KNX PY

Global Irradiance Sensor

Item number 70157

elsner elektronik

Installation and Adjustment

Installation, inspection, commissioning and troubleshooting of the device must only be carried out by a competent electrician.

This manual is amended periodically and will be brought into line with new software releases. The change status (software version and date) can be found in the contents footer. If you have a device with a later software version, please check **www.elsner-elektronik.de** in the menu area "Service" to find out whether a more up-to-date version of the manual is available.

Clarification of signs used in this manual

Safety advice.

Safety advice for working on electrical connections, components, etc.

DANGER! ... indicates an immediately hazardous situation which will lead to death or severe injuries if it is not avoided.

WARNING! ... indicates a potentially hazardous situation which may lead to death or severe injuries if it is not avoided.

CAUTION! ... indicates a potentially hazardous situation which may lead to trivial or minor injuries if it is not avoided.

ATTENTION! ... indicates a situation which may lead to damage to property if it is not avoided.

ETS In the ETS tables, the parameter default settings are marked by underlining.

1. Description

The **Pyranometer KNX PY** measures global irradiance, which is perceived as heat. The measured current irradiance (watts per squaremetre) allows for drawing conclusions on the energy input to an area during a defined period of time (kilowatt hours per squaremetre). Both values can be read out by the **KNX PY**. Four switching outputs with adjustable threshold values as well as additional AND and OR logic gates are available.The sensor system, the evaluation electronics and the electronics of the bus connection are mounted in a compact housing.

Functions:

- **Measurement of global irradiance**: The current irradiance is measured (W/m^2). The energy input to an area during a defined period of time can be read out (kWh/m^2)
- **4 switching outputs** with adjustable threshold values (Threshold values can be set by parameter or via communication objects)
- **2 AND and 2 OR logic gates** with each 4 inputs. Every switching incident as well as 8 logic inputs (in the form of communication objects) may be used as inputs for the logic gates. The output of each gate may optionally be configured as 1 bit or 2 x 8 bits

Configuration is made using the KNX software ETS. The **product file** can be downloaded from the Elsner Elektronik homepage on **www.elsner-elektronik.de** in the "Service" menu.

1.1. Scope of delivery

- Pyranometer with combined wall/pole mounting
- 2 mounting brackets for pole mounting (Ø 40-60 mm)

1.2. Technical specifications

Housing	Plastic material
Colour	White / Transparent
Mounting	On-wall
Protection category	IP 44
Dimensions	approx. 96 × 77 × 118 (W × H × D, mm)
Weight	approx. 145 g
Ambient temperature	Operation -25…+85°C, storage -30…+85°C
Operating voltage	KNX bus voltage
Bus current	max. 7 mA, max. 10 mA when programming LED is active
Data output	KNX +/- bus terminal plug
BCU type	Own micro controller
PEI type	0
Group addresses	max. 200

Allocations	max. 200
Communication objects	52
Measurement range	0…2500 W/m² 0…2196 kWh/m²
Measurement range	5 W/m² 0.1 kWh/m²
Accuracy	± 15% of the measured value at above 150 W/m²

The product conforms with the provisions of EU directives.

2. Installation and commissioning

2.1. Installation notes

Installation, testing, operational start-up and troubleshooting should only be performed by an electrician.

CAUTION!
Live voltage!
There are unprotected live components inside the device.

- National legal regulations are to be followed.
- Ensure that all lines to be assembled are free of voltage and take precautions against accidental switching on.
- Do not use the device if it is damaged.
- Take the device or system out of service and secure it against unintentional use, if it can be assumed, that risk-free operation is no longer guaranteed.

The device is only to be used for its intended purpose. Any improper modification or failure to follow the operating instructions voids any and all warranty and guarantee claims.

After unpacking the device, check it immediately for possible mechanical damage. If it has been damaged in transport, inform the supplier immediately.

The device may only be used as a fixed-site installation; that means only when assembled and after conclusion of all installation and operational start-up tasks and only in the surroundings designated for it.

Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

2.2. Location

Select an assembly location at the building where sun may be collected by the sensors unobstructedly. The sensor may not be shaded by the building or for example by trees.

