E44.X.01.6C-04

GREISINGER
Member of the GHM GROUP

# Mounting- and Operating Manual

# Universal displaying and controlling device

as of version 1.1

# GIR 300


CE

☞ Please read these instructions carefully before use!

☞ Please consider the safety instructions!

☞ Please keep for future reference!

Made in Germany

WEEE-Reg.-Nr. DE 93889386

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# Contents

# 1 Safety

## 1.1 General note

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

Mounting, start-up, operating, maintenance and removing from operation must be done by qualified, specially trained staff that have carefully read and understood this manual before starting any work.

The manufacturer will assume no liability or warranty in case of usage for other purpose than the intended one, ignoring advices of this manual, operating by unqualified staff as well as unauthorized modifications to the device.

## 1.2 Intended use

The device is a universal microcontroller based display -, monitoring - and controlling device.

The device has 1 universal-input, 2 relay outputs and an EASY Bus-interface. It can be used by measurement and –regulation, limit monitoring, etc.

Prior to fulfil the referring requirements, the device has to be configured on the base of this manual. Wrong configuration may lead to malfunction in the application. The commissioning expert / the operator is liable for a suitable configuration.

The device is only to be operated in control panels ore suitable electric housings, where the connection terminal area is sufficiently protected against touch.

The device is designed for industrial or commercial use.

Outdoor installation without suitable means of protection is not allowed.

The counting function is not to be used for e.g. consumption metering in the sense of the measuring instruments directive 2014/32/EU.

The safety guidelines of the manual are followed!

The unit does not contain any components that you can service or repair yourself.

All the described operations are only to be performed of skilled personnel that are authorized by the operator.

Any other use or use exceeding this is considered as non-conforming and leads to the expiration of any liability or guarantee claims from the manufacturer.

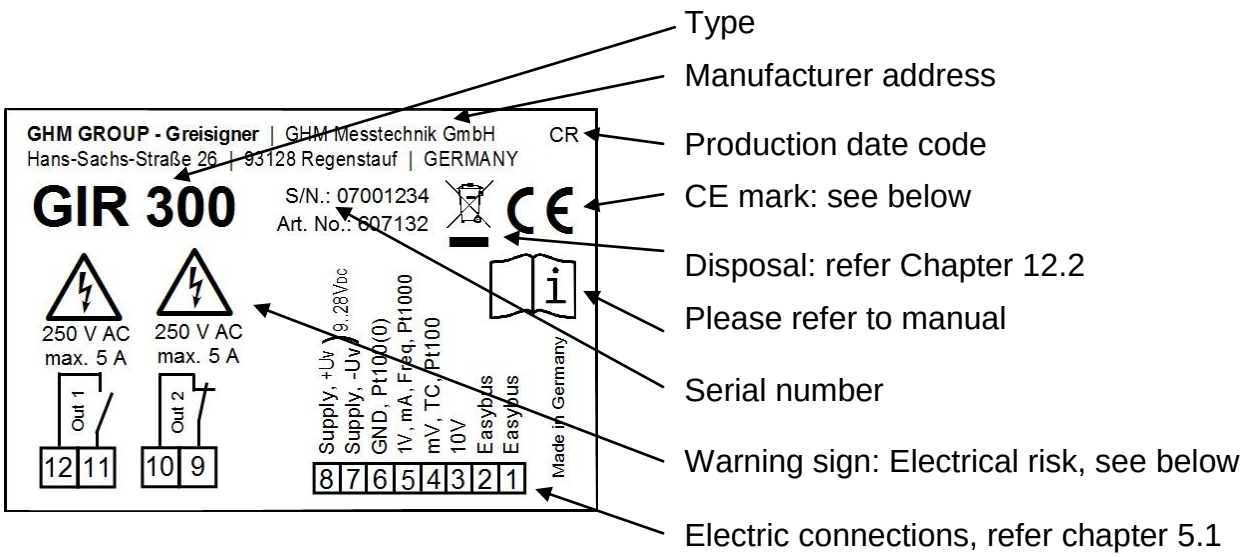
Note: Combination / connection to other electrical equipment with CE marking does not automatically deliver a conform system. A new evaluation of the system’s conformity to the low voltage directive (2014/35/EU) and EMC directive (2014/30/EU) by the manufacturer may be necessary, eventually others have to be considered (e.g. machinery directive).

## 1.3 Skilled personnel

The mounting, electrical installation, start of operation, maintenance and decommissioning must only performed by a skilled electrician.

Users of the readily installed device have to be sufficiently skilled in the operation of the device and able to avoid risks. The operator of the arrangement is responsible for sufficient qualification the operators.

## 1.4 Type-Plate




**Symbol explanation**

**Electrical risk:**
At electrical connections and components signed with this symbol there is a risk of electrical shock.

**Please refer to manual:**
Read the mounting- and operating manual carefully, before you connect and use the device.

**CE mark:**
With the CE-Sign declares the manufacturer, that the Product is conform with the prevailing requirements of EG.

## 1.5 Safety signs and symbols

Warnings are labelled in this document with the followings signs:

DANGER

**Caution!**
This symbol warns of imminent danger, death, serious injuries and significant damage to property at non-observance.

ATTENTION

**Attention!**
This symbol warns of possible dangers or dangerous situations which can provoke damage to the device or environment at non-observance.

**Note!**
This symbol point out processes which can indirectly influence operation, possibly cause incorrect measurement or provoke unforeseen reactions at non-observance.

## 1.6 Reasonably foreseeable misusee

1. 


This device must not be used at potentially explosive areas!
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.

2. 


This device must not be used at a patient for diagnostic or other medical purpose.

## 1.7 Safety guidelines

1. Faultless operation and reliability in operation of the measuring device can only be assured if the device is used within the climatic conditions specified in the chapter 0

2. Always disconnect the device from its supply before opening it. Take care that nobody can touch any of the unit‘s contacts after installing the device.

3. Standard regulations for operation and safety for electrical, light and heavy current equipment have to be observed, with particular attention paid to the national safety regulations (e.g. VDE 0100).

4. When connecting the device to other devices (e.g. the PC) the interconnection has to be designed most thoroughly, as internal connections in third-party devices (e.g. connection of ground with protective earth) may lead to undesired voltage potentials.

5. 


The device must be switched off and must be marked against using again, in case of obvious malfunctions of the device which are e.g.:
- Visible damage.
- Device does not work like prescribed.
- Storing the device under inappropriate conditions for longer time.
When not sure, the device should be sent to the manufacturer for repairing or servicing.

6. Modifications or repairs of the device may not be performed by the customer. For maintenance or repair the device must be sent to the manufacturer.

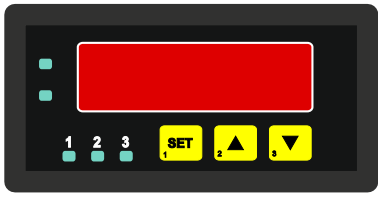
# 2 Product description

## 2.1 Scope of supply

- monitoring- / controlling device
- 2 mounting brackets
- screw-in/plug-in clamps (according to the model)
- mounting and operating manual

## 2.2 Function

It is a universally applicable microprocessor controlled displaying, monitoring and controlling device.




The device is supporting one universal interface for the connection of:

- Standard transmitter signals (0-20 mA, 4-20 mA, 0-50 mV, 0-1 V, 0-2 V and 0-10 V),
- RTD (Pt 100 and Pt 1000),
- Thermocouple probes (type K, J, N, T and S)
- Frequency (TTL and switching contact)

As well as rotation measuring, counting, etc...

Additionally two switching outputs, which can be configured as 2-point-controller, 3-point-controller, 2-point-controller with min./max. alarm common or individual min./max. alarm. The state of the switching outputs is displayed with 2 LED, whereby the LED (label 1) is displayed the state of the contact from relay 1 and the LED (label 2) the state of the contact from relay 2.

(LED on = contact connected).

Furthermore both devices support one EASY Bus-interface for communicating with a host computer that makes the device to a EASY Bus-module.

The device is being examined and completely calibrated.

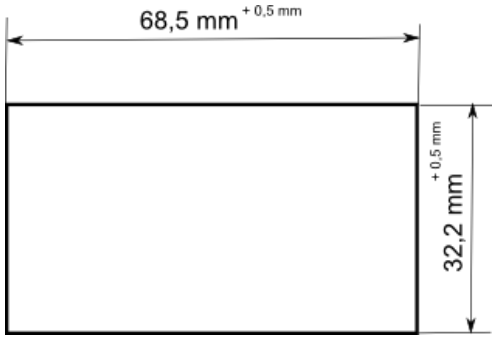
**Before the device can be used, it has to be configured for the customer's application.**


**In order to avoid undefined input states and unwanted or wrong switching processes, we suggest to connect the device's switching outputs after You have configured the device properly.**

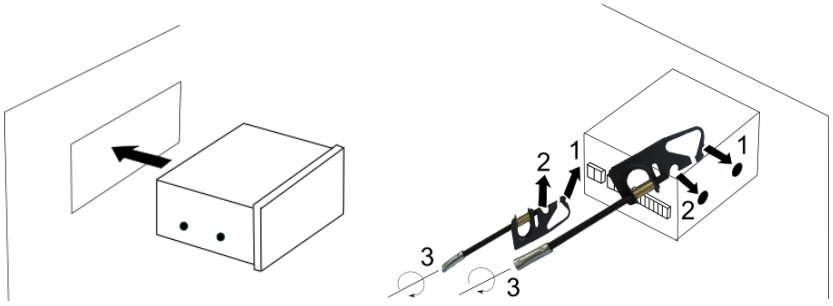
**By calling a configuration menu (configuration of the measuring input, configuration of the analog output, configuration of the output function, offset- and slope-adjustment) the measurement and regulation of the device will be deactivated.**
**By leaving the menu the device will be reinitialised and the measuring/regulation will be started again.**
**At the input function "counter" the counter state will be reset by leaving the menu.**

# 3 Mounting in panels / housings

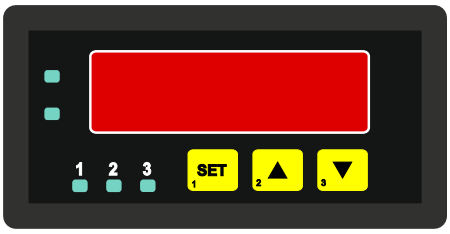
Panel cut-out:




Mounting:



# 4 Display and operating elements




## 4.1 Display elements

| | |
|---|---|
|  | **Main display:**<br>Display element to show minimum / maximum and measuring value.<br>It also displays errors and parameters. |
|  | **LED 1**:<br>Indicates the state of output 1 |
|  | **LED 2**:<br>Indicates the state of output 2 |

## 4.2 Operating elements

| | |
|---|---|
|  | **Button 1:**<br>activates menu "Switching points and alarm boundaries"<br>Button 1 + 5, >2s: activates menu "Configuration of Output functions"<br>Menu: **save value or step** to next parameter |
|  | **Button 2:**<br>display max. value<br>button 2 + 5, >2s: activates menu „Select input signal“<br>button 2 + 3, >2s: reset min-/max. value<br>Menu: press short = increase value<br>press long = roll-function with overflow-function *) |
|  | **Button 3:**<br>display min. value<br>button 3 + 5, >2s: activates menu „Offset- and slope adjustment“<br>button 3 + 2, >2s: reset min-/max. value<br>Menu: press short = decrease value<br>press long = roll-function with overflow-function *) |

*) The input is made with the buttons 2 and 3. When pressing the button once the value will be raised (button 2) by one or lowered (button 3) by one.

