Universal displaying and controlling device

as of Version 1.1

GIR 300

Operating Manual

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**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 this manual, operating by unqualified staff as well as unauthorized modifications to the device. The manufacturer is not liable for any costs or damages incurred at the user or third parties because of the usage or application of this device, in particular in case of improper use of the device, misuse or malfunction of the connection or of the device. The manufacturer is not liable for misprints.

**2 Intended Use**

The GIR 300 is a 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...

The device features 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 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)

Furthermore the device supports one EASYBus -interface for communicating with a host computer that makes the device to a full functions EASYBus-module.

When leaving our factory the GIR 300 has been subjected to various inspection tests and is completely calibrated.

**Before the GIR 300 can be used, it has to be configured for the customer’s application.**

**Hint:** 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.

**Hint:** By calling a configuration menu (configuration of the measuring input, 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 Safety

3.1 Safety signs and symbols

Warnings are labeled in this document with the following signs:

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

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 points out processes which can indirectly influence operation or provoke unforeseen reactions at non-observance.

3.2 Safety guidelines

This device was designed and tested considering the safety regulations for electronic measuring devices. Faultless operation and reliability in operation of the measuring device can only be assured if the General Safety Measures and the device’s specific safety regulations mentioned in this user’s manual are considered.

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 “Specifications”.

2. 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).

3. When connecting the device to other devices (e.g. the PC) the interconnection has to be designed thoroughly, as internal connections in third-party devices (e.g. connection of ground 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 prescribed.
- storing the device under inappropriate conditions for longer time.

In case of doubt, please return device to manufacturer for repair or maintenance.

5. 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. 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.

3.3 Skilled personnel

Are persons familiar with installation, connection, commissioning and operation of the product and have professional qualification relating to their job.

For example:
- Training or instruction and qualifications to switch on or off, isolate ground and mark electric circuits and devices or systems.
- Training or instruction according to the state.
- First-aid training.
4 Electric connection

Wiring and commissioning of the device must be carried out by trained and skilled personnel only. Wrong connection may lead to the destruction of the display device, in which case we cannot assume any warranty!
! Mind for the maximum input conditions !

4.1 Terminal assignment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EASYBus-Interface</td>
</tr>
<tr>
<td>2</td>
<td>EASYBus-Interface</td>
</tr>
<tr>
<td>3</td>
<td>Input: 0-10V</td>
</tr>
<tr>
<td>4</td>
<td>Input: 0-50mV, thermocouples, Pt100</td>
</tr>
<tr>
<td>5</td>
<td>Input: 0-1V, mA, frequency, Pt100, Pt1000</td>
</tr>
<tr>
<td>6</td>
<td>Input: GND, Pt100, Pt1000</td>
</tr>
<tr>
<td>7</td>
<td>Power supply GND</td>
</tr>
<tr>
<td>8</td>
<td>Power supply +Uv</td>
</tr>
<tr>
<td>9</td>
<td>Output 2: relay, break contact</td>
</tr>
<tr>
<td>10</td>
<td>Output 2: relay, input</td>
</tr>
<tr>
<td>11</td>
<td>Output 1: relay, input</td>
</tr>
<tr>
<td>12</td>
<td>Output 1: relay, make contact</td>
</tr>
</tbody>
</table>

4.2 Connection data

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

These limits must not be exceeded (not even for a short time)!
4.3 Connection an input signal

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

4.3.1 Connection a Pt 100 or Pt 1000 RTD probe or a thermocouple probe

![Diagram of Pt100-RTD probe (3-wire)](image1)

*Pt100-RTD probe (3-wire)*

![Diagram of Pt100-RTD probe (2-wire)](image2)

*Pt100-RTD probe (2-wire)*

![Diagram of Pt100-RTD probe (4-wire)](image3)

*Pt100-RTD probe (4-wire)*

![Diagram of Pt1000-RTD probe (2-wire)](image4)

*Pt1000-RTD probe (2-wire)*

![Diagram of Thermocouple probe](image5)

*Thermocouple probe*

4.3.2 Connecting a 4 - 20 mA transmitter in 2-wire-technology

![Diagram with individual transmitter supply](image6)

*with individual transmitter supply*

![Diagram without separate transmitter supply](image7)

*without separate transmitter supply*

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

![Diagram with individual transmitter supply](image8)

*with individual transmitter supply*

![Diagram without separate transmitter supply](image9)

*without separate transmitter supply*
4.3.4 Connecting a 0-1V, 0-2V or 0-10V transmitter in 3-wire-technology

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

4.3.6 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“.

