Application

The weather station serves to collect and forward weather data and events. A digital combination sensor, ordering no. 7590 00 57, (to measure the wind intensity, brightness and twilight as well as rain; with or without DCF77 receiver), and up to four analog measuring sensors can be connected to the weather station. An optional analog input module, ordering no. 7542 40 04, allows for an extension of the range of analog measuring sensors to be connected by another four.

The following measuring sensors, for which preset parameters are avaiable in the device software, can be connected to the analog inputs:

Brightness	Ordering no. 7590 00 53
Twilight	Ordering no. 7590 00 55
Temperature	Ordering no. 7590 00 54
Wind	Ordering no. 7590 00 50
Rain	Ordering no. 7590 00 52
Air humidity	Ordering no. 7590 00 56

Alternatively, other measuring sensors supplying voltage or current signals (0 … 1 VDC, 0 … 10 VDC, 0 … 20 mADC, 4 … 20 mADC) can be used, too. For sensors which supply 4…20 mA signals, the device software parameters offer the option to select wire breakage or open-circuit monitoring.

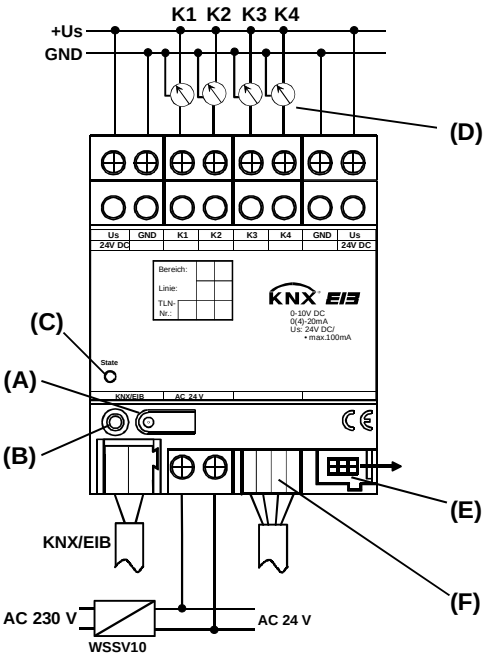
The values measured are translated by the weather station into value telegrams (DPT 9.0xx, 2-byte or DPT 5.001, 1-byte type). Thus, other bus devices (e. g. visualization software, info display, …) can display such measured values, generate messages or control weather-dependent processes.

For each measured value, two adjustable limits are available. Once a measured value exceeds or falls below such limits, the weather station can issue corresponding messages. At the same time, such limits can be gated. Cascading several weather stations can even help to implement complex functions.

The weather station needs an operating voltage supply of 24 VAC. The latter can, for example, be provided by a power supply module, ordering no. 7591 00 01, ordering no. 1024 00, part no. WSSV10. At the same time, such power supply module can also heat wind sensors or feed an analog input module connected.

Terminals $+U_s$ and GND serve to supply external analog sensors with 24 VDC (100 mA max. in total). In the event of a short-circuit between $+U_S$ and GND, the voltage will be switched off.

Illustration:



Dimensions:

Width: 4 PUs, 72 mm
Height: 90 mm
Depth: 58 mm

Controls:

A: Programming key
B: Programming LED
C: Status LED, three-colour (red, orange, green)
D: Measuring sensors
E: Module connector, 6-pole
F: Combination sensor connector, 4-pole

Status LED functions:

LED OFF	No voltage supply.
LED orange/ON	Module scan by weather station.
LED orange/slowly flashing	Combination sensor module scan (waiting for assignment).
LED orange/quickly flashing	DIN rail extension module (REG) parameterization.
LED red/slowly flashing	Error: undervoltage at module connector/U_S short-circuited.
LED red/quickly flashing	Error: no project, parameterization error
LED green/slowly flashing	Module scan complete, configuration OK. Parameter download into module.
LED green/quickly flashing	Initialization complete
LED green/ON	everything OK.
slow flashing approx. 1 Hz fast flashing approx. 2 Hz	

Specifications

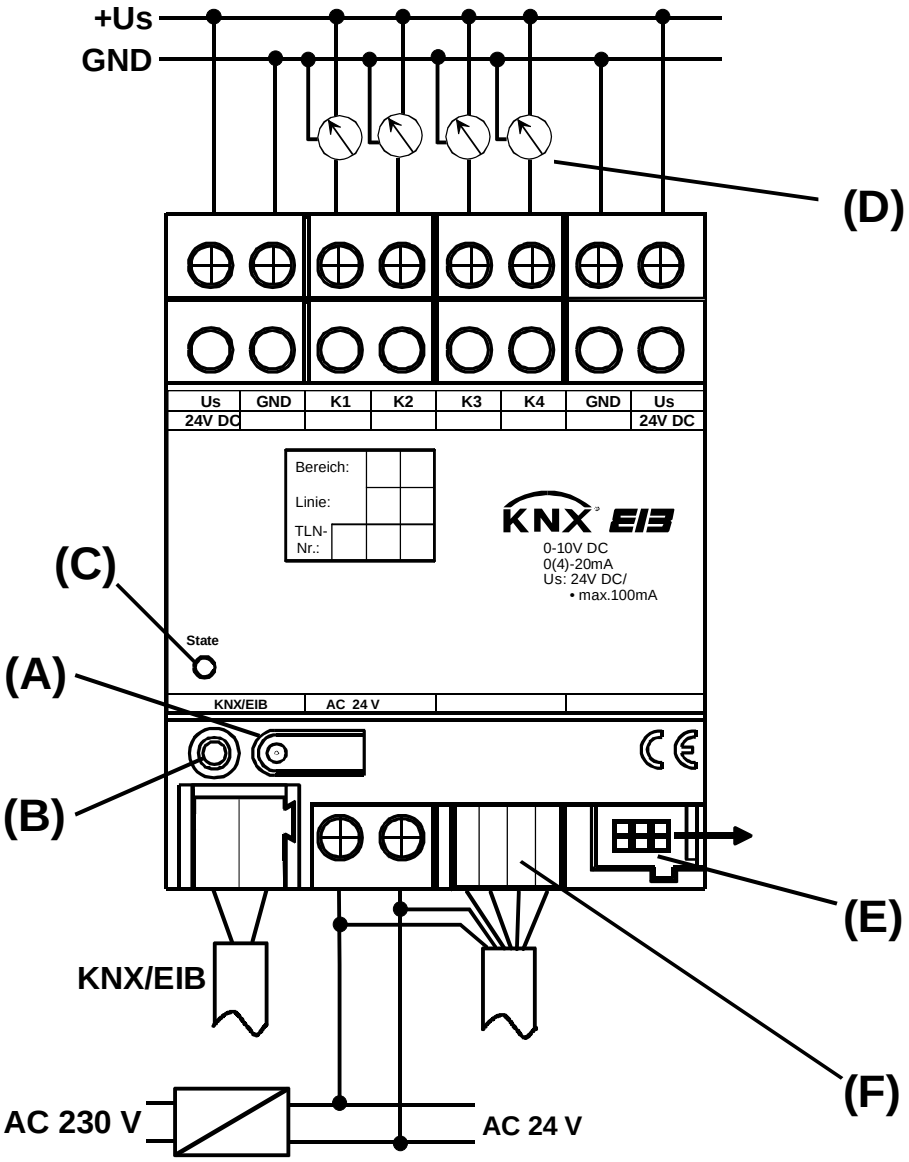
Protective system:	IP 20
Mark of conformity:	KNX / EIB
Ambient temperature:	-5 °C to +45 °C
Storage/transport temperature:	- 25 °C to +70 °C, storage at temperatures above +45 °C will shorten e quipment life
Max. housing temperature	T_c = 75 °C
Relative humidity:	93 % RH max., no condensation
Fitting position:	Any
Minimum distances:	None
Type of fixing:	Snapping onto 35 x 7.5 mm top hat rail, data rail not required.

instabus KNX/EIB power supply		
Voltage:	21 … 32 VDC	
Power consumption:	150 mW typical	
Connection:	Bus connecting terminal (KNX type 5.1)	
External power supply:		
Voltage:	24 VAC ± 10 %	
Current consumption:	250 mA max.	
Connection:	Screw terminals:	0.5 mm^2 to 4 mm^2, single-wire
	Screw terminals:	0.34 mm^2 to 4 mm^2, fine-wire (without ferrule)
	Screw terminals:	0.14 mm^2 to 2.5 mm^2, fine-wire (incl. ferrule)
Response to voltage failure		
Bus voltage only:	No communication with KNX/EIB.	
Operating voltage only:	No communication with KNX/EIB, no feeding of the measuring sensors.	
Bus and mains/operating voltage	No communication with KNX/EIB, no feeding of the measuring sensors.	
Response to recovery		
Bus voltage only:	No communication with KNX/EIB, no feeding of the measuring sensors.	
Operating voltage only:	No communication with KNX/EIB.	
Bus and mains/operating voltage	Communication with KNX/EIB according to initialization parameters.	

Module connection		
Number:	2	
Connection:	6-pole system connector for analog input module 4-pole system connector for combination sensor	
Analog inputs		
Number:	4	
Signal voltage/current:	0...1 VDC, 0...10 VDC, 0...20 mADC or 4...20 mADC, depending on parameterization	
Input resistance	Voltage measurement: approx. 18 kΩ Current measurement: approx. 100 Ω	
Connection:	Screw terminals:	0.5 mm^2 to 4 mm^2, single-wire
	Screw terminals:	0.34 mm^2 to 4 mm^2, fine-wire (without ferrule)
	Screw terminals:	0.14 mm^2 to 2.5 mm^2, fine-wire (incl. ferrule)

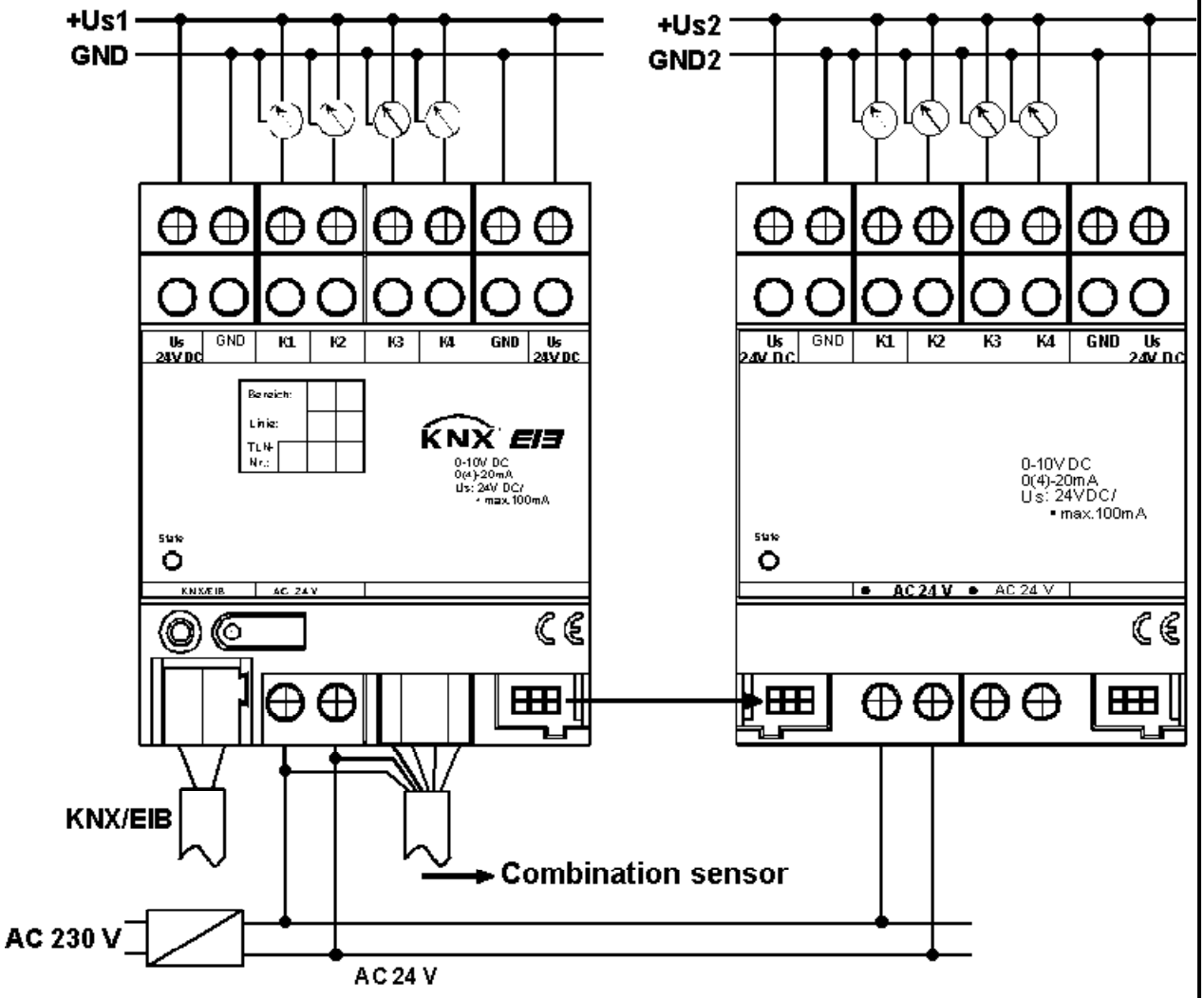
Mesuring sensor power supply outputs		
Number:	2	
Rated voltage:	24 VDC ± 10 %	
Rated current:	100 mADC (total)	
Connection:	Screw terminals:	0.5 mm^2 to 4 mm^2, single-wire
	Screw terminals:	0.34 mm^2 to 4 mm^2, fine-wire (without ferrule)
	Screw terminals:	0.14 mm^2 to 2.5 mm^2, fine-wire (incl. ferrule)

Wiring diagram anf terminal assignment



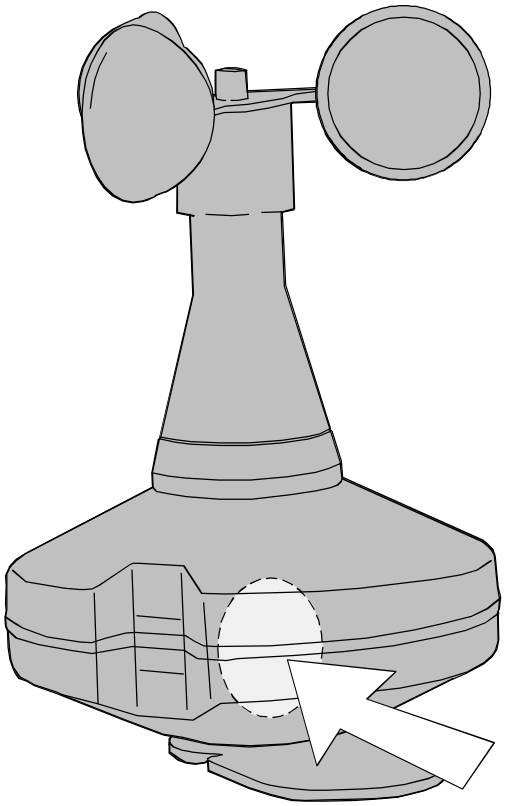
Connection:			
+Us:	Power supply of external sensors	A:	Programming key
		B:	Programming LED
GND:	reference potential for $+U_S$ and inputs	C:	Status LED, three-colour (red, orange,
		D:	green)
K1..K4	measured-value inputs	E:	Measuring sensors
			Extension module connection (6-pole),
		F:	Combination sensor connection (4-pole)
EIB:	KNX/EIB connecting terminal		
24VAC:	External supply voltage		

Wiring diagram with extension module and combination sensor



Combination sensor alignment and login

Magnetic contact position

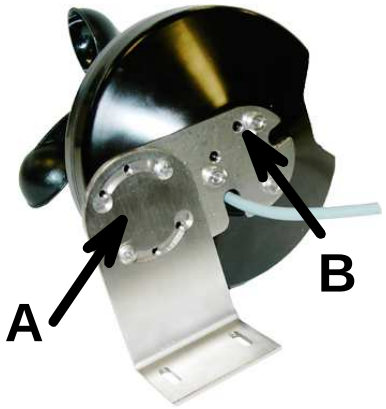


To log the combination sensor into the weather station: Shortly actuate the magnetic contact.