At least 60 cm of clearance must be left all round the device. Concurrently, the prevents spray (raindrops hitting the device) or snow (snow penetration) from impairing the measurement. It also does not allow birds to bite it.

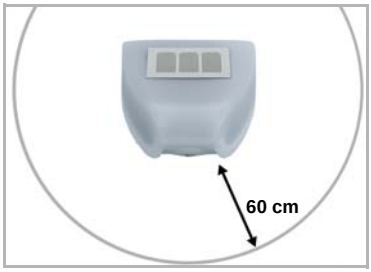


Fig. 1
There must be at least 60 cm of space below, to the sides and in front of the sensor left from other elements (structures, construction parts, etc.).

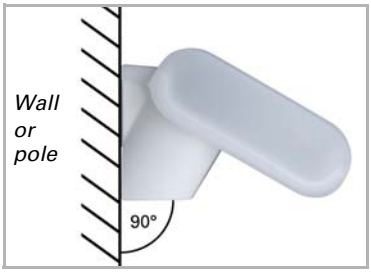


Fig. 2
The sensor must be mounted onto a vertical wall (or pole).

Fig. 3
The sensor must be mounted horizontally in the lateral direction.

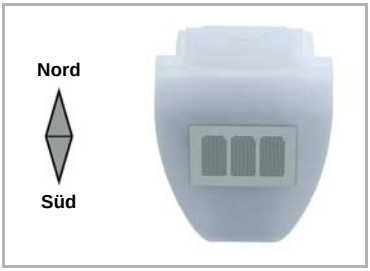


Fig. 4
For installation in the northern hemisphere, the sensor must be aligned to face south.

For installation in the southern hemisphere, the sensor must be aligned to face north.

2.3. Mounting the sensor

2.3.1. Attaching the mount

The sensor comes with a combination wall/pole mount. The mount comes adhered by adhesive strips to the rear side of the housing. Fasten the mount vertically onto the wall or pole.

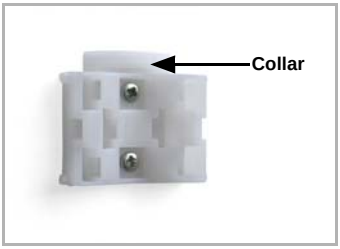


Fig. 5
When wall mounting: flat side on wall, crescent-shaped collar upward.

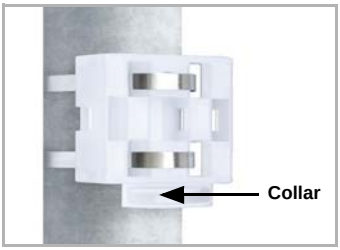


Fig. 6
When pole mounting: curved side on pole, collar downward.

Fig. 7
Different mounting arms are available from Elsner Elektronik as additional, optional accessories for flexible installation of the weather station on a wall, pole or beam (pictures of sensors exemplary).
Example of the use of a mounting arm: Due to flexible ball joints, the sensor can be brought into ideal position.

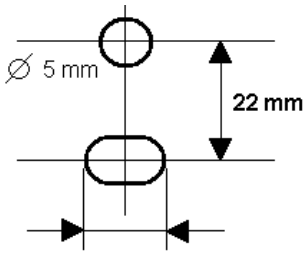
Fig. 8
Example use of the hinge arm mounting:
With the hinge arm mounting, the weather station projects from beneath the roof overhang. Sun, wind and precipitation can act upon the sensors without hindrance.

Fig. 9
Example use of the hinge arm mounting:
Fitting to a pole with worm drive hose clips

