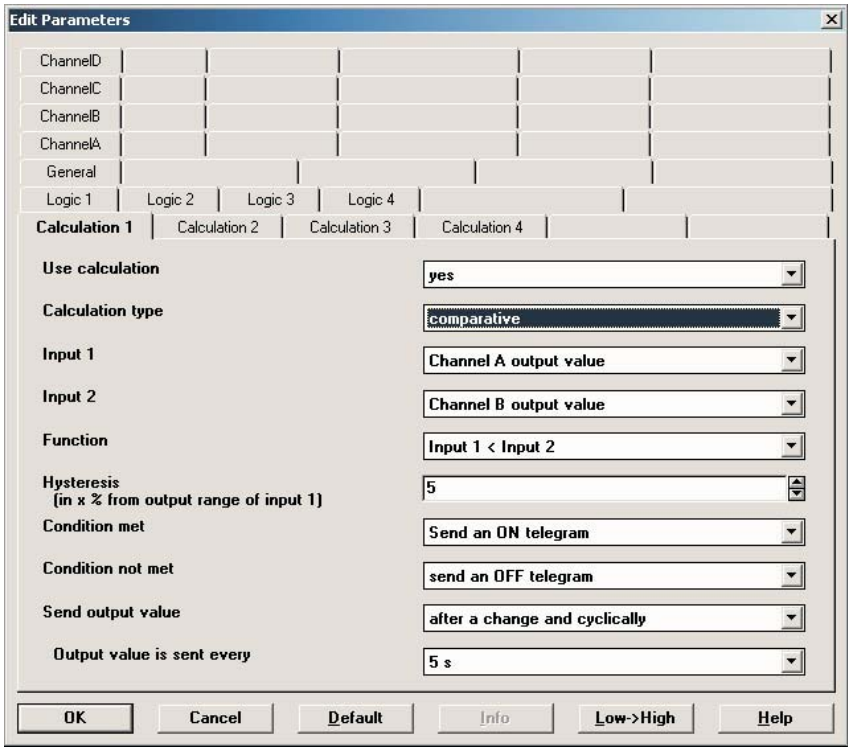


Fig. 25: Parameter window “Calculation 1, comparative”

Use calculation
Options: no/yes

It is defined via this parameter whether calculation 1 should be used. If *yes* is selected, the communication object “Send output value – Calculation 1” appears.

Calculation type
Options: comparative/arithmetic

The calculation type is set with this parameter.

Option *comparative* = Comparison of two output values
Option *arithmetic* = Arithmetical logic operation of two output values

Input 1
Options: Channel A output value
Channel B output value
Channel C output value
Channel D output value

Input 2
Options: Channel A output value
Channel B output value
Channel C output value
Channel D output value

The operands of the comparative calculation are set via these two parameters.

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

For setting the comparison functions.

Hysteresis (in x % from output range of input 1)
Options: 1...5...100

The hysteresis band which is dependent on the output range of input 1 is defined with this parameter.

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

For setting the reaction as a result of the comparison.

Send output value
Options: after a change
after a change and cyclically

It is defined via this parameter how the output value should be sent.

Option *after a change* = Send output value after a change
Option *after a change and cyclically* = Send output value after a change and cyclically.

A further parameter appears in these options.

Output value is sent every
Options: 5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/12 h/24 h

The interval for cyclical sending is set with this parameter.

3.2.8 Parameter window “Calculation 1” with “arithmetic” calculation

The following section describes the parameters for “Calculation 1, arithmetic” which differ from the description for “Calculation 1, comparative”.
The explanations also apply to calculations 2, 3 and 4.

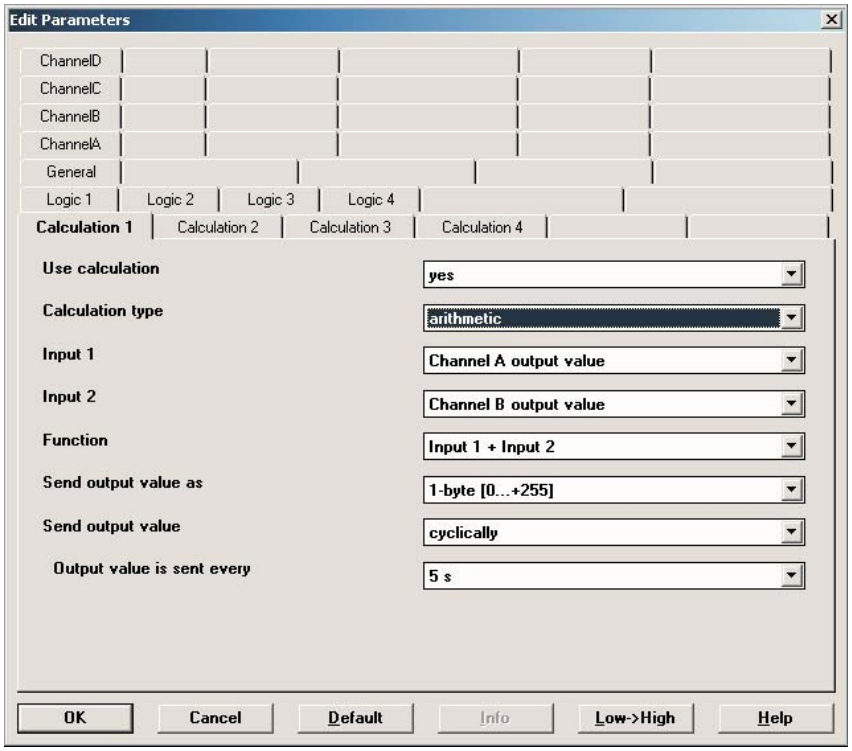


Fig. 26: Parameter window “Calculation 1, arithmetic”

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

Option *Input 1 + Input 2* = Inputs 1 and 2 are added together

Option *Input 1 - Input 2* = Input 2 is subtracted from input 1

Option *Arithmetic mean value* = The arithmetic mean is formed 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]

It is defined via this parameter in which format the *Output value* should be sent. If e.g. the option “1 byte [0...+ 255]” is selected, the *Output value* is sent as a 1-byte value.

Note The setting requires that the result of the calculation is adapted to the set format. Otherwise, the result is truncated.

Send output value
Options: after a change
cyclically
after a change and cyclically

This parameter defines how the output value should be sent.

Option *after a change* = Send output value after a change

Option *cyclically* = Send output value cyclically

Option *after a change and cyclically* = Send output value after a change and cyclically.

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

Output value is sent every
Options: 5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/12 h/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 of input 1
Options: 1...2...100

It is defined via this parameter after which percentage change in the output range of input 1, the output value should be sent.

For option 2, the output value is sent after a 2 % change in the output range of input 1.

3.2.9 Parameter window “Logic 1”

The following section contains the parameters for logic 1 which also apply for logic 2, 3 and 4.

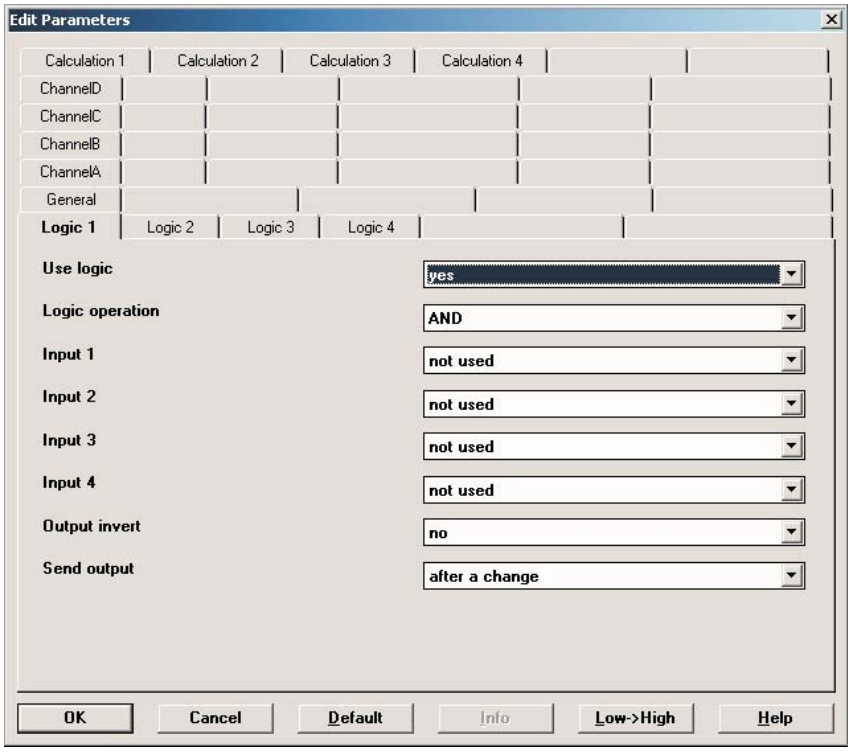


Fig. 27: Parameter window “Logic 1”

Use logic
Options: no/yes

It is defined via this parameter whether logic 1 should be used. If *yes* is selected, the communication object “Send output – Logic 1” appears.

Logic operation
Options: AND/OR

Option *AND* = Logic as AND gate
Option *OR* = Logic as OR gate

Input 1...4
Options: not used
Channel A, value below threshold 1
Channel A, value above threshold 1
...
Channel D, value below threshold 1
Channel D, value above threshold 1
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

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

Note The selection of the options *Calculation 1, condition met* to *Calculation 4, condition not met* refer to the comparative calculation type under parameter window “Calculation 1…4”.