To align the DCF receiver: Keep the magnetic contact actuated (use some adhesive take to hold it, if necessary).

Combination sensor programming procedure: Please refer to the combination sensor's User Guide.

DCF receiver alignment



A: Stainless steel bracket for combination sensor alignment.

B: Opening for DCF receiver alignment by means of a small screwdriver.

Remarks on the Hardware

Please observe the following basic rules when installing the weather station:

- Any sensors connected can be power-supplied via terminals $+U_S$ and GND (refer to the wiring diagram). These terminals are provided in duplicate and are internally connected with each other. The total current consumption of all sensors power-supplied this way must not exceed 100 mA.
- In the event of a short-circuit between $+U_S$ and GND, the voltage will be switched off. After the elimination of the fault, the voltage will reappear automatically.
- Sensors connected can also be power-supplied externally (SELV), e. g. if their current consumption exceeds 100 mA. In this case, such sensors must be connected between terminals K1...K4 and GND.
- The pillar terminal block for the connection of the combination sensor must be plugged on before the mains voltage is switched on and during operation to prevent the digital input from unintentional contact with live wiring. The device as well as any sensors or analog input modules connected can be destroyed thereby.
- The $+U_S$ und GND terminals must not be connected with the corresponding inputs of a different device. **The power supply of any sensors used through an analog input module connected is not permitted (hazard of destruction).**

When mounting and installing the combination sensor, please observe the following things:

- The sensor comes with a stainless steel bracket for installation on a tubular pole (35 ...50 mm dia.). Depending on the wind intensity, very high forces can occur on such pole.
- If external lightning protection is provided the pole must not be higher than the lightning rod.
- The combination sensor should not be affected from any direction by obstacles or shadows. For this reason, a sufficient distance from walls or roof superstructures such as exhaust blowers should be kept.
- To enable the brightness and the twilight sensors to clearly detect the solar altitude align the combination sensor so that its precipitation window faces north.
- Removing or adding modules without adapting their configuration and subsequent downloading into the weather station is not allowed as this will result in system malfunctioning.
- After the first start, the weather station will run a module scan (status LED: "orange/ON").
  Since a new device does not include any configuration by default the status LED will then change to "red/ quickly flashing".
- The combination sensor connected indicates its readiness for operation by two short tones which will recur every 5 s.
- In this state, the combination sensor can be logged in and the antenna aligned (refer to the combination sensor Operating Instructions).
- A defective combination sensor can be replaced in operation by another one of the same type. In such case, the new combination sensor must logged in once again and to aligned. After logging in the new combination sensor, the weather station will reset after about 25 s. This will re-initialize all inputs and outputs of the weather station and of the modules connected and reset them to their original state.

Please observe the following basic rules when installing the analog input module:

- One analog input module at maximum can be conneted to the station.
- Always use the 6-pole system connector (comes with the analog input module) to connect the analog input module to the weather station.
- A defective analog input module can be replaced in operation by another one of the same type (disconnect the module from the voltage supply). After replacement, the weather station will reset after about 25 s. This will re-initialize all inputs and outputs of the weather station and of the modules connected and reset them to their original state.
- Removing or adding any modules without adapting their configuration and subsequent downloading into the weather station is not allowed as this will result in system malfunctioning.
- After the first start, the weather station will run a module scan (status LED: "orange/ON").
  Since a new device does not include any configuration by default the status LED will then change to "red/ quickly flashing".
- An analog input module indicates its readiness for operation by changing its status LED to "quickly flashing".
- After loading a project into the weather station, the status LED will change to "green/ON", with the module turning off its status LED.

Software Description

ETS search path:

Berker / Input / Analog input / Weather station comfort
Berker / Phys. Sensors / Weather station / Weather station comfort

BCU used:	BIM 112	
KNX / EIB type class:	3b device with certified PhL + stack	
Configuration:	S-mode with plug-in	
PEI type:	xx $_{Hex}$	xx $_{Dec}$
PEI connection:	No connector	

Applications:

No.	Brief description:	Name:	Version:
1	Weather station with digital combination sensor and analog input module options	Weather Station Comfort B00601	0.1

Runable from screen form version:	7.1		
Number of addresses (max.):	200	**Dynamic table management**	Yes ☐ No ☒
Number of assignments (max.):	200	**Maximum table length:**	200

Communication objects: 200 max. (dynamically created)

Combination Sensor

Object no.	Name	Format	Flags
0…200	Connection error [combination sensor]	1-bit	C, T
0…200	Wind sensor error 1(possibly iced up) [combination sensor]	1-bit	C, T
0…200	Wind signal error 2 [combination sensor]	1-bit	C, T
0…200	Sun measured value [sun east]	2-byte	C, T
0…200	Limit value 1 [sun east]	1-bit	C, T
0…200	Limit value 2 [sun east]	1-bit	C, T
0…200	External limit value x [sun east]	2-byte	C, W, T, ® *
0…200	Sun measured value [sun south]	2-byte	C, T
0…200	Limit value 1 [sun south]	1-bit	C, T
0…200	Limit value 2 [sun south]	1-bit	C, T
0…200	External limit value x [sun south]	2-byte	C, W, T, R
0…200	Sun measured value [sun west]	2-byte	C, T
0…200	Limit value 1 [sun west]	1-bit	C, T
0…200	Limit value 2 [sun west]	1-bit	C, T
0…200	External limit value x [sun west]	2-byte	C, W, T, R
0…200	Twilight measured value (lux) [twilight]	2-byte	C, T
0…200	Limit value 1 [twilight]	1-bit	C, T
0…200	Limit value 2 [twilight]	1-bit	C, T
0…200	External limit value x [twilight]	2-byte	C, W, T, R
0…200	Wind measured value (m/s) [wind]	2-byte	C, T
0…200	Limit value 1 [wind]	1-bit	C, T
0…200	Limit value 2 [wind]	1-bit	C, T
0…200	External limit value x [wind]	2-byte	C, W, T, R
0…200	Precipitation [precipitation]	1-bit	C, T
0…200	Azimuth [combination sensor – DCF77]	1-byte	C, T, R
0…200	Elevation [combination sensor – DCF77]	1-byte	C, T, R
0…200	Date/time request [combination sensor – DCF77]	1-bit	C, W
0…200	Date [combination sensor – DCF77]	3-byte	C, T [1]
0…200	Time [combination sensor – DCF77]	3-byte	C, T [1]

	0…200	Façade 1 shading [façades 1-4 shading]	1-bit	C, T
	0…200	Façade 2 shading [façades 1-4 shading]	1-bit	C, T
	0…200	Façade 3 shading [façades 1-4 shading]	1-bit	C, T
	0…200	Façade 4 shading [façades 1-4 shading]	1-bit	C, T
	0…200	Slat position (°) [combination sensor]	1-byte	C, T
	0…200	Slat position (%) [combination sensor]	1-byte	C, T

1) The flags of the date and time communication objects of the DCF77 receiver must be set so that they cannot be read out. This will avoid the sending of invalid values.
The “Date/time request” communication object will be available instead. A response to such request can take up to one minute.

Combination Sensor (continued)			
Object no.	**Name**	**Format**	**Flags**
0…200	Façade 1 opening angle [façades 1-4 shading]	1-byte	C, W
0…200	Façade 2 opening angle [façades 1-4 shading]	1-byte	C, W
0…200	Façade 3 opening angle [façades 1-4 shading]	1-byte	C, W
0…200	Façade 4 opening angle [façades 1-4 shading]	1-byte	C, W
0…200	External basic brightness [façades 1-4 shading]	1-byte	C, W
0…200	No DC77 reseption [combination sensor]	1-bit	C, T
Analog Inputs or Analog Input Modules			
Object no.	**Name**	**Format**	**Flags**
0…200	Alarm object – 1-bit [analog inputs]	1-bit	C, T
0…200	Alarm object – 1-bit [analog input module]	1-bit	C, T
0…200	Measured value [analog input x – 0 … 10 V]	2-byte	C, T
0…200	Measured value [analog input x – 0 … 10 V]	1-byte	C, T
0…200	Limit value 1 [analog input x – 0 … 10 V]	1-bit	C, T
0…200	Limit value 2 [analog input x – 0 … 10 V]	1-bit	C, T
0…200	External limit value [analog input x – 0 … 10 V]	2-byte	C, W, T, R
0…200	External limit value x [%] [analog input x – 0 … 10 V]	1-byte	C, W, T, R
0…200	Measured value [analog input x – 0 … 1 V]	2-byte	C, T
0…200	Measured value [analog input x – 0 … 1 V]	1-byte	C, T
0…200	Limit value 1 [analog input x – 0 … 1 V]	1-bit	C, T
0…200	Limit value 2 [analog input x – 0 … 1 V]	1-bit	C, T
0…200	External limit value x [analog input x – 0 … 1 V]	2-byte	C, W, T, R
0…200	External limit value x [%] [analog input x – 0 … 1 V]	1-byte	C, W, T, R
0…200	Measured value [analog input x – 0 … 20 mA]	2-byte	C, T
0…200	Measured value [analog input x – 0 … 20 mA]	1-byte	C, T
0…200	Limit value 1 [analog input x – 0 … 20 mA]	1-bit	C, T
0…200	Limit value 2 [analog input x – 0 … 20 mA]	1-bit	C, T
0…200	External limit value x [analog input x – 0 … 20 mA]	2-byte	C, W, T, R
0…200	External limit value x [%] [analog input x – 0 … 20 mA]	1-byte	C, W, T, R
0…200	Measured value [analog input x – 4 … 20 mA]	2-byte	C, T
0…200	Measured value [analog input x – 4 … 20 mA]	1-byte	C, T
0…200	Limit value 1 [analog input x – 4 … 20 mA]	1-bit	C, T
0…200	Limit value 2 [analog input x – 4 … 20 mA]	1-bit	C, T
0…200	External limit value x [analog input x – 4 … 20 mA]	2-byte	C, W, T, R
0…200	External limit value x [%] [analog input x – 4 … 20 mA]	1-byte	C, W, T, R
0…200	Wire breakage [analog input x – 4 … 20 mA]	1-bit	C, T
0…200	Wind measured value (m/s) [analog input x – wind]	2-byte	C, T
0…200	Limit value 1 [analog input x – wind]	1-bit	C, T
0…200	Limit value 2 [analog input x – wind]	1-bit	C, T
0…200	External limit value [analog input x – wind]	2-byte	C, W, T, R
0…200	External limit value x [%] [analog input x – wind]	1-byte	C, W, T, R
0…200	Brightness measured value (lux) [analog input x – brightness]	2-byte	C, T
0…200	Limit value 1 [analog input x – brightness]	1-bit	C, T
0…200	Limit value 2 [analog input x – brightness]	1-bit	C, T
0…200	External limit value x [analog input x – brightness]	2-byte	C, W, T, R
0…200	External limit value x [%] [analog input x – brightness]	1-byte	C, W, T, R
0…200	Twilight measured value (lux) [analog input x – twilight]	2-byte	C, T
0…200	Limit value 1 [analog input x – twilight]	1-bit	C, T

	0…200	Limit value 2 [analog input x – twilight]	1-bit	C, T
	0…200	External limit value x [analog input x – twilight]	2-byte	C, W, T, R
	0…200	External limit value x [%] [analog input x – twilight]	1-byte	C, W, T, R
	0…200	Atmospheric pressure measured value (Pa) [analog input x – atmospheric pressure]	2-byte	C, T
	0…200	Limit value 1 [analog input x – atmospheric pressure]	1-bit	C, T
	0…200	Limit value 2 [analog input x – atmospheric pressure]	1-bit	C, T
	0…200	External limit value x [analog input x – atmospheric pressure]	2-byte	C, W, T, R
	0…200	External limit value x [%] [analog input x – atmospheric pressure]	1-byte	C, W, T, R
	0…200	Temperature measured value (°C) [analog input x – temperature]	2-byte	C, T
	0…200	Limit value 1 [analog input x – temperature]	1-bit	C, T
	0…200	Limit value 2 [analog input x – temperature]	1-bit	C, T
	0…200	External limit value x [analog input x – temperature]	2-byte	C, W, T, R
	0…200	External limit value x [%] [analog input x – temperature]	1-byte	C, W, T, R
	0…200	Air humidity measured value (% RH) [analog input x – air humidity]	2-byte	C, T
	0…200	Limit value 1 [analog input x – air humidity]	1-bit	C, T
	0…200	Limit value 2 [analog input x – air humidity]	1-bit	C, T
	0…200	External limit value x [analog input x – air humidity]	2-byte	C, W, T, R
	0…200	External limit value x [%] analog input x – air humidity]	1-byte	C, W, T, R
	0…200	Precipitation [analog input x – precipitation]	1-bit	C, W, T, R
Blocking Modules [2)]				
Object no.		**Name**	**Format**	**Flags**
	0…200	Blocking module [input – switching – 1-bit]	1-bit	C, W
	0…200	Blocking module [output – switching – 1-bit]	1-bit	C, T
	0…200	Blocking module [blocking object]	1-bit	C, W
	0…200	Blocking module [input – value – 2-byte]	2-byte	C, W
	0…200	Blocking module [output – value – 2-byte]	2-byte	C, T
	0…200	Blocking module [blocking object]	1-bit	C, W
	0…200	Blocking module [input – rel. value – 1-byte]	1-byte	C, W
	0…200	Blocking module [output – rel. value – 1-byte]	1-byte	C, T
	0…200	Blocking module [blocking object]	1-bit	C, W
Logic Controllers [2)]				
Object no.		**Name**	**Format**	**Flags**
	0…200	Input [logic gate input]	1-bit	C, W
	0…200	Output [logic gate output]	1-bit	C, W, T, R

[2)] The number of the available blocking modules and locig controllers as well as of the available inputs per logic gate depends on the configuration/number of the utilized communication objects of the device. The maximum number of communication objects is 200.

[3)] A maximum of eight inputs is available for each logic gate.

