Dual Sensor for Brightness and Temperature **AP 254/02**	**5WG1 254-3EY02**

Product and Applications Description

Functional description

The Dual Sensor AP 254/02 provides ambient light level and outdoor temperature values. These values can be sent onto the bus.

The device offers four universal channels (A, B, D, E) and one solar protection channel C, which evaluate light level and temperature for their configured function.

Each universal channel alternatively provides the following threshold switches for control of switching, dimming, and solar protection actuators based on ambient light level and/or temperature:

- threshold switch for light level
- threshold switch for temperature
- threshold switch for light level and temperature combined

Dependent on whether the threshold condition is met or not met a corresponding telegram is sent onto the bus via the associated channel object. Additionally, a second object can be activated as required to send a second telegram.

Each universal channel can be deactivated by an associated blocking object. For each universal channel if a light level threshold is applied it may be set to the current light level via an associated learning object.

Additionally, the device provides a solar protection channel C for automatic control of solar protection equipment. The automatic control can be started and stopped via an object (sun control) or via a dusk/dawn ambient light level threshold. Up to three light level thresholds control the position (height and angle of slats) of the solar protection blinds.

The light level thresholds may be set by sending a bus telegram to an associated learning object. The solar pro-

tection channel can be deactivated by an associated blocking object.

Function for blinds:
When threshold 1 is exceeded the blind is moved down via the first object (height) and the slats are moved into a first position via the second object.
When threshold 2 is exceeded the slats are moved into a second position. The height remains the same.
When threshold 3 is exceeded the slats are moved into a third position. The height remains the same.
When the light level falls below any threshold the blind is moved into the previous position and/or height. When the light level falls below threshold level 1 the blind is moved up.

Function for shutters / textile solar protection:
When threshold 1 is exceeded the shutter is moved down into a first position via the object "height".
When threshold 2 is exceeded the shutter is moved down into a second position via the object "height".
When threshold 3 is exceeded the shutter is moved down into a third position via the object "height".
When the light level falls below any threshold the blind is moved to the previous height. When the light level falls below threshold level 1 the blind is moved up.

While automatically controlling solar protection equipment fast changing sunshine conditions can lead to frequent up and down movements of the solar protection equipment. To avoid frequent up and down movement of the solar protection the parameter "Reaction to sun control ON" can be set to "move up & sun control once". The behaviour of the blinds and shutters changes as follows.

Function for blinds (singular automatic sun control):
When threshold 1 is exceeded the blind is moved down via the first object (height) and the slats are moved into a first position via the second object. The blind stays at this height all day long. The blind is moved only at dusk or via the object for automatic sun control. Only the slats are adjusted dependent on the current light level.
When threshold 2 is exceeded the slats are moved into a second position. The height remains the same.
When threshold 3 is exceeded the slats are moved into a third position. The height remains the same.
When the light level falls below any threshold the slats are moved into the previous position.

Function for shutters / textile solar protection (singular automatic sun control):
When threshold 1 is exceeded the shutter is moved down via the object (height).
When threshold 2 is exceeded the shutter is moved into a second position via the object (height).
When threshold 3 is exceeded the shutter is moved into a third position via the object (height).

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When the light level falls below any threshold no telegram is sent. The brighter it gets the further down the shutter is moved. It is only moved up at dusk or when the automatic sun control is turned off. All other movements of the shutters are initiated by the user.

Note

Always a telegram (move up, move down) is sent when the day starts or ends, as a dusk threshold may be crossed or a sun protection telegram is received. This telegram is sent in the evening even if threshold 1 was not exceeded during the day.

The device allows setting or reading the brightness threshold levels for channels A to E at run-time, i.e. without ETS. The current brightness threshold levels are annunciated via object 40 "Brightness thresholds".
After a download of the application program all brightness thresholds are automatically sent. The brightness thresholds are sent in the same sequence as they appear in the application program in ETS.

Channel	Threshold	Comment
1	Brightness	*only, if the channel has been configured as brightness sensor or as universal channel*
2	Brightness	
3	Dusk threshold	*is always sent*
	Brightness threshold 1	*is always sent*
	Brightness threshold 2	*only if two or three thresholds were configured (Parameter: „How many brightness thresholds?")*
	Brightness threshold 3	
4	Brightness	*only, if the channel has been configured as brightness sensor or as universal channel*
5	Brightness	

Thresholds that are not active are not sent (e.g. brightness threshold 3 if channel C is configured for two thresholds only).
Sending any value between 0 and 127 respectively between 132 and 255 to the set brightness threshold object triggers the device to send the current brightness threshold values.