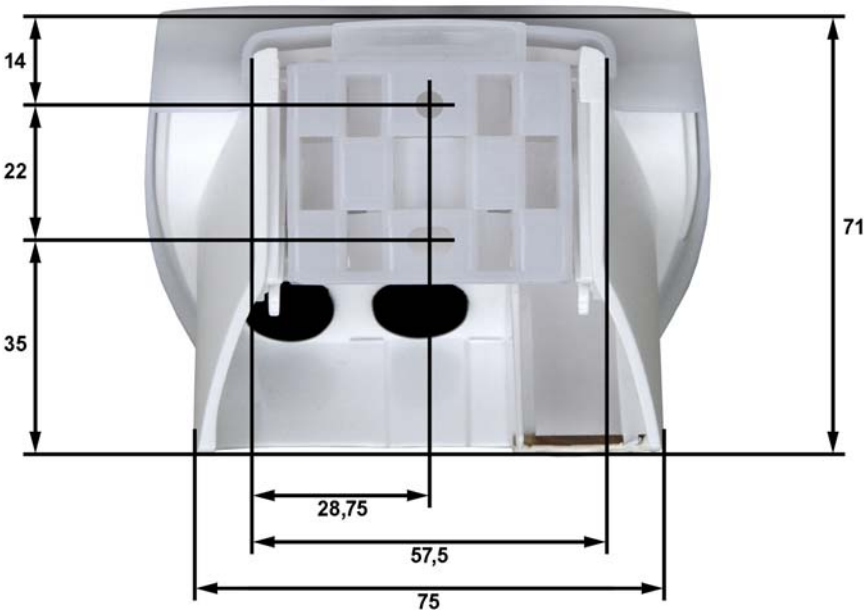
2.3.2. View of rear side and drill hole plan

Fig. 10 a+b
Drill hole plan

Dimensions of rear side of housing with bracket. Subject to change for technical enhancement.



Langloch 7,5 x 5 mm



2.3.3. Preparing the sensor

Fig. 11
1 Cover snaps
2 Bottom part of housing

The sensor cover snaps in on the left and right along the bottom edge (see Fig.).
Remove the cover.
Push the connection cable through the rubber seal on the bottom of the device and connect voltage and data cable to the provided clamps.

2.3.4. PCB layout

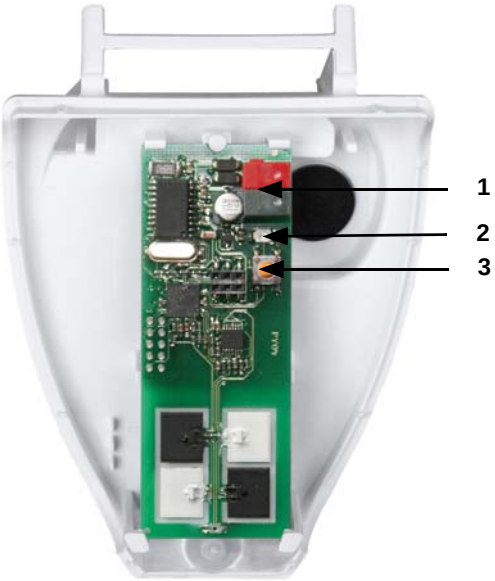


Fig. 12
1 KNX clamp +/-
2 Programming LED
3 Programming pushbutton for the teach-in of the device

2.3.5. Mounting the sensor

Close the housing by putting the cover back over the bottom part. The cover must snap in on the left and right with a definite "click".

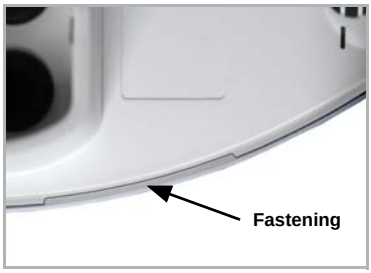


Fig. 13
Make sure the cover and bottom part are properly snapped together! This picture is looking at the closed sensor from underneath.

Fig. 14
Push the housing from above into the fastened mount. The bumps on the mount must snap into the rails in the housing.

To remove it, the sensor can be simply pulled upwards out of the mount, against the resistance of the fastening.

2.4. Notes on mounting and commissioning

Do not open the device if water (rain) might ingress: even some drops might damage the electronic system.

After the bus voltage has been applied, the device will enter an initialisation phase lasting a few seconds. During this phase no information can be received or sent via the bus.

3. Addressing of the device at the bus

The device is supplied with the bus address 15.15.250. You can program another address into the ETS by overwriting the 15.15.250 address or by teaching via the programming key on the circuit board inside the housing.

4. Maintenance

WARNING!
Risk of injury caused by components moved automatically!
The automatic control can start system components and place people in danger.
- Always isolate the device from the mains for servicing and cleaning.

The device must regularly be checked for dirt twice a year and cleaned if necessary. In case of severe dirt, the sensor may not work properly anymore.