When holding the button pressed for longer than 1 sec. the value starts counting up or down, the counting speed will be raised after a short period of time. The device also features a ‘overflow-function‘, when reaching the upper limit of the range, the device switches to the lower limit, vice versa.

# 5 Electric connection

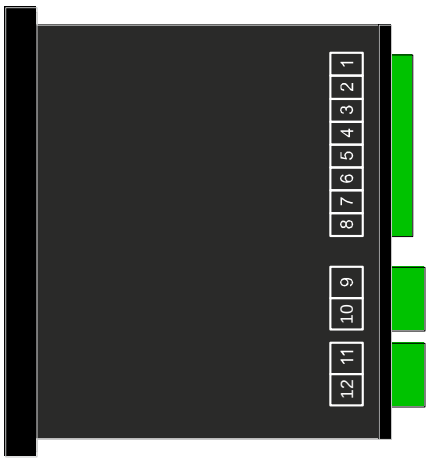
Wiring and commissioning of the device must be carried out by skilled personnel only.

ATTENTION

Use the device only for panel mounting or with suitable electrically housings
The electrical connections must be protected against direct contact. Other way, the risk of an electric shock exists.

In case of wrong wiring the device may be destroyed. We cannot assume any warranty in case of wrong wiring of the device.

## 5.1 Terminal assignment




| | |
|---|---|
| **1** | EASY Bus-Interface |
| **2** | EASY Bus-Interface |
| **3** | Input: 0-10V |
| **4** | Input: 0-50mV, thermocouples, Pt100 |
| **5** | Input: 0-1V, mA, frequency, Pt100, Pt1000 |
| **6** | Input: GND, Pt100, Pt1000 |
| **7** | Supply voltage GND |
| **8** | Supply voltage +Uv |
| **9** | Output 2: relay, break contact |
| **10** | Output 2: relay, input |
| **11** | Output 1: relay, input |
| **12** | Output 1; relay, make contact |

## 5.2 Connection data

ATTENTION

**These limits must not be exceeded (not even for a short time)!**

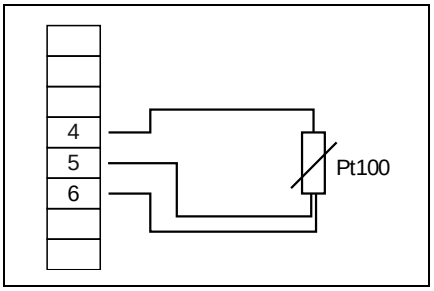
| | between terminals | typical | | limitations | | Note |
|---|---|---|---|---|---|---|
| | | min. | max. | min. | max. | |
| Power supply voltage | 7 and 8 | 9 | 28 | 0 | 30 | *or corresponding designation on the type plate* |
| Output 1: relay: make contact | 11 and 12 | | | | 253 VAC 5A ohmic load | *or corresponding designation on the type plate* |
| Output 2 relay: break contact | 9 and 10 | | | | 253 VAC 5A ohmic load | *or corresponding designation on the type plate* |
| Input 0-50mV, TC, ... | 4 and 6 | 0 V | 3.3 V | -1 V | 10 V, I<10mA | |
| Input mA | 5 and 6 | 0 mA | 20 mA | 0 mA | 30 mA | |
| Input 0-1(2)V, freq., ... | | 0 V | 3.3 V | -1 V | 30 V, I<5mA | |
| Input 0-10V | 3 and 6 | 0 V | 10 V | -1 V | 20 V | |
| Input Pt100 (Pt1000) | 4, 5 and 6 | | | 0 Ω | ∞ Ω | *active signal not allowed* |
| EASYBus-Interface | 1 and 2 | 12 V | 36 V | 0 V | 42 V | |

## 5.3 Connecting an input signal

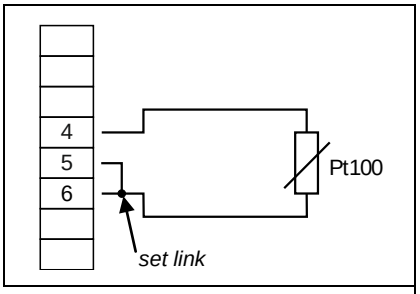
ATTENTION

Please take care not to exceed the limitations of the inputs when connecting the device as this may lead to destruction of the device.

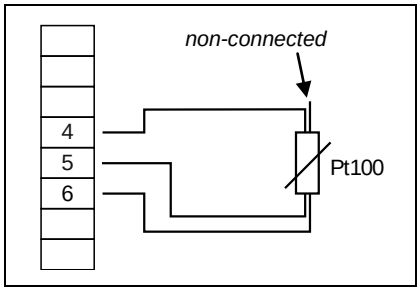
### 5.3.1 Connection a Pt 100 or Pt 1000 RTD probe or a thermocouple probe



