



Operating instructions
Universal display
DX1063

GB

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1 Preliminary note

You will find instructions, technical data, approvals and further information using the QR code on the unit / packaging or at www.ifm.com.

1.1 Symbols used

- ✓ Requirement
- ▶ Instructions
- ▷ Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note
Non-compliance may result in malfunction or interference.
-  Information
Supplementary note

1.2 Warnings used

	ATTENTION Warning of damage to property
	CAUTION Warning of personal injury ▷ Slight reversible injuries may result.

2 Safety instructions

- The unit described is a subcomponent for integration into a system.
 - The system architect is responsible for the safety of the system.
 - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.
- Replace damaged units, otherwise the technical data and safety will be impaired.
- Observe applicable documents.

3 Intended use

The unit evaluates and displays sensor signals.

The unit is intended for panel mounting. The fixing elements supplied are suited for a wall thickness up to 6 mm.

4 Function

With the unit a wide variety of sensors can be operated and the corresponding physical values are displayed. If temperatures are to be measured via Pt100, Pt1000 or thermocouple, the temperature will be displayed in °C or °F (selectable). For measurement inputs such as current, voltage, frequency or counter, the scaling and indication can be freely selected in the display range from -1999 to 9999.

The unit has two relay outputs which support different operating modes. It can be monitored either via a threshold value with hysteresis or a window function with alarm range. The switching status of the relay is visualized. Operation and parameter setting are carried out via four front keys.

5 Installation

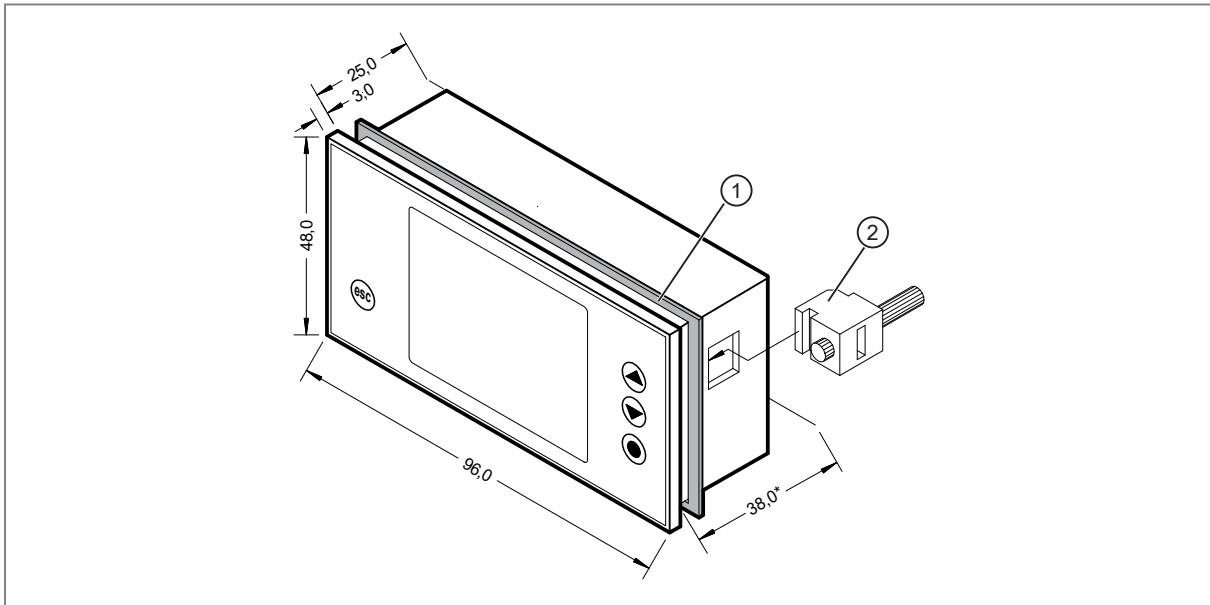


Fig. 1: installation

1: sealing

2: fixing element

*Installation depth including connection terminal



The fixing elements supplied are suited for a wall thickness up to 6 mm.

