Self-sustaining display for 4-20mA transmitter

8930 Series - Operating manual

NU 050 15/10/15

Order code : 894 140

CE

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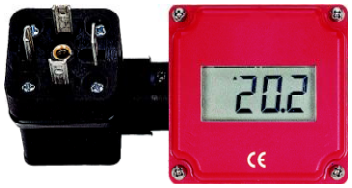
1 Designated Use

8930	8930 T (button)
	

The 8930 and 8930T are microprocessor controlled display devices for 4 – 20 mA standard signals that can be universally applied. They do not require an auxiliary voltage source but can be supplied directly from the measuring current.

The measuring value is displayed on a 4-digit LCD display with max. display area ranging from -1999 to +9999 digits.

The 8930 … is designed for the connection of any measuring transducers (with a 4 to 20 mA output).
The operating range of the display device can be directly adjusted to the transmitter without any additional accessories by simply entering the maximum and minimum measuring range limits as well as the decimal point position.

Parameter and limit values are entered via three keys which are accessible after removal of the cover (8930).
8930T has that keys freely accessible at top of the device. All programmable parameters of the 8930 … are saved in an EEProm; in case of a current failure they will remain there for at least 10 years.

The 8930 … is equipped with a self-diagnosis system continuously monitoring the essential parts of the device for their perfect functioning. Both the self-diagnosis and the measuring sensor monitoring for values exceeding or falling below permissible limits ensure maximum operational reliability of the device.

Prior to delivery the 8930 … will be tested and completely calibrated.

However, prior to you starting your operation make sure to configurate the device for your application. Please also refer to chapter "Configuration".

2 General Note

Read this document carefully and get used to the operation of the device before you use it. Keep this document within reach for consulting in case of doubt.

3 Safety Requirements

This device has been designed and tested in accordance with the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.

1. Trouble-free operation and reliability of the device can only be guaranteed if the device is not subjected to any other climatic conditions than those stated under “Specification”.
2. Standard regulations for operation and safety for electrical, light and heavy current equipment have to be observed, with particular attention having to be paid to national safety regulations (e.g. VDE 0100).
3. When connecting the device to other devices (e.g. PC) the interconnection has to be designed most thoroughly as internal connections in third-party devices (e.g. connection GND with protective earth) may lead to undesired voltage potentials.
4. **If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting.**

   Operator safety may be a risk if:

   - there is visible damage to the device

   - the device is not working as specified

   - the device has been stored under unsuitable conditions for a longer time.

   In case of doubt, please return device to manufacturer for repair or maintenance.
5. **Warning:** Do not use these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury or material damage.
   Failure to comply with these instructions could result in death or serious injury and material damage.
6. **Any changes or repair of the device is not allowed.**
   Please return device to manufacturer for repair or maintenance.

4 Disposal Notes

The device must not be disposed in the unsorted municipal waste!
Send the device directly to us (sufficiently stamped), if it should be disposed.).
We will dispose the device appropriate and environmentally sound.

5 Electric connection

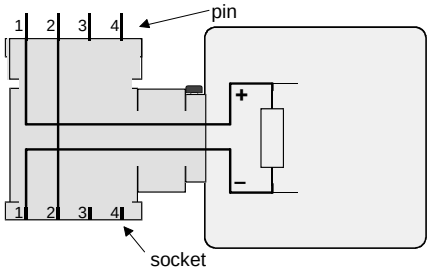
To connect the 8930 it is simply plugged into an existing transmitter by means of a special adaptor for the cubic plug according to DIN EN 175301-803 A (ex. DIN43650 A). **Supply voltage:** device takes power directly from measuring current

Electric connection and commissioning of the device must be carried out by trained and skilled personnel.
Wrong connection may lead to the destruction of the display device, in which case we cannot assume any warranty.
!! Mind the maximum input current rating of 40mA under any circumstances !!

5.1 Assignment of the angle-type plug

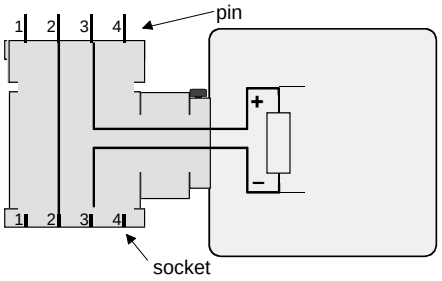
The assignment of the angle-type plug is designed for the most commonly used assignments of the respective input signals. As this is not a standardized assignment, your transmitter assignment may not correspond to the 8930... assignment.