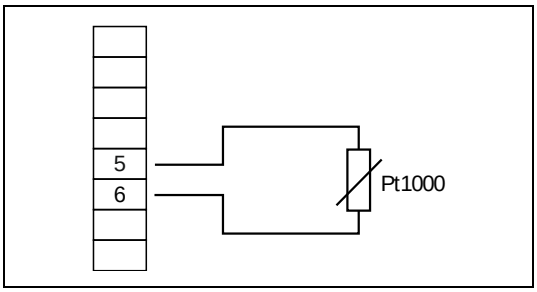

*Pt100-RTD probe (3-wire)*



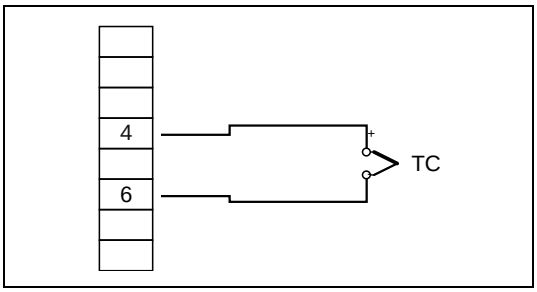

*Pt100- RTD probe (2-wire)*




*Pt100- RTD probe (4-wire)*

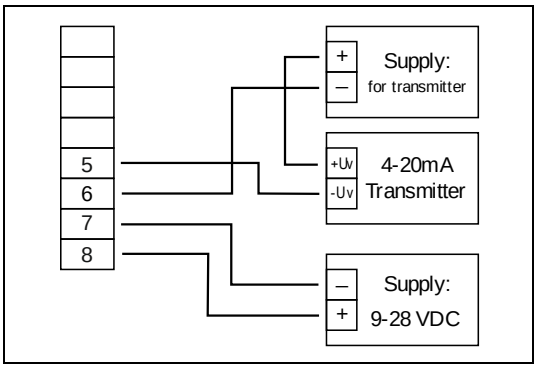



*Pt1000- RTD probe (2-wire)*

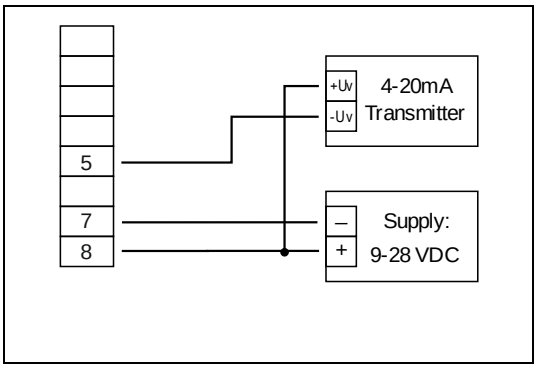



*Thermocouple probe*

### 5.3.2 Connecting a 4 - 20 mA transmitter in 2-wire-technology

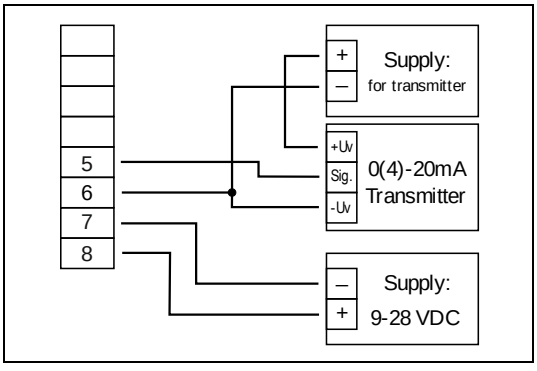



*with individual transmitter supply*

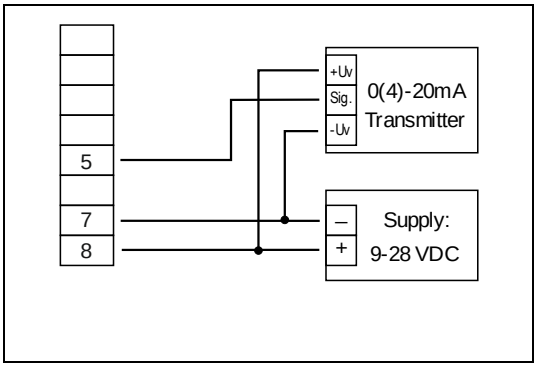



*without separate transmitter supply*

### 5.3.3 Connecting a (0)4 - 20 mA transmitter in 3-wire-technology

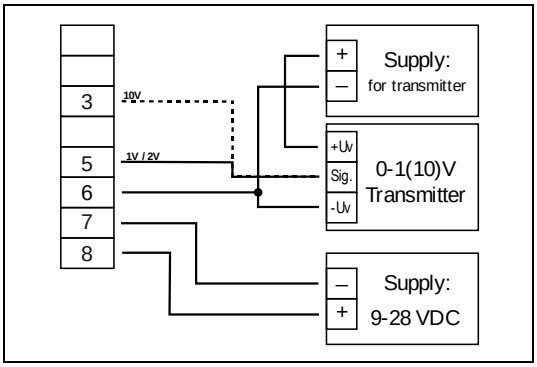



*with individual transmitter supply*

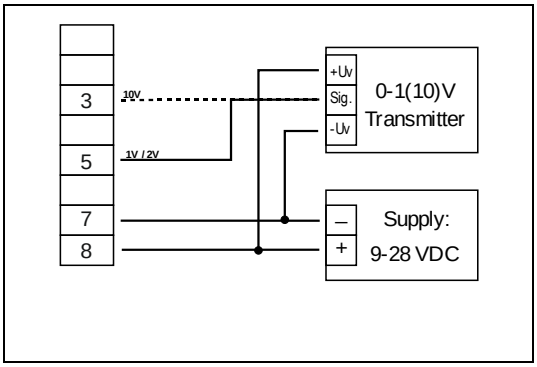



*without separate transmitter supply*

### 5.3.4 Connecting a 0-1V, 0-2V or 0-10V transmitter in 3-wire-technology

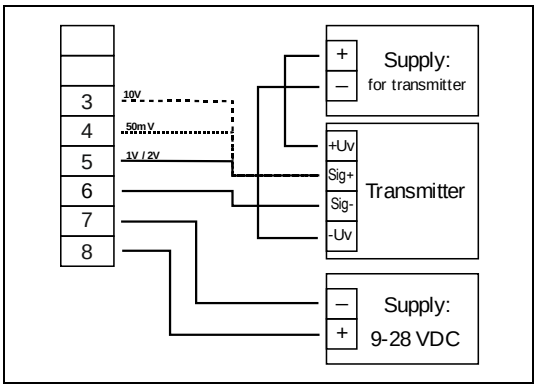



*with individual transmitter supply*

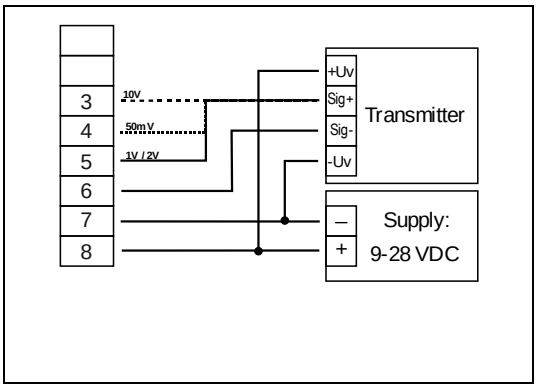



*without separate transmitter supply*

### 5.3.5 Connecting a 0-1/2/10V or 0-50 mV transmitter in 4-wire-technology




*with individual transmitter supply*




*without separate transmitter supply*
*(Note: Sig- and -Uv of the Transmitter must be the same potential)*

### 5.3.6 Connecting a frequency- or rotation-signal

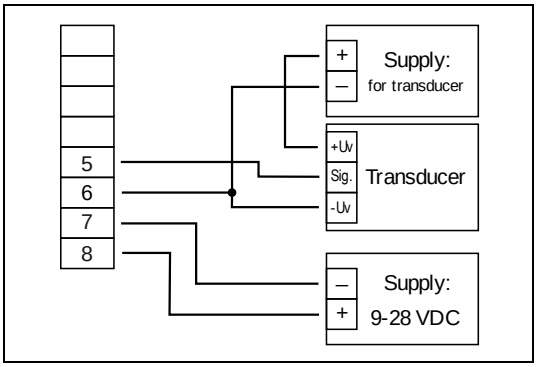
When measuring frequency or rotation three different input signals can be selected in the device's configuration. There is the possibility of connecting an active signal (= TTL, ...), a passive sensor-signal with NPN
(= NPN-output, push-button, relay, ...) or PNP (= a PNP output switching to +Us, high-side push-button, ...)

When configuring the device with a NPN switching output, a pull-up-resistor (~7 kΩ referring to +3.3V) is connected internally. So when you use a device with NPN output you don't need to connect a resistor externally.

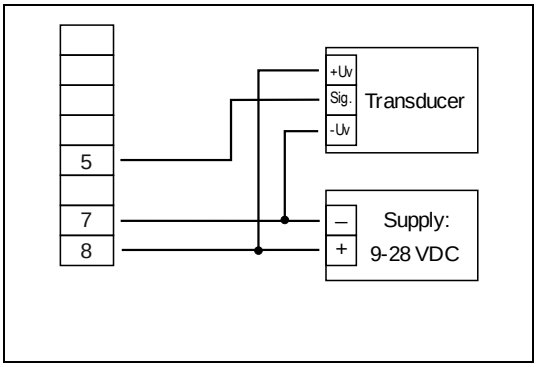
When configuring the device with a PNP switching output, a pull-down resistor (~7 kΩ referring to GND) is connected internally. So when you use a device with PNP output You don't need a resistor externally.

It may be that your measuring-signal source needs the connection of an external resistor e.g. the pull-up-voltage of 3.3V is not enough for the signal source, or you want to measure in the top level frequency range. In this case the input signal has to be treated like an active signal and you have to configure the device as „TTL".

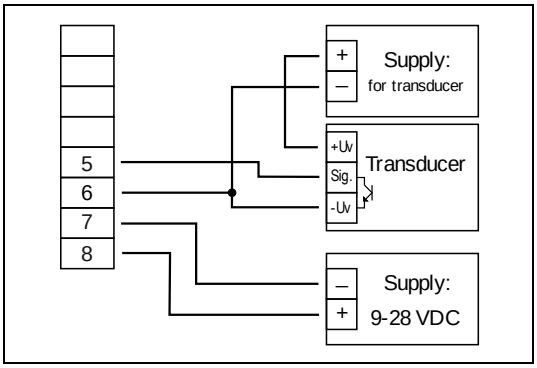
**When connecting the device You have to take care not to exceed the limits of the input voltage respective the input current of the frequency-input.**



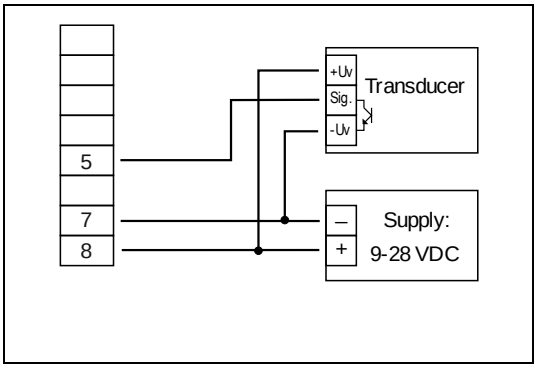

*Connection of a transducer (with separate power supply) with TTL or PNP output*



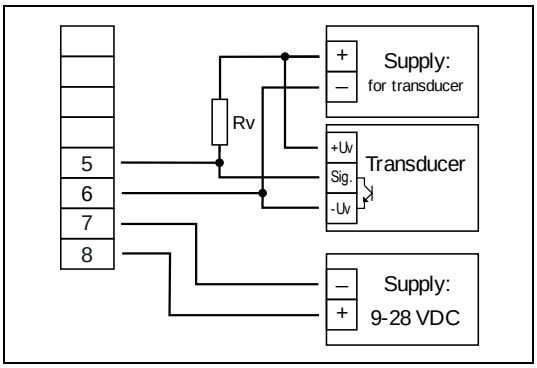

*Connection of a transducer (without separate power supply) with TTL or PNP output*



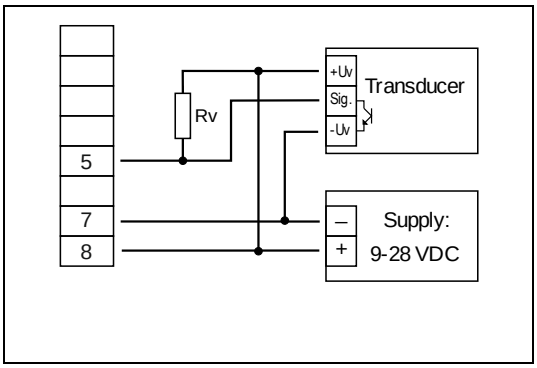

*Connection of a transducer (with separate power supply) with NPN output*




*Connection of a transducer (without separate power supply) with NPN output*

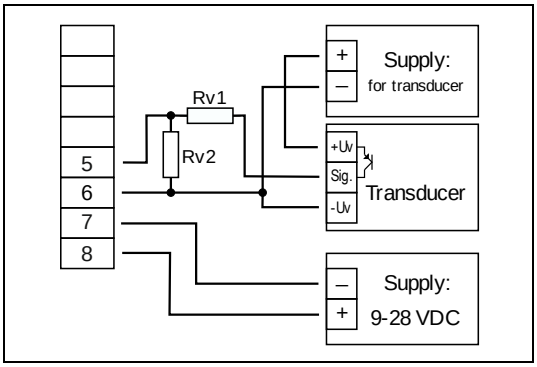



*Connection of a transducer (with separate power supply) with NPN output and necessary external resistor*

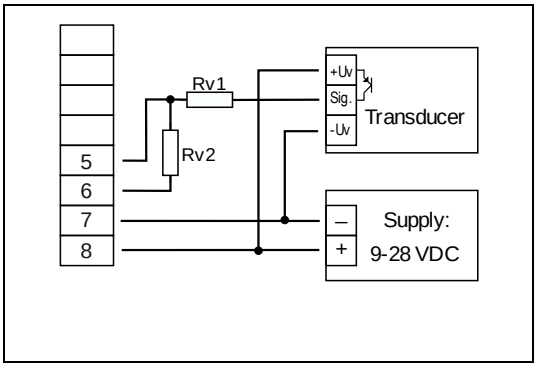



*Connection of a transducer (without separate power supply) with NPN output and necessary external resistor*

*<u>Connection note</u>: Rv = 3 kΩ (with power supply voltage =12 V) or 7 kΩ (at 24 V), device configuration: Sens = TTL*




*Connection of a transducer (with separate power supply) with PNP output and necessary external resistor wiring.*




*Connection of a transducer (without separate power supply) with PNP output and necessary external resistor wiring.*

*<u>Connection note</u>: Rv2 = 600Ω, Rv1 = 1.8kΩ (with power supply voltage =12V) or 4.2kΩ (at 24V), device configuration: Sens = TTL (Rv1 is a current limiting resistor and may be shorted if necessary. It should never exceed the mentioned value)*

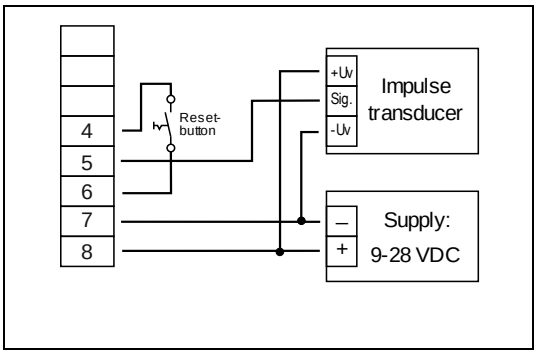
### 5.3.7 Connecting a counter signal

When configuring the device you can select 3 different input signal modes similar to the connection of frequency- and rotation-signals.

