Version: 2023-03-10

SENSORMANAGER

Environmental Data Monitoring Device

Installation Manual

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SENSORMANAGER

The SENSOR MANAGER is an optional accessory to extend the functionality of the CS141:

The GENEREX sensors / actuators can easily be connected to the SENSOR MANAGER, required RJ12 connection cables are included on delivery. The sensor can be configured via the web interface of the CS141 / BACSWEBMANAGER. Any third-party sensor or actuator that are conform with required specifications, can be used with the SENSORMANAGER.

SENSORMANAGER_II application examples:

Monitoring of sensor data

Temperature, humidity, electr. Electricity, electr. Voltage, electr. performance and other analogue measurements.

Monitoring of contacts:

Door contacts, fire detectors, motion detectors, water detectors, glass breakage sensors and other potential-free signaling contacts.

Switching:

Switching of optical and acoustic actuators such as flashing lights, warning horns u. relay contacts

SENSORMANAGER_II input signals:

Up to 8 analog inputs (0-10VDC o. 0 / 4-20mA)
Up to 4 digital inputs (potential-free contacts)

SENSORMANAGER_II output signals:

Up to 4 digital output signals (open collector / 12VDC max 30mA)

SENSORMANANAGER_II PIN assignment of the Rj12 connection sockets

INPUT 1:

Pin 1	9-24VDC, output according to input of supply voltage, default delivery: 12VDC power supply
Pin 2	Analog input channel 1 (0-10VDC o. 0/4-20mA)
Pin 3	Analog input channel 2 (0-10VDC o. 0/4-20mA)
Pin 4	Ground (GND)
Pin 5	Digital output (Open-Collector 9-24VDC/max. 30mA, Default on delivery: 12VDC)
Pin 6	Digital input (min./max. 9-24V via Pin 1)

INPUT 2:

Pin 1	9-24VDC, output according to input of supply voltage, default delivery: 12VDC power supply
Pin 2	Analog input channel 3 (0-10VDC o. 0/4-20mA)
Pin 3	Analog input channel 4 (0-10VDC o. 0/4-20mA)
Pin 4	Ground (GND)
Pin 5	Digital output (Open-Collector 9-24VDC/max. 30mA, Default on delivery: 12VDC)
Pin 6	Digital output (min./max. 9-24V via Pin 1)

INPUT 3:

Pin 1	9-24VDC, output according to input of supply voltage, default delivery: 12VDC power supply
Pin 2	Analog input channel 5 (0-10VDC o. 0/4-20mA)
Pin 3	Analog input channel 6 (0-10VDC o. 0/4-20mA)
Pin 4	Ground (GND)
Pin 5	Digital output (Open-Collector 9-24VDC/max. 30mA, default on delivery: 12VDC)
Pin 6	Digital input (min./max. 9-24V via Pin 1)

INPUT 4:

Pin 1	9-24VDC, output according to input of supply voltage, default delivery: 12VDC power supply
Pin 2	Analog input channel 7 (0-10VDC o. 0/4-20mA)
Pin 3	Analog input channel 8 (0-10VDC o. 0/4-20mA)
Pin 4	Masse (GND)
Pin 5	Digital output (Open-Collector 9-24VDC/max. 30mA, Default on delivery: 12VDC)
Pin 6	Digital input (min./max. 9-24V via Pin 1)

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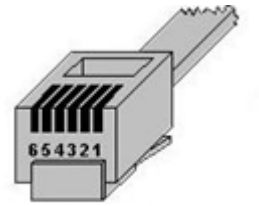

RJ12 pinout

Pin number:	Funktion:
1	9-24VDC, output according to input of supply voltage, default delivery: 12VDC power supply
2	Analog input channel x (0-10VDC o. 0/4-20mA)
3	Analog input channel x (0-10VDC o. 0/4-20mA)
4	Ground (GND)
5	Digital output (Open-Collector 9-24VDC/max. 30mA, Default on delivery: 12VDC)
6	Digitalinput (min./max. 9-24V via Pin 1)

Note:

The voltage provided by pin 1, pin 5 and pin 6 is defined by the power supply unit used on the SENSOR MANAGER. The SENSOR MANAGER itself operates at an operating voltage of 9-24V. If a 12 V power supply is connected, 12 VDC will be offered on these pins accordingly. When connecting external devices, pay attention to the maximum permissible voltage that may be applied:

Overvoltage can damage or even destroy connected devices. In case of undervoltage, however, connected devices may deliver wrong results.