Two external inputs are available with communication objects input 1 and 2.

Output inverted
Options: no/yes

The inversion of the output is defined via this parameter.

Send output
Options: after a change
after a change and cyclically

It is defined via this parameter how the output should be sent.

Option *after a change* = Send output after a change

Option *after a change and cyclically* = Send output after a change and cyclically.

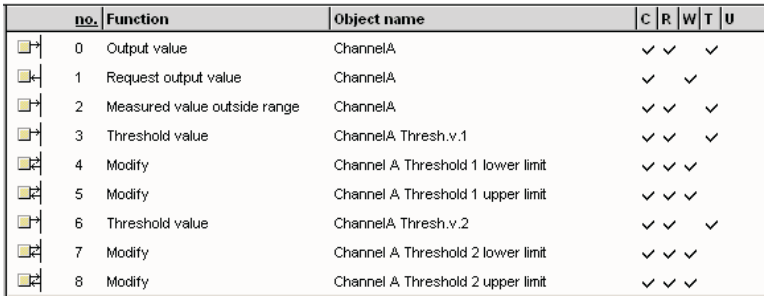
If the option *after a change and cyclically* is selected with the parameter *send output*, the following paramter becomes visible.

Output is sent every
Options: 5 s/10 s/30 s/1 min/5 min/10 min/30 min/1 h/6 h/12 h/24 h

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

3.3 Communication objects

3.3.1 Channel A



	no.	Function	Object name	C	R	W	T	U
	0	Output value	ChannelA	✓	✓		✓	
	1	Request output value	ChannelA	✓		✓		
	2	Measured value outside range	ChannelA	✓	✓		✓	
	3	Threshold value	ChannelA Thresh.v.1	✓	✓		✓	
	4	Modify	Channel A Threshold 1 lower limit	✓	✓	✓		
	5	Modify	Channel A Threshold 1 upper limit	✓	✓	✓		
	6	Threshold value	ChannelA Thresh.v.2	✓	✓		✓	
	7	Modify	Channel A Threshold 2 lower limit	✓	✓	✓		
	8	Modify	Channel A Threshold 2 upper limit	✓	✓	✓		

Fig. 28: Communication objects “Channel A”

No.	Function	Object name	Data type	Flags
0	**Output value**	**Channel A**	**EIS variable DPT variable**	**C, R, T**
This communication object is used to send the output value on 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 9.001/9.026 4-byte value [IEE floating point] EIS 9 DPT 14.000.				
1	**Request output value**	**Channel A**	**EIS1, 1 bit DPT 1.009**	**C, W**
This communication object appears if the output value should be sent “on request”. If a “1” is received at this communication object, the current output value is sent once to the communication object “Output value – Channel A”.				
2	**Measured value outside range**	**Channel A**	**EIS1, 1 bit DPT 1.001**	**C, W**
The communication object can be used for plausibility checking of the sensor e.g. wire breakage at 1 – 10 V and 4 – 20 mA. If the value exceeds or falls below the set upper and lower measuring limit, the communication object sends a “1”. If the measured value again lies between the two limits, the communication object sends a “0”. A “1” is also sent as soon as the measured value lies 5 % above or below the set measuring limit e.g. 21 mA at a set value of 4 – 20 mA. A check is carried out after each measurement to determine whether the measured value is outside the range. The output value can lie up to max. 10 % above or below the set measuring limit. This means that at 0 – 10 V and a set output value of 0 – 40 m/s, an output value of max. 44 m/s (11 V) can be sent. If the output value rises above 44 m/s, 44 m/s continues to be sent. If the value falls below 44 m/s, the current output value is sent.				
3	**Threshold value**	**Channel A Threshold 1**	**EIS variable DPT variable**	**C, R, T**
As soon as the value exceeds or falls below the set threshold, the following can be sent 1-bit value [0/1] EIS 1 DPT 1.001 1-byte value [0...+ 255] EIS 6 DPT 5.001 The object value is dependent on the parameter “Data type of threshold value object (1 bit, 1 byte)”. The parameter can be found in the parameter window “A – Threshold 1”.				

Table 5: Communication objects 0 to 3 “Channel A”

No.	Function	Object name	Data type	Flags
4 5	Modify Modify	Channel A Threshold 1 lower limit Channel A Threshold 1 upper limit	DPT variable EIS variable	C, R, W
The upper and lower limit of threshold 1 can be modified via the bus. In case of bus- and/or main voltage failure the changed threshold value limits are stored. With a new download of the application program the threshold value limits will be overwritten. The data type of these communication objects is dependent on the selected data type of the communication object “Output value – Channel A”.				
6	See communication object 3	Channel A Threshold 2		
7 8	See communication object 4 and 5	Channel A Threshold 2 lower limit Channel A Threshold 2 upper limit		

Table 6: Communication objects 4 to 8 “Channel A”

3.3.2 Channel B, C, und D

No.	Function	Object name	Data type	Flags
9 ... 17	See communication object 0...8	Channel B		
18 ... 26	See communication object 0...8	Channel C		
27 ... 35	See communication object 0...8	Channel D		

Table 7: Communication objects 9 to 35 “Channel B, C and D”

3.3.3 Calculation 1

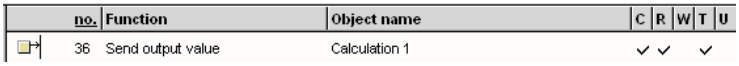


Fig. 29: Communication object “Calculation 1”

No.	Function	Object name	Data type	Flags
36	**Send output value**	**Calculation 1**	**EIS variable** **DPT variable**	**C, R, T**
The result of calculation 1 is sent with this communication object. Depending on which calculation type 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 [IEE floating point]	EIS 9	DPT	14.000	

Table 8: Communication object 36 “Calculation 1”

3.3.4 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**		

Table 9: Communication objects 37 to 39 “Calculation 2, 3 and 4”

3.3.5 Logic 1

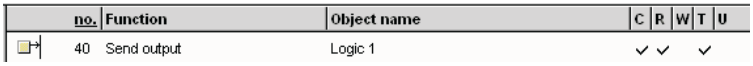


Fig. 30: Communication object “Logic 1”

No.	Function	Object name	Data type	Flags
40	**Send output**	**Logic 1**	**EIS1, 1 bit DPT 1.002**	**C, R, T**
The logic result of logic 1 is sent with this communication object.				

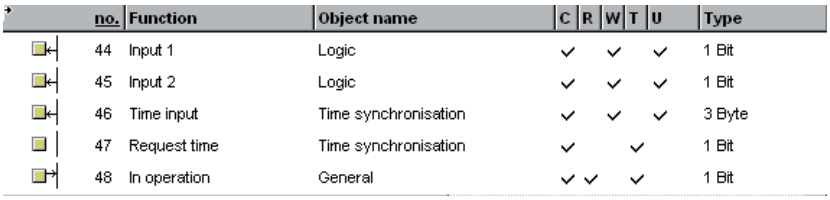
Table 10: Communication object 40 “Logic 1”

3.3.6 Logic 2, 3 und 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**		

Table 11: Communication objects 41 to 43 “Logic 2, 3 and 4”

3.3.7 General



	no.	Function	Object name	C	R	W	T	U	Type
	44	Input 1	Logic	✓		✓		✓	1 Bit
	45	Input 2	Logic	✓		✓		✓	1 Bit
	46	Time input	Time synchronisation	✓		✓		✓	3 Byte
	47	Request time	Time synchronisation	✓			✓		1 Bit
	48	In operation	General	✓	✓		✓		1 Bit

Fig. 31: Communication objects “General”

No.	Function	Object name	Data type	Flags
44 **45**	**Input 1** **Input 2**	**Logic** **Logic**	**EIS1, 1 bit** **DPT 1.002**	**C, W, T**
These two communication objects can be used as external inputs for the internal logic. If a telegram with the value “0” or “1” is received at these communication objects, the value “0” or “1” is assigned to the internal logic, see also chapter 3.2.11.				
46	**Time input**	**Time synchronisation**	**EIS3, 3 byte** **DPT 10.001**	**C, W, T**
This communication object only appears if the parameter “Use EIB time synchronisation” has been selected in the “General” parameter window. The time synchronisation is monitored internally. If the interval between 2 time synchronisations is > 25 h, bit 6 is set to “1” in the communication object “Status byte – System”. It can thus be checked whether an external time signal of the Weather Station is present.				
47	**Request time**	**Time synchronisation**	**EIS1, 1 bit** **DPT 1.001**	**C, T**
This communication object only appears if the parameter “Use EIB time synchronisation” has been selected in the “General” parameter window. A time request is sent once on the bus via this communication object after the set send delay.				
48	**In operation**	**General**	**EIS1, 1 bit** **DPT 1.003**	**C, R, T**
This communication object is active if “yes” has been selected for the parameter “Send object ‚in operation‘”. If the communication object is active, it sends a “1” telegram cyclically. This communication object is sent once when the device is started and then cyclically after the set send delay. The presence of the Weather Station can be monitored with this communication object.				

Table 12: Communication objects 44 to 48 “General”

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

The communication object is used to establish whether one of the measured values lies outside the measuring range, whether the supply voltage of the sensors falls below 20 V, whether the sensors have a short circuit, whether an error can be detected in the analogue component and whether time synchronisation is available.