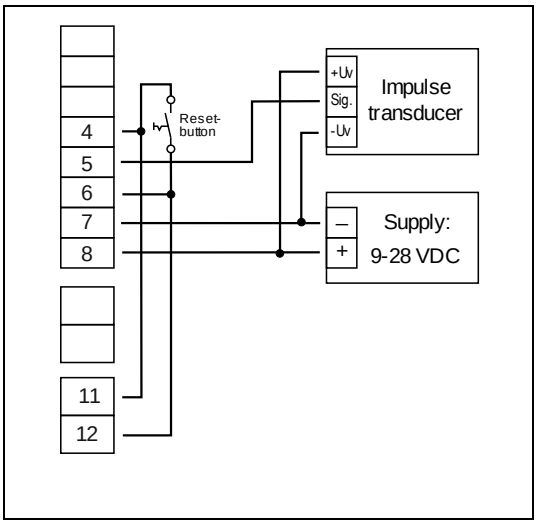
The connection of a sensor-signal for a counter-signal is the same used for the frequency- and rotation-signal.
Please use the wiring diagram given in this chapter.

There is the possibility to reset the counter. When connecting contact 4 with GND (e.g. contact 6) the counter will be reset. You can do this manually (e.g. with the help of a push-button) or automatically (with one switching output of the device).

**When connecting the device, take care not to exceed the limits of the input-voltage or the input-current of the frequency input.**

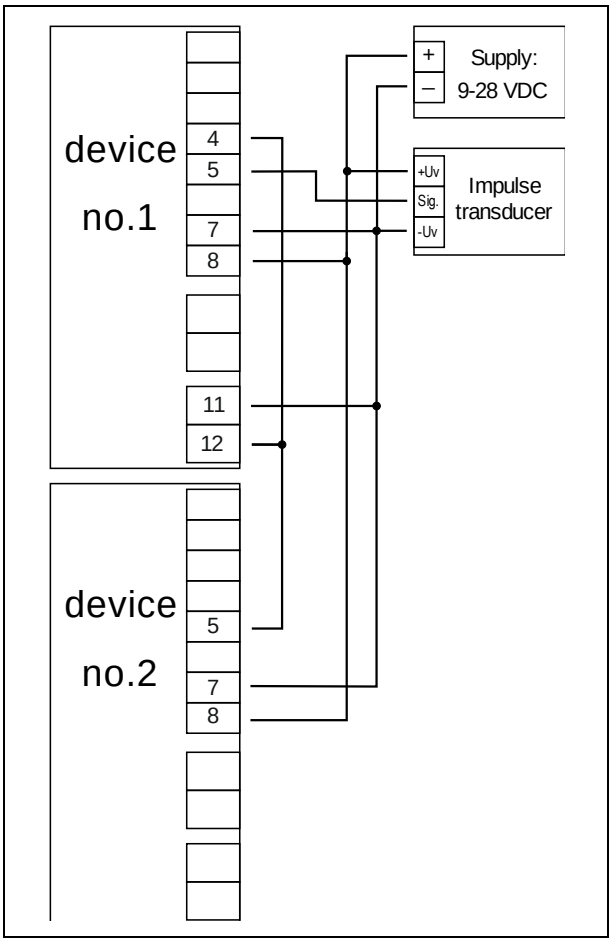



*Manually reset the device with the help of an push-button*




*automatically resetting with the help of output 1 and additional resetting the device via push-button*

*Connection note: output 2 can only be used to switching of low voltage potential!*




*Cascading of GIR 300*

*(Configuration note for the GIR 300:*
*device 1 – input signal like impulse transducer*
*device 2 – input signal = switching-contact*

## 5.4 Connecting switching outputs

ATTENTION

In order to avoid unwanted or wrong switching processes, we suggest to connect the device's switching outputs after you have configured the device's switching outputs properly.

The device have 2 outputs:
- Output 1: Relay, make contact
- Output 2: Relay, break contact

ATTENTION

Please take care that you must not exceed the limits of the voltage and of the maximum current of the switching outputs (not even for a short period of time). Please take extreme care when switching inductive loads (like relays, coils etc.). Because of their high voltage peaks, protective measures (e.g. RC-element) to limit these peaks have to be taken.

More information about switch states from the output functions, see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**

In case of configuring one output as an alarm output, the output will be closed in idle state (no alarm present). The output relay opens when an alarm condition occurred. See chapter7.2 and 7.3

## 5.5 Common wiring of several devices

The inputs of the device are not electrically isolated to the power supply.
When interconnecting several of these devices you have to make sure that there is no potential displacement.

Especially consider the following points:

- If several encoders are supplied with the same voltage (sensors, transducers), it is advisable to isolate each other electrically.
- If encoders have an electrical connection, the supply voltage should be electrically isolated. Please note that electrical connection of the encoders also can be arising with the measuring medium (e.g. liquid).

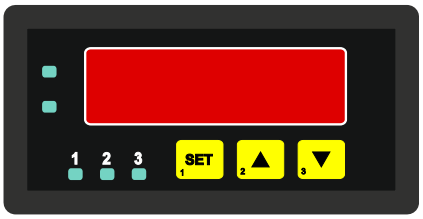
# 6 Configuration

## 6.1 General description and notes to the operating of the menu

**Selection of parameters:**

Switch to the next parameter with **Button1** resp. save after the last parameter.

**Parameter adjustment:**
With **button 2** or button **3** you can adjust its value.



Button 1 Button 2 Button 3

The buttons 2 and 3 are featured with a 'roll-function'. When pressing the button once the value will be raised (button 2) by one or lowered (button 3) by one.
When holding the button pressed for longer than 1 sec. the value starts counting up or down, the counting speed will be raised after a short period of time. The device also features a 'overflow-function', when reaching the upper limit of the range, the device switches to the lower limit, vice versa.

If no key is pressed > 60 sec. the menu will be automatically closed.

When changing the measuring mode “FUNC“ the values for the offset and slope-adjustment will be reset. Furthermore a change of the device scaling for standard signals (di.Lo, di.Hi, dP) or of the resolution can possibly influence the values of the offset and slope-adjustment. Therefore you may check your offset and slope-adjustment after changing the input configuration.
The change of the device scaling for standard signals (di.Lo, di.Hi, dP) can possibly change the switching and alarm points. Therefore you may check your output settings afterwards!

ATTENTION

The alarm-output is inverted!
This means, that the output will be active when there is no alarm!

## 6.2 Selecting an input signal type

- Turn the device on and wait until it completed its built-in segment test.
- Press button 2 for >2 sec. (e.g. with a small screw driver)
  The device displays “**InP**“ ('INPUT').
- Use button 2 or button 3 (middle or right button) to select the input
  signal (see table below).
- Validate the selection with button 1 (the left button). The display will show “**InP**“ again

Depending on the selected input signal, additional configurations will be needed.

| Input type | Input Signal | To select as input | proceed in chapter |
|---|---|---|---|
| Voltage signal | 0 – 10 V | U | 6.3 |
| | 0 – 2 V | | |
| | 0 – 1 V | | |
| | 0 – 50 mV | | |
| Current signal | 4 – 20 mA | I | 6.3 |
| | 0 – 20 mA | | |
| RTD | Pt 100 | t.rES | 6.4 |
| | Pt 1000 | | |
| Thermocouples | NiCr-Ni (type K) | t.tc | 6.4 |
| | Pt10Rh-Pt (type S) | | |
| | NiCrSi-NiSi (type N) | | |
| | Fe-CuNi (type J) | | |
| | Cu-CuNi (type T) | | |
| Frequency | TTL-signal | FrEq | 6.5 |
| | Switch-contact NPN, PNP | | |
| Rotation | TTL-signal | rPn | 6.6 |
| | Switch-contact NPN, PNP | | |
| Counter up | TTL-signal | Co.uP | 0 |

| | | | |
|---|---|---|---|
| | Switch-contact NPN, PNP | | |
| Counter down | TTL-signal | Co.dn | 0 |
| | Switch-contact NPN, PNP | | |
| Interface mode | Serial interface | SEr | 6.8 |

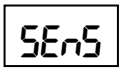
***Please note:*** ***When changing the measuring mode "InP", the input signal "SEnS" and the display-unit "Unit" all settings will be changed to factory default. You have to set all the other settings.***
***This also regards the settings for offset and slope-adjustment as well as the switching points!***

Parameter Overflow for the available measuring types:

| **Measuring type** | U | I | t.rES | t.tc | FrEq | rPn | Co.uP | Co.dn | SEr |
|---|---|---|---|---|---|---|---|---|---|
| Input signal / sensor | X | X | X | X | X | X | X | X | - |
| Signal edge | - | - | - | - | - | - | X | X | - |
| Devisor | - | - | - | - | - | X | X | X | - |
| Input signal low | - | - | - | - | X | - | - | - | - |
| Input signal high | - | - | - | - | X | - | X | X | - |
| Decimal point | X | X | X | - | X | X | X | X | - |
| Display low | X | X | - | - | X | - | - | - | - |
| Display high | X | X | - | - | X | - | X | X | - |
| Temperature unit | - | - | X | X | - | - | - | - | - |
| Limit | X | X | - | - | X | - | X | X | - |
| Filter | X | X | X | X | X | - | - | - | - |
| Address | - | - | - | - | - | - | - | - | X |
| Output | X | X | X | X | X | X | X | X | X |

## 6.3 Measuring voltage or current (0-50mV, 0-1V, 0-2V, 0-10V, 0-20mA, 4-20mA)

This chapter describes how you configure the device for measuring voltage- or current-signals from an external transmitter. This instruction demands that you selected "**U**" or "**I**" as your desired input type like it is explained in chapter 6.2. The display has to show "**InP**".

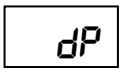



- Press Button 1. The display shows "**SEnS**".
- Select the desired input signal using button 2 or button 3 (middle or right button).

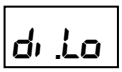
| Display | Input signal (voltage measuring) | Notes |
|---|---|---|
| **10.00** | 0 – 10 V | |
| **2.00** | 0 – 2 V | |
| **1.00** | 0 – 1 V | |
| **0.050** | 0 – 50 mV | |

| Display | Input signal (current measuring) | Notes |
|---|---|---|
| **4-20** | 4 – 20 mA | |
| **0-20** | 0 – 20 mA | |

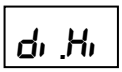
- Validate the selected input signal by pressing button 1. The display shows "**SEnS**" again.



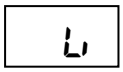

- Press button 1 again, The display will show "**dP**" (decimal point).
- Select the desired decimal point place by pressing button 2 or button 3.
- Validate the selected decimal position by pressing button 1. The display shows "**dP**" again.




- Press button 1 again, the display will show "**di.Lo**" (Display Low = low display value).
- Use button 2 and button 3 to select the desired value the device should display when a 0mA, 4mA or 0V input signal is attached.
- Validate the selected value by pressing button 1. The display shows "**di.Lo**" again.