Hint: 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 wiring.

Connection note: \( R_v = 3 \, \text{k}\Omega \) (with power supply voltage =12 V) or \( 7 \, \text{k}\Omega \) (at 24 V), device configuration: Sens = TTL

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

Connection note: \( R_{v1} = 600 \Omega, R_{v2} = 1.8k\Omega \) (with power supply voltage =12V) or \( 4.2k\Omega \) (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)
4.3.7 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).

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

![Wiring diagram](image)

**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 = impulse transducer
device 2 – input signal = switching-contact)
### 4.4 Connecting switching outputs

**Hint:** 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 features 2 switching outputs by default

- output 1: relay, make contact
- output 2: relay, break contact

*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 coils or relays, etc.). Because of their high voltage peaks, protective measures (e.g. RC-element) to limit these peaks have to be taken.*

**Note:** You will find detailed information to the switching states of the different output functions in chapter 6 (“Switching points and alarm-boundaries”)

**Note:** In case of configuring one output as an alarm output, the relay contact will be closed at the idle state (no alarm is present). If an alarm condition will occurred the relay contact will be opened.

(for detailed information please refer the notes in chapter 6.2 and 6.3)

### 4.5 Common wiring of several devices

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

Make sure to observe the following points:

- When several devices are connected to the same power supply unit it is highly recommended to isolate the sensors, measuring transducers etc.

- When the sensors, measuring transducers etc. are electrically connected, and you can’t manage to isolate them, you should use separate electrically isolated power supply units for each devices.

Please note, that an electric connection may also be created via the medium to be measured (e.g. pH-electrodes and conductivity-electrodes in fluids).
5 Configuration

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 not be saved and will be lost!

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.

5.1 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.

<table>
<thead>
<tr>
<th>Input type</th>
<th>Input Signal</th>
<th>To select as input</th>
<th>proceed in chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage signal</td>
<td>0 – 10 V</td>
<td>U</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>0 – 2 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 – 1 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 – 50 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current signal</td>
<td>4 – 20 mA</td>
<td>I</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>0 – 20 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTD</td>
<td>Pt 100</td>
<td></td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>Pt 1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermocouples</td>
<td>NiCr-Ni (type K)</td>
<td></td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>Pt10Rh-Pt (type S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NiCrSi-NiSi (type N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fe-CuNi (type J)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cu-CuNi (type T)</td>
<td></td>
<td></td>
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<tr>
<td>Frequency</td>
<td>TTL-signal</td>
<td>FrE9</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Switch-contact NPN, PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation</td>
<td>TTL-signal</td>
<td>rPn</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>Switch-contact NPN, PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counter up</td>
<td>TTL-signal</td>
<td>Co.up</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>Switch-contact NPN, PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counter down</td>
<td>TTL-signal</td>
<td>Co.down</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>Switch-contact NPN, PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface mode</td>
<td>Serial interface</td>
<td>SEn</td>
<td>5.7</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Measuring type</th>
<th>U</th>
<th>I</th>
<th>t.es</th>
<th>t.cc</th>
<th>FrEQ</th>
<th>rPn</th>
<th>Co.uP</th>
<th>Co.dn</th>
<th>SEnS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal / sensor</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Signal edge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Devisor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Input signal low</td>
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<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Input signal high</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Decimal point</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Display low</td>
<td>X</td>
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<td>-</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Display high</td>
<td>X</td>
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<td></td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
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<td>Temperature unit</td>
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<td>X</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>Limit</td>
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<td></td>
<td>X</td>
<td>X</td>
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<td>-</td>
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<td>Filter</td>
<td>X</td>
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<td>X</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
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<td>Address</td>
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<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Output</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>

5.2 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 5.1. The display has to show "SEnS".