Bit sequence: 76543210

bit 7: Not occupied

bit 6: No time synchronisation, after startup or failure of more than 25 hours
Telegram value “0”: Time available
“1”: Time not available

bit 5: Internal error of analogue component
Telegram value “0”: In range
“1”: Outside range

bit 4: Under voltage V+ <20 V
Telegram value “0”: OK > 20 V
“1”: Not OK < 20 V

bit 3: Status of channel D, measured value outside range
Telegram value “0”: In range
“1”: Outside range

bit 2: Status of channel C, measured value outside range
Telegram value “0”: In range
“1”: Outside range

bit 1: Status of channel B, measured value outside range
Telegram value “0”: In range
“1”: Outside range

bit 0: Status of channel A, measured value outside range
Telegram value “0”: In range
“1”: Outside range

The communication object is sent after a change and can be read out via a value read command. This communication object is sent once automatically after the set send delay when the device is started.

A value table is included in the appendix.

Table 13: Communication object 49 “General”

4 Planning and application

4.1 Weather Station

The Weather Station WS/S 4.1 can be used wherever parts of installations need to be protected against climatic influences or monitored. The recorded data can e.g. be displayed on a visualisation terminal and the operational personnel are thus informed precisely 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 start and end of the day.
– Humidity sensor for controlling fanlights and ventilation systems. Located outdoors so that it can quickly detect the current weather influences.
– Brightness sensor for shading windows and façades (if necessary a direction-dependent brightness sensor for controlling several façades and for lighting control).
– Air pressure sensor for recording the atmospheric air pressure.
– Pyranometer for controlling shutter systems and interior lighting systems.
– Rainfall gauge for recording rainfall.
– Rain sensor for protecting awnings, roller blinds and shutters as well as fanlights and ventilation flaps.
– Temperature sensor for regulating heating and air conditioning systems.
– Wind speed sensor for protecting shutter systems.
– Wind direction sensor for the direction-dependent control of shutter systems.

4.2 Weather sensors

When planning a Weather Station with 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 lifts, air conditioning plants?
- Can the sensors be “disrupted” by the structures e.g. by an extraction system?
- Is the mounting position of the weather sensors free of shadows e.g. caused by the growth of a tree?
- Are additional structures required for fixing?
- Is the mast subject to strong forces dependent on the strength of the wind?
- Does the installation of the weather sensors hinder any other structures?
- Is an installation of the cables on the building guaranteed?
- Is the cable routing from the Weather Station to the sensor ensured e.g. are the cables protected from UV rays?
- Is there external lightning protection and must it be taken into account?
- Does the height of the mast for fixing the sensors tower above the external range of the lightning protection?
- Where is the installation of the Weather Station WS/S 4.1 possible?
- For safety reasons, should the installation of the Weather Station WS/S 4.1 be carried out in the building as otherwise the bus is “openly” accessible?
- Is a replacement of the sensors possible without considerable cost or effort?

Note: The points above are a selection of the criteria required to install weather sensors, without claiming to be fully comprehensive.

4.3 Description of the threshold value function

How does the threshold value function?

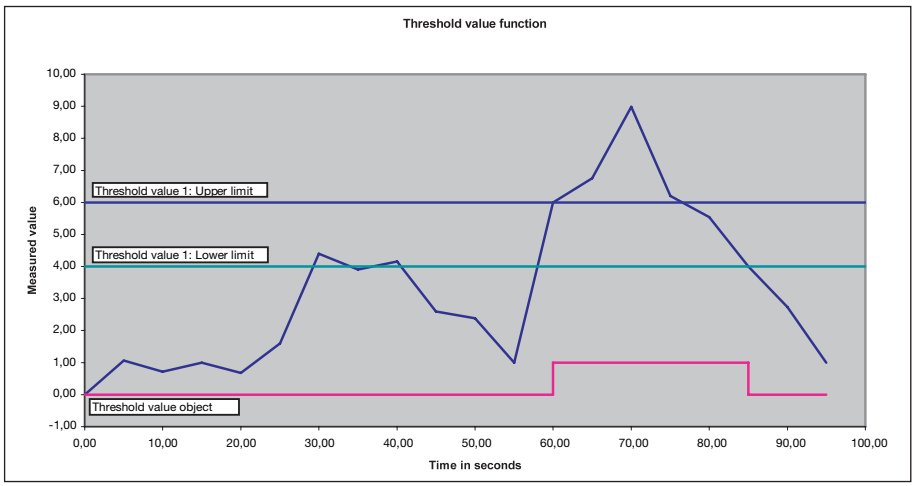


Fig. 32: Threshold value function

In the example diagram above, it can be seen that the measured value begins with a zero value and the communication object for the threshold value 1 has the value „0“. This value can be cyclically sent onto the bus if the relevant parameter in the application program is set.

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 „0“.

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

4.4 Planning example for “Twilight sensor”

The garden and pond lighting should be switched according to the following twilight values:

– When the value falls below 300 lux, a 1-byte value of 200 should be sent in order to dim the pond lighting to approx. 80 %. Otherwise the pond lighting should be set to the maximum brightness value.

– When the value falls below 850 lux, the lights for the walnut tree should be switched on and switched off when the value exceeds 850 lux.

– The signals for the threshold values should be fixed for at least 1 minute.

– The measuring limits of the measurement curve should lie at 100 lux and 900 lux i.e. below the lower measuring limit, a value of 100 lux should be sent while a value of 900 lux should be sent above the upper measuring limit.

Twilight sensor:

Signal output:	0 – 10 V DC
Measuring range:	0...1000 lux
Measurement curve:	linear

Connection on channel A.

Measurement curve of the connected twilight sensor:

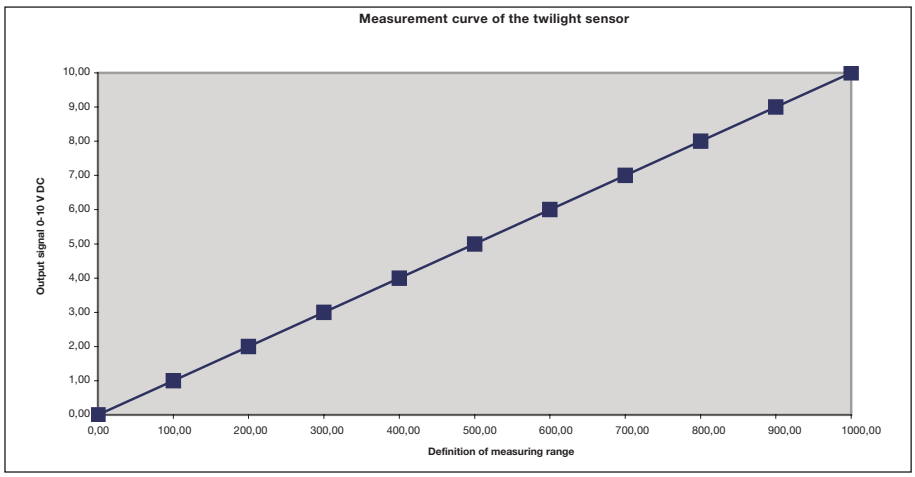


Fig. 33: Measurement curve of the twilight sensor

Measurement curve under consideration of all the settings:

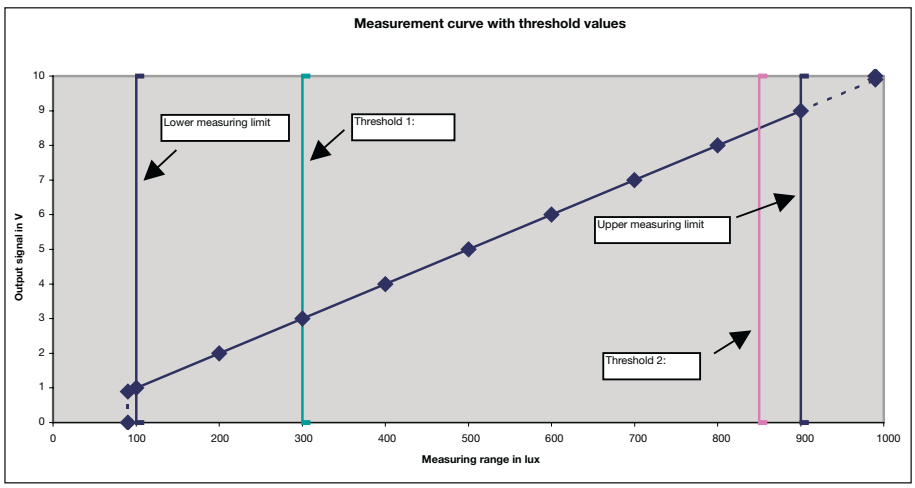


Fig. 34: Measurement curve of the twilight sensor with threshold values

Through the possibility of limiting the measuring range, the set output values are automatically sent below the lower measuring limit and above the upper measuring limit.