- Press button 1 again, the display will show "**di.Hi**" (Display High = high display value).
- Use button 2 and button 3 to select the desired value the device should display when a 20mA, 50mV, 1V, 2V or 10V input signal is attached.
- Validate the selected value by pressing button 1. The display shows "**di.Hi**" again.

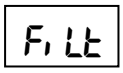



- Press button 1 again. The display will show "**Li**" (Limit = Measuring range limit).
- Use button 2 and button 3 to select the desired measuring range limit.

| Display | Measuring range limit | Notes |
|---|---|---|
| **off** | Deactivated | Exceeding of the measuring range limit is tolerable for about 10% of the selected input signal. |
| **on.Er** | Active, (displays 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, (displays the selected limit) | The measuring range limit is exactly bounded by the input signal. When exceeding or shortfalling 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%]* |

*Hint: When exceeding the measuring range limit > 10% independently from the setting, the device will always display an error message ("Err.1" or "Err.2").*

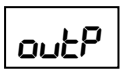



- Press button 1 to validate the selection, the display shows "**Li**" again.
- When pressing button 1 again, the display will show "**FiLt**" (Filter = digital filter).
- Use button 2 and button 3 to select the desired filter [in sec.].
  Selectable values: 0.01 ... 2.00 sec.

  *Explanation: this digital filter is a digital replica of a low pass filter.*

  *Note: when using the input signal 0-50 mV a filter value of at least 0.2 is recommended*
- Press button 1 to validate your value, the display shows "**FiLt**" again.

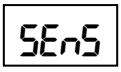
Now your device is adjusted to your signal source. Now the only thing left to do is to adjust the outputs of the device.




- When pressing button 1 again, the display shows "**outP**". (output)
  For configuring the outputs of the device, please follow the instructions given in chapter 6.9.

## 6.4 Measuring temperature (Pt 100, Pt 1000 RTD probes and thermocouples type J, K, N, S or T)

This chapter describes how to configure the device for temperature measuring with the help of external platinum RTD probes or thermocouple probes. This instruction demands that you selected "**t.res**" or "**t.tc**" as your desired input type like it is explained in chapter 6.2. The device has to display "**InP**".

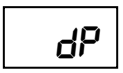



- When pressing button 1 the display shows "**SEnS** ".
- Use button 2 or button 3 (middle or right button) to select your desired input signal.

| Display | Input signal (RTD) | Notes |
|---|---|---|
| **P100** | Pt100 (3-wire) | Meas. range: -50.0 ... +200.0 °C (-58.0 ... + 392.0 °F) |
| | | Meas. range: -200 ... + 850 °C (-328 ... + 1562 °F) |
| **1000** | Pt1000 (2-wire) | Meas. range: -100.0 ... +200.0 °C (-148.0 ... + 392.0 °F) |
| | | Meas. range: -200 ... + 850 °C (-328 ... + 1562 °F) |

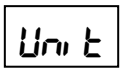
| Display | Input signal (thermocouples) | Notes |
|---|---|---|
| **niCr** | NiCr-Ni (type K) | Meas. range: -270 ... +1350 °C (-454 ... + 2462 °F) |
| **S** | Pt10Rh-Pt (type S) | Meas. range: -50 ... +1750 °C (- 58 ... + 3182 °F) |
| **n** | NiCrSi-NiSi (type N) | Meas. range: -270 ... +1300 °C (-454 ... + 2372 °F) |
| **J** | Fe-CuNi (type J) | Meas. range: -170 ... + 950 °C (-274 ... + 1742 °F) |
| **t** | Cu-CuNi (type T) | Meas. range: -270 ... + 400 °C (-454 ... + 752 °F) |

- Validate the selected input signal by pressing button 1. The display shows "**SEnS**" again.

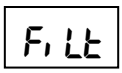



- Press button 1 again, the display will show "**dP**" (decimal point, for the resolution).
  *This menu parameter is only available at input signal Pt 100 and Pt 1000!*

- Use button 2 and button 3 to select whether the temperature is displayed with **0.1°** or **1°**.
- Validate the selected decimal position by pressing button 1. The display shows "**dP**" again.




- Press button 1 again, the display will show "**Unit**" (the unit you want to display).
- Use button 2 and button 3 to select whether you want to display **°C** or **°F**.
- Press button 1 to validate the selected unit, the display shows "**Unit**" again.




- Press button 1 again, the display will be showing "**FiLt**" (Filter = digital filter).
- Use button 2 and button 3 for setting the desired filter-value [in sec.].
  Selectable values: 0.01 ... 2.00 sec.

  *Explanation: this digital filter is a digital replica of a low pass filter.*
- Press button 1 to validate your selection, the display shows "**FiLt**" again.

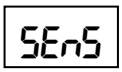
Now your device is adjusted to your signal source. Now the only thing left to do is to adjust the outputs of the device.


- When pressing button 1 again, the display shows "**outP**". (output)
  For configuring the outputs of the device, please follow the instructions shown in chapter 6.9.

For setting the offset and for setting the slope-adjustment, please follow the instructions given in chapter 8.

## 6.5 Measuring of frequency (TTL, switching-contact)

This chapter describes how to configure the device for measuring frequency.
This instruction demands that you selected "**FrEq**" as your desired input type like it is explained in chapter 6.2. The device has to display "**InP**".

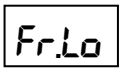



- When pressing button 1 the display will show "**SEnS**".
- Use button 2 or button 3 (middle or right button) to select the desired input signal.

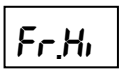
| Display | Input signal | Notes |
|---|---|---|
| **ttL** | TTL-signal | |
| **nPn** | Switching contact, NPN | For direct connection of a passive switching contact (e.g. push button, relay) or Transmitter with NPN output.<br>A pull-up-resistor is internally connected.<br>*Hint: when using push-buttons or relays, they must be bounce-free!* |
| **PnP** | Switching contact, PNP | For direct connection of a transmitter with PNP output.<br>A pull-down-resistor is internally connected. |

*Hint: For the connection of a frequency-transmitter, please follow the instructions given in chapter.*
*When connecting a switching-contact-transmitter with increased frequency range (= with external circuitry) you have to select TTL as your desired input signal.*

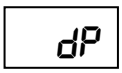
- Validate your selected input signal by pressing button 1. The display shows "**SEnS**" again.



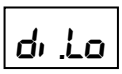

- When pressing button 1 again, the display will show "**Fr.Lo**" (frequency low = lower frequency range limit).
- Use button 2 and button 3 to select the lowest frequency that may occur when measuring.
- Press button 1 to validate your selection. The display shows "**Fr.Lo**" again.



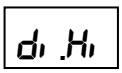

- When pressing button 1 again, the display will show "**Fr.Hi**" (frequency high = upper frequency range limit).
- Use button 2 and button 3 to select the highest frequency that may occur when measuring.
- Press button 1 to validate your selection. The display shows "**Fr.Hi**" again.



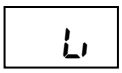

- When pressing button 1 again, the display will show "**dP**" (decimal point).
- Use button 2 and button 3 to select the desired decimal point position.
- Press button 1 to validate your selection. The display shows "**dP**" again.




- When pressing button 1 again, the display will show "**di.Lo**" (display low = display at lower frequency range limit).
- Set the value the device shall display at the lower frequency range limit by pressing button 2 or button 3.
- Press button 1 to validate your selection. The display shows "**di.Lo**" again.




- When pressing button 1 again, the display will show "**di.Hi**" (display high = display at upper frequency range limit).
- Set the value the device shall display at the upper frequency range limit by pressing button 2 or button 3.
- Press button 1 to validate your selection. The display shows "**di.Hi**" again.

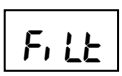



- When pressing button 1 again, the display will show "**Li**" (limit = measuring range limitation).
- Use button 2 and button 3 to select the desired measuring range limitation.

| Display | Measuring range limit | Notes |
|---|---|---|
| **off** | Inactive | Exceeding of the measuring-frequency is tolerable until you reach the maximum measuring range limit. |
| **on.Er** | Active, (displays error) | The measuring range is exactly bounded by the selected frequency-measuring-range-limit. When exceeding or shortfalling of the limit the device will display an error message. |
| **on.rG** | Active, (displays the selected limit) | The measuring range is exactly bounded by the selected frequency-measuring-range-limit. When exceeding or shortfalling of the limit the device will display the lower or upper display-range-limit. *[e.g. for humidity: when shortfalling or exceeding the device will display 0% or 100%]]* |

*Hint: When exceeding the maximum range limit (10 kHz) independently from the limit setting an error message will be displayed ("Err.1").*

- Press button 1 to validate your selection. The display shows "**Li**" again.




- When pressing button 1 again, the display will show "**FiLt**" (Filter = digital filter).
- Use button 2 and button 3 to select the desired filter value [in sec.].
  Usable values: 0.01 ... 2.00 sec.

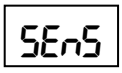
  *Explanation: this digital filter is a digital replica of a low pass filter.*
- Press button 1 to validate your selection. The display shows "**FiLt**" again.

Now your device is adjusted to your signal source. The only thing you left do is to adjust the outputs of the device.


- When pressing button 1 again, the display will show "**outP**". (Output)
  For configuring the outputs of the device, please follow the instructions shown in chapter 6.9.

## 6.6 Measuring of rotation speed (TTL, switching-contact)

This chapter describes how to configure the device for measuring rotation speed.
This instruction demands that you selected "**rPn**" as your desired input type like it is explained in chapter 6.2. The device has to display "**InP**".

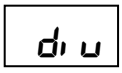



- When pressing button 1 the display will show "**SEnS**".
- Use button 2 or button 3 (middle or right button) to select the desired input signal.

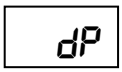
| Display | Input signal | Notes |
|---|---|---|
| **ttL** | TTL-signal | |
| **nPn** | Switching contact, NPN | For direct connection of a passive switching contact (e.g. push button, relay) or Transmitter with NPN output.<br>A pull-up-resistor is internally connected.<br>*Hint: when using push-buttons or relays, they must be bounce-free!* |
| **PnP** | Switching contact, PNP | For direct connection of a transmitter with PNP output.<br>A pull-down-resistor is internally connected. |

*Hint: For the connection of a frequency-transmitter, please follow the instructions given in chapter 5.3.6. When connecting a switching-contact-transmitter with increased frequency range (= with external circuitry) you have to select TTL as your desired input signal.*

- Validate your selected input signal by pressing button 1. The display shows "**SEnS**" again.




- When pressing button 1 again, the display will show "**diu**" (divisor).
- Use button 2 and 3 to select your desired divisor.
  *Set the divisor to the pulses per rotation the transmitter supplies.*
- Press button 1 to validate your selection. The display shows "**diu**" again.




- When pressing button 1 again, the display will show "**dP**" (decimal point).
- Use button 2 and button 3 to select the desired decimal point position.