Combination Sensor Object Descriptions			
	0…200	Connection error [combination sensor]	1-bit object to indicate when the electrical connection between the weather station and the combination sensor is interrupted. Object value = “0”: no error. Object value = “1”: error.
	0…200	Wind sensor error 1 (possibly iced up) [combination sensor]	1-bit object to indicate when the wind sensor has not detected any wind movement for a longer period. Please refer to “Max time for ‘no wind’, measured in hours”. Object value = “0”: no error. Object value = “1”: error.
	0…200	Wind signal error 2 [combination sensor]	1-bit object to indicate when the wind sensor has not detected any wind change for a longer period. Please refer to “Max time for ‘wind unchanged’, measured in minutes”. Object value = “0”: no error. Object value = “1”: error.
	0…200	Sun measured value [sun …]	2-byte objects to output of the current illuminance. In this connection, there is one separate communication object for each of the three directions of east, south and west. A variable measured-value readjustment option and/ or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value x [sun …]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Limit values, hystereses and transmitting criteria can be set in a separate dialog.
	0…200	External limit value x [sun …]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization).These values will overwrite the parameterized ones.
	0…200	Twilight measured value (lux) [twilight]	2-byte object to output of the current illuminance. The twilight stage is determined by a sensor directed to north. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/ criteria.
	0…200	Limit value x [twilight]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Limit values, hystereses and transmitting criteria can be set in a separate dialog.
	0…200	External limit value x [twilight]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization). These values will overwrite the parameterized ones.
	0…200	Wind measured value (m/s) [wind]	2-byte object for the output of the current wind speed. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value x [wind]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Limit values, hystereses and transmitting criteria can be set in a separate dialog.
	0…200	External limit value x [wind]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization).
	0…200	Precipitation [precipitation]	1-bit object to indicate when rain is falling. The object value depends on the “Output” parameter. Presetting: Object value = “0”: No precipitation. Object value = “1”: Precipitation.

	0…200	Azimuth [combination sensor – DCF77]	1-byte object to indicate the current sun position. Object value = “0°”: North. Object value = “90°”: East. Object value = “180°”: South. Object value = “270°”: West. The current date and time information of the DCF77 receiver and the geographical position of the building are used for calculation.
	0…200	Elevation [combination sensor – DCF77]	1-byte object to indicate the current sun position.
	0…200	Date/time request [combination sensor – DCF77]	1-bit object to request the current time and date.
	0…200	Date [combination sensor – DCF77]	3-byte object to send the current date.
	0…200	Time [combination sensor – DCF77]	3-byte object to send the current time.
	0…200	Façade … shading [façades 1-4 shading]	1-bit object to indicate that the respective façade is being exposed to sun radiation to such an extent as to require automatic shading.
	0…200	Façade … opening angle [façades 1-4 shading]	1-byte object to adapt the opening angles for up to four façades by other bus devices (e. g. touch sensor as value transmitter, visualization).These values will overwrite the parameterized ones.
	0…200	External basic brightness [façades 1-4 shading]	1-byte object to adapt the basic brightness for automatic shading by other bus devices (e. g. touch sensor as value transmitter, visualization).These values will overwrite the parameterized ones.
	0…200	Slat position (%/°) [combination sensor]	1-byte object to control the slats in accordance with the sun position. Depending on the shutter/blind actuators used, positioning can be effected on the basis of relative values or angle values.
	0…200	No DCF77 reception [combination sensor]	1-bit object to issue a warning if no DCF77 reception is possible.

Analog input object description

	0…200	Alarm object – 1-bit [analog input]	1-bit object for a message when a problem such as some overvoltage at an input of the weather station or some overloading of the supply voltage for external sensors has occurred. Direct assignment to the cause of the problem will not be possible. Object value = "0": No alarm. Object value = "1": Alarm.
	0…200	Alarm object – 1-bit [analog input module]	1-bit object for a message when a problem such as some overvoltage at an input of the analog input module or some overloading of the supply voltage for external sensors has occurred. Direct assignment to the cause of the problem is not possible. Object value = "0": No alarm. Object value = "1": Alarm.
	0…200	Measured value [analog input x – …]	1-byte or 2-byte object to output the current measured value. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value x [analog input x – …]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Permits the setting of limit values, hystereses and transmitting criteria in a separate dialog.

	0…200	External limit value x [analog input x – …]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization).
	0…200	Wire breakage [analog input x – 4 … 20 mA]	1-bit object to indicate when a wire breakage has occurred on a connected sensor with a measuring range of 4 … 20 mA. The object value depends on the "Output" parameter. Presetting: Object value = "0": No open circuit (wire breakage). Object value = "1": Open circuit (wire breakage).
	0…200	Wind measured value (m/s) [analog input x – wind]	2-byte object to output the current wind speed when a wind sensor is used. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value 1 [analog input x – wind]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Permits the setting of limit values, hystereses and transmitting criteria in a separate dialog.
	0…200	External limit value [analog input x – wind]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization). These values will overwrite the parameterized ones.
	0…200	Brightness measured value (lux) [analog input x – brightness]	2-byte object to output the current illuminance when a brightness sensor is used. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value x [analog input x – brightness]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Permits the setting of limit values, hystereses and transmitting criteria in a separate dialog.
	0…200	External limit value x [analog input x – brightness]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization).
	0…200	Twilight measured value (lux) [analog input x – twilight]	2-byte object to output the current illuminance when a twilight sensor is used. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value 1 [analog input x – twilight]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Permits the setting of limit values, hystereses and transmitting criteria in a separate dialog.
	0…200	External limit value x [analog input x – twilight]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization).These values will overwrite the parameterized ones.
	0…200	Atmospheric pressure measured value (Pa) [analog input x – atmospheric pressure]	2-byte object to output the current atmospheric pressure when an atmospheric pressure sensor with a measuring range of 70000 to 120000 Pa is used. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criteria.
	0…200	Limit value x [analog input x – atmospheric pressure]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Permits the setting of limit values, hystereses and transmitting criteria in a separate dialog.
	0…200	External limit value x [analog input x – atmospheric pressure]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization).These values will overwrite the parameterized ones.
	0…200	Temperature measured value (℃) [analog input x – temperature]	2-byte object to output the current temperature when a temperature sensor is used. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value x [analog input x – temperature]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun Permits the setting of limit values, hystereses and transmitting criteria in a separate dialog.

	0…200	External limit value x [analog input x – temperature]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization).These values will overwrite the parameterized ones.
	0…200	Air humidity measured value (% RH) [analog input x – air humidity]	2-byte object to output the current relative air humidity when a humidity sensor is used. A variable measured-value readjustment option and/or a cycle time is/are available as transmitting criterion/criteria.
	0…200	Limit value 1 [analog input x – air humidity]	1-bit objects to indicate when the preset limit values (1 or 2) are being exceeded or underrun. Permits the setting of limit values, hystereses and transmitting criteria in a separate dialog.
	0…200	External limit value x [analog input x – air humidity]	1-byte or 2-byte objects to adapt the limit values by other bus devices (e. g. touch sensor as value transmitter, visualization). These values will overwrite the parameterized ones.
	0…200	Precipitation [analog input x – precipitation]	1-bit object for indication when a rain sensor is used. The object value depends on the "Output" parameter. Presetting: Object value = "0": No precipitation. Object value = "1": Precipitation.

Blocking Module Object Descriptions

	0…200	Blocking module [input – switching – 1-bit]	1-bit object, the value of which is passed on to the output object of the blocking module in dependence on the value of the associated blocking object.
	0…200	Blocking module [output – switching – 1-bit]	1-bit object which the value of the input object is passed on to.
	0…200	Blocking module [input – rel. value – 1-byte]	1-byte object, the value of which is passed on to the output object of the blocking module in dependence on the value of the associated blocking object.
	0…200	Blocking module [output – rel. value – 1-byte]	1-byte object which the value of the input object is passed on to.
	0…200	Blocking module [input – value – 2-byte]	2-byte object, the value of which is passed on to the output object of the blocking module in dependence on the value of the associated blocking object.
	0…200	Blocking module [input – value – 2-byte]	2-byte object which the value of the input object is passed on to.
	0…200	Blocking module [blocking object]	1-bit object which determines whether the value of the associated input object will be passed on to the output object. Permits setting the response of the blocking object. Presetting: Object value = "0": Blocked. Object value = "1": Released.

[1)] In the device software, the name of the blocking module and thus also the names of the communication objects can be set. This facilitates easier configuring and better documentation.

Logic controller object description

	0…200	Input [logic gate input]	1-bit objects which are gated with each other. Each input object of a logic gate can be used in the normal way or in inverted form.
	0…200	Output [logic gate output]	1-bit object which outputs the result of the logic gating. The type of gating (AND, OR, EXCLUSIVE OR), the behaviour (normal or inverted) and the transmitting criterion (transmit upon each input event, or transmit upon output change) can be set.

Function Scope

- The weather station can be combined with a digital combination sensor to detect brightness (in triple form), twilight, wind speed and precipitation as well as for DCF77 reception.
- The connection to the combination sensor and the wind measured values of the combination sensor can be monitored.
- In conjunction with DCF77 reception, automatic shading of up to four façades with slat readjustment in dependence on the sun position can be implemented.
- Up to four analog sensors providing output signals of 0 … 1 VDC, 0 … 10 VDC, 0 … 20 mADC, 4 … 20 mADC can be directly connect to the weather station.
- The connections to sensors with 4 … 20 mA outputs can be monitored for wire breakage(open circuit).
- With the aid of an analog input module, up to four additional analog sensors can be connected.
- For selected weather sensors (wind, brightness, twilight, precipitation, temperature, air humidity, atmospheric pressure) pre-configured software settings are available.
- The measured values of the weather sensors (with the exception of the precipitation sensor) can be output in 16-bit form. Output can take place when values change or in cycles.
- The measured values of the analog sensors can be output in 16-bit or in 8-bit form. Output can take place when values change or in cycles.
- The precipitation sensor outputs are 1-bit values.
- For each of the analog sensors and for the weather sensors (with the exception of the precipitation sensor), two limit values with definable hystereses are available.
- These limit values can be externally preset as 8-bit or 16-bit values.

- Up to 16 blocking modules facilitate the filtering of 1-bit, 8-bit or 16-bit values.
- Up to 20 logic gates with up to eight inputs each can be used.
- AND, OR and exclusive OR can be selected as logic functions.
- The inputs and outputs of the logic gates can be inverted.

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Functional Description

The function of the weather station and of the sensors connected to it is set by an ETS plug-in. In this connection, the communication objects required for each function are created dynamically. This is the reason why there is no fixed assignment between the individual functions and the numbers of the communication objects.

In order to obtain coherent representation in the configuration of the communication objects of the individual elements such as of an analog input it is recommended that each of the parameters of an individual sensor be set step by step before changing the the next one.

1. Configuration Basic Settings

The weather station primarily serves to collect and pass on weather data or other analog signals. Different sensors can be used for this purpose:

- A digital combination sensor (with or without DCF77 reception) facilitates the measuring of the wind intensity, the brightness, the twilight stage and the detection of rain.
- Specific analog weather sensors allow, in each case, for the detection of weather-referred quantities.
  These are:
  - Brightness: Ordering no. 7590 00 53
  - Twilight: Ordering no. 7590 00 55
  - Wind: Ordering no. 7590 00 50
  - Precipitation: Ordering no. 7590 00 52
  - Temperature: Ordering no. 7590 00 54
  - Air humidity: Ordering no. 7590 00 56
  - Atmospheric pressure:

  Up to four of these sensors can be connected to the wearther station in any combination, the device software providing pre-configured settings for them.
- In conjunction with an analog input module, up to four additional analog sensors can be connected.
- Instead of the specific analog weather sensors, other types of analog measuring sensors working in the following signal ranges can also be connected:
  - 0 … 1 VDC,
  - 0 … 10 VDC
  - 0 … 20 mADC
  - 4 … 20 mADC.
-

  For such sensors, the device software will not provide any pre-configured settings. The parameters to be set must be specified separately .

In addition to pure measured-value acquisition, the weather station facilitates fully automatic control of shading facilities, depending on the position of the sun. Such control is based on the calculated position of the sun and on the illuminance measured.

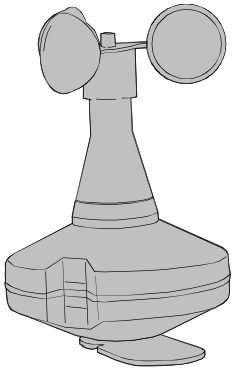
Irrespective of the processing of analog values, the weather station provides logic controllers and blocking modules. In conjunction with the weather information collected, such software modules can implement more complex functions. However, they can also be used by the other device functions.

2. Connection with a Digital Combination Sensor

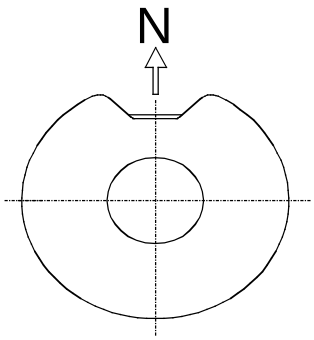
To be able to use the weather station together with a digital combination sensor select the "Modules" option in the tree structure shown in the configuration window where the combination sensor can be added as a new module.

To reliably detect the beginning of dawn/dusk and to correctly determine the sun radiation during the course of the day align the combination sensor exactly to north when mounting it to the pole.The top of the flat lower part of its enclosure must not be shaded by parts of buildings or trees.

Combination sensor side view



Combination sensor alignment to north



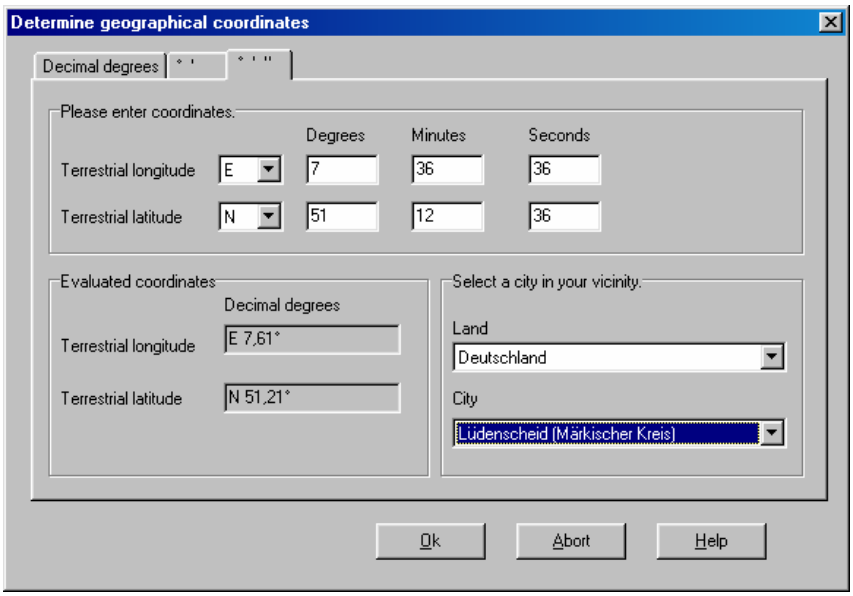
2.1 DC77 reception and automatic slat readjustment

If automatic shading as a function of the sun position is desired in addition to the pure collecting of weather information, the DCF77 reception and slat adjustment functions in the combination sensor must be enabled.