On delivery the SENSOR MANAGER comes with a standard power supply providing 12 VDC.

Analog inputs:

Each of the 4 SENSORMANAGER_II physical RJ-12 connectors provide 2 analog inputs on pin 2 and pin 3.

Administrators wishing to connect a third-party device, must set the signal (0-10VDC o. 0 / 4-20mA) of the third-party device to PIN 2 or pin 3 and pin 4 (ground / GRD).

Digital inputs:

Each of the 4 physical RJ-12 connections of the SENSORMANAGER_II provides a digital input on pin 6.
For Administrators who wish to connect a third-party device:
The high signal (12VDC) from pin 1 must be routed to pin 6 via the signaling contact of the third-party device.

Digital outputs:

Each of the SENSORMANAGER's 4 physical RJ-12 ports provides a digital output on pin 5.
Administrators who wish to connect a third-party device:
The device must be connected to pin 5 (open collector output: + 12VDC / max.30mA) and pin 4 (Ground / GND) are connected.

Note:

How to use third-party sensors

Due to the fact third-party devices do not have the standardized RJ12 port,
our Connection Terminal SM_CON is an easy-to use possibility to connect these devices to the CS141. By using the SM_CON it is possible to adapt
open line ends to the Rj12 connector directly - No custom plug

Connecting sensors / actuators to the SENSORMANAGER_II

The sensors / actuators for the SENSORMANAGER II can be connected directly to the SENSORMANAGER II RJ12 sockets- ensure to use the original RJ12 cables supplied with the according sensor.

The SENSORMANANAGER II provides to connect several sensors / actuators to one physical port. The system design provides following wiring options:

1. A maximum of two analog sensors per port
2. A maximum of one more digital sensor per port
3. A maximum of one digital actuator per port

The sensor manager supports a total installation of 8 analog and 4 digital sensors as well as up to 4 digital actuators.

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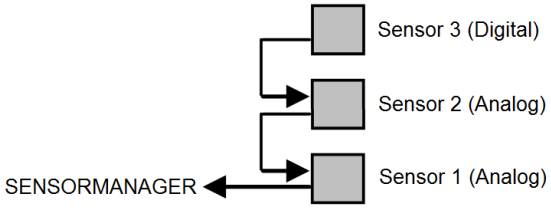
Sensor connection scenarios: SENSORMANAGER_II.

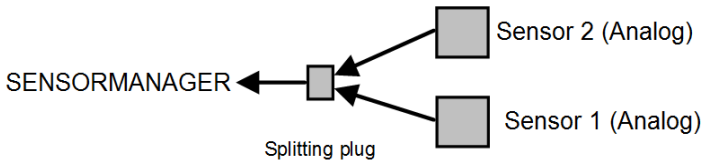
The SENSORMANAGER II provides various options to connect sensors.

The Daisy Chain: Connection



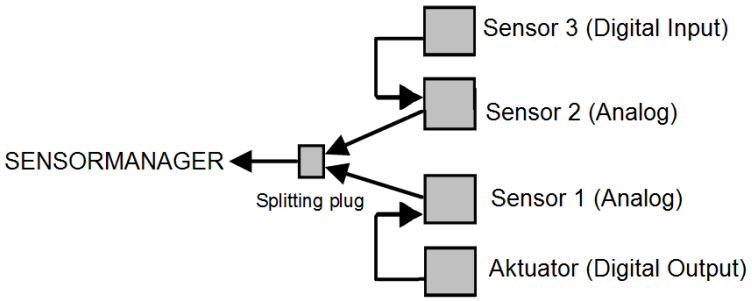
The daisy chain is a sequential arrangement of sensors and actuators. The signal is transmitted from the sensor manager through the first sensor to the second sensor. In this installation example, a digital third sensor is attached to the second sensor. Please note that no further digital sensor can be attached to the sensor 3.