  *Use the decimal point position to change the resolution of your measurement.*
  *The more the decimal point position is on the left, the finer the resolution will become. Please note that you lower the maximum value that can be displayed, either.*
  *Example: your engine runs with 50 rotations per minute.*
  *With no decimal point the device will display something like 49 – 50 – 51, the maximum value that can be displayed is 9999 rotations per minute.*
  *With the decimal point position on --.-- the device will display something like 49.99 – 50.00 – 50.01, but the maximum value that can be displayed is 99.99 rotations per minute.*
- Press button 1 to validate your selection. The display shows "**dP**" again.

Now your device is adjusted to your signal source. The only thing left to do is to adjust the outputs of the device.


- When pressing button 1 again, the display will show "**outP**". (Output)
  For configuring the outputs of the device, please follow the instructions shown in chapter 6.9.

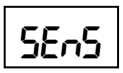
## 6.7 Up-/Downwards counter

The upwards counter starts counting from 0 according to its settings.
The downwards counter starts counting from the upper value that had been selected.

The current value of the counter can be reset anytime by connecting terminal 4 to GND (e.g. terminal 6)
The counter starts from its beginning as you disconnect the pin connection.

*Feature:* *The current counter value won't be lost if the voltage supply is disconnected.*
*After restarting the counter starts from this value.*

This chapter describes how to configure the device as a counter.
This instruction demands that you selected "**Co.up**" or "**Co.dn**" as your desired input type like it is explained in chapter 6.2. The device has to display "**InP**".

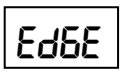



- When pressing button 1 the display will show "**SEnS**".
- Use button 2 or button 3 (middle or right button) to select the desired input signal.

| Display | Input signal | Notes |
|---|---|---|
| **ttL** | TTL-signal | |
| **nPn** | Switching contact, NPN | For direct connection of a passive switching contact (e.g. push button, relay) or Transmitter with NPN output.<br>A pull-up-resistor is internally connected.<br>*Hint: when using push-buttons or relays, they must be bounce-free!* |
| **PnP** | Switching contact, PNP | For direct connection of a transmitter with PNP output.<br>A pull-down-resistor is internally connected. |

*Hint: For the connection of a frequency-transmitter, please follow the instructions given in chapter 5.3.6 and 5.3.7. When connecting a switching-contact-transmitter with increased frequency range (= with external circuitry) you have to select TTL as your desired input signal.*

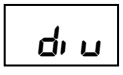
- Validate your selected input signal by pressing button 1. The display shows "**SEnS**" again.




- When pressing button 1 again, the device will be displaying "**EdGE**" (signal edge).
- Use button 2 or button3 (middle or right button) to select the desired signal edge.

| Display | Signal edge | Notes |
|---|---|---|
| **PoS** | positive | The counter is triggered on the positive (rising) edge. |
| **nEG** | negative | The counter is triggered on the negative (falling) edge. |

- Press button 1 to validate your selection, the display shows "**EdGE**" again.




- When pressing button 1 again, the display will show "**diu**" (divisor = pre-scaling factor).
- Use button 2 and button 3 to select the desired pre-scaling factor.

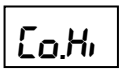
*The incoming pulses will be divided with the selected pre-scaling factor, after that they will be transmitted to the device for further processing.*
*By this factor you can adapt the device to your transmitter or select a pre-scaling factor for large values.*

*Example 1: Your flow rate transmitter supplies 165 pulses per litre. When setting a pre-scaling factor of 165 every 165th pulse (so 1 pulse per litre) will be used for further processing.*

*Example 2: Your transmitter is supplying about 5 000 000 pulses during the measurement, which exceeds the limit of the device.*
*But when setting a pre-scaling factor of 1000 only every 1000th pulse is used for*

*further processing. So you only got a value 5000 which won't exceed the limit of the device.*

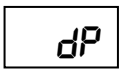
- Press button 1 to validate your selection. The display shows "**diu**" again.



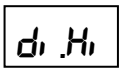

- Press button 1 again. The display shows "**Co.Hi**" (counter high = upper counting range limit).
- Use button 2 and button 3 to select the maximum pulse-count (after pre-scaling factor) for the counting process.

  *Example:* *Your flow rate transmitter is supplying 1800 pulses per litre, you selected a pre-scaling factor of 100 and you are expecting a maximum flow rate of 300 litres during the measurement.*
  *With a pre-scaling factor of 100 selected, you will get 18 pulses per litre.*
  *With a maximum flow rate of 300 litres you will be getting a pulse count of 18 * 300 = 5400.*

- Press button 1 to validate your selection. The display shows "**Co.Hi**" again.



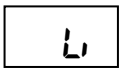

- When pressing button 1 again, the device will be displaying "**dP**" (decimal point).
- Use button 2 and button 3 to select the desired decimal point position.
- Press button 1 to validate your selected decimal point position. The display shows "**dP**" again.




- Press button 1 again. The display shows "**di.Hi**" (display high = upper display range limit).
- Use button 2 and button 3 to set the value to be displayed when the maximum pulse (setting of co.Hi) count is reached.

  *Example:* *Your flow rate transmitter is supplying 1800 pulses per litre and you are expecting a maximum flow rate of 300 litres. You selected a pre-scaling factor of 100 and a counter range limit of 5400.*
  *When wanting a resolution of 0.1 litres shown in the display of the device you would have to set the decimal point position to ---.- and a display range limit of 300.0.*

- Press button 1 to validate your selection. The display shows "**di.Hi**" again.




- Press button 1. The display will show "**Li**" (Limit = measuring range limit).
- Use button 2 and button 3 to select the desired measuring range limit (counter range limit.

| Display | Measuring range limit | Notes |
|---|---|---|
| **off** | Inactive | Exceeding of the counter range is tolerable until you reach the maximum measuring range limit. |
| **on.Er** | active, (error indicator) | The measuring range is exactly bounded by the selected counter-range-limit. When exceeding or shortfalling of the limit the device will display an error message. |
| **on.rG** | active, (measuring range limit) | The measuring range is exactly bounded by the selected counter-range-limit. When exceeding or shortfalling of the limit the device will display the upper counter-range-limit or 0. |

*Hint:* *The lower counter-range-limit (for configured downwards counter) is fixed to 0.*

- Press button 1 to validate your selection. The display shows "**Li**" again.

Now your device is adjusted to your signal source. The only thing left to do is to adjust the outputs of the device.


- When pressing button 1 again, the display will show "**outP**". (Output)
  For configuring the outputs of the device, please follow the instructions shown in chapter 6.9.

## 6.8 Interface mode

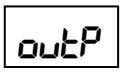
*When the device is in the interface mode it won't make any measurements by itself.*
*The value shown in the device's display is sent via serial interface.*
*But the switching and alarm functions of the displayed value are still available.*

*The EASYBus-Address of the device needed for the communication can be set manually with the device itself or with the help of an EASYBus-software (like EASYBus-Configurator).*
*Please note, when carrying out an EASYBus-system-initialisation the device's address will be reset automatically.*

This chapter describes how to configure the device as an EASYBus-display.
This instruction demands that you selected "**SEri**" as your desired input type like it is explained in chapter 6.2.
The device has to display "**InP**".


- When pressing button 1 again, the device will display "**Adr**" (address).
- Use button 2 and button 3 to select the desired address [0 ... 239] of the device.
- Press button 1 to validate the selected device address. The display shows "**Adr**" again.

You don't need any further configuration but the outputs.




- When pressing button 1 again, the device will be displaying "**outP**" (output).
  For configuring the outputs please follow the instructions given in chapter 6.9.

## 6.9 Selection of the output function

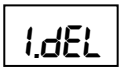
- After configuration of the input (chapter 6.3 – 6.8) you have to select the output function.
  The display shows "**outP**" (output).
- Use button 2 and button 3 (middle or right button) to select the desired output-function.

| Description | Function | | To select as output | For switching point setting please refer to chapter |
|---|---|---|---|---|
| | Output 1 | Output 2 | | |
| No output, device is used as display unit | inactive (contact is open) | inactive (contact is open) | **no** | -- |
| 2-point-controller | switching function 1 (active = contact closed) | switching function 1 (active = contact is open) | **2P** | 7.1 |
| 3- point-controller | switching function 1 (active = contact closed) | switching function 2 *1 (active = contact closed) | **3P** | 7.1 |
| 2- point-controller with min-/max-alarm | switching function 1 (active = contact closed) | min-/max-alarm (alarm = contact closed) | **2P.AL** | 7.2 |
| min-/max-alarm, common | min-/max-alarm (alarm = contact is open) | min-/max-alarm (alarm = contact closed) | **AL.F1** | 7.3 |
| min-/max-alarm, individual *2 | max-alarm (alarm = contact closed) | min-alarm (alarm = contact closed) | **AL.F2** | 7.3 |

*1 = Please take notice, that output 2 is a breaking contact of the relay, which means, that the contact will be closed if the device have no power supply!

2 = Note: please take notice, that output 1 and 2 has different contact types.
Through this the device will have different contact states by max- and min-alarm in case of no power supply is present! *(Max alarm = contact is open, min alarm = contact is closed)*.

*Depending on your output function setting, it may be possible that one or more settings described below won't be available.*

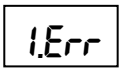



- When pressing button 1 again, the device will display "**1.dEL**" (delay of output 1).

- Use button 2 and button 3 to set the desired value for the switching-delay of output 1.

  *Hint: The selected value [0.01 ... 2.00] will be in seconds.*

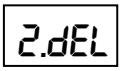
- Press button 1 to validate the selection. The display shows "**1.dEL**" again.

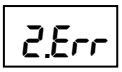



- When pressing button 1 again, the device will display "**1.Err**" (preferred state of output 1).
- Use button 2 and button 3 (middle or right button) to set the desired initial state in case of an error.

| Display | Preferred state of the output | Notes |
|---|---|---|
| **off** | Inactive in case of an error (contact is open) | |
| **on** | Active in case of an error (contact ist closed) | |

- Press button 1 to validate the selection. The display shows "**1.Err**" again.




- In case you selected a 3-point-controller you have to make the following settings similar to the settings you already made for output 1:
  "**2.dEL**" (delay of output 2) and
  "**2.Err**" (preferred state of output 2).

Depending on the selected output function you have to make the settings for switching and alarm points. See description in chapter **Fehler! Verweisquelle konnte nicht gefunden werden. „Fehler! Verweisquelle konnte nicht gefunden werden.**" for further information.

*Hint: The settings for the switching and alarm points can be made later in an extra menu (see chapter* **Fehler! Verweisquelle konnte nicht gefunden werden.***)*

# 7 Switching points and alarm-boundaries

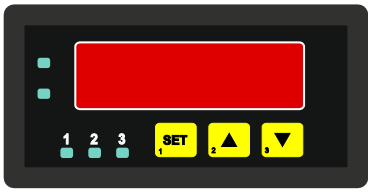
Note: All relevant switching and alarm points can be set at this menu.
*(Preferred output position and delay of the output can only be set at configuration menu)*
Depending on the selected output function different parameters have to be adjusted.
The configuration menu automatically skips parameters not needed for the selected output function.