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

<table>
<thead>
<tr>
<th>Display</th>
<th>Input signal (voltage measuring)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00</td>
<td>0 – 10 V</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>0 – 2 V</td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0 – 1 V</td>
<td></td>
</tr>
<tr>
<td>0.050</td>
<td>0 – 50 mV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display</th>
<th>Input signal (current measuring)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-20</td>
<td>4 – 20 mA</td>
<td></td>
</tr>
<tr>
<td>0-20</td>
<td>0 – 20 mA</td>
<td></td>
</tr>
</tbody>
</table>

- 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 “d.i.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 “d.i.Lo” again.
- Press button 1 again, the display will show “d.i.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 “d.i.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.

<table>
<thead>
<tr>
<th>Display</th>
<th>Measuring range limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>Deactivated</td>
<td>Exceeding of the measuring range limit is tolerable for about 10% of the selected input signal.</td>
</tr>
<tr>
<td>on.Er</td>
<td>Active, (displays error)</td>
<td>The measuring range limit is exactly bounded by the input signal. When exceeding or short-falling the input signal the device will display an error message.</td>
</tr>
<tr>
<td>on.rG</td>
<td>Active, (displays the selected limit)</td>
<td>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%]</td>
</tr>
</tbody>
</table>

**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 5.8.
5.3 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 5.1. 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.

<table>
<thead>
<tr>
<th>Display</th>
<th>Input signal (RTD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>P100</td>
<td>Pt100 (3-wire)</td>
<td>Meas. range: -50.0 ... +200.0 °C (-58.0 ... + 392.0 °F)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meas. range: -200 ... + 850 °C (-328 ... + 1562 °F)</td>
</tr>
<tr>
<td>1000</td>
<td>Pt1000 (2-wire)</td>
<td>Meas. range: -100.0 ... +200.0 °C (-148.0 ... + 392.0 °F)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meas. range: -200 ... + 850 °C (-328 ... + 1562 °F)</td>
</tr>
</tbody>
</table>

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

- 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 5.8.

For setting the offset and for setting the slope-adjustment, please follow the instructions given in chapter 7.
5.4 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 5.1. 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.

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

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.

<table>
<thead>
<tr>
<th>Display</th>
<th>Measuring range limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>Inactive</td>
<td>Exceeding of the measuring-frequency is tolerable until you reach the maximum measuring range limit.</td>
</tr>
<tr>
<td>on.Er</td>
<td>Active, (displays error)</td>
<td>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.</td>
</tr>
</tbody>
</table>
Connection and operating manual GIR 300

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 5.8.

5.5 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 5.1. 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.

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

Hint: For the connection of a frequency-transmitter, please follow the instructions given in chapter 4.3.6. 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 5.8.

### 5.6 Up-/Downwards counter

The upwards counter starts counting upwards from 0 according to its settings.

The downwards counter starts counting downwards 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 5.1. 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.

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

**Hint:** For the connection of a frequency-transmitter, please follow the instructions given in chapter 4.3.6 and 4.3.7. 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.

<table>
<thead>
<tr>
<th>Display</th>
<th>Signal edge</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoS</td>
<td>positive</td>
<td>The counter is triggered on the positive (rising) edge.</td>
</tr>
<tr>
<td>nEG</td>
<td>negative</td>
<td>The counter is triggered on the negative (falling) edge.</td>
</tr>
</tbody>
</table>

- 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).

<table>
<thead>
<tr>
<th>Display</th>
<th>Measuring range limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>Inactive</td>
<td>Exceeding of the counter range is tolerable until you reach the maximum measuring range limit.</td>
</tr>
<tr>
<td>on.Er</td>
<td>active, (error indicator)</td>
<td>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.</td>
</tr>
<tr>
<td>on.rG</td>
<td>active, (measuring range limit)</td>
<td>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.</td>
</tr>
</tbody>
</table>

**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 5.8.
5.7 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 5.1.
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 5.8.