The Splitting Plug SPSMRJ connection



If sensors needs be installed in different areas, the signal distribution can be splitted into two wirings. The optional splitting plug will splitt the signal accordingly. Please note that the sensor manager can only serve two analog sensors per port.

Combined connections: Daisy Chain and Splitting Plug SPSMRJ



This installation constellation extends the existing installation by an actuator and a digital sensor: The port on the sensor manager is maxed out utilizing a total of 4 devices:
Please note the system design:

This installation design provides the maximum of two analog sensors and one digital sensor as well as one digital output per sensor manager port.

SENSORMANAGER II: Available sensors

These sensors are currently available for SENSORMANAGER_II:

GENEREX-Analog-Sensors:

SM_T (Temperature sensor -> 1 analog channel required)
SM_T_H (Combined sensor: Temperature and humidity -> 2 analog channels required)
SM_VMC (True RMS AC voltage sensor -> 1 analog channel required
SM_CSxxxA (AC- current sensor -> 1 analog channel required)

GENEREX-Digital-Input-Sensors

SM_HYG2 (water and humidity sensor -> 1 digital input required)
SM_Glas (Glas breach detector -> 1 digital input required)
SM_MD (motion detector -> 1 digital input required)
SM_SD (Smoke - und fire dector -> 1 digital input required)
SM_DC (door contact alarm detector -> 1 digital input required)
SM_H2 (Hydrogen Sensor -> 2 digital inputs required)
Digital GENEREX-Actuators:

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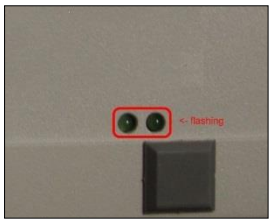
SM_IO (Ralais-Box -> 1 digital output required)
SM_BUZ (accustical alarm buzzer -> 1 digital output required)
SM_Flash (flash light -> 1 digital output required)

SENSORMANAGER_II – Installation and configuration

Before you start …

The configuration must be saved to the PIC processor of the SENSOR MANAGER. This will be done by the CS141 automatically if pressing save buttons. If a configured SENSOR MANAGER needs to be replaced, the configuration stored in the CS141 must be written to the new PIC processor by applying again. A spare parted SENSORMANAGER will not work without writing the new configuration.

SENSORMANAGER_II: Connecting to CS141



Use the supplied cable to connect the COM1 of the SENSOR MANAGER II to the COM 2 of the CS141. Log into the CS141 and go to general COM port settings. Configure the comport for sensormanager usage.

Then connect the power supply to the SENSORMANAGER:

Two LED's are installed on the underside of the SENSOR MANAGER: one should now light continuously and signal the operational readiness. The second LED flashes only when the CS141 makes a request to the SENSORMANAGER.

After the SENSORMANAGER is ready for configuration, open sensor manager configuration menu at CS141 and start configurating your sensors and devices.

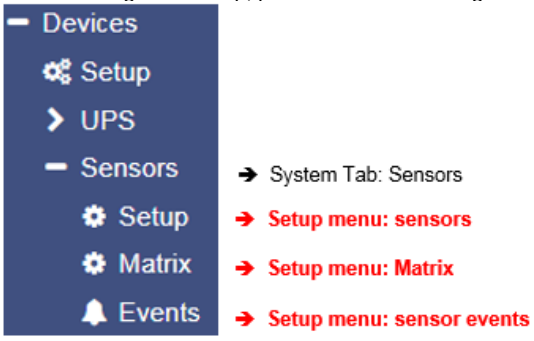
Note:

The CS141 will only make a request to the SENSORMANAGER if it is configured accordingly. The LED on the sensor manager will only flash when a request has been received or is answered by the SENSORMANAGER.

Please note that the sensor manager is a stand-alone device with its own power supply. In case of main power supply is not available will cause disabling the connected sensors and actuators. The CS141 will notice this fact and can be configured to send custom alarm messages for sensor lost issues.
When using a SENSORMANAGER, ensure both, CS141 and SENSORMANAGER are secured by independent power supply (UPS) for full operationality in case of main power issues.

Sensor matrix

For this configuration step, proceed to the following menus



A special feature of the sensor manager is the possibility to link logically all available sensors and contacts via a matrix. Because the matrix does not tell you which sensors and digital inputs you want to use for linking to each other, there are numerous ways to map your operating scenario - as an example, a pressure sensor monitoring a pipe can be used with a temperature sensor on a corresponding pump in the first instance. With a second instance, different sets of sensor markers can be combined to trigger a unique alarm behavior.