- ▶ Make a panel cut-out (92 x 45 mm).
- ▶ Remove the fixing elements from the unit.
- ▶ Insert the unit into the panel cut-out.
- ▶ Check the seal to make sure it fits securely.
- ▶ Reinsert the fixing elements into the unit and tighten the 2 clamping screws by hand. Then use a screwdriver to tighten them another half a turn.
Maximum tightening torque: 0.1 Nm

6 Electrical connection



The unit must be connected by a qualified electrician.

- ▶ Observe the national and international regulations for the installation of electrical equipment.
- ▶ Disconnect power.
- ▶ Connect the unit as follows:

6.1 Wiring

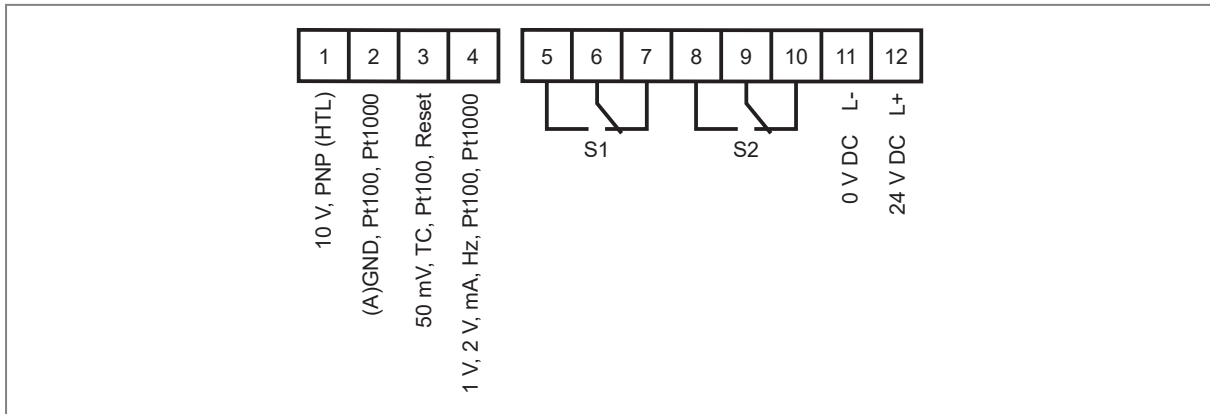


Fig. 2: Wiring

6.2 Connection examples

6.2.1 Voltage/Current