Settings for the parameter window of channel A:

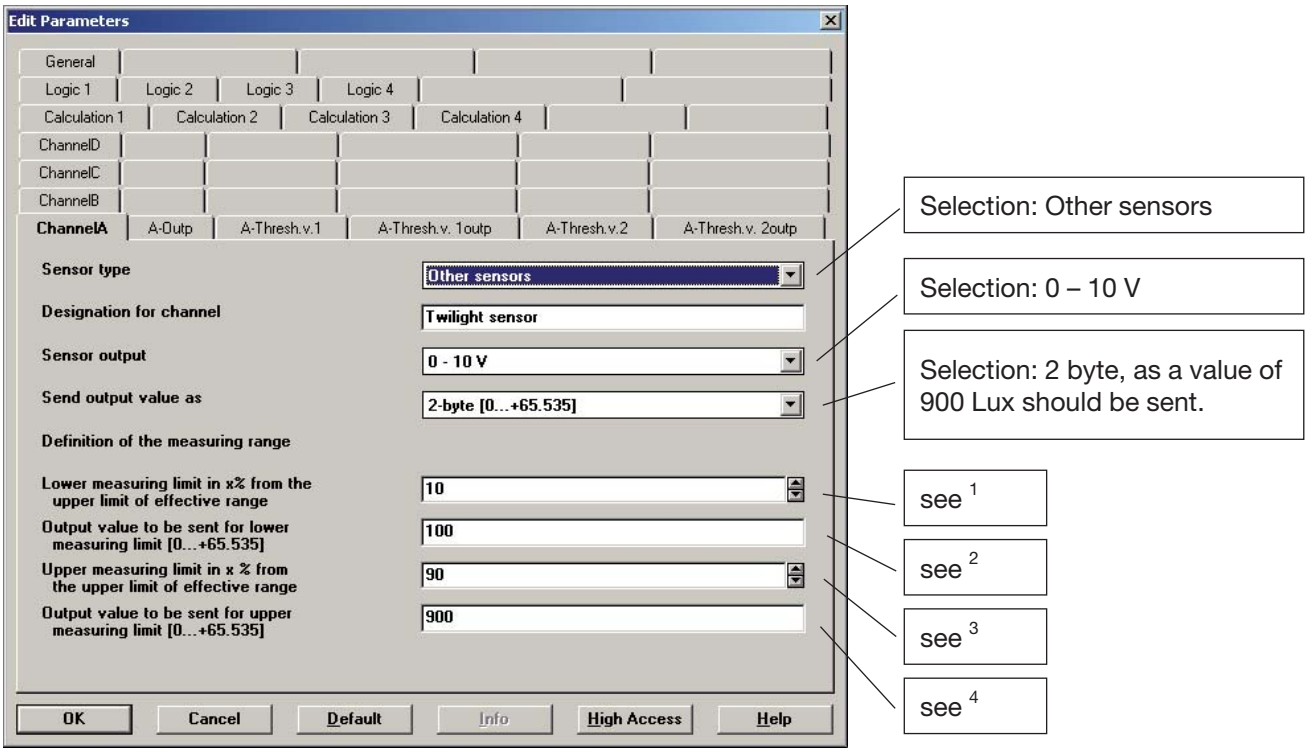


Fig. 35: Parameter window Channel A – Twilight sensor"

[1] The setting for the "Lower measuring limit in x % from the upper limit of effective range" is 10.
The setting for the lower limit is 100 lux.
1000 lux = 10 volts => 100 lux = 1 volt
1 volt = 10 % of 10 V => 10

[2] The parameter "Output value to be sent for lower measuring limit [0...+ 65,535]" is 100.
The setting for the lower limit is 100 lux => 100.

[3] The setting for the "Upper measuring limit in x % from the upper limit of effective range" is 90.
The setting for the upper limit is 900 lux.
1000 lux = 10 volts => 900 lux = 9 volts
9 volts = 90 % of 10 V => 90

[4] The parameter "Output value to be sent for upper measuring limit [0...+ 65,535]" is 900.
The setting for the upper limit is 900 lux => 900.

Settings for threshold values 1 and 2 of channel A:

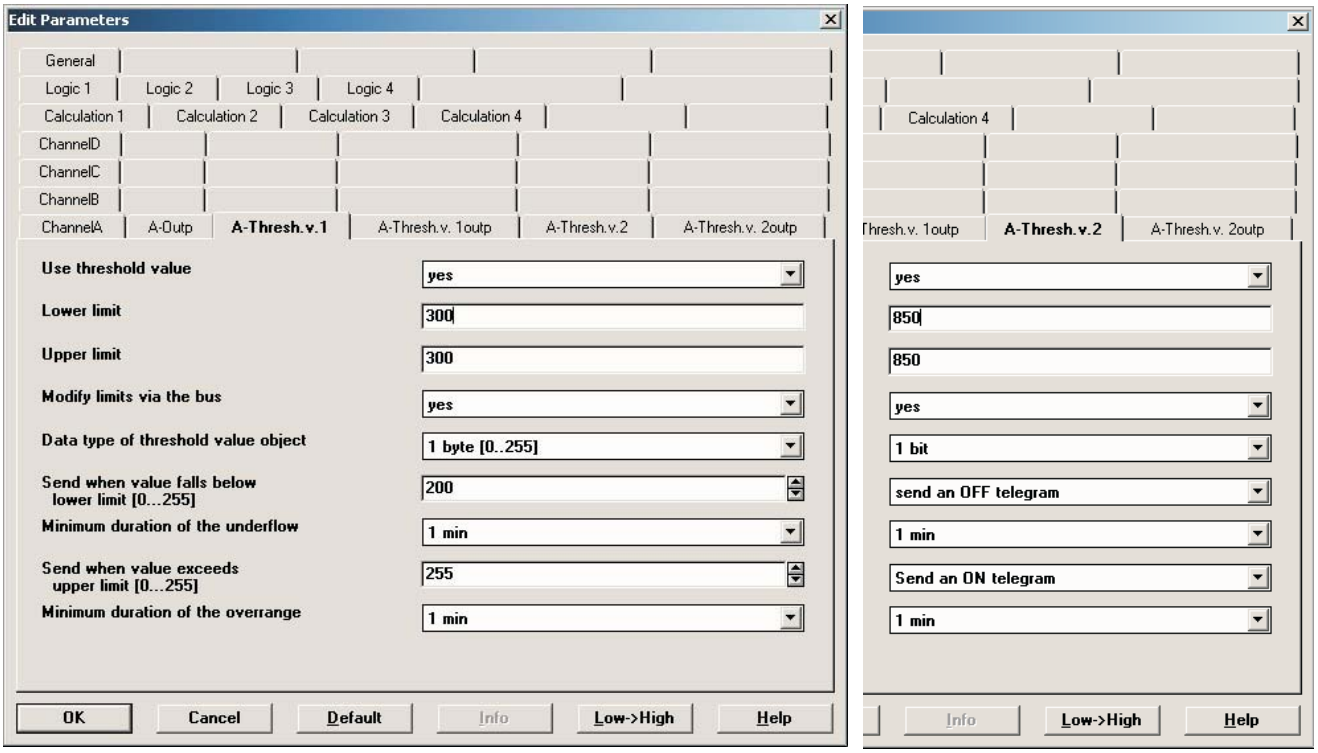


Fig. 36: Parameter window “Channel A – Twilight sensor, threshold 1 and 2”

4.5 Planning example “Temperature sensor PT100”

A user wishes to protect the awnings in his office building against minus temperatures (less than 0 °C) i.e. they should be raised. The awnings should be lowered automatically at + 20 °C so that the offices do not “heat up” unnecessarily. Further, he would like the fanlights in an adjacent assembly shop to open automatically at + 30 °C. The fanlights should not be continually closed and opened but only if the temperature is fixed above 30 °C for longer than 1 minute. They should be automatically closed as soon as the temperature drops to + 25 °C again for longer than 30 s. Furthermore, a line fault compensation via the cable length should be taken into account.
The distance between the Weather Station and the temperature sensor PT100 is 150 metres. The cross-section of the copper cable is 2.5 mm^2.
The user wishes to be able to change the threshold values via the bus.

Temperature sensor PT100:

Signal output:	PT100 2-conductor technology in ohms
Measuring range:	– 20...+ 60 °C
Measurement curve:	linear
Connection on channel A.	

The standard characteristic curve of a temperature sensor PT100 is stored in the Weather Station. The measuring range of the stored measurement curve: – 30 °C to + 70 °C.

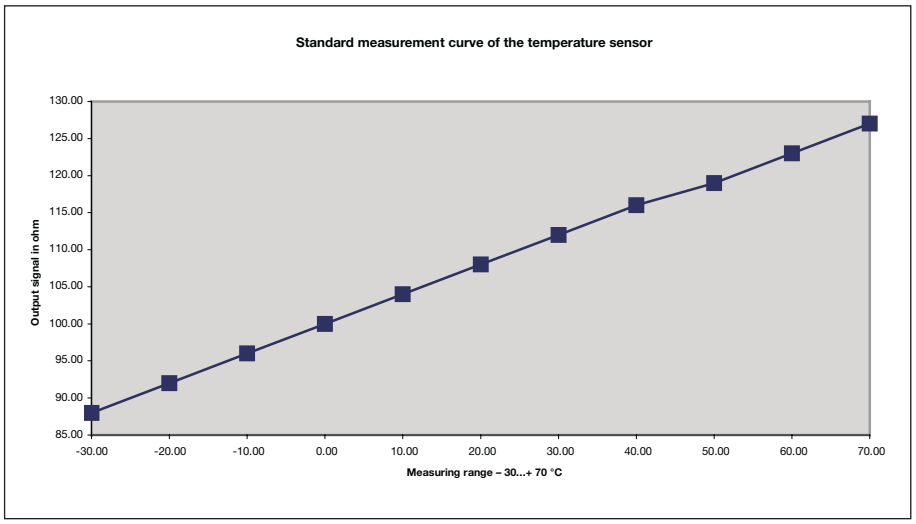


Fig. 37: Measurement curve of the standard PT100 temperature sensor. Values are rounded up or down.

