arcus-eds | KNX

Physical and Chemical Measurement Technology
Application Description
Product Page
SK08-GLBS   Global Solar Radiation

S8
―――
GLBS

SK08-GLBS- MES	Global Radiation	Product Group 10
EIB/KNX, Indoor / Outdoor, IP65	Document: 3400_ex_SK08-GLBS.pdf	Article No.
SK08-GLBS -MES	KNX - Global radiation sensor, silicon pyranometer pyranometer and Busmodul included Range: 0 .. 1800W/m^2 Accuracy: 5% Spectral range: 400 .. 1100nm Temperature range: -40 .. +65°C Drift: typical 2% p.a. With bubble level for exact leveling UV-resistant plastic housing (Sensor only) (115 x 65 x 55) mm Connection cable length: 1m	30804001

4.1 Application Description

Operating Principals and Areas of Application

The production series S8 uses sensors and controllers for a number of physical and chemical measurements for indoor and outdoor areas.

The measuring system **SK08-GLBS-MES** records the global radiation which is measured by the GLBS Sensor. It has a spectral response range of 400nm to 1100nm. The recorded value is then digitally converted and displayed on the KNX bus.

The sensory measurement accuracy is ±3% when the angle of incidence lies below 70° and ±10% when the angle of incidence lies between 70-85°. The absolute error for the sensor is ±5%.

A number of controller models with various functions are available.

KNX sensors are set up using the ETS (KNX Tool Software) with the associated application program.
The device is delivered unprogrammed.
All functions are parameterized and programmed by ETS.
The controller can be switched on or off by activation or locking via the KNX bus.

Functions

Global radiation measurement with

- Two position controller with switch and pulse 1-bit output
  or
- PI controller with continuous 8-bit or pulse-width modulated 1-bit output
- Measured Value can be periodically displayed or when value changes
- Adjustable periodic display of control variable (parameterized)
- Adjustable release and lock with all controllers (parameterized)
- Threshold alarm for upper and lower thresholds
- Auxiliary quantity of set value or threshold via the bus
- Calibration of the sensor (offset cancellation)

4.2 KNX Parameter

4.2.1 General Settings

General Settings   -   SK08-GLBS-MES

Parameter	Setting	Description
Measured value send cycle period	1 .. 120 minutes	The transmission period of the measurement values that are to be sent cyclically. In the parameter set „Measured value x" you can determine if the measurement values are sent periodically.
Actuating value send cycle period (Seconds)	10 .. 250	The transmission period of the correcting variables of the controller that are to be sent cyclically. In the parameter set „Controller x" you can determine if the measurement values are sent periodically.

General Settings - SK08-GLBS-MES (continue)

Parameter	Setting	Description
Use clock timer	• No • Yes	When the timer is used, two additional parameters (timer from / to) and the objects 58 „device time" and 59 „device date" are available.
Timer from Timer until	0 .. 24 hour	The controller output can be locked depending on the time of day. The time in which the controller is unlocked must be entered here. In the parameter set „Controller x" you can determine if the timer function is to be used for a specified controller.

4.2.2 Measured Value Global Radiation

Measured Value Global Radiation -   SK08-GLBS-MES

Parameter	Setting	Description
Measured value send cyclical	• No • Yes	The transmission period can be parameterized in the parameter set „General Settings".
Measured value send by change	• No • Yes	The necessary change can be set in the parameter „Differential gab send / limits".
Type datapoint	• 2-Byte unsigned • 2-Byte float • 4-Byte float	Measured Data Output and Auxiliary Data are defined concurrently.
Auxiliary object is	• Setpoint • Upper limit • Lower limit	Every controller has an auxiliary object which can control either the set point of the controller or the limit values.

Measured Value Global Radiation - SK08-GLBS-MES (continue)

Parameter	Setting	Description
Auxiliary value store by change	• No • Yes	When the auxiliary data is changed the new value is carried over to EEPROM and saved in case of a bus voltage breakdown. This should be used only when the data is not frequently changed as EEPROM has only a limited memory cycle.
Lower limit W/m^2	0 .. 1800	If the measured value corresponds with the preset value, the object 5 „Output, Lower Limit W/m^2" will be set.
Upper limit W/m^2	0 .. 1800	If the measured value corresponds with the preset value, the object 4 „Output, Upper Limit W/m^2" will be set.
Differential gab send / limits W/m^2	0 .. 1800	To reduce the bus load when a value is changed and to avoid multiple switching between measured data and thresholds, a hysteresis between 10 W/m^2 and 100 W/m^2 should be used.