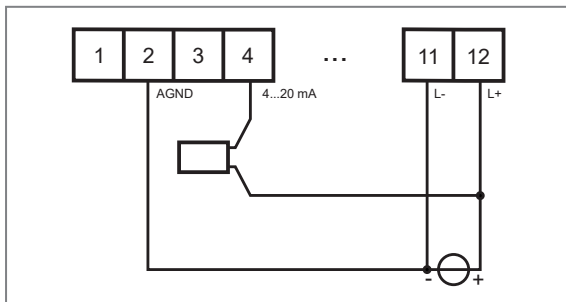


Fig. 3: 2-wire sensor 4...20 mA

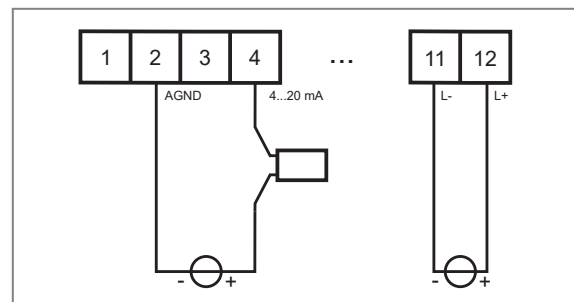


Fig. 4: 2-wire sensor 4...20 mA with external voltage supply

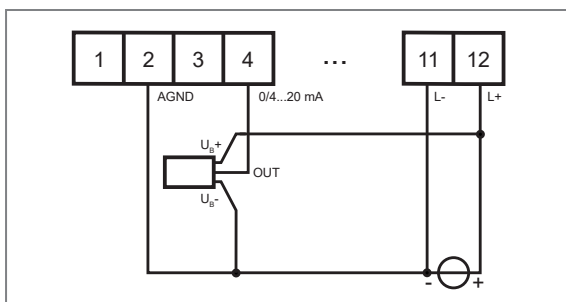


Fig. 5: 3-wire sensor 0/4...20 mA

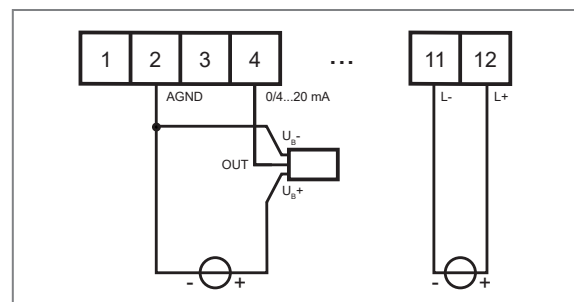


Fig. 6: 3-wire sensor 0/4...20 mA with external voltage supply

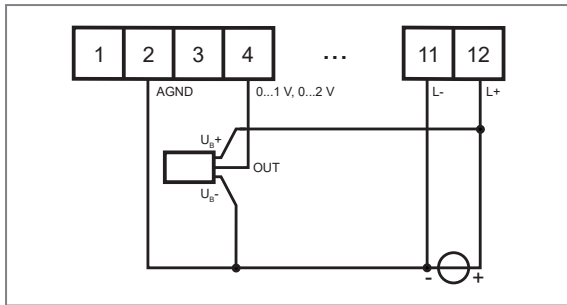


Fig. 7: 3-wire sensor 0...1 V, 0...2 V

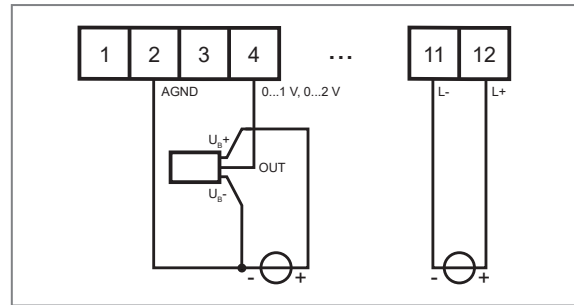


Fig. 8: 3-wire sensor 0...1 V, 0...2 V with external voltage supply

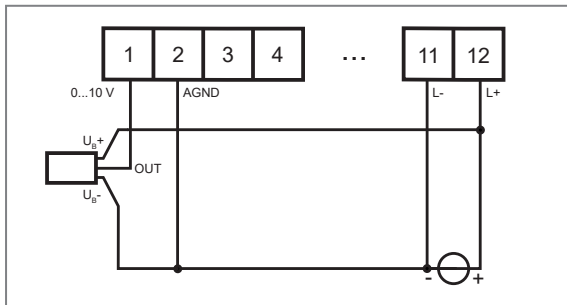


Fig. 9: 3-wire sensor 0...10 V

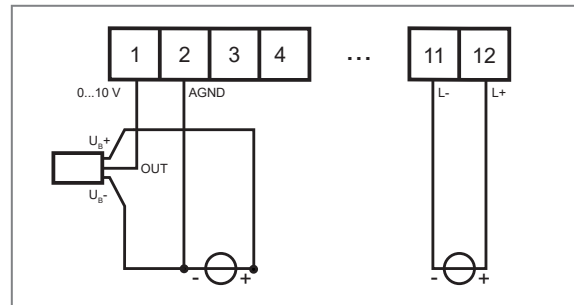


Fig. 10: 3-wire sensor 0...10 V with external voltage supply