How does the sensor matrix work?

As already described, the matrix is a link of individual instances that build on each other

1. Sensors and Inputs -> Individual single configuration and event management
2. Matrix marker -> Links logically individual sensors and digital inputs to a collective marker
3. Output switcher -> Links logically single alarm marker to switch an output

Each of these three instances has its own events, which can be assigned with jobs via the event control inside the sensor menu.:

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Adding analog sensors

At system tab Sensors, open Setup to entert he sensor configuration dialog:

Sensor Inputs	Name	Sensortype	Unit	Low PreAlarm	Low Alarm	High PreAlarm	High Alarm	Sensor Range	Offset
1	Temperature	SM_T_H	°C	10	4	70	90	-5 - 100	
	Humidity	SM_T_H	% rel H	17	15	28	30	0 - 100	

Name

Enter a name or a description that will be shown at the alarm matrix as well as the sensor monitor.

Sensortype

Determine the type of sensor. To do this, select one of the predefined sensor types from the list. For third-party sensors, please consult the appropriate user manual to enable connection. Please note that some sensors are so-called combinated sensors - two sensors in one housing. These require both channels and no further sensors can be connected.

Unit

With the choice of the sensor a suggestion for the indicated unit name appears. You can customize the name to your liking, but the unit that you see as a suggestion will not change itself.

Pre-alarm / alarm

Passen Sie an dieser Stelle die entsprechende Alarmstufe an. Dabei gilt folgendes Grundprinzip:
Adjust the appropriate alarm level. The following basic principle applies:

With increasing values on a measurement scale, the pre-alarm is BEFORE the actual alarm - at a temperature, e.g. the pre-alarm (pre-alarm) at 70 °C - the actual alarm is 90 °C. As the values decrease, the concept revolves: the pre-alarm must be higher than the actual alarm - in relative humidity, this means the pre-alarm is at 17% humidity during the actual alarm, which would be triggered at 15% relative humidity.

Note:
Please keep in mind, with decreasing temperatures the pre-alarm may be set with +3°C, but the actual alarm is at -5°C. From 0°C down, the numbers will start to increase with a negativ sign.

Sensor range

Many sensors have a predefined measuring range - in other cases it makes no sense to create a measuring range outside certain operating values. With this value range, it is possible to adjust the measuring range to a custom sensor as well as to specific operating environments.

Offset

Although all sensors are calibrated on delivery by GENEREX, operating conditions may use different reference values. The values may difffer as a result from changing atmosphrerical pressure, ambient temperatures, solar radiation, etc. Use the offset values to adjust the values to fit to a local reference measuring. Simply enter the corresponding deviation:
If e.g. If your reference reading deviates downward at a temperature of 2 ° C, enter -2 as offset value.

Sensor event vs matrix event

Configured sensor alarms can be used to configure according event:
For each analog sensor, you will find 2 according events:

Alarm Analog Input High -> Alarm: critical value reached or exceeded high alarm settings
Alarm Analog Input High off -> Alarm: Critical value fell below high alarm settings
Pre-Alarm Analog Input High -> Pre-Alarm: Questionable value reached or exceeded high pre-alarm settings
Pre-Alarm Analog Input High off -> Pre-Alarm: Questionable value fell below high pre-alarm settings
---
Normal state – no alarm -> No alarm configurable

Pre-Alarm Analog Input Low off -> Pre-Alarm: Questionable value fell below low pre-alarm settings*
Pre-Alarm Analog Input Low -> Pre-Alarm: Questionable value reached or exceeded low pre-alarm settings*
Alarm Analog Input Low off -> Alarm: Critical value fell below low alarm settings*
Alarm Analog Input Low -> Alarm: critical value reached or exceeded high alarm settings *

*) Please note the paradox that the value can also increase with negative values (eg at temperatures in the minus range).
For each of these events, you can configure a corresponding job to setup a specific alarm behavior. Using the alarm matrix, you can summarize the corresponding events and stitch them an event marker with coming with it's own conditions.