ATTENTION
The device can be damaged if water penetrates the housing.
- Do not clean with high pressure cleaners or steam jets.

5. Transmission Protocol

Units of measurement:

Irradiation intensity in Watt per square metre (W/m²)
Application of energy in kilowatt hours per square metre (kWh/m²)

5.1. List of all communication objects

Abbreviations Flags:

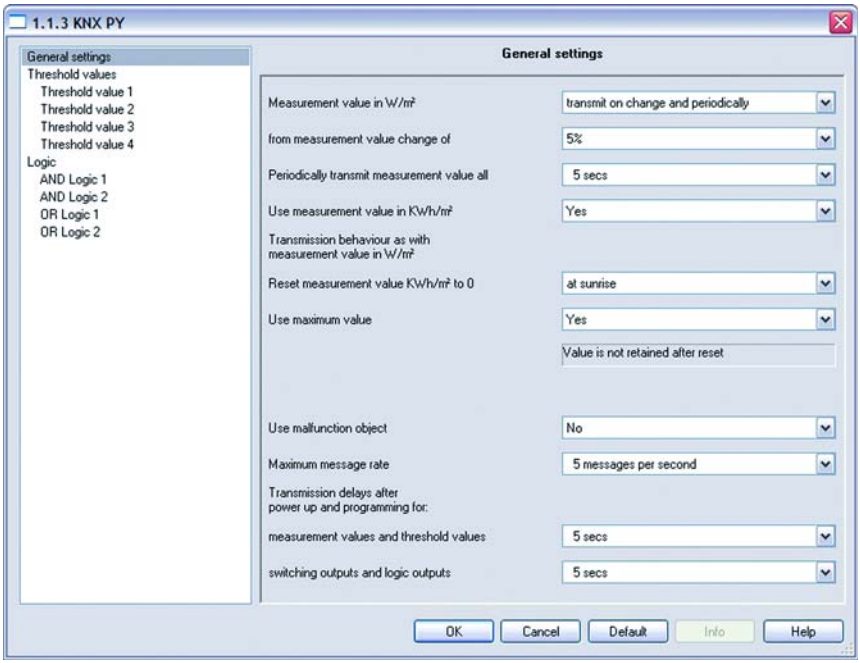
C Communication
R Read
W Write
T Transmit
A Actualise

No.	Name	Function	DPT	Flags
0	Measured value W/m²	Output	9.022	C R T
1	Measured value KWh/m²	Output	9.022	C R T
2	Measured value KWh/m² set on 0	Input	1.006	C R W
3	Request maximum value	Input	1.006	C R W
4	Maximum value	Output	9.022	C R T
5	Reset maximum value	Input	1.006	C R W
6	Sensor malfunction	Output	1.001	C R T
7	Threshold value 1: 16 bit value	Input / Output	9.008	C R W T A
8	Threshold value 1: 1 = increment | 0 = decrement	Input	1.006	C R W
9	Threshold value 1: Increment	Input	1.006	C R W
10	Threshold value 1: Decrement	Input	1.006	C R W
11	Threshold value 1: Switching output	Output	1.006	C R T
12	Threshold value 1: Switching output block	Input	1.006	C R W
13	Threshold value 2: 16 bit value	Input / Output	9.008	C R W T A
14	Threshold value 2: 1 = Increment | 0 = Decrement	Input	1.006	C R W
15	Threshold value 2: Increment	Input	1.006	C R W
16	Threshold value 2: Decrement	Input	1.006	C R W
17	Threshold value 2: Switching output	Output	1.006	C R T
18	Threshold value 2: Switching output block	Input	1.006	C R W
19	Threshold value 3: 16 bit value	Input / Output	9.008	C R W T A