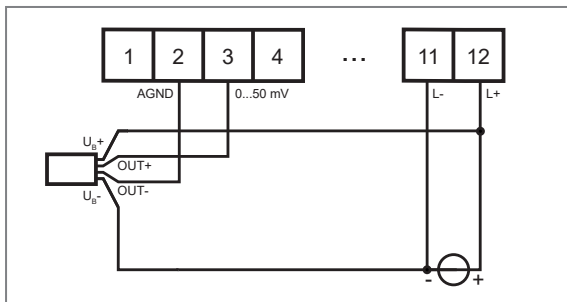


Fig. 11: 4-wire sensor 0...50 mV

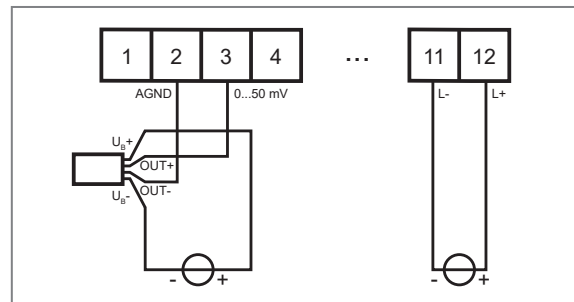


Fig. 12: 4-wire sensor 0...50 mV with external voltage supply

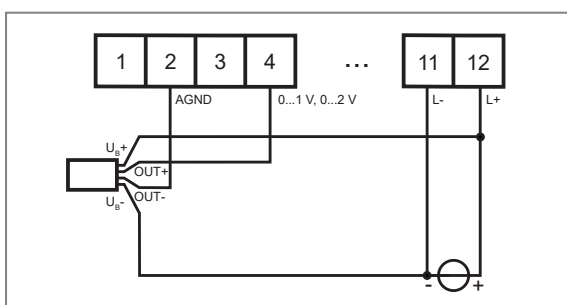


Fig. 13: 4-wire sensor 0...1 V, 0...2 V

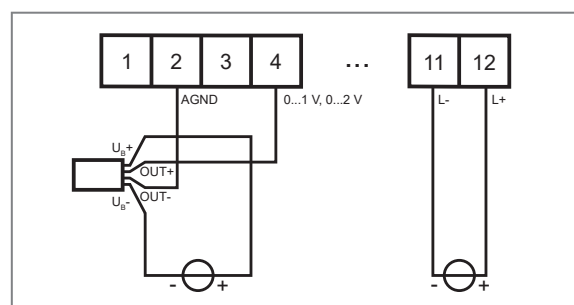


Fig. 14: 4-wire sensor 0...1 V, 0...2 V with external voltage supply

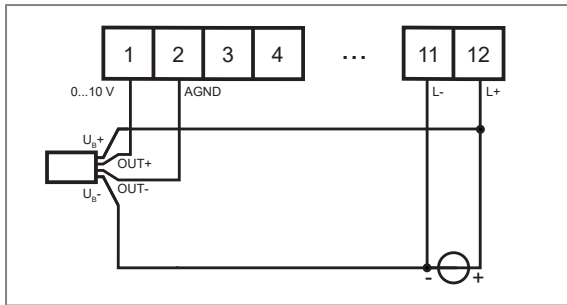


Fig. 15: 4-wire sensor 0...10 V

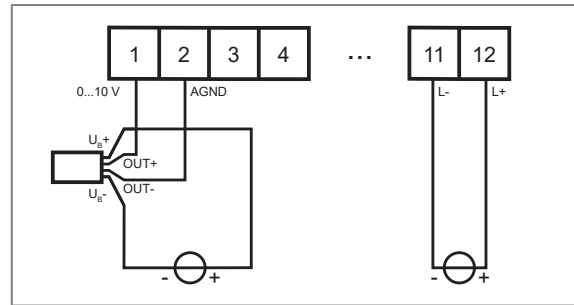


Fig. 16: 4-wire sensor 0...10 V with external voltage supply

6.2.2 Temperature

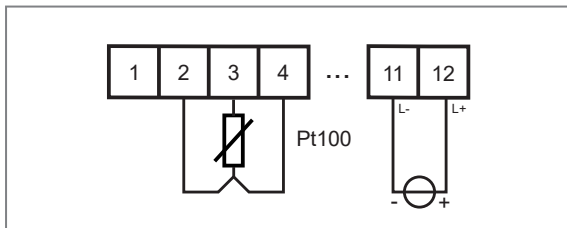


Fig. 17: Pt100 3-wire
(connection of a 4-wire sensor possible by combining two conductors connected in the sensor)