DCF77 reception can be used internally, on the one hand, and for synchronizing other devices (master function) such as timers or room temperature controllers with built-in time programs, on the other one.

For the synchronization of other devices, the weather station can alternatively send the data every minute, every hour or once per day. If the DCF77 receiver sends the time and the date every hour, for example, the values of the communication objects will only be updated internally at those sending times. For this reason, set the flag so that the time and the date will not be read out. However, if the current time information is still needed, the weather station has an additional 1-bit "Date/time request" communication object. If this object receives a telegram with a selectable value the weather station will send the current time and date upon the next incoming DCF signal.

For automatic slat control, the geographical position is required in addition to the current time. This position can be set in a separate dialog box. As an alternative to numerical entries, a German town or city close to your location can be selected from a list.



Under the "Façades 1-4 shading" branch in the configuration window, the basic brightness must be entered at which shading is to start and the orientations of the façades. Such values can either be fixed internally or set externally as variables through a visualization software, for example.

2.2 Twilight

To detect twilight the combination sensor has a built-in sensor of its own which determines the illuminance from the north.

Its pre-configured measuring range covers 0 … 674 lux.

To display the current illuminance the measured value can be sent at a selectable difference from the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

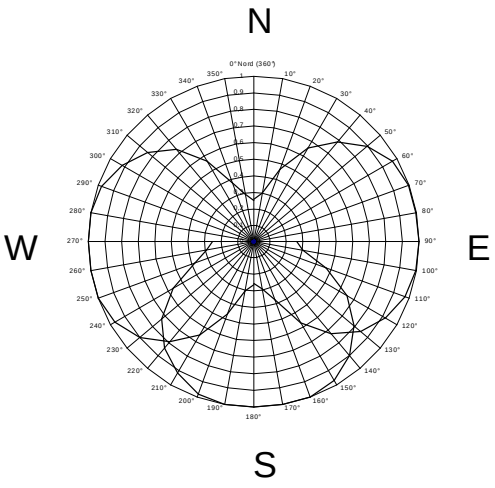
With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

2.3 Brightness

The combination sensor has a sensor of its own for each of the directions of east, south and west. Each of these sensors has the same setting options.

Their pre-configured measuring ranges cover 0 … 110,000 lux.

The three detection ranges of the sensors are somewhat overlapping to follow the sun's path to an optimum.



To display the current illuminance the measured value can be sent with a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available for each sensor where the weather station can send switching telegrams when these values are exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

2.4 Wind speed

To determine the wind intensity the combination sensor has a revolving vane which can be heated to protect it from getting iced up.

Its pre-configured measuring range covers 0 … 40 m/s.

To display the current wind speed the measured value can be sent at a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

2.5 Precipitation

To detect precipitation (rain, snow, soft hail) the combination sensor has a detector which works with modulated infrared light.

Unlike the other weather sensors, the precipitation sensor does not output any analog measured values but sends a switching telegram with a selectable value immediately after detecting some precipitation.

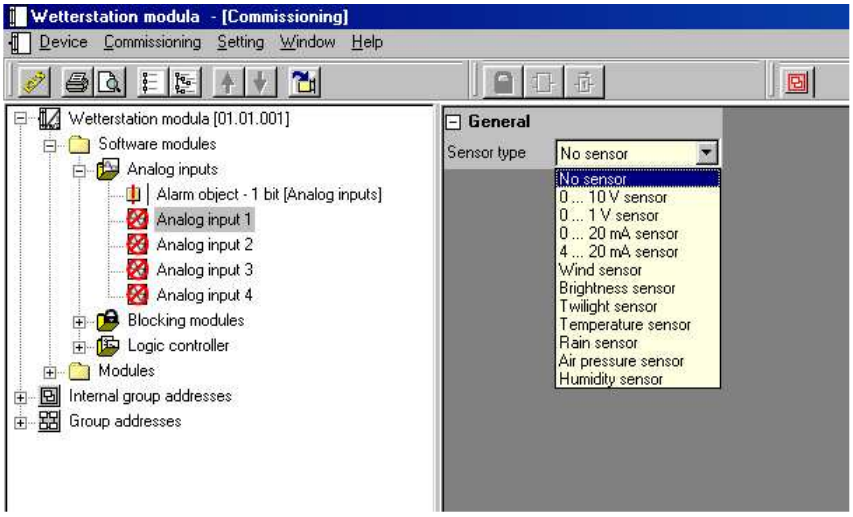
When the precipitation has ceased, the sensor will still work with a fixed delay of about two minutes.

3. Connection with Analog Weather Sensors

If only a part of the combination sensor is used or if additional data are needed, the weather station can be combined with individual sensors which, in each case, convert a quantity into an analog signal.

For some wather sensors, the weather station provides pre-configured settings.

A common alarm object can be activated for all analog inputs of the weather station. This object will be activated if, for example, some overvoltage occurs at an input, or if the connection for the power supply of the measuring sensors is overloaded. With this communication object, the direct error cause cannot be determined.



If an analog sensor is to be used, the corresponding channel in the tree structure must be highlighted. The desired sensor type can then be selected from a list.

3.1 Wind speed

To determine the wind intensity the wind sensor has a revolving vane which can be heated to protect it from getting iced up. Its setting options correspond to those of the combination sensor.

Its pre-configured measuring range covers 0 … 40 m/s.

To display the current wind speed the measured value can be sent at a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are being exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

3.2 Brightness

The brightness sensor has a detecting element which will be aligned vertically to the building wall when the sensor has been mounted at normal position. In contrast to this, the brightness detectors of the combination sensor are aligned at an angle of about 30° to the horizontal line. For this reason, the indi vidual brightness sensor will normally measure lower illuminance values. Usually, each of these sensors has the same setting options.

Their pre-configured measuring range covers 0 … 60,000 lux.

To display the current illuminance the measured value can be sent at a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are being exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

3.3 Twilight

The twilight sensor has a detecting element which will be aligned vertically to the building wall when the sensor has been mounted at normal position. In contrast to this, the twilight detector of the combination sensor is aligned at an angle of about 30° to the h orizontal line. For this reason, the individual twilight sensor will normally measure lower illuminance values. Usually, each of these sensors has the same setting options.

Their pre-configured measuring range covers 0 … 255 lux.

To display the current illuminance the measured value can be sent at a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are being exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

3.4 Temperature

The temperature sensor determines the temperature of the ambient air.

Its pre-configured measuring range covers -30 … +70 °C.

To display the current temperature the measured value can be sent at a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are being exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

3.5 Precipitation

The precipitation sensor works with a conductor meander track which evalueates the conductivity of the rain water.

Unlike the other weather sensors, the precipitation sensor does not output any analog measured values but sends a switching telegram with a selectable value immediately after detecting some precipitation.

3.6 Air humidity

The air humidity sensor determines the relative atmospheric humidity and the room temperature. Both measured values are provided as analog voltages.

Its pre-configured measuring range covers 0 … 100 % RH.

To display the current relative air humidity the measured value can be sent at a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are being exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

3.7 Atmospheric pressure

The pre-configured measuring range of the atmospheric pressure sensor covers 70,000 … 120,000 Pa.

To display the current atmospheric pressure the measured value can be sent at a selectable difference to the previous measured value. Sending the values in cycles is also possible.

Two selectable limit values are available where the weather station can send switching telegrams when these values are being exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all weather sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

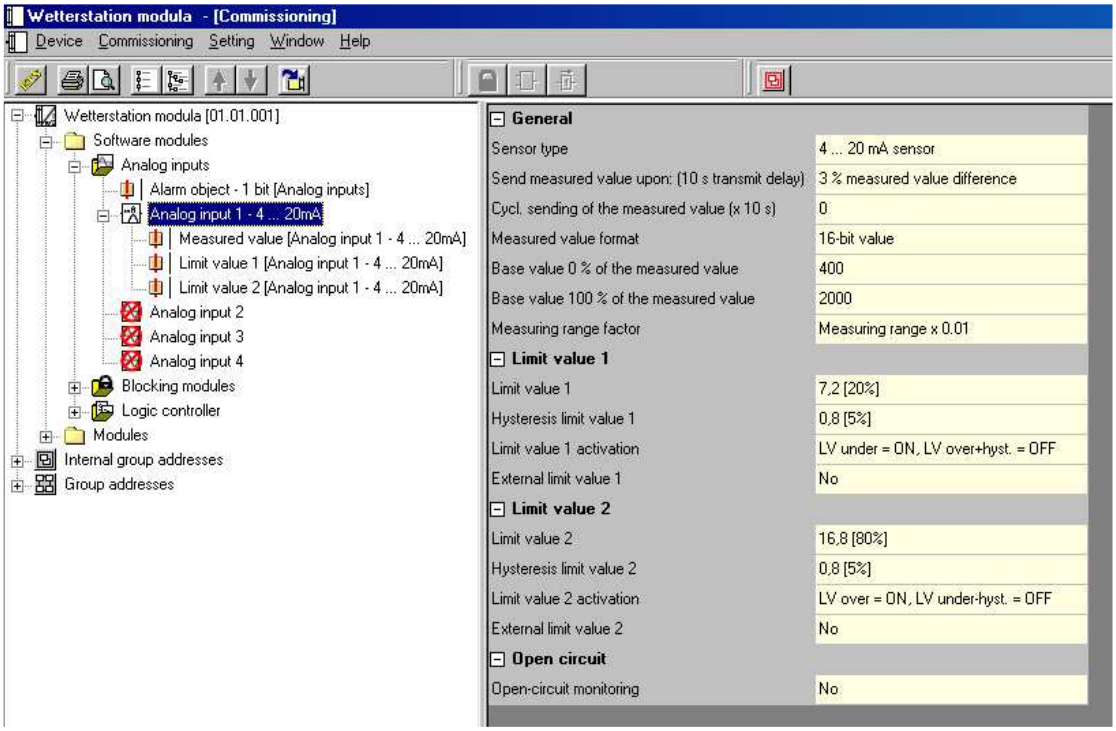
4. Connection with other Analog Sensors

In addition to the pre-configured weather sensors, other measuring sensors providing output signals of 0 … 1 V, 0 … 10 V, 0 … 20 mA or 4 … 20 mA can be connected to the weather station.

This sensor type is preset in the same way as the other weather sensors.

4.1 Setting the measuring range

Unlike the pre-configured sensors, the general sensors require presetting of the measuring range.



First of all, this includes the decision whether the measured values are to be output in 8-bit or 16-bit form. This choice essentially depends on the other devices which work with such data.

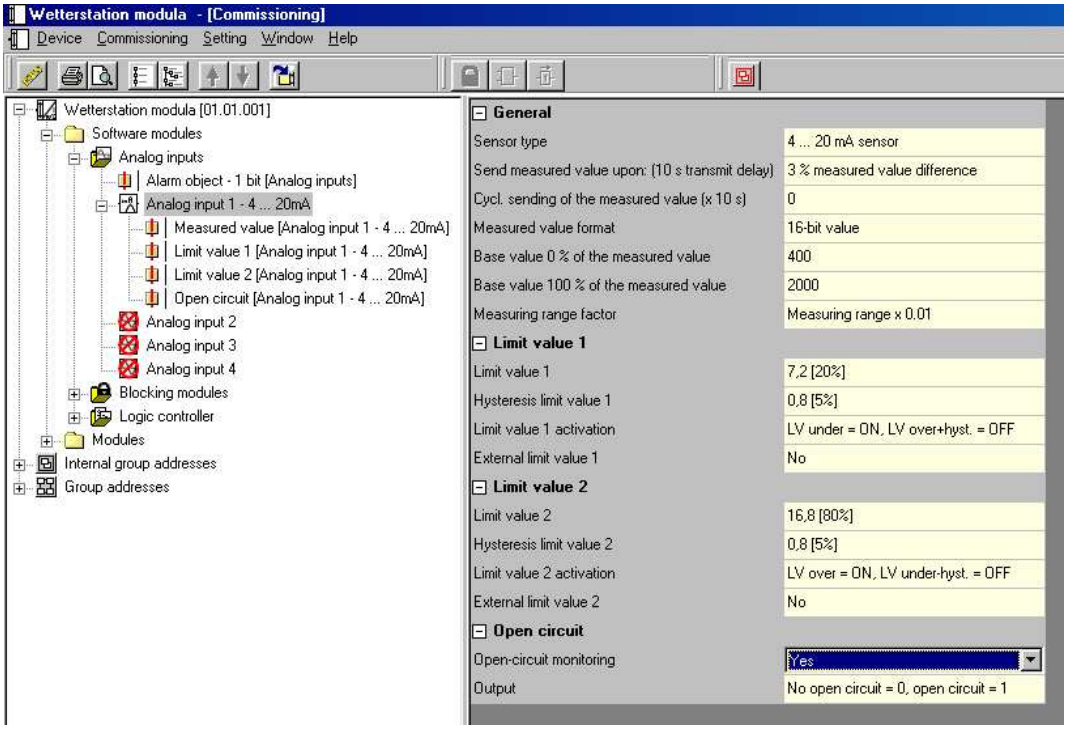
- 8-bit values can be processed by a lot of devices (e. g. dimming actuators or current shutter/blind actuators). However, they have a much restricted resolution.
- 16-bit values are very suitable for display in visualization programs, for example. They have a considerably higher resolution.

Two selectable limit values are available where the weather station can send switching telegrams when these values are being exceeded or underrun. Such limit values can either be fixed internally or set externally as variables through a visualization software, for example.

With the exception of the precipitation sensor, the setting of the limit values and of the hysteresis is the same for all sensors. This procedure is described in detail under "Software Functions – Limit values and hysteresis".

4.2 Open-circuit monitoring

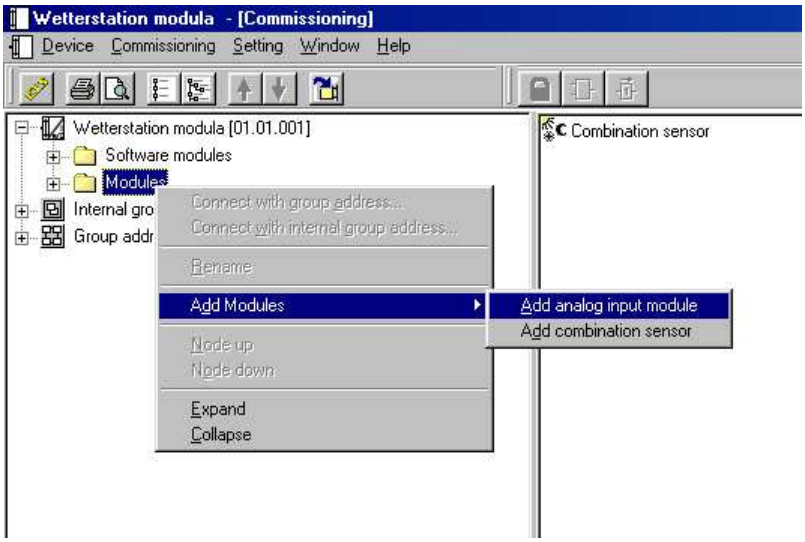
For sensors which work with an analog signal of 4 … 20 mA, an open-circuit monitoring option for the electrical connection can be selected in addition.