4.2.3 Controller Global Radiation

Controller Global Radiation - SK08-GLBS-MES

Parameter	Setting	Description
Locking object	• locked if 1 • locked if 0	When using the Locking object 7 „Input, enable / lock controller" the controller output is deactivated. The lock function can be set up for „release" or „lock".
Actuating value by ascending actual value	• increasing • decreasing	The actuating direction of the controller can be adapted to the characteristics of the controlled system.

Controller Global Radiation - SK08-GLBS-MES   (continue)

Parameter	Setting	Description
Controller	• Steady PI Controller • Switched PI Controller (PWM) • Two-Position Controller • Two-Position Controller Pulsed	The different controller types and the corresponding parameters are described in chapter *4.4 Notes* .
Setpoint W/m^2	0 .. 1800	Setpoint setting
Proportional range W/m^2	-9999 .. +19999	see chapter *4.4 Notes* - General Rules for Adjusting the PI Parameter
Reset time (in Minuten)	0 .. 255	see chapter *4.4 Notes* - General Rules for Adjusting the PI Parameter
Actuating value send cyclical	• No • Yes	The cycle period is set in „General Settings".
Actuating value distance to limit in %	0 .. 50	When the lower threshold is surpassed 0% is set, when the upper threshold is surpassed 100% will be set. This is important for actuators which do not operate reliably at threshold levels.
Cycle duration in seconds	0 .. 65535	Total time of On and Off state.
Differential gab Cotroller W/m^2	0 .. 1800	see chapter *4.4 Notes* - Two-Positon Control
Duty cycle in %	0 .. 50	duty cycle = pulse duration / cycle duration x 100 see chapter *4.4 Notes* - Two-Positon Control with Pulsed Output
Use clock timer	• No • Yes	The use of the clock timer can be enable / disable for each channel separately.

4.3 KNX Objects

Objects - SK08-GLBS-MES

Nr.	Name	Datenpunkttyp			Funktion
0	Output, error code	DPT		4 Byte	Error code
2	Output, measured value W/m^2	DPT	adjustable		Measured value
3	Input, auxiliary object W/m^2	DPT	adjustable		Auxiliary object
4	Output, upper limit W/m^2	DPT	1.002 Bool	1 Bit	Exceeding limit
5	Output, lower limit W/m^2	DPT	1.002 Bool	1 Bit	Undercut limit
6	Output, conrtroller W/m^2	DPT	adjustable		Actuating value
7	Input, enable/lock controller	DPT	1.001 Switch	1 Bit	Enable/lock
8	Output, status object W/m^2	DPT		1 Byte	Status
58	Equipment time	DPT	10.001 Time of day	3 Byte	Time
59	Equipment date	DPT	11.001 day of month	3 Byte	Date

Object Description - SK08-GLBS-MES

No.	Label	Description
0	Output, error code	An error code other than 0 indicates a sensor malfunction.
8	Output, status object W/m^2	The values of the individual bits are added and transmitted to the bus. The status functions monitor the controller status for purposes of reporting and troubleshooting.

Status:	Bit-No.	Hexadecimal	Decimal
upper limit too large	0	0x01	1
lower limit underrun	1	0x02	2
setpoint not equal to zero	2	0x04	4
lock activ	3	0x08	8
auxiliary is stored	4	0x10	16
timer activ	5	0x20	32

4.4 Notes

Controller models available are the PI controller or a two-position controller. Both controllers are equipped with pulsed output.
The pulsed two-position controller works with constant duty cycle, which like the cycle duration is parameterized.
The duty cycle of the pulsed PI controller is variable and depends on the control variable (pulse-width modulation).

Two-Position Control

Two-position control is a very simple way of controlling.
Once the actual value (± half the switching difference) exceeds or falls below the set point a switch-on or switch-off command is sent to the bus.
Set the differential gap large enough to keep bus load to a minimum and configure the differential gap small enough to avoid extreme actual value fluctuations.

The two-position controller is parameterized using the set point and the switching threshold.
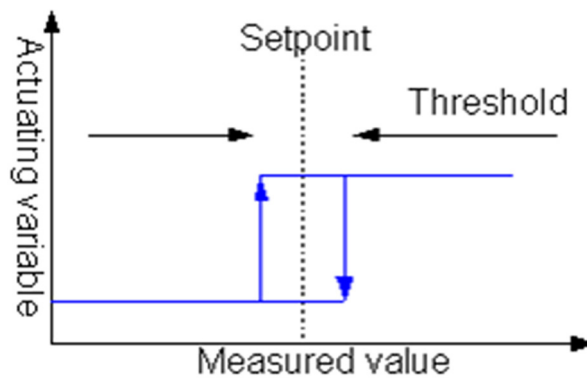
Two-Position Control with Pulsed Output

The controller works analogous to the two-position controller.
The actuating variable emits pulses with fixed duty cycle.