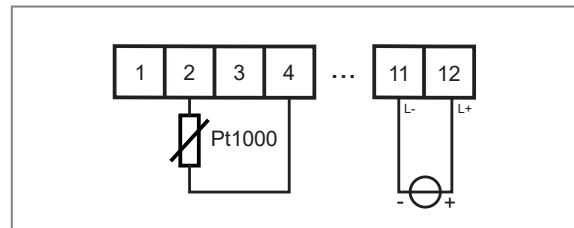


Fig. 18: Pt1000 2-wire
(connection of a 3-wire or 4-wire sensor possible by combining the conductors connected in the sensor)

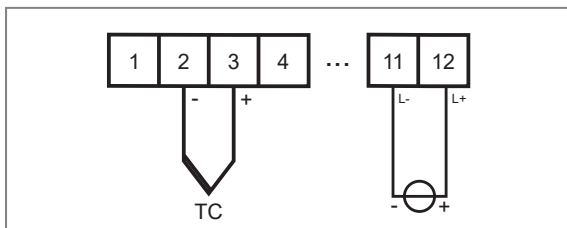


Fig. 19: Thermocouple

6.2.3 Frequency / Rotational speed

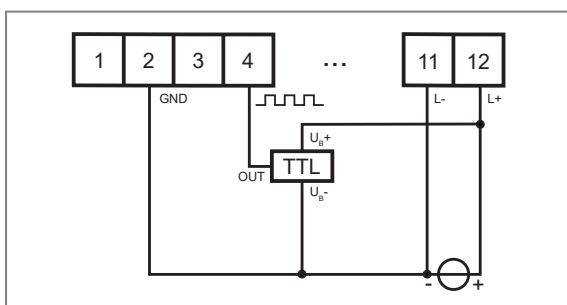


Fig. 20: Signal transmitter with TTL output

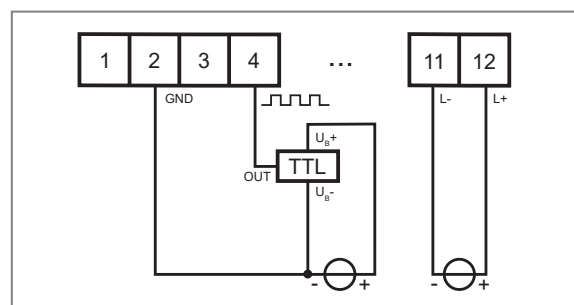


Fig. 21: Signal transmitter with TTL output and with external voltage source

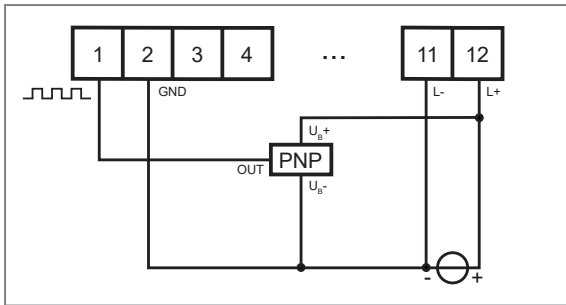


Fig. 22: Signal transmitter with PNP output

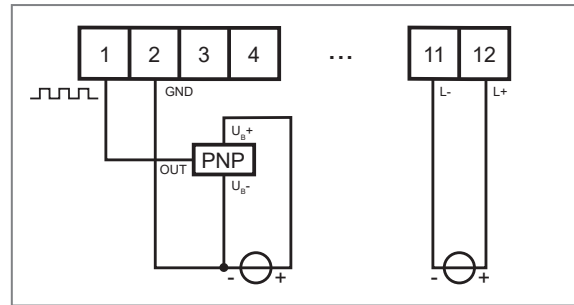


Fig. 23: Signal transmitter with PNP output and with external voltage source

Depending on the design of the system, an external resistance circuit can be helpful to reliably detect higher frequencies.