***Please note: The settings of the switching points and alarm-boundaries will automatically be reset to factory default when any changes for the settings „Func", „Inp.1" or „Unit" had been made!***

General note: The state of the switching contacts is displayed with 2 LED´s. LED "1" displays the state of the contact of relay 1 and LED "2" displays the state of contact of relay 2. (LED illuminate = contact is closed)

*Hint: The buttons 2 and 3 are featured with a 'roll-function'. When pressing the button once the value will be raised (button 2) by one or lowered (button 3) by one.*
*When holding the button pressed for longer than 1 sec. the value starts counting up or down, the counting speed will be raised after a short period of time.*
*The device also features a 'overflow-function', when reaching the upper limit of the range, the device switches to the lower limit, vice versa.*

**Please note: When you are configuring the device and don't press any button for more than 60 sec. the configuration of the device will be cancelled.**
**The changes you made will <u>not</u> be saved and will be lost!**




button 1 button 2 button 3

- When pressing button 1 for >2 sec. the menu to select the switching points and alarm-boundaries will be called.
- Depending on the configuration you have made in the „output" menu you will get different Display values.
  Please follow the specific chapter for further information.

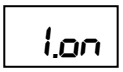
| Description | Function | | To select as output | proceed in chapter |
|---|---|---|---|---|
| | Output 1 | Output 2 | | |
| No output, device is used as display unit | inactive (contact is open) | inactive (contact is open) | **no** | --- |
| 2-point-controller | switching function 1 (active = contact closed) | switching function 1 (active = contact is open) | **2P** | 7.1 |
| 3- point-controller | switching function 1 (active = contact closed) | switching function 2 *1 (active = contact closed) | **3P** | 7.1 |
| 2- point-controller with min-/max-alarm | switching function 1 (active = contact closed) | min-/max-alarm (alarm = contact closed) | **2P.AL** | 7.2 |
| min-/max-alarm, common | min-/max-alarm (alarm = contact is open) | min-/max-alarm (alarm = contact closed) | **AL.F1** | 7.3 |
| min-/max-alarm, individual *2 | max-alarm (alarm = contact closed) | min-alarm (alarm = contact closed) | **AL.F2** | 7.3 |

*1 = Please take notice, that output 2 is a breaking contact of the relay, which means, that the contact will be closed if the device have no power supply!

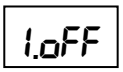
2 = Note: please take notice, that output 1 and 2 has different contact types.
Through this the device will have different contact states by max- and min-alarm in case of no power supply is present! *(Max alarm = contact is open, min alarm = contact is closed)*

## 7.1 2-point-controller, 3-point-controller

This chapter describes how to configure the device as a 2-point-controller or 3-point-controller.
This instruction demands that you selected "**2P**" or "**3P**" as your desired output function like it is explained in chapter **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.** 6.9.




- Press button 1 *(when not already done).*
  The device will be displaying "**1.on**" (turn-on-point of output 1).
- Use button 2 and button 3 to set the desired value, the device's output 1 should be turning on.
- Press button 1 to validate your selection. The display shows "**1.on**" again.

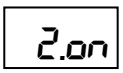



- When pressing button 1 again, the device will be displaying "**1.off**". (turn-off-point) of output 1)
- Use button 2 and button 3 to set the desired value, the device's output 1 should be turning off.
- Press button 1 to validate your selection. The display shows "**1.off**"again.

<u>Example:</u> *You want to control the temperature of a heating coil, with a hysteresis of +2°C, to 120°C.*
*Therefore you will have to select the turn-on-point "1.on" to 120°C and the turn-off-point to "122°C".*
*When your heating coil temperature falls below 120°C it will be turned on. When the temperature rises above 122°C the heating coil will be turned off.*
*Note: Depending on the inertia of your heating coil an overshooting of the temperature may be possible.*

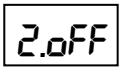
When selected '2-point-controller' you finished configuring your device. Press button 1 to switch over to display the measuring value.

When selected '3-point-controller' please follow the instructions given below:




- Press button 1 *(when not already done).* The device will be displaying "**2.on**" (turn-on-point of output 2).

- Use button 2 and button 3 to set the desired value, the device's output 2 should be turning on.
- Press button 1 to validate your selection. The display shows "**2.on**" again.

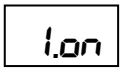



- When pressing button 1 again, the device will be displaying "**2.off**". (turn-off-point) of output 2)
- Use button 2 and button 3 to set the desired value, the device's output 2 should be turning off.
- Press button 1 to validate your selection. The display shows "**2.off**"again.

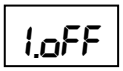
Now you finished configuring your device. Press button 1 to switch over to display the measuring value.

## 7.2 2-point-controller with alarm function

This chapter describes how to configure the device as a 2-point-controller with alarm function.
This instruction demands that you selected "**2P.AL** as your desired output function like it is explained in chapter **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**.

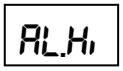



- Press button 1 *(when not already done).*
  The device will be displaying "**1.on**" (turn-on-point of output 1).
- Use button 2 and button 3 to set the desired value, the device's output 1 should be turning on.
- Press button 1 to validate your selection. The display shows "**1.on**" again.

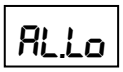



- When pressing button 1 again, the device will be displaying "**1.off**". (turn-off-point) of output 1)
- Use button 2 and button 3 to set the desired value, the device's output 1 should be turning off.
- Press button 1 to validate your selection. The display shows "**1.off**"again.

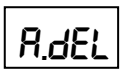
*Example: You want to control the temperature of a cooling chamber between –20°C and –22°C.*
*Therefore you will have to select –20°C for the turn-on-point 1 "1.on" and –22°C for the turn-off-point 1 "1.off". When the temperature rises above –20°C the device turns its output 1 on, when falling below –22°C the device will turn its output 1 off.*
*Note: Depending on the inertia of your cooling circuit an overshooting of the temperature may be possible.*




- When pressing button 1, the device will be displaying "**AL.Hi**". (maximum alarm-value)
- Use button 2 and button 3 to set the desired value, the device should turn on its maximum-alarm.
- Press button 1 to validate your selection. The display shows "**AL.Hi**" again.




- When pressing button 1 again, the device will be displaying "**AL.Lo**". (minimum alarm-value)
- Use button 2 and button 3 to set the desired value, the device should turn on its minimum-alarm
- Press button 1 to validate your selection. The display shows "**AL.Lo**" again.




- When pressing button 1 again, the device will be displaying "**A.dEL**". (delay of the alarm-function)
- Use button 2 and button 3 to set the desired delay of the alarm-function.

*Note: The unit of the value to be set [0 .. 9999] is in seconds. The device will turn on the alarm after the minimum or maximum alarm value was active for the delay-time you have set.*

- Press button 1 to validate the delay time. The display shows "**A.dEL**" again.

*Example: You want to have an alarm monitoring for the cooling chamber mentioned above. The alarms should start when the temperature will be rising above -15°C or falling below -30°C.*

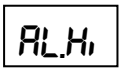
*Therefore you have to select -15°C for the maximum alarm-value "AL.Hi" and -30°C for the minimum alarm-value "AL.Lo".*
*=>The alarm will be starting after the temperature rises above -15°C and stays above*
*-15°C for the entered delay time or after it had been falling below -30°C and stays*
*below -30°C for the entered delay time.*

*Please note: The relay for alarm output (output 2) will be active if no alarm are exist. If an alarm condition will occurred the relay will drop. For this function follows the following output states:*
- *no alarm relay contact is open*
- *alarm relay contact is closed*
- *power failed relay contact is closed*

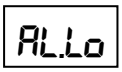
Now you finished configuring your device. Press button 1 to switch over to display the measuring value.

## 7.3 Minimum/maximum alarm (individual or common)

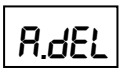
This chapter describes how to configure the device's alarm boundaries for min-/max-alarm-monitoring. This instruction demands that you selected "**AL.F1**" or "**AL.F2**" as your desired output function like it is explained in chapter **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**.




- Press button 1 *(when not already done)* , the device will be displaying "**AL.Hi**". (maximum alarm-value)
- Use button 2 and button 3 to set the desired value, the device should turn on its maximum-alarm.
- Press button 1 to validate your selection. The display shows "**AL.Hi**" again.




- When pressing button 1 again, the device will be displaying "**AL.Lo**". (minimum alarm-value)
- Use button 2 and button 3 to set the desired value, the device should turn on its minimum-alarm
- Press button 1 to validate your selection. The display shows "**AL.Lo**" again.




- When pressing button 1 again, the device will be displaying "**A.dEL**". (delay of the alarm-function)
- Use button 2 and button 3 to set the desired delay of the alarm-function.

  *Note: The unit of the value to be set [0 .. 9999] is in seconds. The device will turn on the alarm after the minimum or maximum alarm value was active for the delay-time you have set.*

- Press button 1 to validate the delay time. The display shows "**A.dEL**" again.

*Example: You want to have a temperature alarm-monitoring of a greenhouse. The alarm should start when the temperature rises above 50°C or falls below 15°C. Therefore your settings will be 50°C for the maximum alarm-value "AL.HI" and 15°C for the minimum alarm-value "AL.Lo".*
*=>The alarm will be starting after the temperature rises above 50°C and stays above 50°C*
*for the entered delay time or after it had been falling below 15°C and stays below 15°C*
*for the entered delay time.*

*Please note: When using the output function AL.F1 (common min-/max-alarm) both outputs will be active parallel.*
*In consequence of the different contact types of the relay´s are both output contact states available.*

| | *output 1* | *output 2* |
|---|---|---|
| *• no alarm* | *relay contact is closed* | *relay contact is open* |
| *• alarm* | *relay contact is open* | *relay contact is closed* |
| *• power fail* | *relay contact is open* | *relay contact is closed* |

*Please note: When using the output function AL.F2 (individual max and min alarm) the outputs have following states:*

- *no alarm* *relay contact is open*
- *alarm* *relay contact is closed*
- *power fail* *relay contact is open (at output 1)*
  *relay contact is closed (at output 2)*

Now you finished configuring your device. Press button 1 to switch over to display the measuring value.

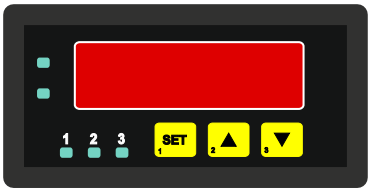
# 8 Offset- and slope-adjustment

The offset and slope-adjustment function can be used for compensating the tolerance of the used sensor, and for vernier adjustment of the used transducer or transmitter. Offset- and slope adjustment only affects at the frequency- and rotation speed.