5.8 Selection of the output function

- After configuration of the input (chapter 5.2 – 5.7) 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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Function</th>
<th>To select as output</th>
<th>For switching point setting please refer to chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>No output, device is used as display unit</td>
<td>inactive (contact is open)</td>
<td>inactive (contact is open)</td>
<td>no</td>
</tr>
<tr>
<td>2-point-controller</td>
<td>switching function 1 (active = contact closed)</td>
<td>switching function 1 (active = contact closed)</td>
<td>2P</td>
</tr>
<tr>
<td>3-point-controller</td>
<td>switching function 1 (active = contact closed)</td>
<td>switching function 2 (active = contact closed)</td>
<td>3P</td>
</tr>
<tr>
<td>2-point-controller with min/max-alarm</td>
<td>switching function 1 (active = contact closed)</td>
<td>min-/max-alarm (alarm = contact closed)</td>
<td>2P.AL</td>
</tr>
<tr>
<td>min-/max-alarm, common</td>
<td>min-/max-alarm (alarm = contact open)</td>
<td>min-/max-alarm (alarm = contact closed)</td>
<td>AL.F1</td>
</tr>
<tr>
<td>min-/max-alarm, individual ¹</td>
<td>max-alarm (alarm = contact closed)</td>
<td>min-alarm (alarm = contact closed)</td>
<td>AL.F2</td>
</tr>
</tbody>
</table>

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)
Press button 1 to validate the selected output function. The display shows “outP” again.

**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.

<table>
<thead>
<tr>
<th>Display</th>
<th>Preferred state of the output</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>Inactive in case of an error (contact is open)</td>
<td></td>
</tr>
<tr>
<td>on</td>
<td>Active in case of an error (contact ist closed)</td>
<td></td>
</tr>
</tbody>
</table>

- 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 6 „Switching points and alarm-boundaries“ for further information.

*Hint: The settings for the switching and alarm points can be made later in an extra menu (see chapter 6)*
6 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 “InP”, “SEnS” 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 not be saved and will be lost!

- 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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Function</th>
<th>Output 1</th>
<th>Output 2</th>
<th>To select as output</th>
<th>proceed in chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>No output, device is used as display unit</td>
<td>in active</td>
<td>inactive (contact is open)</td>
<td>inactive (contact is open)</td>
<td>no</td>
<td>--</td>
</tr>
<tr>
<td>2-point-controller</td>
<td>switching function 1</td>
<td>(active = contact closed)</td>
<td>switching function 1</td>
<td>2P</td>
<td>6.1</td>
</tr>
<tr>
<td>3-point-controller</td>
<td>switching function 1</td>
<td>(active = contact closed)</td>
<td>switching function 2 1</td>
<td>3P</td>
<td>6.1</td>
</tr>
<tr>
<td>2-point-controller with min/max-alarm</td>
<td>switching function 1</td>
<td>(active = contact closed)</td>
<td>min/max-alarm</td>
<td>2P.AL</td>
<td>6.2</td>
</tr>
<tr>
<td>min/max-alarm, common</td>
<td>min/max-alarm</td>
<td>(alarm = contact is open)</td>
<td>min/max-alarm</td>
<td>AL.F1</td>
<td>6.3</td>
</tr>
<tr>
<td>min/max-alarm, individual 2</td>
<td>max-alarm</td>
<td>(alarm = contact is open)</td>
<td>min-alarm</td>
<td>AL.F2</td>
<td>6.3</td>
</tr>
</tbody>
</table>

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)
6.1 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 5.8.

- 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 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.

6.2 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 5.8.

- 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 a 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 fail**  relay contact is closed

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

### 6.3 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 5.8.

- 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.

<table>
<thead>
<tr>
<th>output 1</th>
<th>output 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• no alarm</td>
<td>relay contact is closed</td>
</tr>
<tr>
<td>• alarm</td>
<td>relay contact is open</td>
</tr>
<tr>
<td>• power fail</td>
<td>relay contact is open</td>
</tr>
</tbody>
</table>

**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.
7 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.

**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 “InP”, “SEnS” or “Unit” 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.