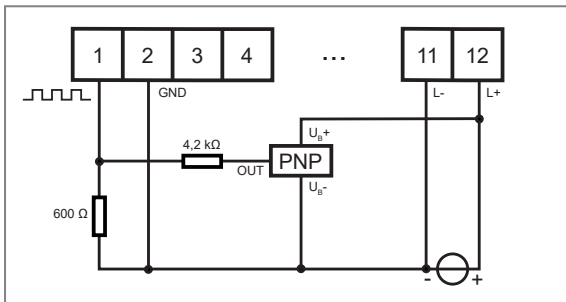


Fig. 24: Signal transmitter with PNP output and external resistance circuit

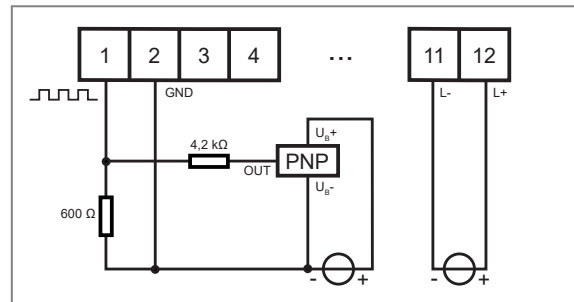


Fig. 25: Signal transmitter with PNP output, external resistance circuit and with external voltage source

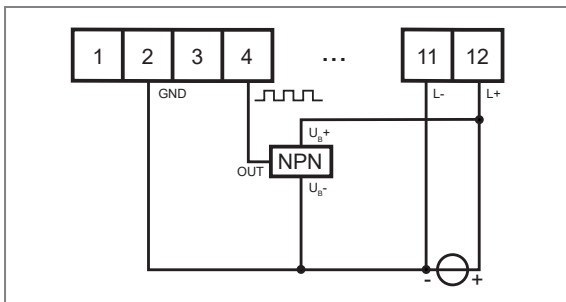


Fig. 26: Signal transmitter with NPN output

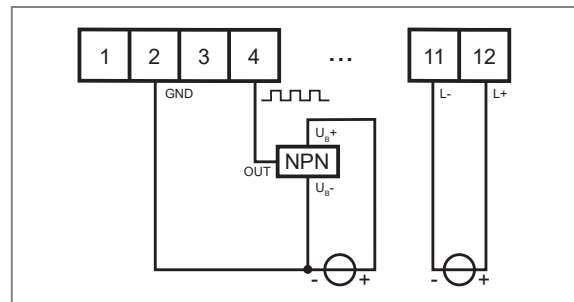


Fig. 27: Signal transmitter with NPN output and with external voltage source

Depending on the design of the system, an external resistance circuit can be helpful to reliably detect higher frequencies.

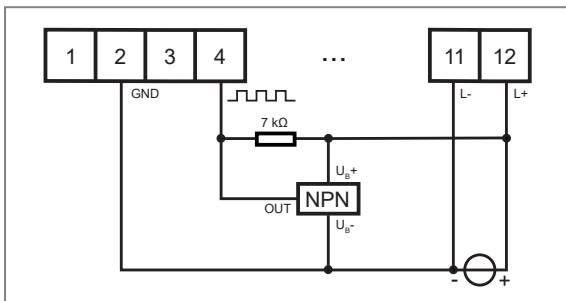


Fig. 28: Signal transmitter with NPN output and external resistance circuit

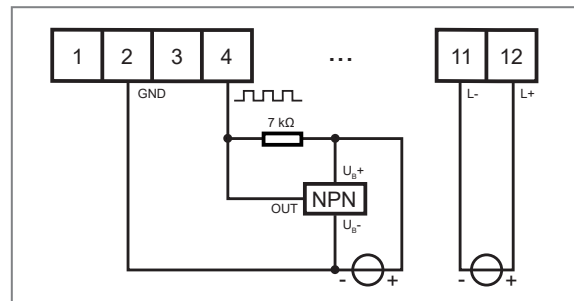


Fig. 29: Signal transmitter with NPN output, external resistance circuit and with external voltage source

6.2.4 NAMUR

The use of NAMUR sensors is possible. However, the wire break and short circuit detection typically provided by these sensors is not supported.