Note

As the encoding precision of a 2-Byte value (EIS 5) is limited values are rounded up or down. Because of this a e.g. value of 10,000 lux may be displayed as 9,999.36 ($4FA1) or as 10,004.48 ($4FA2).

Brightness thresholds may be set during operation via the teach-in objects of the channels.
If the value 128 is received via the teach-in object of channels A, B, C, D, or E the currently measured brightness value is saved thus replacing by the previously configured value.
The threshold behaviour "above XY lux" or "below XY lux" configured with ETS remains. The lower boundary for the brightness threshold of channels A, B, C, D, and E is 2 lux. The upper boundary is 90,000 lux.
The newly saved value of the brightness threshold is sent onto the bus via object 40 thus confirming that the threshold has been successfully set.
The solar protection channel C offers a dusk / dawn threshold and up to three additional thresholds for controlling the solar protection. The teach-in codes for these thresholds are listed in the following table.

learning code		Threshold	lower limit	upper limit
Hex.	Dec.			
$80	128	dusk / dawn threshold	2 lx	500 lx
$81	129	threshold 1	2 klx	60 klx
$82	130	threshold 2	6 klx	70 klx
$83	131	threshold 3	10 klx	80 klx

The newly saved values of the thresholds are sent onto the bus via object 40 thus confirming that the thresholds have been successfully set.

The brightness thresholds of the solar protection channel C must be spaced 4,000 lux apart from each other, thus fulfilling these conditions:
threshold 1 + 4,000 lux < threshold 2
threshold 2 + 4,000 lux < threshold 3

If one of these conditions is not met during teach-in the device corrects the thresholds according to these rules.
The last threshold set by teach-in determines the value of the other thresholds if the difference is too low.
If the teach-in value of threshold 3 is lower than the value of threshold 2 then thresholds 1 and 2 are decreased.
If the teach-in values for thresholds 1 to 3 would be below the lower limits then those lower limit values are used.
If the teach-in value for the dusk / dawn threshold would be above the upper limit then the upper limit value is used.
The device also corrects thresholds that were improperly set with ETS. If the gap between thresholds is too small threshold 1 is taken as the reference. The other thresholds are corrected with a gap of 4,000 lux between them.

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Application programs

21 S2 Brightness and Temperature 909712
− Send temperature value / brightness value cyclically and / or on change
− Each threshold can be set separately
− Closed loop control of illumination light level to a pre-set value
− Up to four shading systems can be controlled based on combined temperature and light level values
− Automatic solar protection control based on dusk/dawn threshold and up to three additional brightness thresholds
− The current light level can be used to set any of the brightness thresholds

Application examples

The Dual Sensor AP 254/02 is suitable for these applications:

− Multi-staged lighting controls
− Temperature controls e.g. control of electric band heaters for frost protection
− Awnings / blinds / shutter controls
− Glass house controls
− Systems with visualization of light level and outdoor temperature

Technical Specifications

Power supply
Via bus line
Power consumption: < 150 mW

Measurement range:
− Light level: 1 ... 100 000 Lux, ± 5 Lux resp. ± 20%
− Temperature: -30 ... 60°C, ± 1 Grad resp. ± 5%
The higher value of tolerance is applicable.

Aperture
horizontal +/- 60°
vertical –35° ... + 66,5°

Control elements
1 learning button:
for switching between normal operating mode and addressing mode

Display elements
1 red LED:
for monitoring bus voltage and displaying mode selected with learning button

Connections
• Bus line: screwless bus connection block 0,6 ... 0,8 mm Ø single core

Physical specifications
• Polymer casing
• Dimensions: 110 x 72 x 54 mm (H x B x T)
• Weight: ca. 145 g
• Fire load: ca. 4100 KJ ± 10 %
• Installation: surface mounted

Electrical safety
• Fouling class (according to IEC 60664-1): 2
• Protection (according to DIN EN 60 529): IP 54
• Protection in mounted position: IP 54 with vertical mounting and applied protective cap
• Bus: safety extra low voltage SELV DC 24 V
• Device complies with: EN 50 090-2-2

Reliability
Failure rate: 441 fit at 40°C

Electromagnetic compatibility
Complies with EN 50090-2-2

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Environmental specifications
- Ambient temperature operating: -25°C ... +55°C
- Climatic conditions: EN 50090-2-2
- Ambient temperature non-operating: - 25°C ... +70° C
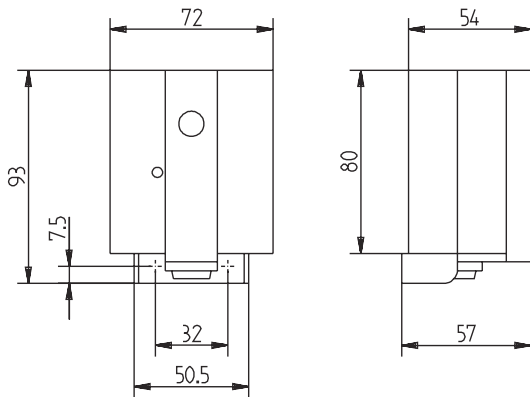- rel. humidity (non-condensing): 5 % to 93 %