***Please note:*** ***The settings of the offset- / slope-adjustment will be cancelled, when no button was pressed for more than 60 sec.***
***Changes you may have made already won't be saved and will be lost!***

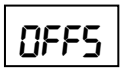
***Please note:*** ***The settings of the offset- / slope-adjustment and alarm-boundaries will automatically be reset to factory default when any changes for the settings "Func" had been made!***

*Hint:* *The buttons 2 and 3 are featured with a 'roll-function'. When pressing the button once the value will be raised (button 2) by one or lowered (button 3) by one.*
*When holding the button pressed for longer than 1 sec. the value starts counting up or down, the counting speed will be raised after a short period of time.*
*The device also features a 'overflow-function', when reaching the upper limit of the range, the device switches to the lower limit, vice versa.*

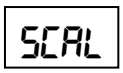


button 1 button 2 button 3

- Turn on the device and wait after it finished its built-in segment test.




- Press button 3 > 2 sec.
  The device will be displaying "**OFFS**" (offset).
- Use button 2 and button 3 for setting the desired zero point offset-value.
  *The input of the offset will be in digit or °C/°F.*
  *The value that had been set will be subtracted from the measured value.* *(see below for further information)*
- Press button 1 to validate your selection. The display shows "**OFFS**" again.




- When pressing button 1 again, the device will be displaying "**SCAL**". (scale = slope)
- Use button 2 and button 3 to select the desired slope-adjustment.
  *The slope adjustment will be entered in %. The value displayed can be calculated like this:*
  ***Displayed value = (measured value – zero point offset) * (1 + slope adjustment [% / 100] )***
  *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%).*
- Press button 1 to validate the selection of the slope-adjustment. The display shows "**SCAL**" again.

Now you finished the offset and slope adjustment of your device. Press button 1 to switch over to display the measuring value.

# 9 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.

# 10 Serial interface

The device features an EASYBus-Interface. For the communication the extended EASYBus data format is necessary. Please note, that the standard easybus software and EB3000 plus EB3000 and EB2000 don’t support this dataformat. Therefore an integration in existing EASYBus-Installations is only possible in a limited extend.

# 11 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 broken (Pt 100 and Pt 1000).
- Sensor shorted (0(4)-20 mA).
- Counter overflow

Remedies:
- The error-message will be reset if the input signal is within the limits.
- check sensor, transducer or transmitter.
- check device configuration (e.g. input signal)
- reset the counter.

---

### 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 shorted (Pt 100 and Pt 1000).
- Sensor broken (4-20 mA).
- Counter underflow

Remedies:
- The error-message will be reset if the input signal is within the limits.
- Check sensor, transducer or transmitter.
- check device configuration (e.g. input signal)
- Reset the counter.

---

### 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.
- Counter overflow

Remedies:
- The error-message will be reset if the display value is below 9999.
- Reset the counter.
- When happening frequently, check the scale-setting, maybe it was set too high and should be reduced

---

### 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.
- Counter underflow

Remedies:
- The error-message will be reset if the display value is above -1999.
- Reset the counter.
- When happening frequently, check the scale-setting, maybe it was set too low and should be increased

---

### 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:
- Valid operating temperature range has been exceeded or is below the valid temperature range.
- Device defective

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

---

### Er.9 System error

The device features an integrated diagnostic-function for the connected sensor or transmitter. When detecting a failure, error-message Err.9 will be displayed.

Possible causes:
- Sensor broken or sensor shorted (Pt 100 or Pt 1000).

- Sensor broken (thermo-elements)

Remedies: - Check sensor or exchange defective sensor

**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

# 12 Decommissioning, reshipment and disposal

## 12.1 Decommissioning

Always disconnect the device before from its supply before decommission (e.g. at fuse). Valid general safety requirements shall be observed.

Please also make sure that connected Loads are disconnected also and are in a safe state.

## 12.2 Reshipment and disposal


All devices returned to the manufacturer have to be free of any residual of measuring media and other hazardous substances.
Measuring residuals at housing or sensor may be a risk for persons or environment

Use an adequate transport package for reshipment, especially for fully functional devices. Please make sure that the device is protected in the package by enough packing materials.

Add the completed reshipment form of the GHM website http://www.ghm-messtechnik.de/downloads/ghm-formulare.html.

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

# 13 Specification

**Absolute maximum ratings:** *see chapter 5.2.*

**Measuring inputs:** Standard inputs for

| Input type | Input signal | Measuring range | Resolution | Note |
|---|---|---|---|---|
| Standard voltage-signal | 0 – 10 V | 0 ... 10 V | | Ri ≥ 300 kOhm |
| | 0 – 2 V | 0 ... 2 V | | Ri ≥ 10 kOhm |
| | 0 – 1 V | 0 ... 1 V | | Ri ≥ 10 kOhm |
| | 0 – 50 mV | 0 ... 50 mV | | Ri ≥ 10 kOhm |
| Standard current-Signal | 4 – 20 mA | 4 ... 20 mA | | Ri = ~ 125 Ohm |
| | 0 – 20 mA | 0 ... 20 mA | | Ri = ~ 125 Ohm |
| RTD probes | Pt100 (0.1°C) | -50.0 ... +200.0 °C (or -58.0 ... +392.0 °F) | 0.1 °C / °F | 3-wire-connection max. perm. line resistance: 20 Ohm |
| | Pt100 (1°C) | -200 ... +850 °C (or -328 ... +1562 °F) | 1 °C / °F | 3-wire-connection max. perm. line resistance: 20 Ohm |
| | Pt1000 (0.1°C) | -100.0 ... +200.0 °C (or -148.0 ... +392.0 °F) | 0.1 °C / °F | 2-wire-connection |
| | Pt1000 (1°C) | -200 ... +850 °C (or -328 ... +1562 °F) | 1 °C / °F | 2-wire-connection |
| Thermocouple probes | NiCr-Ni (type K) | -270 ... +1350 °C (or -454 ... +2462 °F) | 1 °C / °F | |
| | Pt10Rh-Pt (type S) | -50 ... +1750 °C (or -58 ... +3182 °F) | 1 °C / °F | |
| | NiCrSi-NiSi (type N) | -270 ... +1300 °C (or -454 ... +2372 °F) | 1 °C / °F | |
| | Fe-CuNi (type J) | -170 ... +950 °C (or -274 ... +1742 °F) | 1 °C / °F | |
| | Cu-CuNi (type T) | -270 ... +400 °C (or -454 ... +752 °F) | 1 °C / °F | |
| Frequency | TTL-Signal | 0 Hz ... 10 kHz | 0.001 Hz | *signal low: 0.0 – 0.5 V signal high: 2.7 – 24 V* |
| | Switching contact NPN | 0 Hz ... 3 kHz | 0.001 Hz | *an internal pull-up-resistor (~7 kOhm to +3.3V) is connected automatically.* |
| | Switching contact PNP | 0 Hz ... 1 kHz | 0.001 Hz | *an internal pull-down-resistor (~7 kOhm to +3.3V) is connected automatically.* |
| Rotation | TTL-Signal, Swit.contact NPN, PNP | 0 ... 9999 U/min | 0.001 U/min | Pre-scaling-factor (1-1000), Pulse frequency: max. 600000 p./min. * |
| Up/Downwards - Counter | TTL-Signal, Swit.contact NPN, PNP | 0 ... 9999 with pre-scaling factor: 9 999 000 | | Pre-scaling-factor (1-1000), Pulse frequency: max. 10000 p./sec. * |

* = with switching contact accordingly to frequency input lower values may occur

**Display range:** (voltage-, current and frequency-measurement)
-1999 ... 9999 digit, *initial value, terminal value and decimal point position arbitrary*
Recommended rang: < 2000 digit

**Accuracy:** (at nominal temperature)

**Standard signal:** < 0.2% FS ±1 digit (from 0 – 50 mV: < 0.3% FS ±1 digit)
**RTD**: < 0.5% FS ±1 digit
**Thermocouples:** < 0.3% FS ±1 digit (from type S: < 0.5% FS ±1 digit)
**Frequency:** < 0.2% FS ±1 digit

**Point of compensation:** ±1°C ±1 digit (at nominal temperature)

**Temperature drift:** < 0.01% FS / K (from Pt 100 - 0.1°C: < 0.015% FS / K)

**Measuring freq.:** approx. 100 measures / sec. (standard-signal) or
approx. 4 measures / sec. (temperature-measurement) or
approx. 4 measures / sec. (frequency, rpm at f ≥ 4 Hz) or accordingly f (at f < 4 Hz))

**Outputs:** 2 volt-free relay-outputs

**Output 1:** make contact, breaking capacity 5A (ohmic load), 250V

**Output 2:** breaking contact, breaking capacity 5A (ohmic load), 250V

**Response Time:** ≤ 25 msec. for standard signals
≤ 0.3 sec. for temperature, frequency (f > 4 Hz)

**Output function:** 2-point, 3-point, 2-point with alarm, min-/max-alarm common or individual.

**Switching points:** arbitrary

**Switching delay:** arbitrary: 0.01 ... 2.00 sec.

**Alarm delay:** arbitrary: 1 ... 9999 sec.

**Display:** approx. 10 mm height, 6-digit red LED-display

**Handling:** 3 push-buttons

**Interface:** EASYBus-interface, electrically isolated

**Bus load:** 1 EASYBus standard load

**Power supply:** 9 to 28 V DC

**Current drain:** max. 35 mA

**Nominal temp.:** 25 °C

**Ambient conditions:**

Operating temp.: -20 to +50 °C
Relative humidity: 0 to 80 %RH (non condensing)
Storage temp.: -30 to +70 °C
Max elevation:: 5000 m above sea level

**Housing:** Panel mounting with brackets

**Dimensions:** 36 x 72 mm (front-panel dimensions).

**Installation depth:** ca. 95 mm (incl. screw-in/plug-in clamps)

**Panel mounting:** with brackets.

**Panel cut-out:** $32.2^{+0.5}$ x $68.5^{+0.5}$ mm (H x B)

**Elec. connection:** via screw-in/plug-in clamps: 2 x 2-pol. for relays and 8-pol. for the other connections.
Conductor cross-selection from 0.14 to 1.5 mm².

**Protection data**

Prot. class front: IP 54 acc. EN 60529

Prot. class housing and connections:
IP 20 acc. EN 60529

Contamination class: 2 acc. EN 61010-01

**Directives and standards:** The instruments confirm to following European Directives:

2014/35 EU Low Voltage directive
2014/30/EU EMC Directive
2011/65/EU RoHS

Applied harmonized standards:

EN 61326-1 : 2013 emissions level: class B
emi immunity according to table 2
Additional fault: <1 %

EN 61010-1 : 2011

When connecting long leads adequate measures against voltage surges have to be taken.