If open-circuit monitoring is activated an additional 1-bit communication object is created which will send a telegram with a selectable value in the event of a fault.

5. Connection with an Analog Input Module

With the aid of an analog input module, the number of the analog sensors can be doubled from four to eight. To be able to use the weather station together with an analog input module select the "Modules" option in the tree structure shown in the configuration window.



Here, the analog input module can be added as a new module.

5.1 Setting the analog input module

In this connection, the device software provides the same settings for the four channels of the analog input module as are applicable to the four analog inputs of the weather station.

A common alarm object can be activated for all inputs of the analog input module. This object will be activated if, for example, some overvoltage occurs at an input, or if the connection for the power supply of the measuring sensors is overloaded. This communication object does not permit to draw conclusions as direct error cause.

5.2 Electrical connection

Please observe the following points when installing the analog input module:

- One analog input module at maximum can be connected .
- A defective analog input module can be replaced in operation by another one of the same type (disconnect the module from the voltage supply). After replacement, the weather station will reset after about 25 s. This will re-initialize all inputs and outputs of the weather station and of the modules connected and reset them to their original state.
- Removing or adding modules without adapting their configuration and subsequent downloading into the weather station is not allowed as this will result in system malfunctioning.
- Do not connect the U_S and GND terminals of the analog input module with the corresponding terminals of a different device, for example, of the weather station. In such case, problems can be caused as a result of ground transfer.
- Any sensors connected to the inputs of the analog input module must not be power-supplied by the weather station. Any sensors connected to the inputs of the weather station must not be power-supplied by the analog input module.

6. Software Functions

The weather station has a number of software functions used for all sensor inputs in the same way, or which can be used within the entire building installation, regardless what method of measured-value acquisition is applied.

The functions used for all sensors in the same way concern measured-value conditioning as well as setting the limit values and hysteresis.

Those functions which can be used as independent software modules are blocking elements and logic gates.

6.1 Measured-value conditioning

What settings of the measuring ranges are necessary or possible depends on the type of the sensor used.

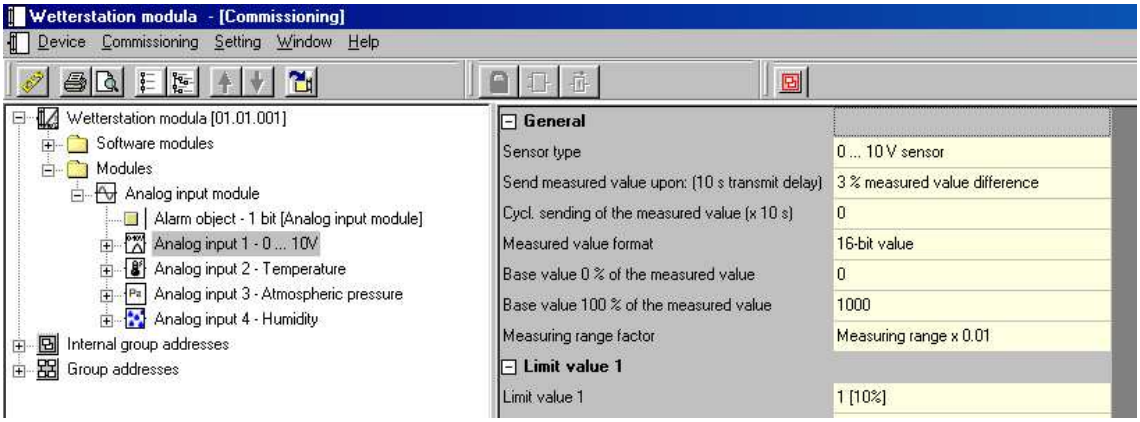
For the pre-defined weather sensors, the data point types of the communication objects are fixed in accordance with the KNX standard. Any further alteration of these measuring ranges will not be possible.

Sensor	Range	Unit	Data point type
Brightness – combination sensor	0 … 110,000	Lux	9.004
Brightness – analog input	0 … 60,000	Lux	9.004
Twilight – combination sensor	0 … 674	Lux	9.004
Twilight – analog input	0 … 255	Lux	9.004
Wind	0 … 40	m/s	9.005
Temperature	-30 … +70	℃	9.001
Air humidity	0 … 100	%	9.007
Atmospheric pressure	70,000 … 120,000	Pa	9.006

For the general analog sensors, the measured values of the analog sensors can be output either in 16-bit or in 8-bit form.

6.1.1 16-bit measured-value output

When 16-bit values are used, the parameters "Base value 0 % of the measured value", "Base value 100 % of the measured value" and "Measuring range factor" will be available.



In this connection, both base values must be selected so that they cover the measuring range of the sensor sufficiently by their common factor.

To obtain maximum possible resolution, the samllest possible factor should be chosen. On the other hand, the resolution should not be so as to suggest an unrealistic precision as, for instance, a room temperature with two places after the decimal point.

Example:
A pressure transmitter has a measuring range of -50 Pa … +150 Pa.
Its output signal is 0 … 10 V.
The combination of

base value 0 % of the measured value:	-5000
base value 100 % of the measured value:	+15000
measuring range factor	0.01

will the cover the range of -50,00 Pa … +150,00 Pa with two places after the decimal point.

The combination of

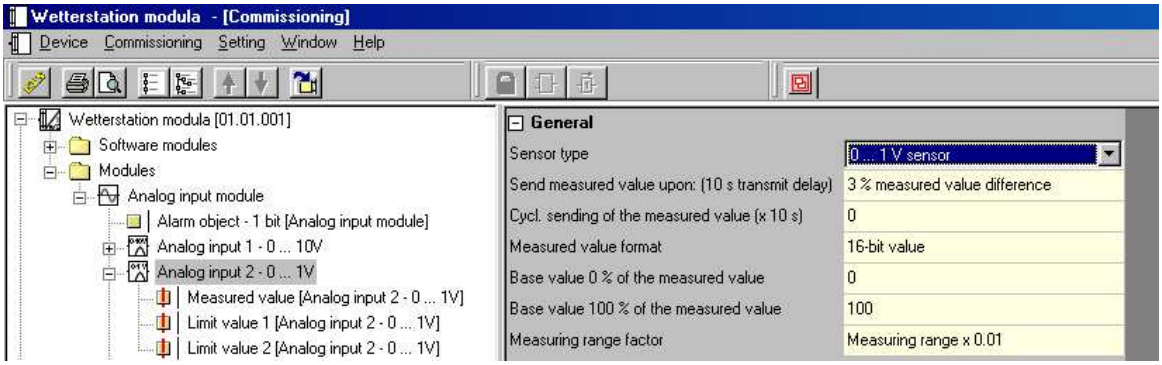
base value 0 % of the measured value:	-50
base value 100 % of the measured value:	+150.
measuring range factor	1

will the cover the range of -50 Pa … +150 Pa without any places after the decimal point.

For connections with other devices, it should be noted that only the numerical values will be transmitted in the telegrams on the bus. The physical quantities and their units are defined in the KNX standard and will have to be uniformly set in the devices.

6.1.2 8-bit measured-value output

If 8-bit values are used, the parameters "Base value 0 % of the measured value" and "Base value 100 % of the measured value" will be available.

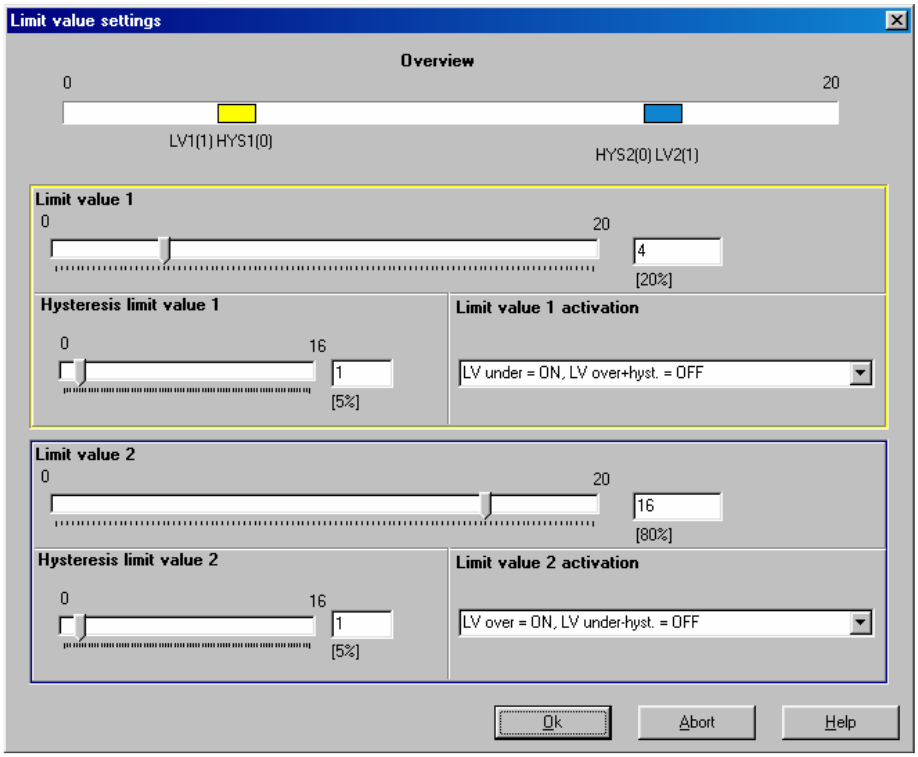


If the measured values are to be output in 8-bit form an output value between 0 and 255 for the minimum and maximum values can be entered in each case. However, the minimum output value must be lower than the maximum output value.

6.2 Limit values and hysteresis

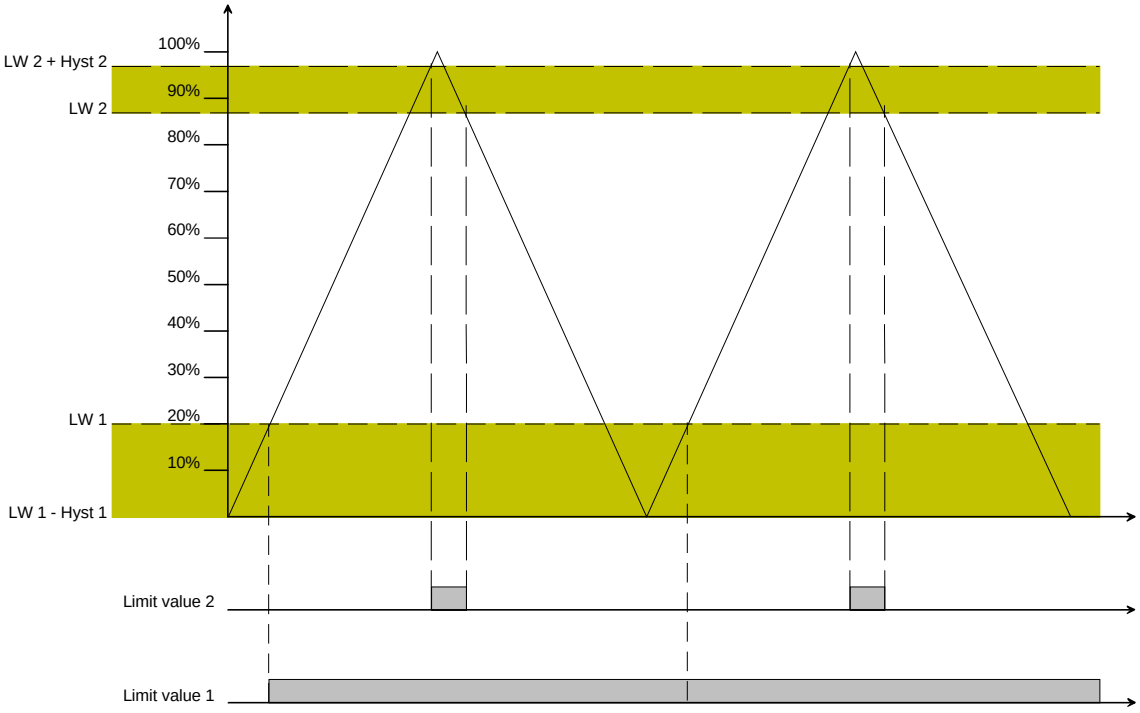
The weather station has two limits for each analog value. For each value, a hysteresis can be set and the response defined when the values are exceeded or underrun.

In the following dialog, such values can be set either by sliders or in numerical form. In this connection, the "Overview" box will show a graphical representation of the response selected with reference to the currently defined measuring range.



When setting the limit value or the hysteresis with the sliders, the software prevents leaving the limits of the measuring range. However, the two limit values or the hysteresis may reach the right or left limits of the setting ranges. If this should happen it will not be possible to go below the limit on the left or exceed the limit on the right.

Example:



In this example, limit value 2 has a sufficient distance to the maximum value of the measuring range. However, for limit value 1 the hysteresis is getting into contact with the minimum value of the 0 % measuring range. In this case, the object value needs to be changed not more than once. Then it will remain constant.

6.3 External limit values

If the limit values are to remain adjustable while the building installation is in operation the "External limit value …" communication objects can be enabled. These communication objects are capable of processing either 1-byte or 2-byte values and can, for example, be connected with external push sensors to act as value transmitters.

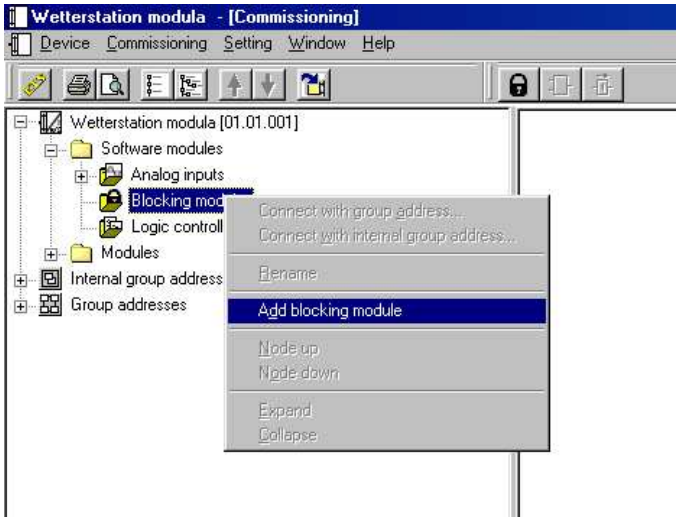
The information in the "Limit value settings" dialog can serve as clues for the parameterization of such value transmitters. In this connection, the setting range should be restricted in such a way that a 1 % safety distance to each range limit will remain.

Important: Any external value will overwrite the internal one. The original internal value will only be re-activated after a new application download by the ETS. Reading out the object values will only be correct if some value has been written into the objects via the bus at least once after a reset.

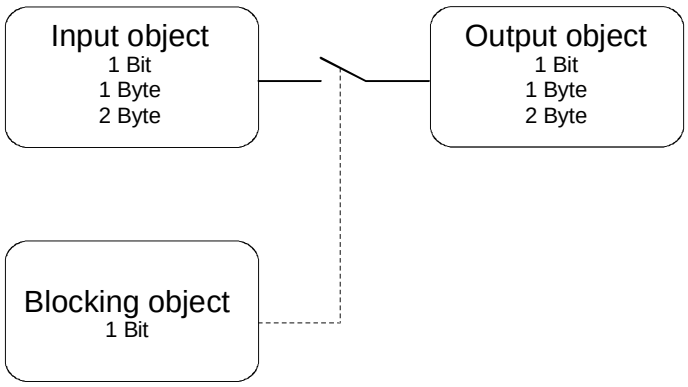
6.4 Blocking modules

The device software has up to 16 blocking modules, the actually useful number depending on the configuration of the device, since a maximum of 200 communication objects are available for the whole device.