- 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:

  \[
  \text{Displayed value} = (\text{measured value} - \text{zero point offset}) \times (1 + \text{slope adjustment} \times \frac{\text{deviation}}{\text{actual slope}})
  \]

  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.

**Examples for offset- and slope-adjustment:**

**Example 1:** Connecting a Pt1000-sensor (with an offset error depending on the cable-length of the sensor)

The device displays the following values (without offset- or slope-adjustment): 2°C at 0°C and 102°C at 100°C

Therefore you calculated:

- zero point: 2
- slope: 102 – 2 = 100 (deviation = 0)

You have to set:

- offset = 2
- scale = 0.00

**Example 2:** Connecting a 4-20mA-pressure-transducer

The device displays the following values (without offset- or slope-adjustment): 0.08 at 0.00 bar and 20.02 at 20.00 bar

Therefore you calculated:

- zero point: 0.08
- slope: 20.02 – 0.08 = 19.94
- deviation: 0.06 (= target-slope – actual slope = 20.00 - 19.94)

You have to set:

- offset = 0.08 (= zero point-deviation)
- scale = 0.30 (= deviation / actual slope = 0.06 / 19.94 = 0.0030 = 0.30%)

**Example 3:** Connecting a flow-rate-transducer

The device displays the following values (without offset- or slope-adjustment): 0.00 at 0.00 l/min and 16.17 at 16.00 l/min

Therefore you calculated:

- zero point: 0.00
- slope: 16.17 – 0.00 = 16.17
- deviation: -0.17 (= target-slope – actual slope = 16.00 - 16.17)

You have to set:

- offset = 0.00
- scale = -1.05 (= deviation / actual slope = -0.17 / 16.17 = -0.0105 = -1.05%)
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 Serial interface

The device features one EASYBus-Interface. You can use the device as a full function EASYBus-device.

The serial interface allows the device to communicate with a host computer. Data polling and data transfer is done in master/slave mode, so the device will only send data on demand. Every device has a unique ID-number that makes exact identification of each device possible.

With the help of a software (like EASYBus-Configurator – freeware version available via internet) you are able to reassign an address to the device.

Additional accessories needed for the interface mode:
- Interface Converter EASYbus ☞ PC: e.g. EBW 1, EBW 3, EBW 64, EBW 240 and EB 2000 MC
- Software for communication with the device

EBS 20M / 60M: 20- or 60-channel-software for displaying a measured value
EASYControl net: multi-channel software for real-time-recording and displaying measure-values.
EASYBus-DLL: EASYBus-developer-package for developing own software. This package features a universal WINDOWS®-Library with documentation and program-examples. The DLL can be used in any usual programming language.