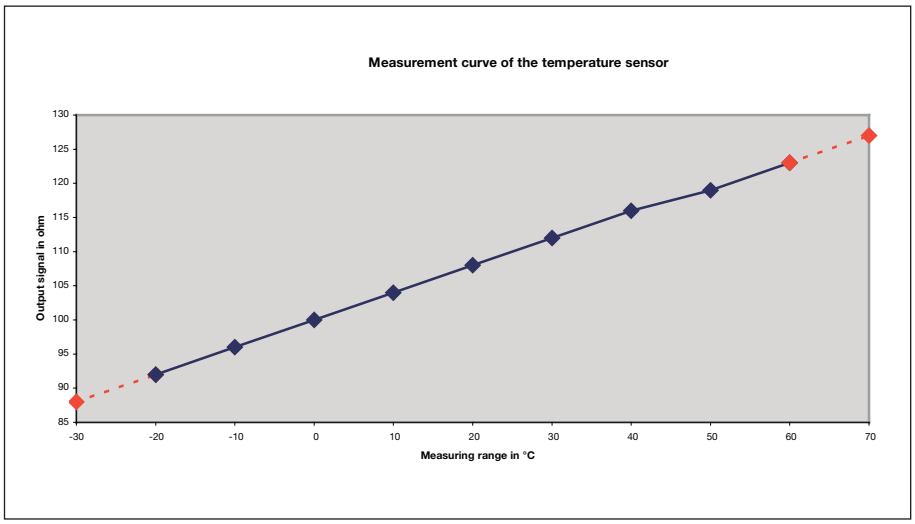


Fig. 38: Measurement curve of the temperature sensor PT100

The two hatched lines indicate the possible further progression of the measurement curve. The manufacturer guarantees the standardised values for the measuring range of – 20 °C to + 60 °C. This example shows that the resistance values of < – 20 °C and > + 60 °C do not comply with the standard resistance values.

Measurement curve under consideration of all the settings:

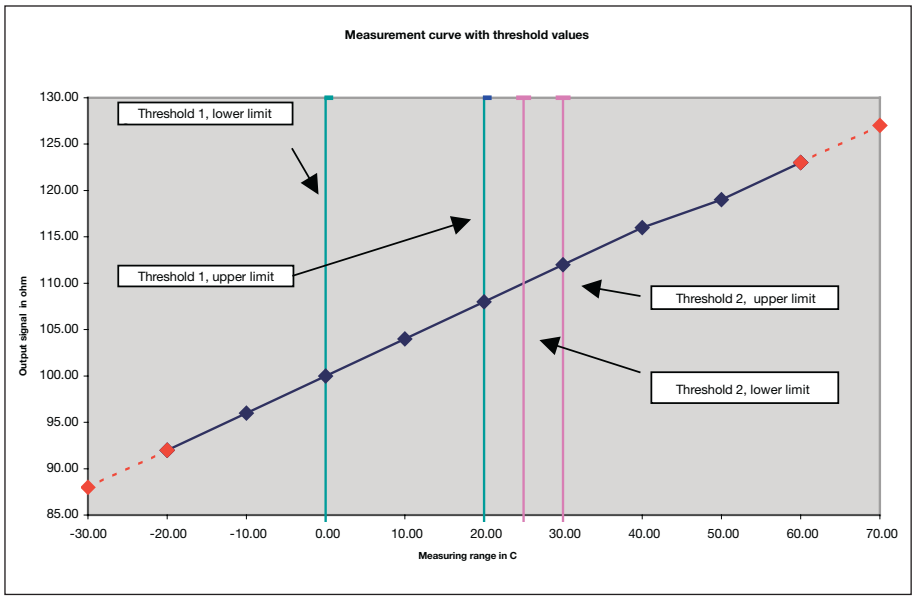
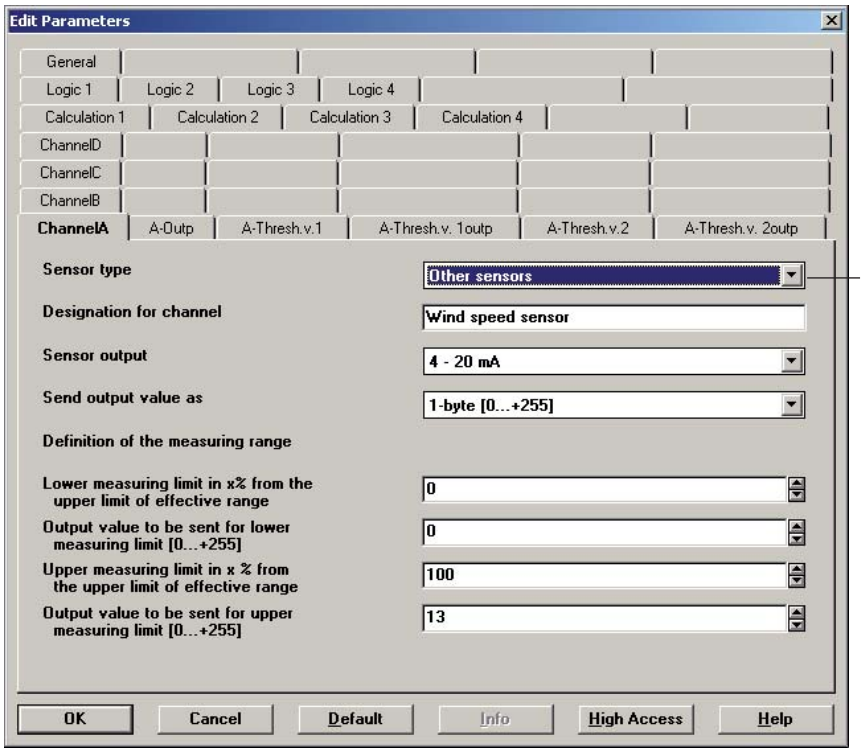


Fig. 39: Measurement curve of the temperature sensor PT100 with threshold values

Settings for the parameter window of channel A:



Selection: Other sensors

Fig. 40: Parameter window “Channel A – Temperature sensor PT100”

Settings for threshold values 1 and 2:

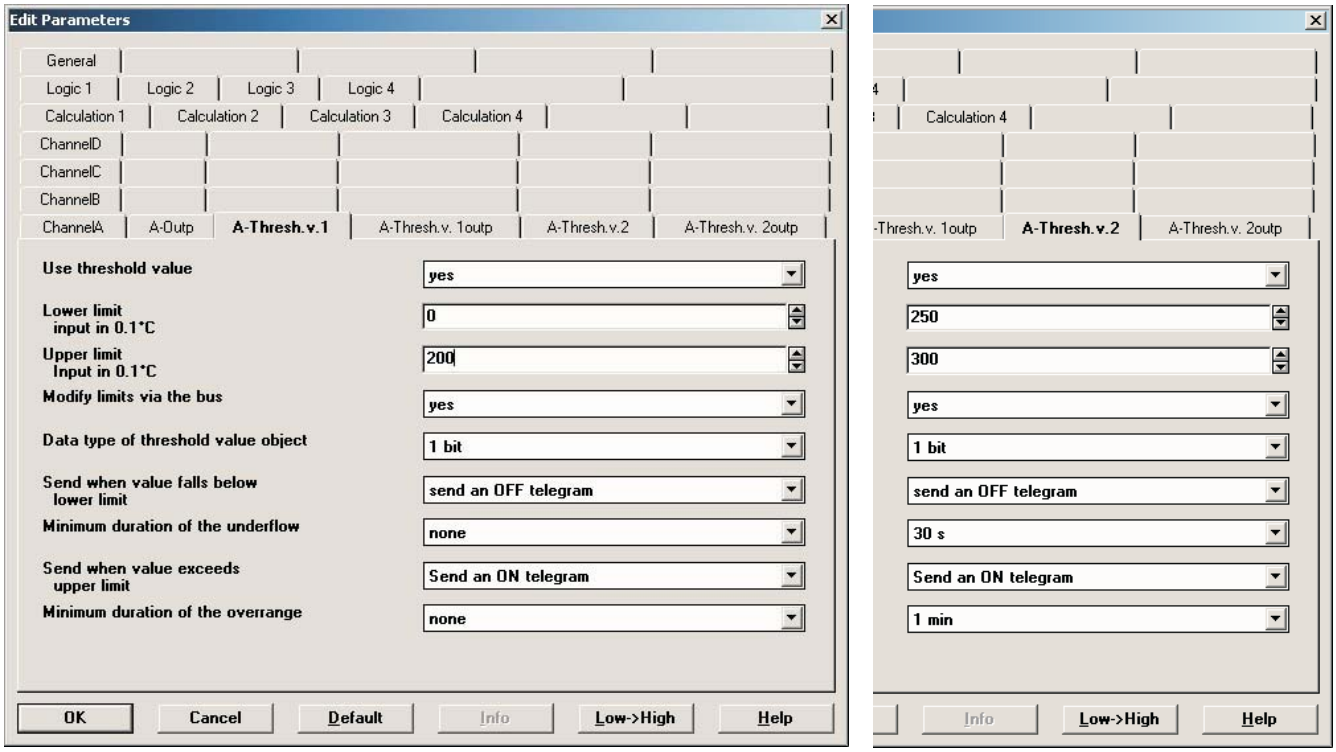


Fig. 41: Parameter window “Channel A – Temperature sensor PT100, threshold 1 and 2”

4.6 Planning example for “Wind speed sensor”

A user wishes to protect his shutter installation against strong wind in different ways. He would like the shutters of façade A to be raised from a wind force of 6 and lowered from a wind speed of 5. The shutters of façade B should be raised from a wind force of 8 and lowered from a wind force of 7. The wind speed should be visible in the form of the wind force (Beaufort) on a display. Further, the user would like the sensor to monitor for wire breakage. A telegram should also be sent above 5 % of the maximum value.