To be able to use a blocking module select the "Software modules -> Blocking modules" option in the tree structure shown in the configuration window. Here, a new blocking module can be added.



Blocking modules consist of an input object, an output object and of a blocking object. In the device software they act like a lock. Depending on the value of the blocking object, the value of the input object will be passed on to the output object in unchanged form, or be blocked.



The blocking object is a 1-bit communication object, its behaviour (block at 0, block at 1) and its status being selectable upon initialization.

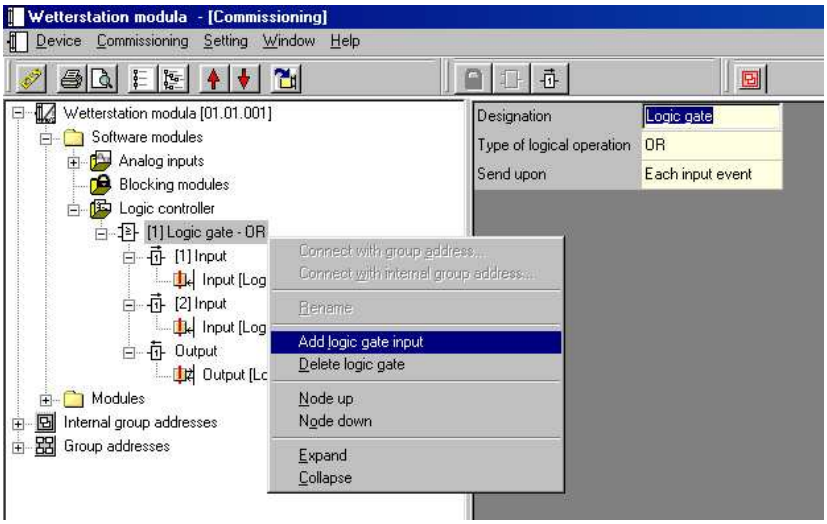
If the value of the input is being changed during a blocking period the output will send this value once the blocking is being cancelled.

In the configuration, a name can be assigned to each blocking module. Such name will then be used in the three communication objects as a part of the object name. This helps to improve documentation and also will make easier further configuration work.

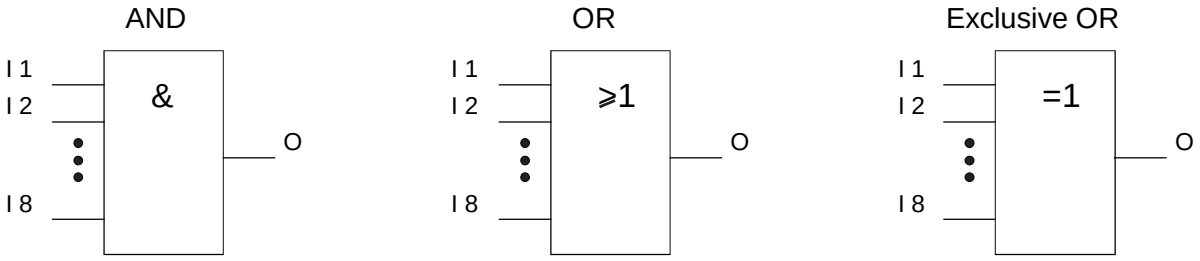
6.5 Logic controller

The device software has up to 20 logic controllers, the actually useful number depending on the configuration of the device, since a maximum of 200 communication objects are available for the whole device.

To be able to use a logic gate select the "Software modules -> Logic controller" option in the tree structure shown in the configuration window. Here, a new logic gate can be added. After selecting a gate, further inputs can be added. Each gate can have up to eight inputs.



For each logic gate, the type of logic operation (AND, OR, exclusive OR) which will then also be shown in the tree structure can be set. In addition, each input and the output can be used in its normal or in inverted form.



Thus, the following combinations will result for three inputs with or without an inverted output:

Inputs			Output					
1	2	3	AND	OR	Excl.-OR	NAND	NOR	Non-excl.-OR
0	0	0	0	0	0	1	1	1
0	0	1	0	1	1	1	0	0
0	1	0	0	1	1	1	0	0
0	1	1	0	1	0	1	0	1
1	0	0	0	1	1	1	0	0
1	0	1	0	1	0	1	0	1
1	1	0	0	1	0	1	0	1
1	1	1	1	1	1	0	0	0

The transmitting behaviour of the gate/output can be influenced in different ways:

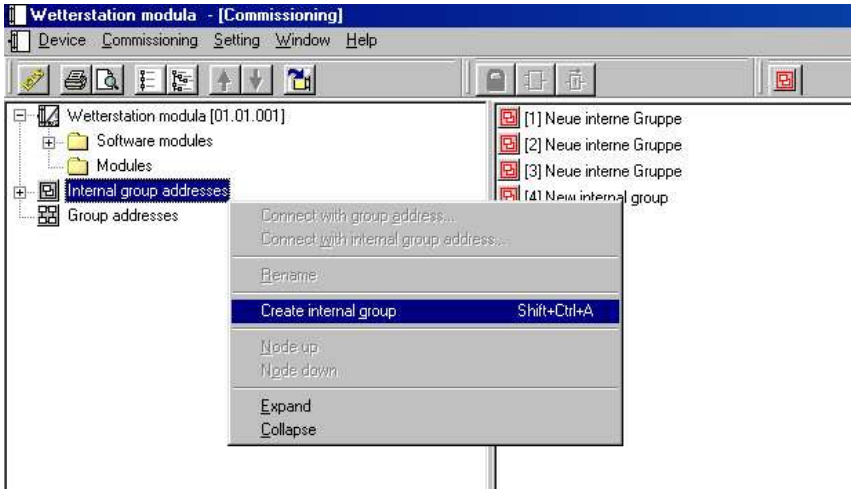
- Having been set to "Output change", the "Transmit upon" parameter of the gate will allow for a reduction of the bus load. If the result of the logic operation is, for example, time-monitored in a shutter/blind actuator it may make sense that the output sends a telegram upon each input event.
- Switch-on delay/switch-off delay: No telegram/delay ON/no delay. The two parameters "Switch-on delay" or "Switch-off delay" of the gate output can block or delay output telegrams having the value of "1" or "0" (no telegram). In such case, the "Base" and "Factor" parameters will be shown. The delay times will be re-started by new input telegrams.
- By the "Output cyclic sending (x 10 s)" parameter, the output can repeat the telegrams at regular intervals, even though their values do not change. Basic setting "0" of this parameter means that the output will not repeat the telegrams. A maximum cycle time of 20 minutes (120 x 10 s) can be preset.

For more complex functions, several logic gates can be combined. If this should result in any feedback effects, i. e. connection of an output with an input of the same gate (possibly also through other logic gates or blocking modules) it will not be prevented by the configuration software. The other device functions will not be disturbed thereby. As such feedbacks can lead to a huge number of telegrams, appropriate switch-on or switch-off delays should be set in this case.

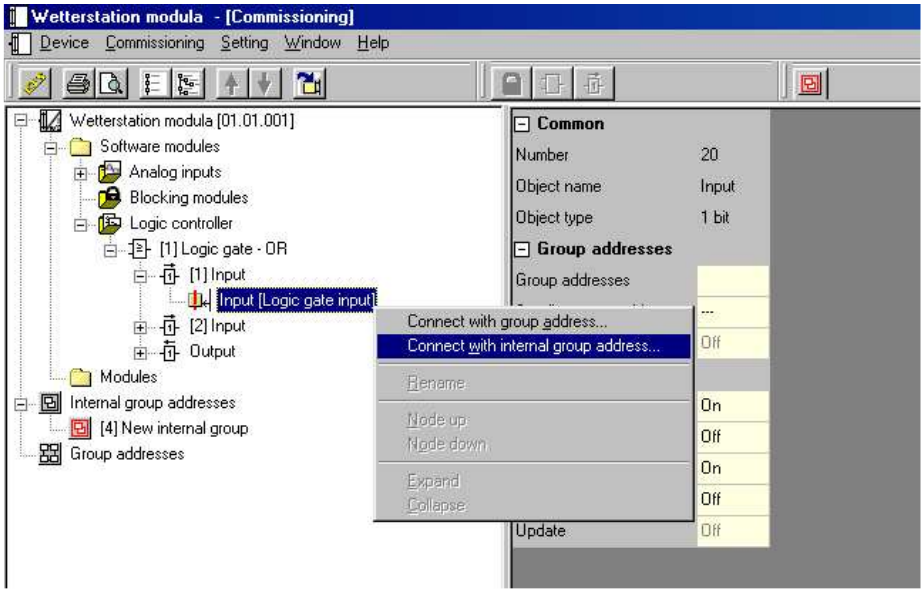
Normally, a logic operation will only be evaluated upon the reception of an incoming telegram. If there is a feedback with a cyclically sending output it may happen that the device will send telegrams on its own after the application has been loaded, or after a reset. Especially in such case, switch-on or switch-off delays will make sense.

6.6 Group addresses/internal group addresses

When being started, the plug-in takes all the currently defined group addresses from the ETS and shows them in the tree structure. In addition, the plug-in can use "internal group addresses" which are not sent to the bus. From the shortcut menu, internal group addresses can be created.



Group addresses and internal group addresses can be connected with the communication objects in the same way by "drag and drop" using the mouse, or from the shortcut menu. If want to create a connection is to be created from the shortcut menu, a dialog box will open where a group address can be entered.



The use of internal group addresses will make sense if, for example, it is intended to combine two limit values into a logic operation, with only the result of such operation being processed by a different device.

7. Automatic Shading

Shading control with automatic readjustment of the shutter/blind slats offers the optimized utilization of the natural daylight, avoiding extreme dazzling at the same time.

The automatic shading control function is based on the calculated position of the sun which, for the human observer, moves from east over south to west during the course of the day. In this connection, the path of the sun is very flat in winter and very steep in summer.

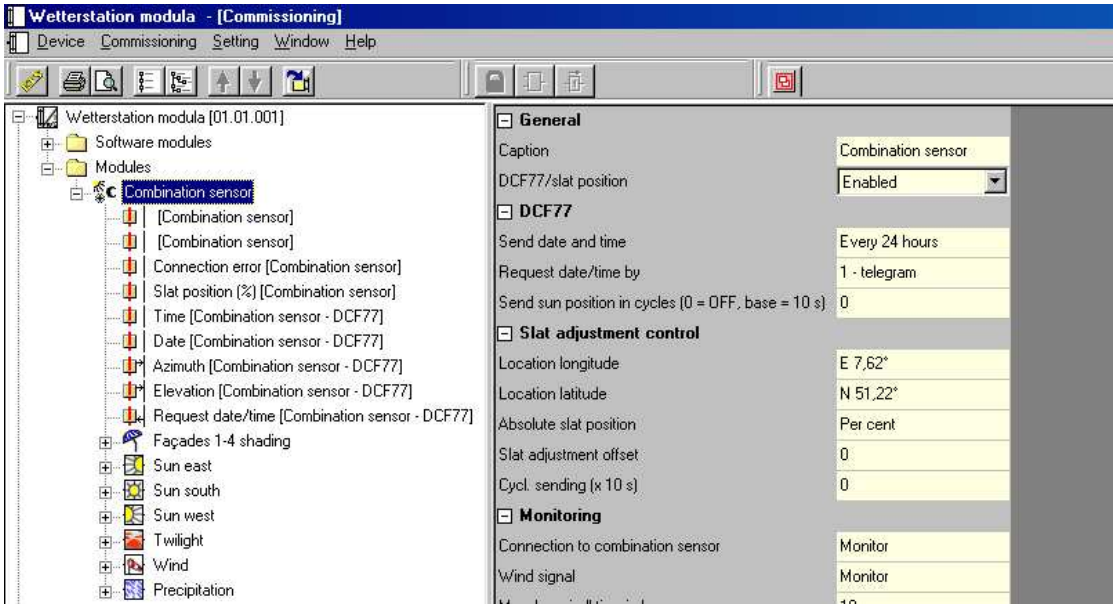
Also, information on the building is required.

Automatic readjustment of the shutter/blind slats will only be possible in connection with the DCF-reception combination sensor.

The shutter/blind actuators must facilitate slat positioning through a 1-byte communication object.

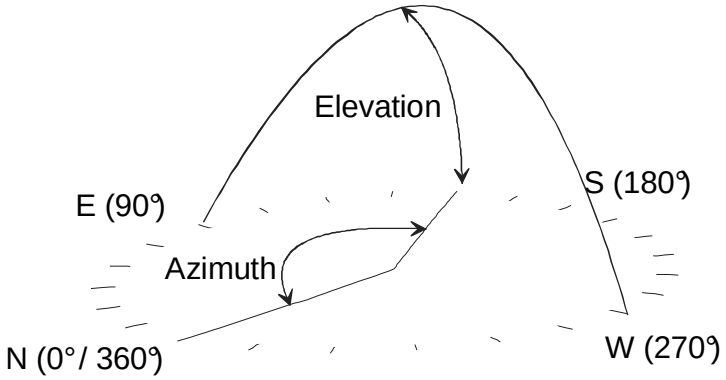
7.1 Calculating the sun position

The weather station calculates the position of the sun from the geographical position of the building as well as from the current time and the current date.

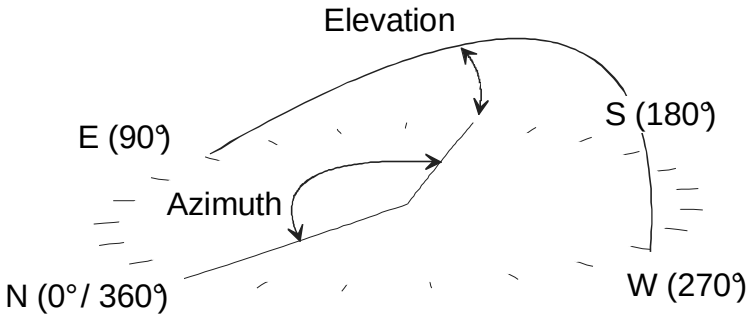


The geographical position can be entered within the framework of the configuration work. For this purpose, either the exact coordinates of the building are available, or a neighbouring German town or city can be selected from the list. To get the correct time the weather station uses the DCF77 receiver of the combination sensor. From these values, the weather station can calculate the correct sun position.

Steep path of the sun in summer.