Standard assignment of the angle-type plug:



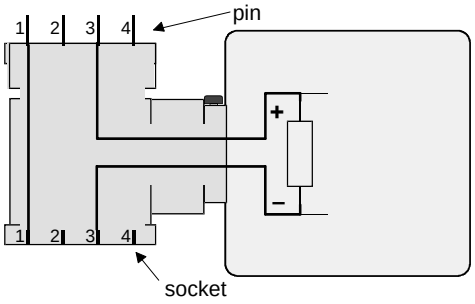
contact number	wire colour (socket contact)	Device design 8930… pin	socket
1	grey	IN: +Vcc	OUT: +Vcc
2	red	OUT / GND	OUT / GND
3	--	n.c.	n.c.
4 (⏚)	--	n.c.	n.c.

n.c. = not connected



contact number	wire colour (socket contact)	Device design 8930… pin	socket
1		n.c.	n.c.
2	red	OUT / GND	OUT / GND
3	grey	IN: +Vcc	OUT: +Vcc
4 (⏚)	--	n.c.	n.c.

n.c. = not connected



contact number	wire colour (socket contact)	Device design 8930... pin	socket
1	red	OUT / GND	OUT / GND
2		n.c.	n.c.
3	grey	IN: +Vcc	OUT: +Vcc
4 (⏚)	--	n.c.	n.c.

n.c. = not connected

5.2 Adjust assignment

If the '*Signal/GND*'-line in your transmitter is not assigned to contact 2 and if the '-*Ub*'-line is not assigned to contact 1, please do not forget to adjust the 8930..-angle-type plug and the external angle-type plug accordingly:
To do so open the 8930..-angle-type plug (refer to the "general instructions for change ....") and exchange the wire of contact 1 and contact 2 against the wire of the contact representing the connection in your transmitter. Then exchange and rewire the two contacts in the angle-type plug of your connecting cable.

General instructions for change of the angle-type plug assignment:

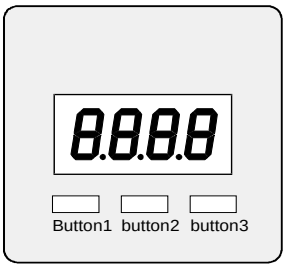
Remove the coupling insert by means of a screw driver at the position indicated (arrow).
Change the assignment according the notes of the respective input signal.

Latch coupling insert in cover. You have a choice between 4 different orientations – each of them spaced 90°.

Put on angel-type plug and connect plugs using the long screw delivered (do not forget seals).

6 Configuration

Note: ***To configurate 8930 the cover has to be removed carefully to get access to the needed buttons. Take care of adequate ESD safety precautions to prevent damage to the exposed parts. Please note: measuring current should be at least 4mA during configura-tion!***



Follow these instructions to configure the device:

- Press **button 2** for 2 seconds during actual value display, **"dP"** is displayed.
- Set parameter with **button 2** and **button 3**.
- Save the set value with **button 1**, the parameter name is displayed again.
- Proceed to the next parameter with **button 1**, the name of that parameter is displayed.

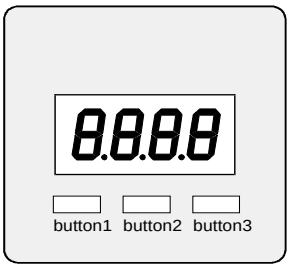
If there is no key pressed within 60 seconds the configuration is cancelled. The settings already entered are lost.

Parameter	Value	Description
Button 1	Button 2 and 3	
dP	**Position of decimal point**	
	----	Max. display range: -1999 … 9999
	---.-	Max. display range: -199.9 … 999.9
	--.--	Max. display range: -19.99 … 99.99
	-.---	Max. display range: -1.999 … 9.999
di .Lo	**Lower display range limit (display low)**	
	-1999 … 9999	This value is displayed for input signal = 4mA.
di .Hi	**Upper display range limit (display high)**	
	-1999 … 9999	This value is displayed for input signal = 20mA.
Li	**(Measuring range) limit**	
	oFF	**deactivated:** Exceeding of the measuring range limit is tolerable as long as value is within measuring range (p.r.t. note).
	on.Er	**active, (display error):** The measuring range limit is exactly bounded by the input signal. When exceeding or shortfalling the input signal the device will display an error message.
	on.rG	**active, (display measuring range limit):** The measuring range limit is exactly bounded by the input signal. When exceeding or short-falling the input signal the device will display the selected lower/upper display value. *e.g. humidity: when shortfalling or exceeding, the device will display 0% or 100%*
	Note:	*When exceeding the measuring range, the device will always display an error message (.Err.1. or .Err.2.) independent of the current limit settings. The measuring range is from approx. 3.7 to 20.8 mA.*
FILt	**Filter**	
	oFF	Filter deactivated
	0.1 … 2.0	Filter active: Prevents "jumping" of the last digit and filters short noise pulses. Higher numbers imply stronger filtering. *Attention: this causes higher response times of the switching functions!*

Press **button 1** one more time after the input of the last parameter to close the configuration menu.
The devices restarts (segment test).

7 Offset and slope adjustment

The offset and slope-adjustment function can be used for compensating the tolerance of the used sensor, resp. for vernier adjustment of the used transducer / transmitter.



Follow these instructions to run the offset and slope adjustment of the device:

- Press **button 3** for 2 seconds during actual value display, **"OFFS"** is displayed.
- Set parameter with **button 2** and **button 3**.
- Save the set value with **button 1**, the parameter name is displayed again.
- Proceed to the next parameter with **button 1**, the name of that parameter is displayed.