Markings
EIB, KNX, CE

CE mark
complies with the EMC regulations (residential and functional buildings), and low voltage regulations

Dimension Diagram

Dimensions in mm

Installation Instructions

When determining the installation location consider:
- protecting the dual sensor from dust and grime. A dirty sensor inhibits the light level measurement.
- direct exposure of the sensor to sun light which will impact the temperature measurement.

⚠ WARNING

- The device must be mounted and commissioned by an authorized electrician.
- The prevailing safety and installation rules must be heeded.
- The device must not be opened. A device suspected faulty should be returned to the local Siemens office.

Mounting and Wiring

Warning:

Mount the Dual Sensor in a vertical position only!
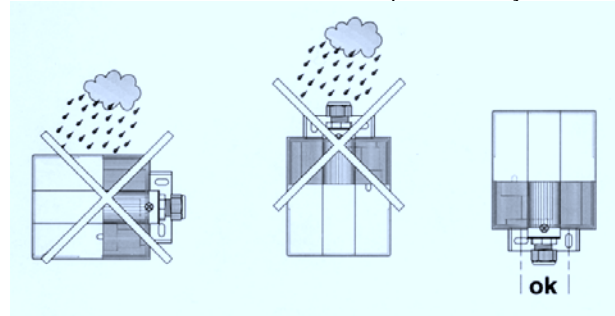
Consequences of false installation:
Moisture and/or dust can get into the device!
Device failure and short circuiting of the bus line are potential consequences.

Bus connection
- Untighten the screw for the protective cap.
- Remove the protective cap.
- Push the bus wire through the bushing into the bus connection block space.
- Watch the polarity (black on black; red on red) when connecting the bus wire to the bus connection block!
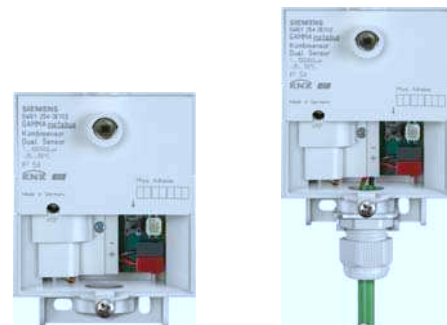- Push the bus connection block fully down.

Figure 1: Connection of bus line

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Mounting and maintenance of the protective cap

Mounting the protective cap
- Place the protective cap over the installed device
- Lock the cap by tightening the screw.

Maintenance of the protective cap
- Clean the protective cap regularly to avoid false readings of the light level due to dust and grime.
- Use a damp cloth.

Aperture and inclination of the sun

When installing the device south of the 47th latitude (Berne, Graz) it is beneficial to tilt the device upwards to compensate for the higher inclination of the sun.
During installation of the mounting bracket tilt the mounting bracket towards the mounting surface such that the distance between the upper edge of back of the device and the mounting surface (e.g. building wall) is 15 ... 17mm.
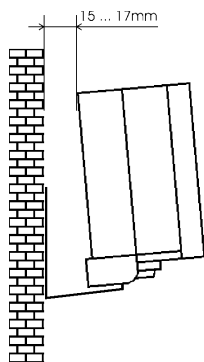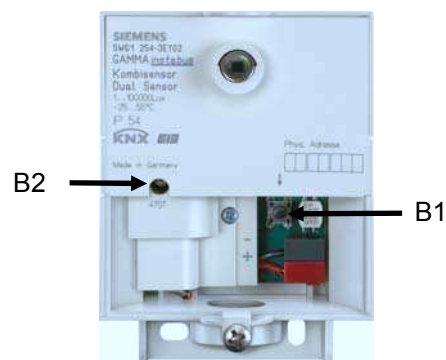
Operator Elements

Figure 2: Location of display and operator elements

B1   Learning button for switching between normal mode and addressing mode.
B2   LED for indicating normal operating mode (LED off) and addressing mode (LED flashes); upon receiving the physical address the device automatically returns to normal mode and the LED is turned off.

Assigning the Physical Address
- Press button (B1).
- LED (B2) flashes brighter.
- The Physical Address can now be assigned nun with the ETS and the application program can be loaded into the device.

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General Notes

- The operating instructions must be handed over to the client.
- Any faulty device should be returned to the local Siemens office.
- If you have further questions concerning the product please contact our technical support.
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  📰 www.siemens.com/automation/support-request

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