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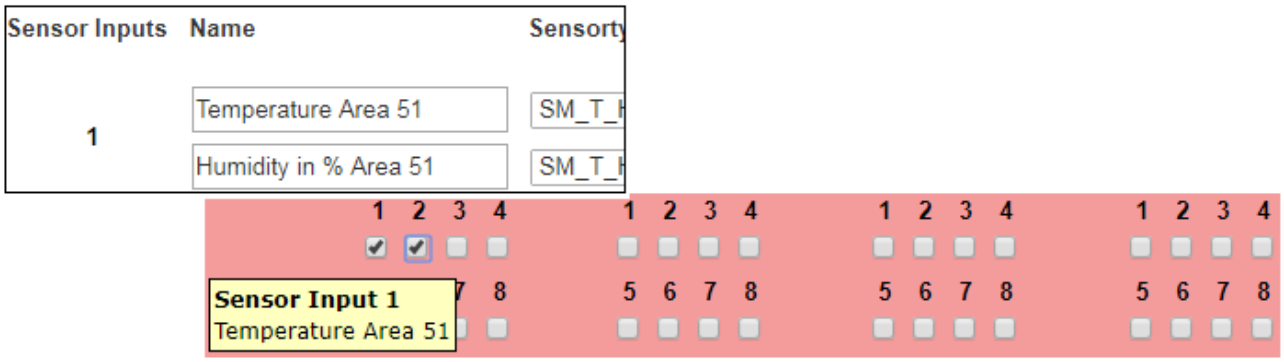
Open the menu Matrix to find all events as checkbox list:



At sensor configuration, you can enter a name for each channel. After entering a name press apply and change tot he menu „Matrix“: The recently entered name will it will be displayed automatically as soon as you move the mouse over the according channel checkbox.

Setting up the logical connection

Using the logic link, the condition can be defined to set the marker to a logical On:

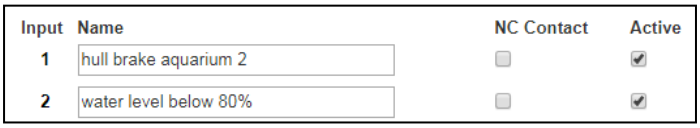
And	Both conditions must be
Or	At least on of the configured conditions are met.

Inverted mode

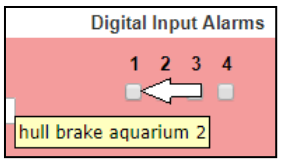
As a standard, the marker is pre-configured to switch to ON as long as the conditions for ON are met.
The inverted turn this switching behavior from OFF to ON: The marker ist always at High (ON) posititon and will will switch to Low (Off).

Digital inputs

In addition to analog inputs, the SENSORMANAGER can manage up to 4 ditigal inputs. The inputs
Diese Eingänge werden entsprechend der Konfiguration auf Aktiv geschaltet und können im Alarmverhalten als NC (Normally Closed) oder NO (Normally Open) – Kontakt definiert werden.



Linking digital inputs



The marker only looks whether the result of the digital input is "High (On)" or "Low (Off)" - The type of contact is unimportant for the marker. like the analog inputs, name of the digital input will be shown by mouse over action. The linking of the digital inputs follows the same principle as with the sensors.

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Linking digital inputs and analog sensors

Simply select the appropriate digital inputs with the analog inputs. Press Apply to save the setting and restart the services for the sensors.*Switching an output*

Outputs will be switched in case of conditions met via the defined alarm markers:

In contrast to the markers, however, no pre-alarms are used - if the marker is set to high, the output will be switched depending on its switching logic. The CS141 matrix provides combining up to 8 markers individually and assign them with an AND / OR combination.

The output will be switched:

1. As soon as only one of the configured marker are set to high. („OR“)
2. As soon as all configured marker are in high state („AND“)

Fallback of the output to normal state

the output is only switched as long as the condition has been fulfilled exactlyhereby the corresponding logical link will decide which condition leads to the drop of the output:

In a restrictive AND operation, only one marker to off will force the output to off.
With an OR operation, the output remains at ON state until each marker is turned off.
Keep in mind that the markers conditions for an on/off state will not be checked by output switching control – This control only checks logically the markers state and act according to it.

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