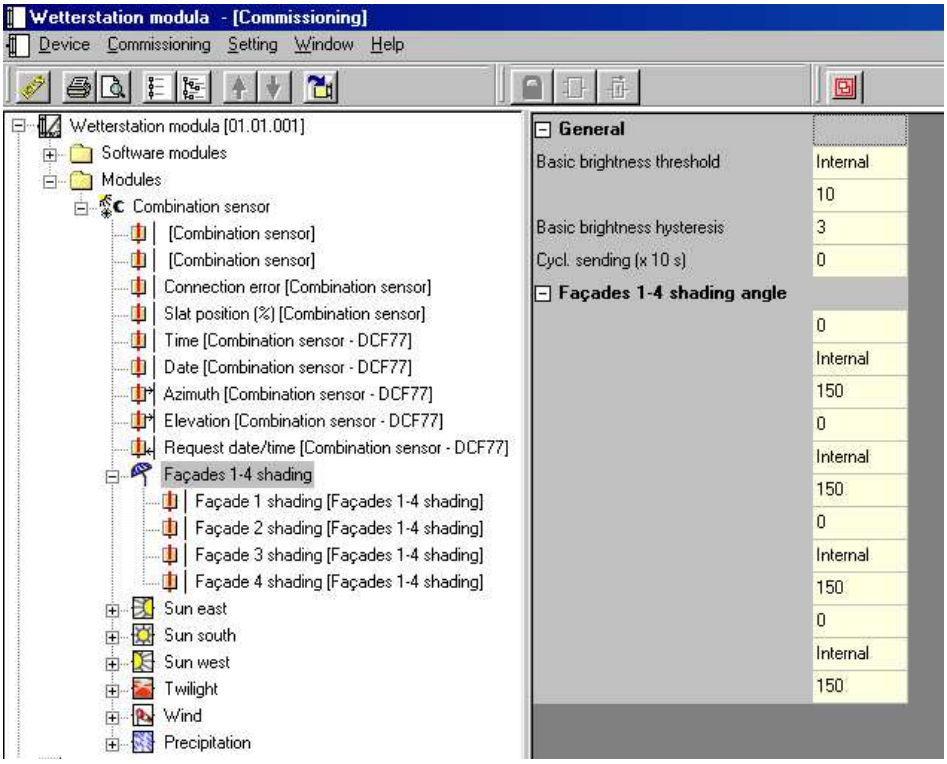
Flat path of the sun in winter.



From the viewpoint of the observer, the sun's position is described by two angles. The azimuth defines the angle between the geograsphical north direction and a vertical circle through the centre of the sun. The elevation (sun height) defines the angle between the horizon and the sun's centre.

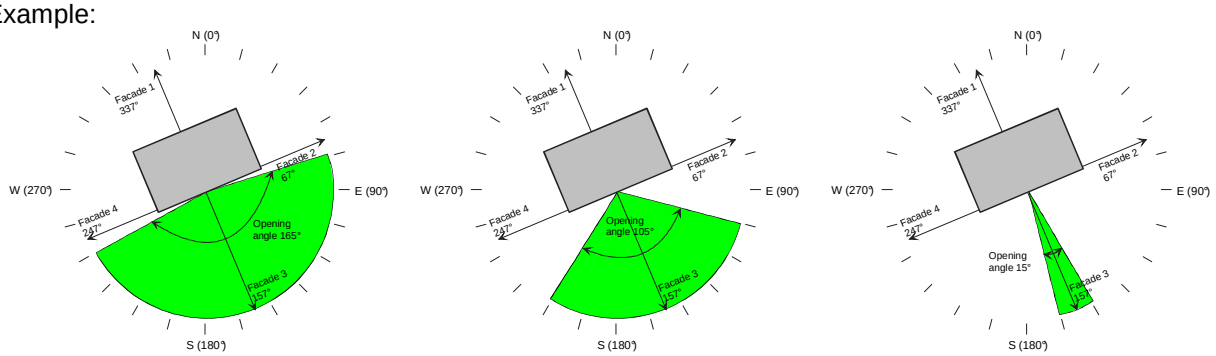
7.2 Building orientation

The automatic shading control starts at the moment when at least one of the three brightness sensors indicates that the illuminance has exceeded the selectable threshold.



To enable the weather station to determine for which of the up to four façades of the building shading is necessary the orientation and the opening angle are still required for each façade.

Example:



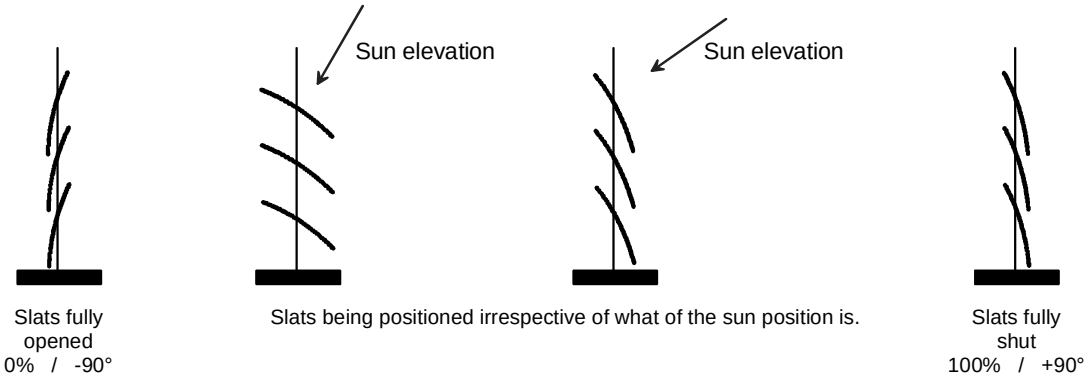
The orientation of the façades are determined by the direction of a vertical line projected onto each façade. Such orientation data can, for example, be obtained from the construction documents.

The opening angle determines in what range the sun azimuth must be so that disturbing dazzling can occur. Entering a value of 180°means, that as soon as the sun just begins to shine through the windows of this façade, the shutters/blinds of this façade will be moved down. If an opening angle of 1°has been ente red, the azimuth must virtually be vertical to the façade. It is possible either to set a fixed opening angle, or to vary it in operation by an external value transmitter. In such case, the external opening angle will overwrite the parameterized value.

7.3 Shutter/blind control

As already described in the previous sections, the weather station will send a 1-bit telegram with the value of "1" for each façade if the brightness threshold has been exceeded and the sun azimuth is within the opening angle of the façade. This "Façade … shading" communication object will be linked up with the "Long-time operation" objects of the shutter/blind actuators for this façade.

Thus, the shutters/blinds of this façade can be moved down. To enable all shutter/blind drives to really reach their bottom end position the slats will be positioned only after some waiting time.



The positioning of the slats depends on the elevation of the sun. To obtain optimum protection from dazzling the slats must be adjusted vertically to the falling sunlight. For adaptation to different actuators, slat positioning can be effected either with percentage values or by angular data. In this connection, an offset can be selected for adaptation to different slat curtain materials.

As long as the sun radiation is above the parameterized "Basic brightness for shading" value, the slat positioning telegrams will be sent in cycles. For most of the shutters/blinds, slat readjustment is effected by short-time moving of the slat curtain. This is normally in connection with a clearly audible jerk. For this reason, the slat positioning cycle time should not be selected too short.

8. Protection of Awnings and Outer Blinds

Awnings and externally installed blinds are endangered by the weather conditions. Normally, two aspects are taken into consideration in this connection.

1. Excessively high winds could damage the curtains.
2. When the curtains are wet they could freeze under frost conditions. So they could get damaged during the next positioning event.

Under what weather conditions an external blind or an awning can get damaged depends on its design and on its proper installation. Detailed information can be obtained from their respective manufacturers.

8.1 Wind speed

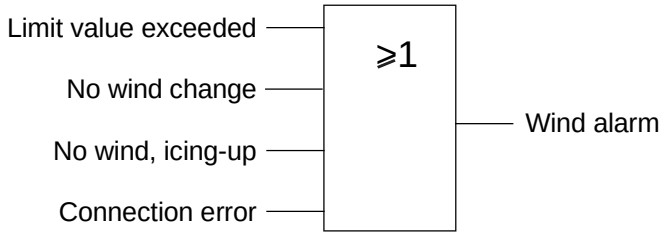
The wind speed is normally defined in metres per second or in kilometres per hour. Since 1806, a classification of wind force levels established by Sir Francis Beaufort is existing. For this reason, the unit of wind intensity has been named after him. The unit is abbreviated as "bft".

The following table provides an overview of the different wind force levels:

bft	m/s	km/h	Name of wind	Description
0	0.0 … 0.4	0.0 … 1.8	Calm	Calm; smoke rises vertically.
1	0.5 … 2.0	1.9 … 7.3	Light Air	Direction of wind shown by smoke drift, but not by wind vanes.
2	2.1 … 3.5	7.4 … 12.9	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind.
3	3.6 … 5.6	13.0 … 20.3	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag.
4	5.7 … 8.1	20.4 … 29.5	Moderate Breeze	Raises dust and loose paper; small branches are moved.
5	8.2 … 11.2	29.6 … 40.6	Fresh Breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	11.3 … 14.3	40.7 … 51.8	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	14.4 … 17.4	51.9 … 63.8	Near Gale	Whole trees in motion; inconvenience felt when walking against the wind.
8	17.5 … 21.0	63.9 … 75.8	Gale	Breaks twigs off trees; generally impedes progress.
9	21.1 … 24.6	75.9 … 88.8	Severe Gale	Slight structural damage occurs (chimney-pots and slates removed).
10	24.7 … 28.7	88.9 … 103.6	Storm	Seldom experienced inland; trees up-rooted; considerable structural damage occurs.
11	28.8 … 32.8	103.7 … 118.4	Violent Storm	Very rarely experienced; accompanied by wide-spread damage
12	More than 32.9	More than 118.5	Hurricane	Massive and widespread damage to structures.

To monitor the wind, the weather station can be used either in connection with a separate wind sensor or with the combination sensor. For large buildings or nested ground plans, it may make sense to combine several sensors since the same wind speed will possibly not occur in all places.

In addition to pure wind speed measurements, the combination sensor offers the advantage that the weather station will be enabled to monitor the connection with the combination sensor and to check the information from the latter for plausibility.

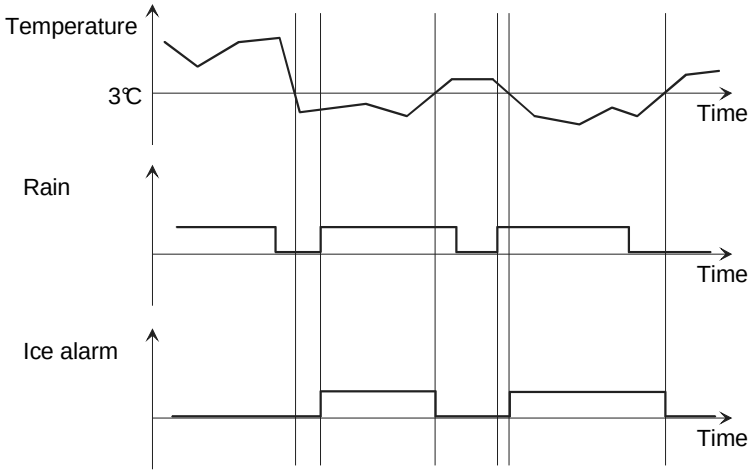


The result of this internal logic OR operation can now be connected to the safety communication objects of the corresponding shutter/blind actuators.

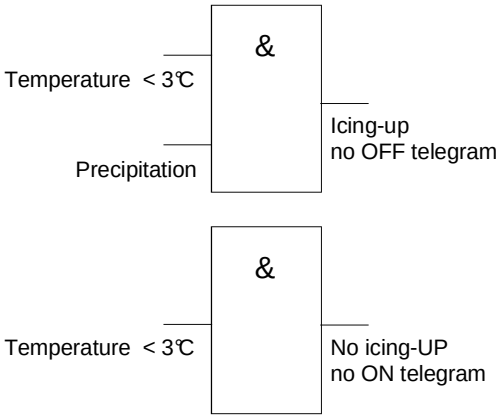
8.2 Frost protection

To protect awnings, external blinds or other frost-sensitive curtains from icing up, two influence quanitites must be considered.

Curtains at risk should be drawn in when the temperature drops below about 3 ℃ and when precipitation occurs. Even if the precipitation stops, the risk of icing up will only be over when the temperature climbs above the limit value.



To accomplish this task, two logic gates can be combined in the following way:



- The first gate is a logic AND operation of the two signals "Temperature below 3 ℃" and "Precipitation". In this connection, set the output so that it will send the switch-on telegram, thus setting the alarm status. If the rain ceases the curtains should, however, not be moved out before the temperature is again above 3 ℃. For this reason, the output of the first gate will send no switch-off telegram.
- The second gate serves to stop the ise alarm. It only has one input and does not send any switch-on telegrams.

The temperature limit can be monitored by a temperature sensor connected to an analog input. A temperature variation of say 2 Kelvin (corresponding to 2 % for the pre-configured temperature sensor) should be used as hysteresis. The precipitation can be monitored either by the rain sensor of the combination sensor device or by a separate rain sensor connected to an analog input. Unless the two pieces of information "Temperature < 3 ℃" and "Precipitation " are used by other devices, the connections with the inputs of the gates can be established as "internal group addresses".

9. Getting Started

The weather station can be programmed with the ETS with the installed plug-in.

9.1 Initialization/status indications

After the first start, the weather station will run a module scan (status LED: "orange/ON"). Since a new device does not include any configuration by default the status LED will then change to "red/ quickly flashing".

A connected analog input module will indicate readiness for operation by changing its status LED to "quickly flashing".

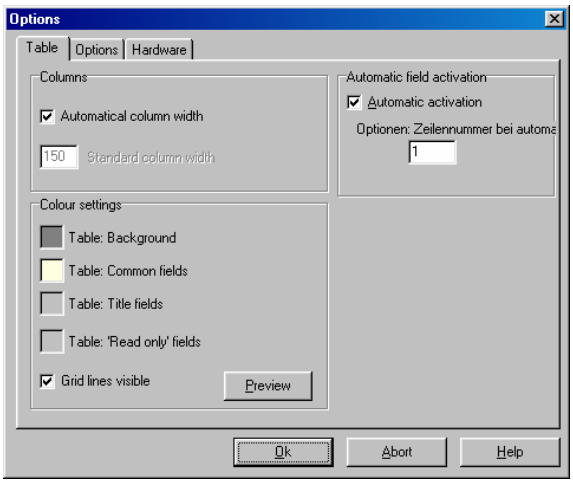
A combination sensor which has not yet been logged into the weather station will indicate readiness for operation by two short tones recurring every 5 s. In this state, the combination sensor can already be logged in and the antenna aligned (refer to the combination sensor Operating Instructions).

After loading a project into the weather station the status LED will change to "green/ON". The extension module will switch off its status LED.

9.2 Plug-in options

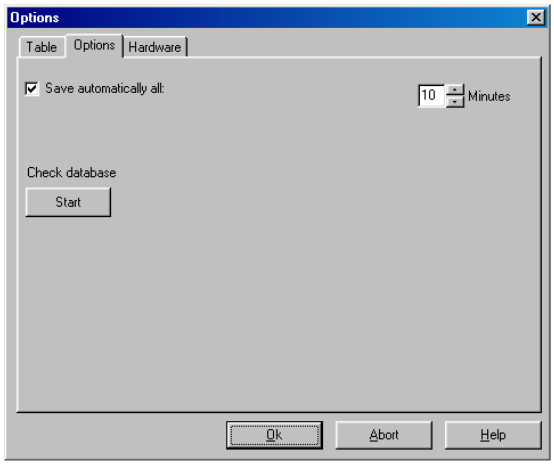
The weather station can be configured by means of a plug-in to be called from the ETS. This plug-in provides various options.