Wind speed sensor:

Signal output:	4 – 20 mA
Measuring range:	0...40 m/s
Measurement curve:	linear

Connection on channel A.

The measurement curve of the connected wind speed sensor:

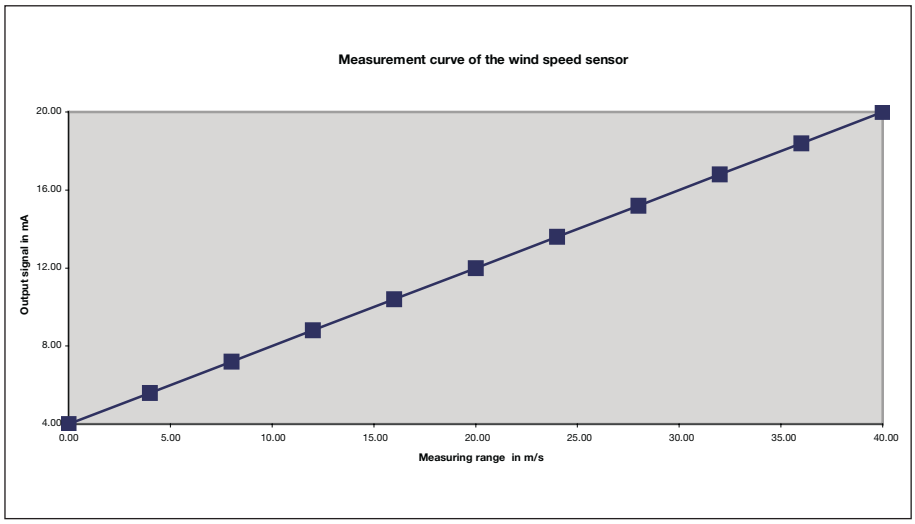


Fig. 42: Measurement curve of the wind speed sensor

Measurement curve under consideration of all the settings:

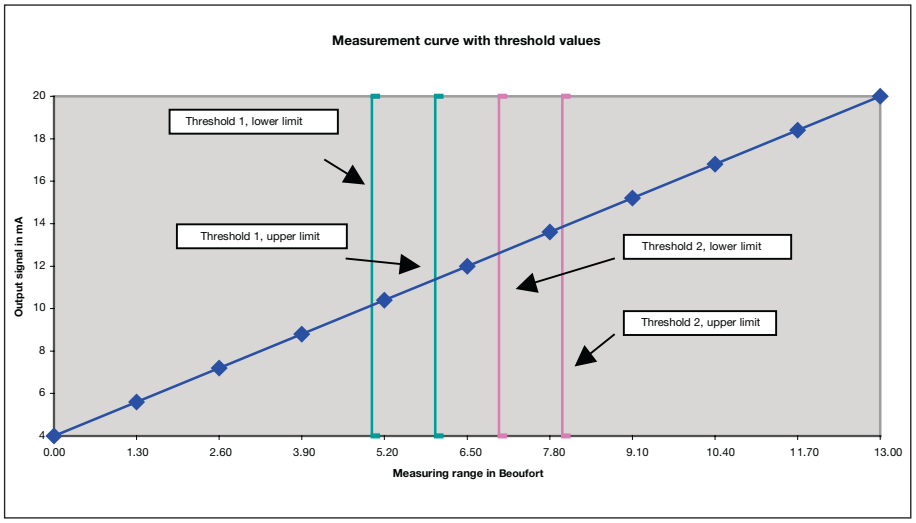


Fig. 43: Measurement curve of the wind speed sensor with threshold values

The wind speed should be displayed in Beaufort which requires a conversion of the unit m/s into Beaufort. The connected sensor measures a maximum wind speed of 40 m/s. The maximum value of 40 m/s corresponds to a wind force of 13. You can find a table with the representation of different units of wind speed and their values in the appendix.

The communication object “Measured value outside range – Channel A” covers both wire breakage and the request that a telegram should be sent above 5 % of the maximum value.

The parameter settings can be found on the next page.

Settings for the parameter window of channel A:

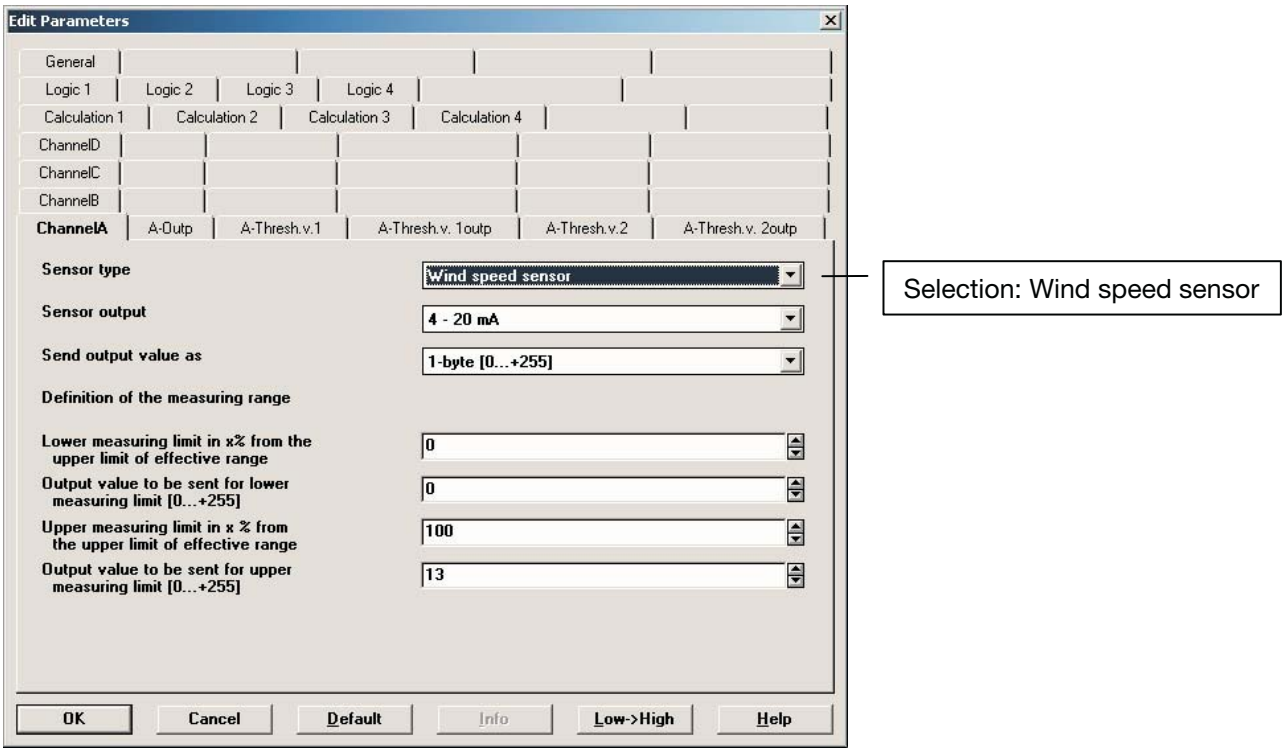


Fig. 44: Parameter window “Channel A – Wind speed sensor”

Settings for threshold values 1 and 2:

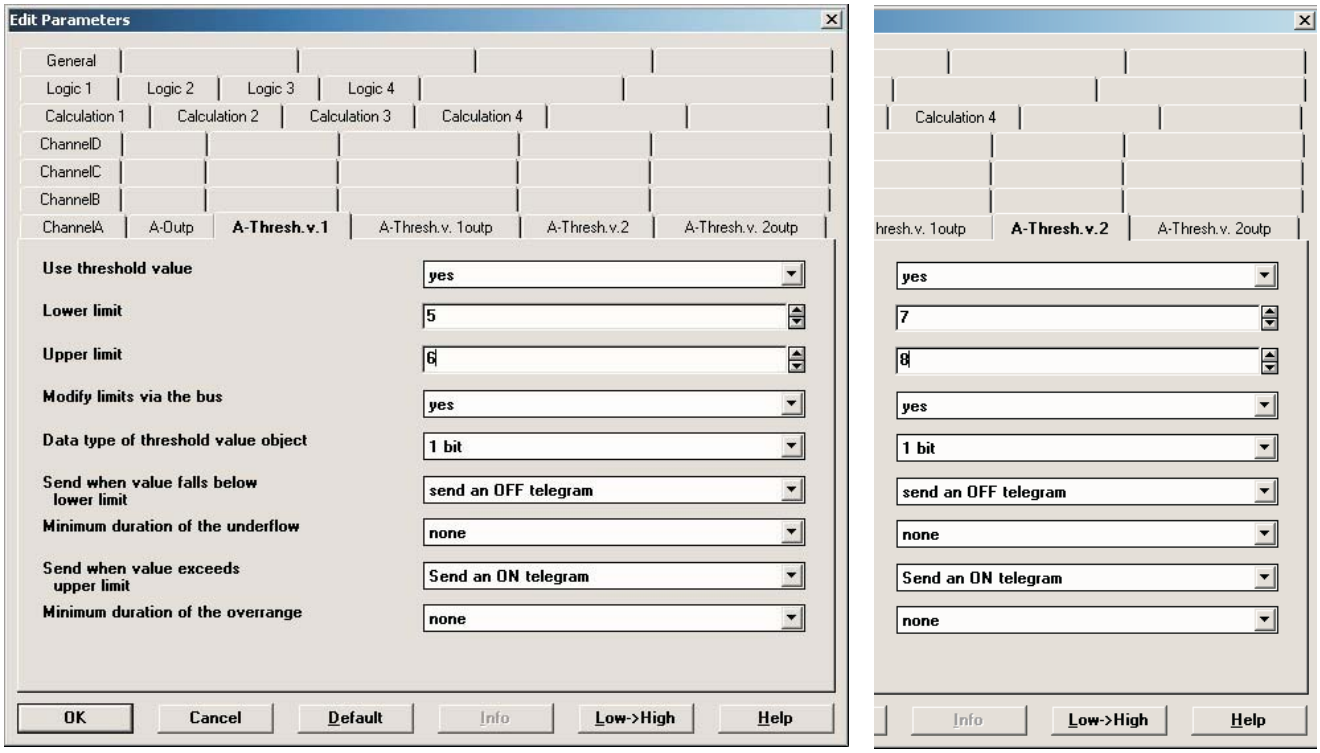


Fig. 45: Parameter window “Channel A – Wind speed sensor, threshold 1 and 2”

4.7 Send sensor values via the bus

The following table provides an overview of how the measured values can be sent on the bus according to the EIS standard and the data point type.

Sensor	Data type	EIS type	Data point type	Value range
Twilight	2 byte [EIB floating point]	5	9.004	0...+ 670,760
Humidity	1 byte	6	5.001	0 %...100 % [0...+ 255]
Brightness	2 byte [EIB floating point]	5	9.004	0...+ 670,760
Air pressure	2 byte [EIB floating point]	5	9.006	0...+ 670,760
Pyranometer	2 byte	10	7.001	0...+ 65,535
Rainfall gauge	1 bit	1	1.001	Binär: 0 oder 1
Rain	1 bit	1	1.001	Binär: 0 oder 1
Temperature PT100	2 byte [EIB floating point]	5	9.001	– 163,84...+ 163,76 [0.08 K steps]
Other temperature	2 byte [EIB floating point]	5	9.001	– 163,84...+ 163,76 [0.08 K steps]
Wind speed	2 byte [EIB floating point]	5	9.005	0...+ 670,760
Wind direction	1 byte	6	5.003	0°...360° [0...+ 255]

Table 14: Measured values according to the EIS standard and data point type

A Appendix

A.1 Scope of supply

The Weather Station WS/S 4.1 is supplied with the following parts.
Please check the scope of supply against the following list.

– 1 x WS/S 4.1, Weather Station, 4-fold, MDRC
– 1 x installation and operating instructions
– 1 x bus connection terminal (red/black

A.2 Truth table for logic function

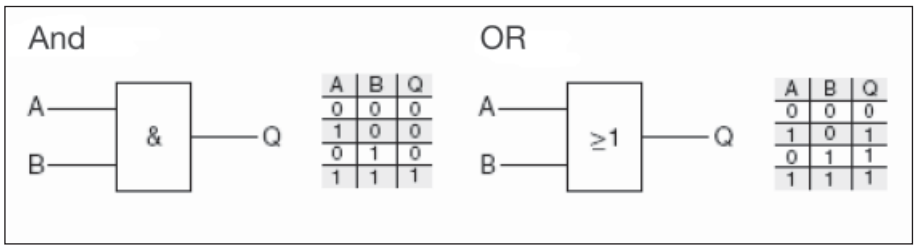


Table 15: Truth table

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

A.3 Overview of wind speeds

Representation of the various units of wind speed and their values.

Wind force (Beaufort)	m/s		km/h		Knots (nm/h)		mi/h		ft/min	
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	1063
4	5.5	7.9	20	28	11	15	12	18	1083	1555
5	8	10.7	29	38	16	21	18	25	1575	2106
6	10.8	13.8	39	49	22	27	25	32	2126	2717
7	13.9	17.1	50	61	28	33	32	38	2736	3366
8	17.2	20.7	62	74	34	40	39	47	3386	4075
9	20.8	24.4	75	87	41	47	47	55	4094	4803
10	24.5	28.4	88	102	48	55	55	64	4823	5591
11	28.5	32.6	103	117	56	63	64	73	5610	6417
12	32.7	36.9	118	132	64	72	74	83	6437	7264
13	37	41.4	133	149	73	80	85	93	7283	8150
14	41.5	46.1	149	165	81	90	94	104	8169	9075
15	46.2	50.9	166	183	90	99	104	114	6094	10020
16	51	56	184	201	99	109	114	126	10039	11024
17	56		202		109		126		11024	

Table 16: Wind speeds

A.4 Truth table for communication object "Status byte – System"