When the control variable reaches 40% in a cycle time of 10 minutes it will repeatedly turned on for 4 minutes and turned off for 6 minutes.

Continuous PI Control

To understand a PI controller one should think of an algorithm consisting of a proportional and integral part.
By combining these two parts it is possible to get a quick and exact adjustment of the actuating variable.
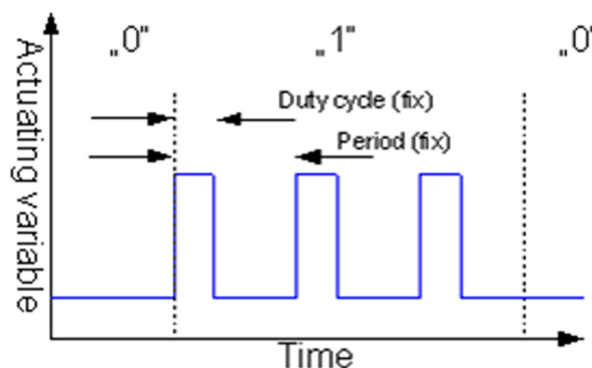
The controller calculates the control variable every second.
It can constantly be updated and is displayed periodically (value parameterized) by the PI controller.

Through the integral part an offset is adjusted to 0 over a certain period of time.
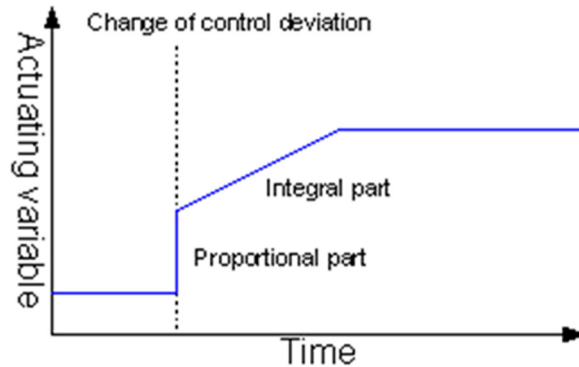
Continuous PI Control with Pulsed Output (PWM)

The controller works analogous to the PI controller, but the actuating variable emits pulses with a variable duty cycle.

PWM control sets the cycle duration of the transmission interval.
This allows a permanent on and off within the cycle time, which reaches an average valve position.

The duty cycle is determined indirectly via the integration time.
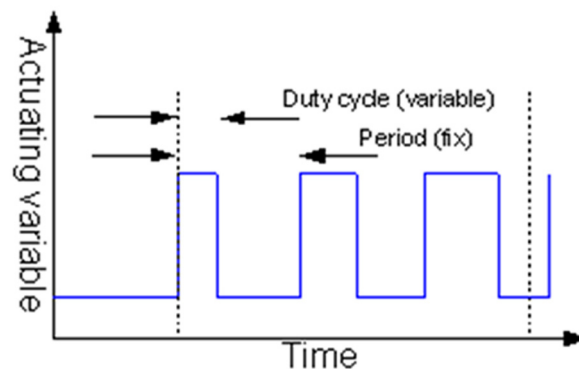
General Rules for Adjusting the PI Parameter

The reset time must be significantly larger than the delay time of the control system.
The proportional area corresponds to the reinforcement of the control circuit.
The smaller the proportional area, the larger the reinforcement is.
.

Parameters	Effect
Low Proportional Area	Quick adjustment to the setpoint. Strong overshoot when setpoint is compensated (continuous oscillation possible).
High Proportional Area	Slow correction of control deviations. No or few overshoots.
Short Integration Time	Rapid correction of control deviations. Danger of continuous oscillation.
Long Integration Time	Slow correction of control deviations. Little danger of overshoots or continuous oscillation.

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4.5 Product Page

The KNX Sensor Global Radiation **SK08-GLBS-MES** is a sensor / controller from the S8 product series which measures global radiation (the sum at the point of measurement of both the direct and diffuse components of solar irradiance). The sensor / controller has an offset sensor element which measures global irradiance in a horizontal position.

The device has an integrated KNX bus coupler and does not require additional voltage.