10 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
### 11 Specification

**Absolute maximum ratings:** see chapter 4.2

**Measuring inputs:** Standard inputs for

<table>
<thead>
<tr>
<th>Input type</th>
<th>Input signal</th>
<th>Measuring range</th>
<th>Resolution</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard voltage-signal</td>
<td>0 – 10 V</td>
<td>0 ... 10 V</td>
<td>Ri ≥ 300 kOhm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 – 2 V</td>
<td>0 ... 2 V</td>
<td>Ri ≥ 10 kOhm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 – 1 V</td>
<td>0 ... 1 V</td>
<td>Ri ≥ 10 kOhm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 – 50 mV</td>
<td>0 ... 50 mV</td>
<td>Ri ≥ 10 kOhm</td>
<td></td>
</tr>
<tr>
<td>Standard current-Signal</td>
<td>4 – 20 mA</td>
<td>4 ... 20 mA</td>
<td>Ri = ~ 125 Ohm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 – 20 mA</td>
<td>0 ... 20 mA</td>
<td>Ri = ~ 125 Ohm</td>
<td></td>
</tr>
<tr>
<td>RTD probes</td>
<td>Pt100 (0.1°C)</td>
<td>-50.0 ... +200.0 °C (or -58.0 ... +392.0 °F)</td>
<td>0.1 °C / °F</td>
<td>3-wire-connection max. perm. line resistance: 20 Ohm</td>
</tr>
<tr>
<td></td>
<td>Pt100 (1°C)</td>
<td>-200 ... +850 °C (or -328 ... +1562 °F)</td>
<td>1 °C / °F</td>
<td>3-wire-connection max. perm. line resistance: 20 Ohm</td>
</tr>
<tr>
<td></td>
<td>Pt1000 (0.1°C)</td>
<td>-100.0 ... +200.0 °C (or -148.0 ... +392.0 °F)</td>
<td>0.1 °C / °F</td>
<td>2-wire-connection</td>
</tr>
<tr>
<td></td>
<td>Pt1000 (1°C)</td>
<td>-200 ... +850 °C (or -328 ... +1562 °F)</td>
<td>1 °C / °F</td>
<td>2-wire-connection</td>
</tr>
<tr>
<td>Thermocouple probes</td>
<td>NiCr-Ni (type K)</td>
<td>-270 ... +1350 °C (or -454 ... +2462 °F)</td>
<td>1 °C / °F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pt10Rh-Pt (type S)</td>
<td>-50 ... +1750 °C (or -58 ... +3182 °F)</td>
<td>1 °C / °F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NiCrSi-NiSi (type N)</td>
<td>-270 ... +1300 °C (or -454 ... +2372 °F)</td>
<td>1 °C / °F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fe-CuNi (type J)</td>
<td>-170 ... +950 °C (or -274 ... +1742 °F)</td>
<td>1 °C / °F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cu-CuNi (type T)</td>
<td>-270 ... +400 °C (or -454 ... +752 °F)</td>
<td>1 °C / °F</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>TTL-Signal</td>
<td>0 Hz ... 10 kHz</td>
<td>0.001 Hz</td>
<td>signal low: 0.0 – 0.5 V signal high: 2.7 – 24 V</td>
</tr>
<tr>
<td></td>
<td>Switching contact NPN</td>
<td>0 Hz ... 3 kHz</td>
<td>0.001 Hz</td>
<td>an internal pull-up-resistor (~7 kOhm to +3.3V) is connected automatically.</td>
</tr>
<tr>
<td></td>
<td>Switching contact PNP</td>
<td>0 Hz ... 1 kHz</td>
<td>0.001 Hz</td>
<td>an internal pull-down-resistor (~7 kOhm to +3.3V) is connected automatically.</td>
</tr>
<tr>
<td>Rotation</td>
<td>TTL-Signal, Swit.contact NPN, PNP</td>
<td>0 ... 9999 U/min</td>
<td>0.001 U/min</td>
<td>Pre-scaling-factor (1-1000), Pulse frequency: max. 60000 p/min. *</td>
</tr>
<tr>
<td></td>
<td>TTL-Signal, Swit.contact NPN, PNP</td>
<td>0 ... 9999 with pre-scaling factor: 9 999 000</td>
<td>0.001 U/min</td>
<td>Pre-scaling-factor (1-1000), Pulse frequency: max. 10000 p/sec. *</td>
</tr>
</tbody>
</table>

* = 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 range: < 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 $f \geq 4$ 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, 4-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: -20 ... +50 °C, 0 ... 80 %RH (non condensing)  
Storage temp.: -30 ... +70 °C  
Housing:  
Dimensions: 36 x 72 mm (front-pane dimensions).  
Installation depth: approx. 72 mm (incl. screw-in/plug-in clamps)  
Panel mounting: with brackets.  
Panel cut-out: $32.2^{6.5} \times 68.5^{0.5}$ mm (H x W)  
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 class: front IP54  

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: EN 61326-1 : 2013 (table 2, class B), additional errors: < 1% FS  
When connecting long leads adequate measures against voltage surges have to be taken.

12 Reshipment and disposal

12.1 Reshipment

DANGER

All devices returned to the manufacturer have to be free of any residual of measuring media and other hazardous substances. Measuring residuals at housing 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.

12.2 Disposal instruction

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.