No.	Name	Function	DPT	Flags
20	Threshold value 3: 1 = Increment | 0 = Decrement	Input	1.006	C R W
21	Threshold value 3: Increment	Input	1.006	C R W
22	Threshold value 3: Decrement	Input	1.006	C R W
23	Threshold value 3: Switching output	Output	1.006	C R T
24	Threshold value 3: Switching output block	Input	1.006	C R W
25	Threshold value 4: 16 bit value	Input / Output	9.008	C R W T A
26	Threshold value 4: 1 = Increment | 0 = Decrement	Input	1.006	C R W
27	Threshold value 4: Increment	Input	1.006	C R W
28	Threshold value 4: Decrement	Input	1.006	C R W
29	Threshold value 4: Switching output	Output	1.006	C R T
30	Threshold value 4: Switching output block	Input	1.006	C R W
31	Logic input 1	Input	1.001	C R W
32	Logic input 2	Input	1001	C R W
33	Logic input 3	Input	1001	C R W
34	Logic input 4	Input	1001	C R W
35	Logic input 5	Input	1001	C R W
36	Logic input 6	Input	1001	C R W
37	Logic input 7	Input	1001	C R W
38	Logic input 8	Input	1001	C R W
39	AND Logic 1	Switching output	1.001	C R T
40	AND Logic 1	8 bit output A	5.010	C R T
41	AND Logic 1	8 bit output B	5.010	C R T
42	AND Logic 2	Switching output	1.001	C R T
43	AND Logic 2	8 bit output A	5.010	C R T
44	AND Logic2	8 bit output B	5.010	C R T
45	OR Logic 1	Switching output	1.001	C R T
46	OR Logic 1	8 bit output A	5.010	C R T
47	OR Logic 1	8 bit output B	5.010	C R T
48	OR Logic 2	Switching output	1.001	C R T
49	OR Logic 2	8 bit output A	5.010	C R T
50	OR Logic 2	8 bit output B	5.010	C R T
51	Software version	readable	217.001	C R

6. Setting of parameters

6.1. General settings



Measurement value in W/m²	• do not transmit • transmit periodically • transmit on change • transmit on change and periodically
From measurement value change of *(only if sending "on change")*	1 ... 50%; 5 %
Periodically transmit measured value all *(only if sending "periodically")*	5 secs ... 2 h
Use measurement value in kWh/m²	No • Yes
Transmission behaviour as with measured value in W/m²	
Reset measurement value KWh/m² to 0	• at sunrise • on reception of a communication object
Use maximum value	No • Yes (Value is not retained after reset)
Use malfunction object	No • Yes
Maximum message rate	1 • 2 • 3 • 5 • 10 • 20 messages per second

Transmission delays after power up and programming	
Measurement values and threshold values	5 secs ... 2 h
Switching outputs and logic outputs	5 secs ... 2 h

6.2. Threshold values

The instantaneous global radiation in Central Europe at mid-day in summer is when the sky is clear 900 ... 1000 W/m² and when the sky is overcast approx. 100 W/m².

Use threshold value 1 / 2 / 3 / 4	No • Yes

6.2.1. Threshold value 1 / 2 / 3 / 4

Threshold value

Threshold value setting via	Parameter • Communication object

If threshold value is set via Parameter:

Threshold value setting via	**Parameter**
Threshold value in W/m²	0 ... 2500; 500
Hysteresis of the threshold value in %	0 ... 50; 20

If threshold value is set via Communication object

Threshold value setting via	**Communication object**
The last communicated value shall be retained	• not • after voltage restoration (the changed threshold value can be safed at least 100,000 times) • after voltage restoration and programming (Attention: Do not use during initial start-up)
Start threshold value in W/m² valid until 1. communication	0 ... 2500; 500
Type of threshold value change	• Absolute value with a 16-bit comm. object • Increase / Decrease with a comm. object • Increase / Decrease with two comm. objects
Step length in W/m² *(only if type of threshold value change is „Increase/Decrease“)*	1 • 2 • 5 • 10 • 20 • 50 • 100 • 200
Hysteresis of the threshold value in %	0 ... 50; 20

Switching output

Output is (TV = Threshold Value)	• TV above = 1 | TV - Hyst. below = 0 • TV above = 0 | TV - Hyst. below = 1 • TV below = 1 | TV + Hyst. above = 0 • TV below = 0 | TV + Hyst. above = 1
Switching delay from 0 to 1	none • 1 secs ... 2 h

Switching delay from 1 to 0	none • 1 secs ... 2 h
Switching output transmits	• on change • on change to 1 • on change to 0 • on change and periodically • on change to 1 and periodically • on change to 0 and periodically
Transmit switching output in the cycle of *(only if sending "periodically")*	5 secs ... 2 h

Block

Use switching output block	No • Yes

Only if switching output block is used:

Use switching output block	**Yes**
Evaluation of blocking object	• on value 1: block | on value 0: release • on value 0: block | on value 1: release
Value of blocking object before 1. communication	0 • 1
Behaviour of switching output on block	• do not transmit message • transmit 0 • transmit 1
Behaviour of switching output on release	if switching output = 0 ➔ transmit 0

Blocking

„Blocking" only appears if using „Switching output sends on change"

Use block of the switching output	Yes • No

If block of the switching output is used:

Use block of the switching output	**Yes**
Evaluation of the blocking object	• if value 1: block | if value 0: release • if value 0: block | if value 1: release
Value of the blocking object before 1. communication	0 • 1
Behaviour of the switching output with blocking	• do not send telegram • send 0 • send 1
Behaviour of the switching output with release (selection possible according to previous settings)	• do not send telegram • send status of the switching output • if switching output = 1 => send 1 • if switching output = 0 => send 0

6.3. Logic

Communication objects logic inputs	do not release • release

AND Logic

Logic 1 / 2	not active • active

OR Logic

Logic 1 / 2	not active • active

6.3.1. AND Logic 1 / 2

1. / 2. / 3. / 4. Input	• do not use • all switching events which the sensor provides (see "Linkage inputs of the AND logic")
Logic output sends	• not • one 1 bit object • two 8 bit objects

Logic output sends "one 1 bit Object":

Logic output sends	**one 1 bit object**
if logic = 1 ➔object value	1 • 0
if logic = 0 ➔object value	1 • 0
Communication object AND Logic 1 sends	• in case of the change of logic • in case of the change of logic to 1 • in case of the change of logic to 0 • in case of the change of logic and cyclically • in case of the change of logic to 1 and cyclically • in case of the change of logic to 0 and cyclically
send cyclically every *(only if sending "cyclically")*	5 sec … 2 h

Logic output sends "two 8 bit objects":

Logic output sends	**two 8 bit objects**
if logic = 1 ➔object A value	0 … 255; 127
if logic = 0 ➔object A value	0 … 255
if logic = 1 ➔object B value	0 … 255; 127
if logic = 0 ➔object B value	0 … 255

Communication objects AND Logic 1 A and B sends	• in case of the change of logic • in case of the change of logic to 1 • in case of the change of logic to 0 • in case of the change of logic and cyclically • in case of the change of logic to 1 and cyclically • in case of the change of logic to 0 and cyclically
send cyclically every *(only if sending "cyclically")*	5 sec ... 2 h

6.3.2. Linkage inputs of AND Logic

do not use
Communication object logic input 1
Communication object logic input 1 inverted
Communication object logic input 2
Communication object logic input 2 inverted
Communication object logic input 3
Communication object logic input 3 inverted
Communication object logic input 4
Communication object logic input 4 inverted
Communication object logic input 5
Communication object logic input 5 inverted
Communication object logic input 6
Communication object logic input 6 inverted
Communication object logic input 7
Communication object logic input 7 inverted
Communication object logic input 8
Communication object logic input 8 inverted
Threshold value 1
Threshold value1 inverted
Threshold value 2
Threshold value 2 inverted
Threshold value 3
Threshold value 3 inverted
Threshold value 4
Threshold value 4 inverted
Malfunction
Malfunction inverted

6.3.3. OR Logic 1 / 2

1. / 2. / 3. / 4. Input	• do not use • all switching events which the sensor provides (see "Linkage inputs of the OR logic")

Logic output sends	• one 1 bit object • two 8 bit objects

All settings of the OR logic correspond to those of the AND logic.

6.3.4. Linkage inputs of OR Logic

The linkage inputs of the OR logic correspond with the parameters of the AND logic. The OR logic is additionally provided with the following inputs:

AND Logic output 1
AND Logic output 1 inverted
AND Logic output 2
AND Logic output 2 inverted

Elsner Elektronik GmbH Control and Automation Technology
Sohlengrund 16
75395 Ostelsheim
Germany
Phone +49 (0) 7033/30945-0
Fax +49 (0) 7033/30945-20
info@elsner-elektronik.de
www.elsner-elektronik.de

Technical support: +49 (0) 70 33 / 30 945-250