The transducer is located in a high-strength, extremely robust stable impact ABS plastic housing. Cover and base have a revolving groove and tongue system with neoprene gasket. The housing is IP65.

In the application software a separate controller (2-position or PI controller with continuous or pulsed output) is available for every channel.

Other functions include maximum and minimum thresholds and a help key where the set point and thresholds can be switched.

The sensor is configured with ETS (KNX Tool Software) and the application program. Controlling functions such as signal threshold and diverse adjustments are set using ETS (KNX Tool Software).

Article-No.: 30804001

SK08-GLBS-MES
Global Radiation Sensor / Controller

Areas of Application

- Surveillance Systems
- Watering Systems (as a lock function)
- Observation of solar panels with a calculation of its efficiency.
- Calculation of solar power
- Observation of greenhouses

Applicable Sensor
DAVIS Instruments, Solar Radiation Sensor 6450

Measuring Range:	0 .. 1800W/m^2
Accuracy:	5%
Spectral Range:	400 .. 1100nm
Temperature Range:	-40 .. +65°C
Operating Voltage:	21 .. 32VDC
Power Consumption:	approx. 240mW (at 24VDC)
Operating Temperature:	-20 .. +55°C
Storage Temperature:	-20 .. +85°C

Use
Electronic Measuring Equipment on flat surfaces, sensor connector facing down

Protection class: IP65

4.6 Technical Data

**Technical Data   -   SK08-GLBS-MES**

Measured Data	Global Radiation wavelength: 400 - 1100 nm
Sending Options	no sending, cyclical sending when change occurs
Parameter	Periodic sending with variable cycle duration, sending when change occurs with variable hysteresis
Object type	2-Byte unsigned, 2-Byte float, 4-Byte float
Controller Modi	Steady PI controller Switched PI controller (PWM) Two-Position controller Two-Position controller Pulsed
Parameter Steady PI controller	Setpoint, reset time, proportional factor, controller mode
Parameter Switched PI controller (PWM)	Setpoint, reset time, proportional factor, controller, cycle duration, threshold pitch
Parameter Two-Position controller	Setpoint, differential gap, controller mode
Parameter Two-Position controller Pulsed	Setpoint, differential gap, controller mode , cycle duration, duty cycle
Lock Function	All controller parameterizable as enable or lock
Controller Variables Output	depends on Controller Modi 1-Byte unsigned, 1-Bit Switch
Setpoint value send cyclical	None or 10-250 seconds, parameterizable
Limits	Lower limit, Upper limit
Auxiliary value	Setpoint, Upper limit or Lower limit
Bus power failure	Saving changed auxiliary quantities, parameterizable
Calibration	None
Ambient Temperature Electronic Measuring Equipment Casing	Operation -20 .. +55°C Storage -20 .. +85°C
Ambient Humidity	0 .. 95% rH not condensating
Accuracy	± 5%
Resolution	1W/m^2

Technical Data - SK08-GLBS-MES   (continue)

Operating Voltage	EIB/KNX bus voltage 21 .. 32VDC
Power Consumption	approx. 240mW (at 24VDC)
Auxiliary Supply	not required
Bus Coupler	integrated
Start-up with ETS	**ARC_S8.VD2 Product: S8-GLBS**
Curcuit Points	EIB-2-pole clamps (red / black)
Protection Class	IP65
Assembly Type Transducer	Assembly with 2 screws finery
Casing Transducer	ABS plastic grey
Casing Dimensions	(115 x 65 x 55) mm (L x W x H)
Article Number	30804000
Probe	Davis Solar Radiation Sensor 6450

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Arcus-EDS GmbH   Rigaer Str. 88 , 10247 Berlin   Tel.:   +49 / (0)30 / 2593 3914
www.arcus-eds.de   sales@arcus-eds.de   Fax.: +49 / (0)30 / 2593 3915   e3

4.7 Startup

The KNX Sensor is set up using the ETS (KNX Tool Software) and the applicable application program.
The sensor is delivered unprogrammed.
All functions are programmed and parameterized with ETS.
Please read the ETS instructions.