bit-No.		7	6	5	4	3	2	1	0
8-bit value	Hexadecimal	Not assigned	No time synch.	Internal error	Undervoltage	Status of ch. D	Status of ch. C	Status of ch. B	Status of ch. A
0	00	0	0	0	0	0	0	0	0
1	01	0	0	0	0	0	0	0	1
2	02	0	0	0	0	0	0	1	0
3	03	0	0	0	0	0	0	1	1
4	04	0	0	0	0	0	1	0	0
5	05	0	0	0	0	0	1	0	1
6	06	0	0	0	0	0	1	1	0
7	07	0	0	0	0	0	1	1	1
8	08	0	0	0	0	1	0	0	0
9	09	0	0	0	0	1	0	0	1
10	0A	0	0	0	0	1	0	1	0
11	0B	0	0	0	0	1	0	1	1
12	0C	0	0	0	0	1	1	0	0
13	0D	0	0	0	0	1	1	0	1
14	0E	0	0	0	0	1	1	1	0
15	0F	0	0	0	0	1	1	1	1
16	10	0	0	0	1	0	0	0	0
17	11	0	0	0	1	0	0	0	1
18	12	0	0	0	1	0	0	1	0
19	13	0	0	0	1	0	0	1	1
20	14	0	0	0	1	0	1	0	0
21	15	0	0	0	1	0	1	0	1
22	16	0	0	0	1	0	1	1	0
23	17	0	0	0	1	0	1	1	1
24	18	0	0	0	1	1	0	0	0
25	19	0	0	0	1	1	0	0	1
26	1A	0	0	0	1	1	0	1	0
27	1B	0	0	0	1	1	0	1	1
28	1C	0	0	0	1	1	1	0	0
29	1D	0	0	0	1	1	1	0	1
30	1E	0	0	0	1	1	1	1	0
31	1F	0	0	0	1	1	1	1	1
32	20	0	0	1	0	0	0	0	0
33	21	0	0	1	0	0	0	0	1
34	22	0	0	1	0	0	0	1	0
35	23	0	0	1	0	0	0	1	1
36	24	0	0	1	0	0	1	0	0
37	25	0	0	1	0	0	1	0	1
38	26	0	0	1	0	0	1	1	0
39	27	0	0	1	0	0	1	1	1
40	28	0	0	1	0	1	0	0	0
41	29	0	0	1	0	1	0	0	1
42	2A	0	0	1	0	1	0	1	0
43	2B	0	0	1	0	1	0	1	1
44	2C	0	0	1	0	1	1	0	0
45	2D	0	0	1	0	1	1	0	1
46	2E	0	0	1	0	1	1	1	0
47	2F	0	0	1	0	1	1	1	1
48	30	0	0	1	1	0	0	0	0
49	31	0	0	1	1	0	0	0	1
50	32	0	0	1	1	0	0	1	0
51	33	0	0	1	1	0	0	1	1
52	34	0	0	1	1	0	1	0	0
53	35	0	0	1	1	0	1	0	1
54	36	0	0	1	1	0	1	1	0
55	37	0	0	1	1	0	1	1	1
56	38	0	0	1	1	1	0	0	0
57	39	0	0	1	1	1	0	0	1
58	3A	0	0	1	1	1	0	1	0
59	3B	0	0	1	1	1	0	1	1
60	3C	0	0	1	1	1	1	0	0
61	3D	0	0	1	1	1	1	0	1
62	3E	0	0	1	1	1	1	1	0
63	3F	0	0	1	1	1	1	1	1
64	40	0	1	0	0	0	0	0	0
65	41	0	1	0	0	0	0	0	1
66	42	0	1	0	0	0	0	1	0
67	43	0	1	0	0	0	0	1	1
68	44	0	1	0	0	0	1	0	0
69	45	0	1	0	0	0	1	0	1
70	46	0	1	0	0	0	1	1	0
71	47	0	1	0	0	0	1	1	1
72	48	0	1	0	0	1	0	0	0
73	49	0	1	0	0	1	0	0	1
74	4A	0	1	0	0	1	0	1	0
75	4B	0	1	0	0	1	0	1	1
76	4C	0	1	0	0	1	1	0	0
77	4D	0	1	0	0	1	1	0	1
78	4E	0	1	0	0	1	1	1	0
79	4F	0	1	0	0	1	1	1	1
80	50	0	1	0	1	0	0	0	0
81	51	0	1	0	1	0	0	0	1
82	52	0	1	0	1	0	0	1	0
83	53	0	1	0	1	0	0	1	1
84	54	0	1	0	1	0	1	0	0
85	55	0	1	0	1	0	1	0	1
86	56	0	1	0	1	0	1	1	0
87	57	0	1	0	1	0	1	1	1
88	58	0	1	0	1	1	0	0	0
89	59	0	1	0	1	1	0	0	1
90	5A	0	1	0	1	1	0	1	0
91	5B	0	1	0	1	1	0	1	1
92	5C	0	1	0	1	1	1	0	0
93	5D	0	1	0	1	1	1	0	1
94	5E	0	1	0	1	1	1	1	0
95	5F	0	1	0	1	1	1	1	1
96	60	0	1	1	0	0	0	0	0
97	61	0	1	1	0	0	0	0	1
98	62	0	1	1	0	0	0	1	0
99	63	0	1	1	0	0	0	1	1
100	64	0	1	1	0	0	1	0	0
101	65	0	1	1	0	0	1	0	1
102	66	0	1	1	0	0	1	1	0
103	67	0	1	1	0	0	1	1	1
104	68	0	1	1	0	1	0	0	0
105	69	0	1	1	0	1	0	0	1
106	6A	0	1	1	0	1	0	1	0
107	6B	0	1	1	0	1	0	1	1
108	6C	0	1	1	0	1	1	0	0
109	6D	0	1	1	0	1	1	0	1
110	6E	0	1	1	0	1	1	1	0
111	6F	0	1	1	0	1	1	1	1
112	70	0	1	1	1	0	0	0	0
113	71	0	1	1	1	0	0	0	1
114	72	0	1	1	1	0	0	1	0
115	73	0	1	1	1	0	0	1	1
116	74	0	1	1	1	0	1	0	0
117	75	0	1	1	1	0	1	0	1
118	76	0	1	1	1	0	1	1	0
119	77	0	1	1	1	0	1	1	1
120	78	0	1	1	1	1	0	0	0
121	79	0	1	1	1	1	0	0	1
122	7A	0	1	1	1	1	0	1	0
123	7B	0	1	1	1	1	0	1	1
124	7C	0	1	1	1	1	1	0	0
125	7D	0	1	1	1	1	1	0	1
126	7E	0	1	1	1	1	1	1	0
127	7F	0	1	1	1	1	1	1	1
128	80	1	0	0	0	0	0	0	0
129	81	1	0	0	0	0	0	0	1
130	82	1	0	0	0	0	0	1	0
131	83	1	0	0	0	0	0	1	1
132	84	1	0	0	0	0	1	0	0
133	85	1	0	0	0	0	1	0	1
134	86	1	0	0	0	0	1	1	0
135	87	1	0	0	0	0	1	1	1
136	88	1	0	0	0	1	0	0	0
137	89	1	0	0	0	1	0	0	1
138	8A	1	0	0	0	1	0	1	0
139	8B	1	0	0	0	1	0	1	1
140	8C	1	0	0	0	1	1	0	0
141	8D	1	0	0	0	1	1	0	1
142	8E	1	0	0	0	1	1	1	0
143	8F	1	0	0	0	1	1	1	1
144	90	1	0	0	1	0	0	0	0
145	91	1	0	0	1	0	0	0	1
146	92	1	0	0	1	0	0	1	0
147	93	1	0	0	1	0	0	1	1
148	94	1	0	0	1	0	1	0	0
149	95	1	0	0	1	0	1	0	1
150	96	1	0	0	1	0	1	1	0
151	97	1	0	0	1	0	1	1	1
152	98	1	0	0	1	1	0	0	0
153	99	1	0	0	1	1	0	0	1
154	9A	1	0	0	1	1	0	1	0
155	9B	1	0	0	1	1	0	1	1
156	9C	1	0	0	1	1	1	0	0
157	9D	1	0	0	1	1	1	0	1
158	9E	1	0	0	1	1	1	1	0
159	9F	1	0	0	1	1	1	1	1
160	A0	1	0	1	0	0	0	0	0
161	A1	1	0	1	0	0	0	0	1
162	A2	1	0	1	0	0	0	1	0
163	A3	1	0	1	0	0	0	1	1
164	A4	1	0	1	0	0	1	0	0
165	A5	1	0	1	0	0	1	0	1
166	A6	1	0	1	0	0	1	1	0
167	A7	1	0	1	0	0	1	1	1
168	A8	1	0	1	0	1	0	0	0
169	A9	1	0	1	0	1	0	0	1
170	AA	1	0	1	0	1	0	1	0
171	AB	1	0	1	0	1	0	1	1
172	AC	1	0	1	0	1	1	0	0
173	AD	1	0	1	0	1	1	0	1
174	AE	1	0	1	0	1	1	1	0
175	AF	1	0	1	0	1	1	1	1
176	B0	1	0	1	1	0	0	0	0
177	B1	1	0	1	1	0	0	0	1
178	B2	1	0	1	1	0	0	1	0
179	B3	1	0	1	1	0	0	1	1
180	B4	1	0	1	1	0	1	0	0
181	B5	1	0	1	1	0	1	0	1
182	B6	1	0	1	1	0	1	1	0
183	B7	1	0	1	1	0	1	1	1
184	B8	1	0	1	1	1	0	0	0
185	B9	1	0	1	1	1	0	0	1
186	BA	1	0	1	1	1	0	1	0
187	BB	1	0	1	1	1	0	1	1
188	BC	1	0	1	1	1	1	0	0
189	BD	1	0	1	1	1	1	0	1
190	BE	1	0	1	1	1	1	1	0
191	BF	1	0	1	1	1	1	1	1
192	C0	1	1	0	0	0	0	0	0
193	C1	1	1	0	0	0	0	0	1
194	C2	1	1	0	0	0	0	1	0
195	C3	1	1	0	0	0	0	1	1
196	C4	1	1	0	0	0	1	0	0
197	C5	1	1	0	0	0	1	0	1
198	C6	1	1	0	0	0	1	1	0
199	C7	1	1	0	0	0	1	1	1
200	C8	1	1	0	0	1	0	0	0
201	C9	1	1	0	0	1	0	0	1
202	CA	1	1	0	0	1	0	1	0
203	CB	1	1	0	0	1	0	1	1
204	CC	1	1	0	0	1	1	0	0
205	CD	1	1	0	0	1	1	0	1
206	CE	1	1	0	0	1	1	1	0
207	CF	1	1	0	0	1	1	1	1
208	D0	1	1	0	1	0	0	0	0
209	D1	1	1	0	1	0	0	0	1
210	D2	1	1	0	1	0	0	1	0
211	D3	1	1	0	1	0	0	1	1
212	D4	1	1	0	1	0	1	0	0
213	D5	1	1	0	1	0	1	0	1
214	D6	1	1	0	1	0	1	1	0
215	D7	1	1	0	1	0	1	1	1
216	D8	1	1	0	1	1	0	0	0
217	D9	1	1	0	1	1	0	0	1
218	DA	1	1	0	1	1	0	1	0
219	DB	1	1	0	1	1	0	1	1
220	DC	1	1	0	1	1	1	0	0
221	DD	1	1	0	1	1	1	0	1
222	DE	1	1	0	1	1	1	1	0
223	DF	1	1	0	1	1	1	1	1
224	E0	1	1	1	0	0	0	0	0
225	E1	1	1	1	0	0	0	0	1
226	E2	1	1	1	0	0	0	1	0
227	E3	1	1	1	0	0	0	1	1
228	E4	1	1	1	0	0	1	0	0
229	E5	1	1	1	0	0	1	0	1
230	E6	1	1	1	0	0	1	1	0
231	E7	1	1	1	0	0	1	1	1
232	E8	1	1	1	0	1	0	0	0
233	E9	1	1	1	0	1	0	0	1
234	EA	1	1	1	0	1	0	1	0
235	EB	1	1	1	0	1	0	1	1
236	EC	1	1	1	0	1	1	0	0
237	ED	1	1	1	0	1	1	0	1
238	EE	1	1	1	0	1	1	1	0
239	EF	1	1	1	0	1	1	1	1
240	F0	1	1	1	1	0	0	0	0
241	F1	1	1	1	1	0	0	0	1
242	F2	1	1	1	1	0	0	1	0
243	F3	1	1	1	1	0	0	1	1
244	F4	1	1	1	1	0	1	0	0
245	F5	1	1	1	1	0	1	0	1
246	F6	1	1	1	1	0	1	1	0
247	F7	1	1	1	1	0	1	1	1
248	F8	1	1	1	1	1	0	0	0
249	F9	1	1	1	1	1	0	0	1
250	FA	1	1	1	1	1	0	1	0
251	FB	1	1	1	1	1	0	1	1
252	FC	1	1	1	1	1	1	0	0
253	FD	1	1	1	1	1	1	0	1
254	FE	1	1	1	1	1	1	1	0
255	FF	1	1	1	1	1	1	1	1

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A.8 Ordering details

Description	**Ordering information** **Short code**	Order no.	**bbn 40 16779 EAN**	Price group	Unit weight [kg]	Pack unit [pc.]
Weather Station, 4-fold, MDRC	**WS/S 4.1**	2CDG 110 032 R0011	**58092 2**	26	0.1	1

Table 17: Ordering details for the Weather Station, 4-fold, MDRC

A.9 Notes

The information in this leaflet is subject to change without further notice.

Pub. No. 2CDC 504 031 D0203
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