9.2.1 Table



On the "Table" tab, various options concerning the appearance of the tables on the right of the window can be set. These can be changed in acc. with personal requirements.

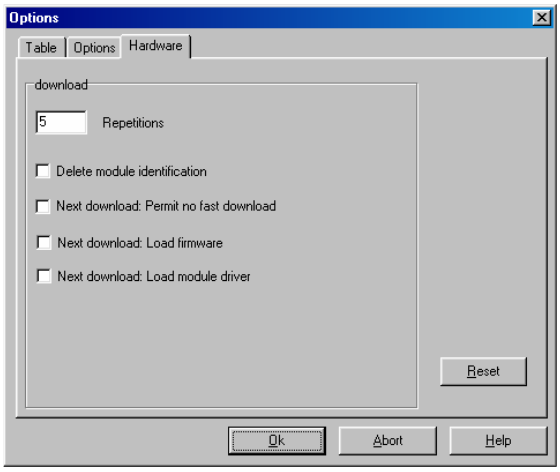
9.2.2 Options



The "Options" tab can be used to specify at what intervals the plug-in is to to save changed data.

In addition, the saved data can be checked for internal conflicts or other errors.

9.2.3 Hardware



The "Hardware" tab can be used to set four different options which will come into effect when the application software is being loaded into the weather station. In principle, it should not become necessary to activate these options. If any problems should occur during the start-up they can possibly be solved by the following options.

Deleting a module ID:

If the weather station works in conjunction with a digital combination sensor it must be logged into the weather station one single time by means of the programming magnet. By this procedure, the combination sensor will tell the weather station its unambiguous module ID. If a defective combination sensor has to be replaced by a new device, the module ID of the previous sensor will be overwritten by the ID of the new one when the latter is being logged in. After activating this option, the combination sensor must be logged in once again.

No fast download:

During the start-up, the PC will first determine what data have been currently loaded into the weather station. To keep the programming time as short as possible, only the changed data will then be transferred. By means of this option, the entire application without any optimization will be loaded. This will possibly prolong the start-up time considerably.

Firmware download/module driver download:

These two software components are always downloaded into the devices at their manufacturing stage. Within the scope of a later version of the plug-in, later versions will possibly be provided. In such case, the start-up software should automatically recognize that a different version has been downloaded into the device and issue a corresponding message. If these two options are actuated manually, the two software components will be downloaded into the device again. This will considerably prolong the start-up time.

Parameters		
Description	**Values**	**Comment**
Analog inputs software module		
Alarm message	**Do not send** Send as 1-bit object	If the weather station detects an error at one of the four analog inputs or in the power supply of the measuring sensors an alarm message can be sent. If the parameter has been set to "Send as 1-bit object" the "Alarm object" will be indicated.

Parameters		
Description	**Values**	**Comment**
Analog inputs/analog input 1 … 4 software module		
Sensor type	**No sensor** 0 … 10 V sensor 0 … 1 V sensor 0 … 20 mA sensor 4 … 20 mA sensor Wind sensor *) Brightness sensor *) Twilight sensor *) Temperature sensor *) Rain sensor *) Atm. pressure sensor *) Air humidity sensor *)	This parameter specifies whether a sensor and what sensor is connected to one of the inputs. For the general sensor types, the format and the scaling of the measured values can be defined afterwards. This is already pre-defined for the weather sensors *).
Send measured value upon 10 s transmit delay)	0.5 % measured-value difference 1% measured-value difference **3% measured-value difference** 10% measured-value difference	This parameter specifies at what difference to the previous object value a new measured value will be sent. For a 0 … 10 V sensor, a measured-value difference of 3 % corresponds to 0.3 V. If the last telegram contained the value of 4 V a new telegram will be sent when the current measured value is below 3.7 V or above 4.3 V.
Cycl. sending of the measured value (x 10 s)	**0** … 120	This parameter specifies the time after which the current measured value will be sent, even though the difference to the previous measured value has not been reached yet. For default setting "0", the measured value will not be sent in cycles.
Sensor type = wind		
Unit	m/s	This unit cannot be changed as the settings for this sensor have been preconfigured.
Sensor type = brightness		
Unit	lux	This unit cannot be changed as the settings for this sensor have been preconfigured.

Sensor type = twilight		
Unit	lux	This unit cannot be changed as the settings for this sensor have been pre-configured.

Sensor type = temperature		
Unit	°Celsius	This unit cannot be changed as the settings for this sensor have been pre-configured.
Sensor type = rain		
Output	**No precipitation = 0, precipitation = 1** No precipitation = 1, precipitation = 0	Compared with the other weather sensors, the rain sensor provides only two different status messages. This parameter specifies which object value will be sent when it is raining or when it is dry.
Sensor type = atmospheric pressure		
Unit	Pa	This unit cannot be changed as the settings for this sensor have been pre-configured.
Sensor type = air humidity		
Unit	%	This unit cannot be changed as the settings for this sensor have been pre-configured.
Sensor type = 0 … 10V, 0 … 1V, 0 …20 mA, 4 … 20 mA		
Measured-value format	**16-bit value** 8-bit value	This parameter specifies the format of the measured values of the analog sensors to be transmitted. The choice depends on what other devices the information is to be further processed in. The "16-bit" choice always offers higher resolution if, for example, the values are to be displayed by a visualization software.
Measured-value format = 16-bit		
Base value 0% of the measured value Base value 100% of the measured value Measuring range factor	-32768 … (**0**) … 32767 -32768 … (**1000**) … 32767 **Measuring range x 0.01** Measuring range x 0.1 Measuring range x 1 Measuring range x 10 Measuring range x 100	With the aid of the three parameters "Base value 0 %", "Base value 100 %" and "Measuring range factor", the weather station can convert the analog input signal to the real measuring range of the measuring sensor used. To obtain a high resolution, the two base values should be set so as to sufficiently cover the measuring range of the sensor with a factor as small as possible.
Measured-value format = 8-bit		
Base value 0% of the measured value Base value 100% of the measured value	**0** … 255 0 … **255**	Using these two parameters, the weather station can convert the analog input signal to the value range of the 1-byte communication object.

Sensor type = no rain sensor		
Limit value 1, 2 Limit value 1, 2 hysteresis Limit value 1, 2 activation	0 … 100 % 0 … 100 % **LV over = ON,** **LV hyst. under = OFF** LV over = OFF LV hyst. under = ON LV under = ON, LV hyst. over = OFF LV under = OFF, LV hyst. over = ON	With the aid of these three parameters, the thresholds are defined where corresponding switching telegrams will be sent when those thresholds are exceeded or underrun. For these settings, a separate dialog is available where sliders or input fields can be used to define the limit values and hystereses. For better overview, the values set will also be graphically represented.
External limit value 1, 2	**No** 16-bit value 8-bit value	This parameter enables either a 2-byte or a 1-byte object through which the limit value can be changed in operation.
Sensor type = 4 … 20 mA		
Open-circuit monitoring	Yes **No**	When a 4 … 20 mA output sensor is in use, this parameter will allow a message to be issued if the electrical connection is interrupted. A 1-bit communication object will then be enabled for this purpose.

Parameters		
Description	**Values**	**Comment**
Blocking module		
Name	**Blocking module**	Enter into your project an internal name, for example, indicating the function of the blocking module. This text will then appear in the tree structure in the left part of the window and in the communication objects in the ETS.
Blocking module response	Blocking upon 1-telegram **Blocking upon 0-telegram**	This parameter specifies at which value of the blocking object the values of the input will be passed on to the output object.
Blocking response upon initialization	**Enabled** Disabled	This parameter specifies whether the blocking module will be enabled or disabled upon initialization (voltage recovery, new programming).
Input/output object type	**Switching – 1-bit** Value – 2-byte Rel. value – 1 byte	This parameter specifies the type of the input and output objects. Both objects will always be of the same type.

Parameters		
Description	**Values**	**Comment**
Logic controller		
Name	**Logic gate**	Enter into your project an internal name, for example, indicating the function of the gate. This text will then appear in the tree structure in the left part of the window.
Type of operation	AND **OR** Exclusive OR	This parameter specifies at which value of the blocking object the values of the input will be passed on to the output object.
Transmit upon	**each input event** change of the output	This parameter specifies whether the blocking module will be enabled or disabled upon initialization (voltage recovery, new programming).

Parameters		
Description	**Values**	**Comment**
Logic controller, input		
Name	**Input**	Enter into your project an internal name, for example, indicating the function of the input object. This text will then appear in the tree structure in the left part of the window and in the communication objects in the ETS.
Input behaviour	Normal Inverted	This parameter specifies whether the value of the input object will be inverted or not before the logic operation.

Parameters		
Description	**Values**	**Comment**
Logic controller, output		
Name	Output	Enter into your project an internal name, for example, indicating the function of the output object. This text will then appear in the tree structure in the left part of the window and in the communication objects in the ETS.
Output behaviour	Normal Inverted	This parameter specifies whether the value of the output object will be inverted or not before the logic operation.
Switch-on delay	No telegram Delay ON **No delay**	This parameter can block (no telegram) or delay output telegrams having the value of "1". In this case, the following two parameters will be shown.
Base switch-on delay	**100 ms** 1 s 1 min	In conjunction with the following "Factor" parameter, this parameter defines the delay time.

Factor switch-on delay	0 … **10** … 100	In conjunction with the previous "Base" parameter, this parameter defines the delay time.
Switch-off delay	No telegram Delay ON **No delay**	This parameter can block (no telegram) or delay output telegrams having the value of "0". In this case, the following two parameters will be shown.
Base switch-off delay	**100 ms** 1 s 1 min	In conjunction with the following "Factor" parameter, this parameter defines the delay time.
Factor switch-off delay	0 … **10** … 100	In conjunction with the previous "Base" parameter, this parameter defines the delay time.
Output cyclic sending (x 10 s)	**0** … 120	This parameter specifies whether and how often the output telegrams will be send in cycles.

Parameters		
Description	**Values**	**Comment**
Combination sensor		
Name	**Combination sensor**	No selectable parameter.
DCF77/slat position	Enabled **Disabled**	If a combination sensor with a built-in DCF77 receiver is used, this parameter can be set to "Enabled". In addition to the transmission of the time, this will facilitate the calculation of the current sun position, thus automatically readjusting shutter/blind slats to provide shading. If a combination sensor which has no DCF77 receiver is used, please set this parameter to "Disabled".
DCF77/slat position = enabled		
Send date and time	Do not send only when requested every minute every hour **every 24 hours**	The sending of the DCF77 time information can either be entirely deactivated, only be requested through a separate telegram, or take place in cycles. Even though the time information is normally sent in cycles, it can also be requested at any other time. In such case, the weather station will wait until the next DCF time signal comes in and then send the time and the date. To avoid the sending of invalid information, do not set the R-flags of the communication objects.
Request date/time by	0-telegram **1-telegram**	This parameter specifies by which object value the date and the time are to be requested.
Send sun position in cycles (0= OFF, base 10 s)	**0** … 255	If desired, the weather station can send the current sun position (azimuth and elevation) in cycles. The selectable values of 0 … 255 correspond to 0 … 2550 s or 0 … 42 min.
Location longitude	**E 7.62°**	These two parameters will open a dialog box where the terrestrial position of the building location can be entered. The position can be entered in decimal degrees, in degrees and decimal minutes, or in degrees, minutes and seconds. Alternatively, a place from a list of German towns and cities can be selected.
Location latitude	**N 51.22°**	

Absolute slat position	**Per cent** degrees	Depending on the shutter/blind actuators in operation, percentage or degree values can be used for slat positioning.
Slat adjustment offset	**0**	
Cycl. sending (x 10 s)	**0** … 255	If needed, the weather station can send slat readjustment telegrams in cycles. The selectable values of 0 … 255 correspond to 0 … 2550 s or 0 … 42 min. Since the noise produced by the short-time starting and stopping of the motors for slat readjustment may possibly be disturbing, the cycle times selected should not be too short.
Connection to combination sensor	**Monitor** Do not monitor	The weather station can monitor the connection to the combination sensor. If a connection error is detected the "Connection error" communication object can send a telegram. Connection monitoring can be disabled, if necessary.
Wind signal	**Monitor** Do not monitor	In addition to monitoring the connection to the combination sensor, the weather station can determine whether the signals coming from this sensor are plausible. For this purpose, the weather station will check for what period the wind intensity remains unchanged and how long a possible calm period lasts. This plausibility check can be disabled, if necessary.
Max. "no wind" time in hours	**10**	If the wind sensor does not detect any wind for a time longer than the preset value, the weather station will interpret such situation as an error (e. g. icing up, mechanical malfunctioning) and send a corresponding telegram.
Max. "wind unchanged" time in hours	**10**	If the wind sensor does not detect any change of the wind intensity for a time longer than the preset value, the weather station will interpret such situation as an error and send a corresponding telegram.

DCF77 signal	Monitor **Do not monitor**	The combination sensor synchronizes after each reset or daily at 04:00 hrs. After successful synchronization, it internally reprocesses the time with an accuracy of 40 ppm (approx. 4 s/ 24 h) until the next synchronization on the following morning. If the synchronization was not successful the combination sensor will try to re-synchronize every hour. If this parameter has been set to "Monitor" the weather station will send an error message 5 minutes after an unsuccessful synchronization, with this message being repeated every 5 minutes.
Façades 1 – 4 shading Visible when DCF77/slat position = enabled		
Basic brightness threshold	**Internal** External	The shading function will become active when at least one of the three measured values of the internal brightess sensors exceeds the basic brightness threshold. If this parameter has been set to "External", the internal threshold (see next parameter) can be overwritten by an external value transmitter (e. g. touch sensor or visualization).
Shading basic brightness (lux * 1000)	**10**	This parameter specifies the threshold which must be exceeded to enable the shading function.
Basic brightness hysteresis	**3**	This parameter specifies the hysteresis for the basic brightness of the shading function.
Cycl. sending (x 10 s)	**0**	If desired, the weather station can send shading object telegrams in cycles. The selectable values of 0 … 255 correspond to 0 … 2550 s or 0 … 2 min.
Façades 1 – 4 shading angle		
Façade x orientation (°)	**0**	What direction does the building façade face? North: 0° East: 90° South: 180° West: 270°
Opening angle towards sun	**Internal** External	If this parameter has been set to "External", the internal opening angle (see next parameter) can be overwritten by an external value transmitter (e. g. touch sensor or visualization).

Opening angle in °for façade x	**150**	When should the shading function for this façade be initiated. 0°: No shading 1°: When the sun is shining on the façade almost vertically. 150°: When the sun is shining on the façade at an angle more acute than 15°. 179°: As soon as the sun is hsining on the façade only at a mini-mum.
Sun east – refer to brightness analog input.		
Sun south – refer to brightness analog input.		
Sun west – refer to brightness analog input.		
Twilight – refer to twilight analog input.		
Wind – refer to wind analog input.		
Precipitation – refer to precipitation analog input.		
Analog input module – refer to analog inputs.		