Programming Button
LED

KNX Terminal Block

Connector GLBS

SK08-GLBS-MES   Assembly View
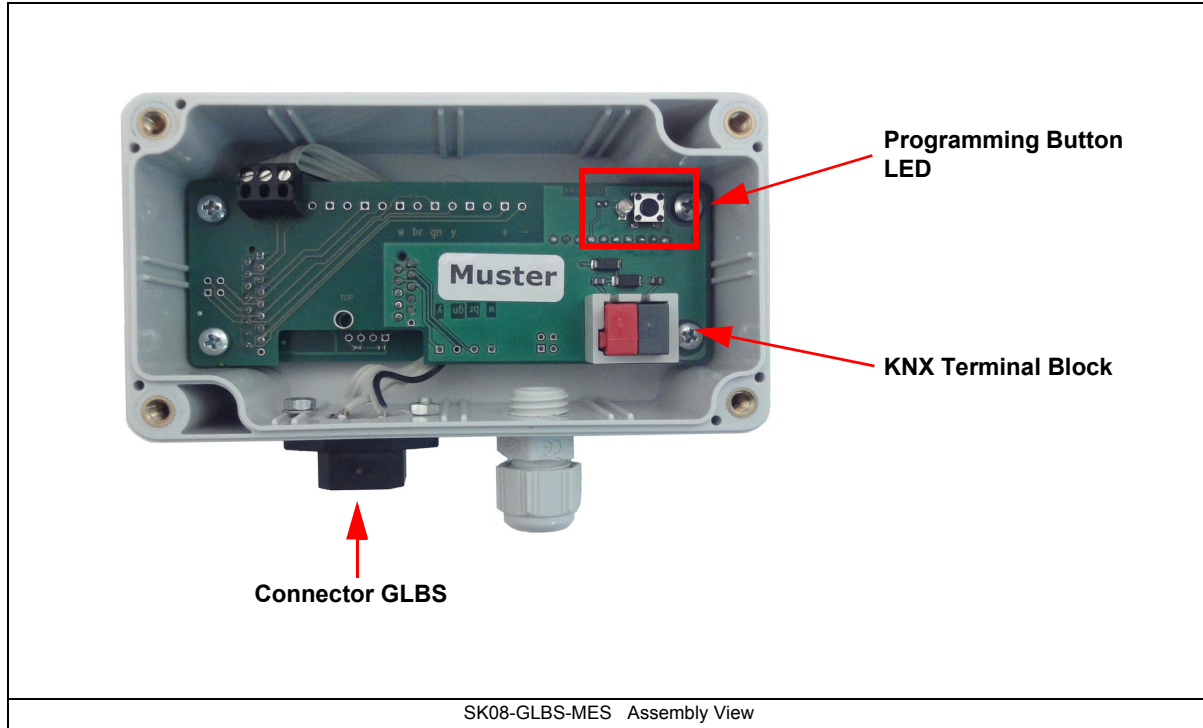
4.8 Assembly

The Sensor **SK08-GLBS-MES** is for outdoor and (moist) indoor areas. It fulfills protection class IP65.
The sensor is attached to the wall with two screws
The transducer lid is opened by loosening the screws.

The cable of the global radiation sensor must be mounted to the position indicated in the figure. The plug must be fixed to the transducer, using the supplied screw. After mounting the sensor to the wall or to the ceiling, lay the KNX bus cable through the cutout of the casing (PG gland). Remove the bus terminal from the device. After connecting the cable to the bus terminal, it can be replugged to the sensor module. When the programming is completed, the casing cover must be locked with the cover screws.
In order to fulfil IP65 protection class the gasket ring must be carefully placed in the lid.

Be careful not to damage the electronics with tools and cable heads.

In Case of Bus Voltage Recurrence

All changes made using the help key for the KNX/EIB bus are saved if the device has been correctly parameterized.
The controller and outputs start with their current values and the ETS parameter settings are saved.

Discharge Program and Reset Sensor

In order to delete the programming (projecting) and to reset the module back to delivery status, it must be switched to zero
potential (disconnect the EIB bus coupler).
Press and hold the programming button while reconnecting the EIB bus coupler and wait until the programming LED
lights up (approx. 5-10 seconds).
Now you can release the programming button.
The module is ready for renewed projecting.
If you release the programming button too early, repeat the aforementioned procedure.

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Arcus-EDS GmbH   Rigaer Str. 88 , 10247 Berlin   Tel.:   +49 / (0)30 / 2593 3914
www.arcus-eds.de   sales@arcus-eds.de   Fax.: +49 / (0)30 / 2593 3915   e3

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Responsible for the contents: Hjalmar Hevers, Reinhard Pegelow
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Manufacturer

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Arcus-EDS GmbH   Rigaer Str. 88 , 10247 Berlin   Tel.: +49 / (0)30 / 2593 3914
www.arcus-eds.de   sales@arcus-eds.de   Fax.: +49 / (0)30 / 2593 3915