Parameter	**Value**	**Description**
Button 1	Button 2 and 3	
oFFS	**Offset**	
	-5.00 ... 5.00	The offset in digit. The set offset value is subtracted from measured value.
ScAL	**Scale**	
	-5.00 ... 5.00	The scale in %. The displayed value is calculated according to the following formula: *Display = (measured value - offset - di.Lo) * (1 + slope adjustment [% / 100]) + di.Lo*

Example: The setting is 2.00 => the slope has risen 2.00% => slope = 102%.
When measuring a value of 1000 (without slope-adjustment) the device would display 1020 (with slope adjustment of 102%)

Example for offset and slope adjustment:

Connection of pressure transmitter

The device displays without offset and slope adjustment: at 0 bar = 0.08, at 20 bar = 20.02

This means: *offset:* *0.08*
slope: *20.02 – 0.08 = 19.94*
difference: *0.06* *(= ideal slope - actual slope = 20.00 - 19.94)*

Therefore this values should be set: *offset =* *0.08*
scale = *0.30* *(= difference / actual slope = 0.06 / 19.94 = 0.0030 = 0.30%)*

8 Min-/max- value memory

The device features a minimum/maximum-value storage. In this storage the highest and lowest performance data is saved.

Calling of the minimum value:

Press button 3 shortly: the device will display "Lo" briefly, after that the min-value is displayed for about 2 sec.

Calling of the maximum value:

Press button 2 shortly: the device will display "Hi" briefly, after that the max-value is displayed for about 2 sec.

Erasing of the min/max values:

Press button 2 and 3 for 2 sec.: The device will display "CLr" briefly, after that the min/max-values are set to the current displayed value

9 Error Codes

When detecting an operating state which is not permissible, the device will display an error code.
The following error codes are defined:

Err.1: **Exceeding of measuring range**

Indicates that the valid measuring range of the device has been exceeded.

Possible causes:
- Input signal to high
- Sensor shorted

Remedies:
- The error-message will be reset if the input signal is within the limits.
- Check transmitter and device configuration (e.g. input signal)

Err.2: **Values below measuring range**

Indicates that the values are below the valid measuring range of the device.

Possible causes:
- Input signal is to low or negative
- Current below 4mA
- Sensor broken

Remedies:
- The error-message will be reset if the input signal is within the limits.
- Check transmitter and device configuration (e.g. input signal)

Err.3: **Display range has been exceeded**

Indicates that the valid display range (9999 digit) of the device has been exceeded.

Possible causes:
- Incorrect scale

Remedies:
- The error-message will be reset if the display value is below 9999.

Err.4: **Values below display range**

Indicates that display value is below the valid display range of the device (-1999 digit).

Possible causes:
- Incorrect scale

Remedies:
- The error-message will be reset if the display value is above -1999.

Err.7: **System error**

The device features an integrated self-diagnostic-function which checks essential parts of the device permanently. When detecting a failure, error-message Err.7 will be displayed.

Possible causes:
- Actual temperature is below / above the valid temperature range
- Device defective

Remedies:
- Stay within valid temperature range
- Exchange the defective device

Er.11: **Value could not be calculated**

Indicates a measuring value, needed for calculation of the display value, is faulty or out of range.

Possible causes:
- Incorrect scale

Remedies:
- Check settings and input signal

10 Specifications

Input signal:	4 ... 20 mA (2-wire)
Voltage load:	approx. 2.0 V (at option S2: approx. 3V)
Max. permissible input:	25 mA (40mA short time)
Supply current:	from current loop
Display:	approx. 10 mm high LCD-display
Display range:	limits freely adjustable
Max. display value:	9999 digit
Min. display value:	-1999 digit
Recommended range:	$\underline{<}$ 2000 digit
Decimal point:	any position
Accuracy: (at 25°C)	< 0.2% ±1 digit
Temperature drift:	< 100 ppm / K
Measuring rage:	approx. 5 measurements / second
Filter:	adjustable
Operation:	via 3 buttons (at ..VO and ..WK the cover has to be removed)
Min-/max-value memory:	callable via buttons
Nominal temperature:	25 °C
Working conditions:	-20 ... 50 °C, 0 ... 80 % (non condensing)
Storage temperature:	-20 ... 70 °C
Connection: ***8930...***	special-adapter design for cubic plug according to EN 175301-803 A (ex. DIN43650 A) simple plug-in. 2 screws (68 and 75 mm) included in scope of supply (needed length depends on height of cubic plug)
Housing:	ABS, front screen made of polycarbonate and plastic foil keyboard approx. 48.5 x 48.5 x 35.5 mm (L x W x H) without cubic plug and cable gland approx. 50.5 x 90 x 39.5 mm (L x W x H) with cubic plug
Protection ***8930...***	IP65 (when cubic plug mounted appropriately)
EMC:	The device corresponds to the essential protection ratings established in the Regulations of the Council for the Approximation of Legislation for the member countries regarding electromagnetic compatibility (2004/108/EG). In accordance with EN61326-1 (table 3, class B), additional fault: < 1% FS When connecting long leads adequate measures against voltage surges have to be taken.