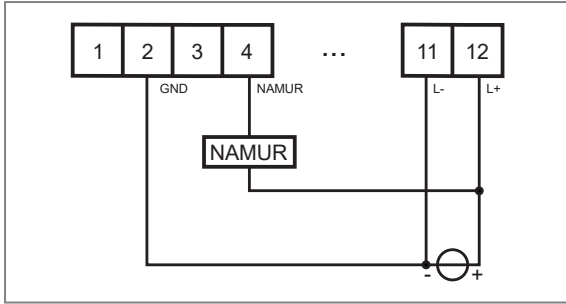


Fig. 30: NAMUR sensor

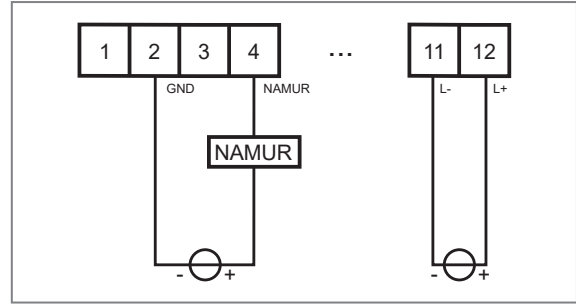


Fig. 31: NAMUR sensor with external voltage supply

6.2.5 Counter

When used as a counter, use the connection examples for frequency/speed.

The following figure shows the reset input connection.

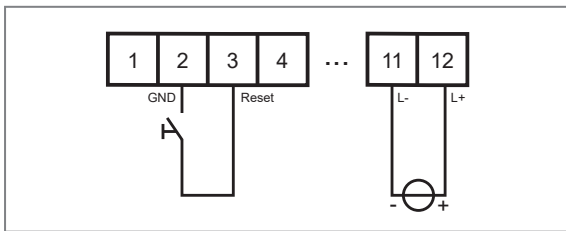


Fig. 32: Manual reset with external pushbutton

7 Operating and display elements

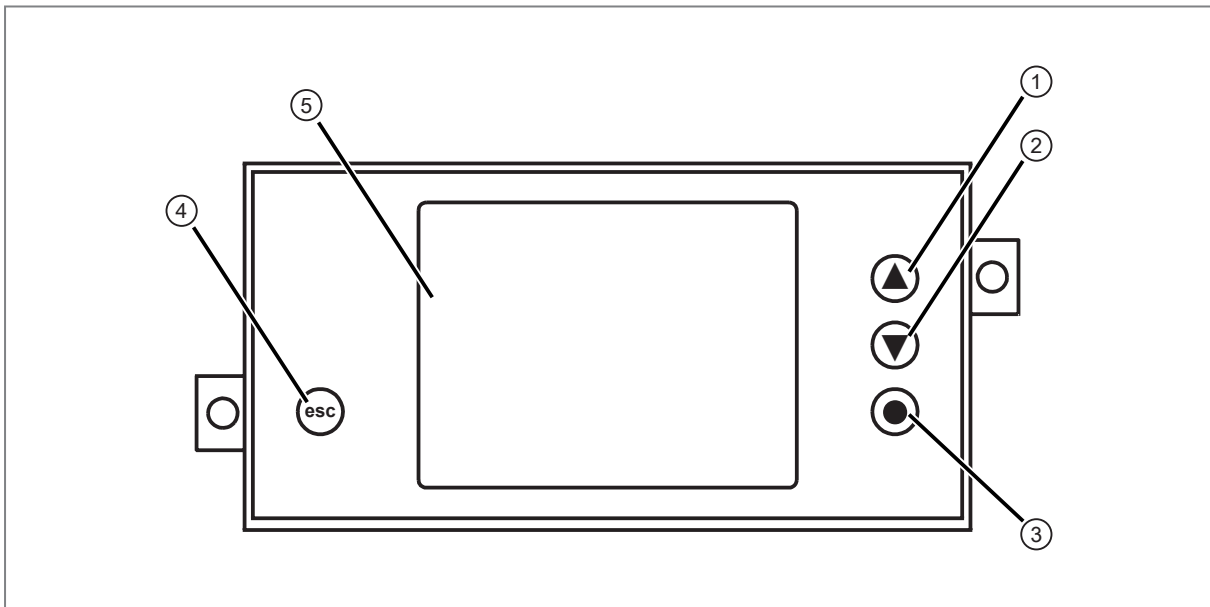


Fig. 33: Operating and display elements

- 1: [▲] key
- 2: [▼] key
- 3: [●] key
- 4: [esc] key
- 5: display

8 Menu

Press the operating key [●] > 1 s to navigate from the process value display to the main menu and from there to the submenus. See also [Parameter setting](#) (→ [19](#)).

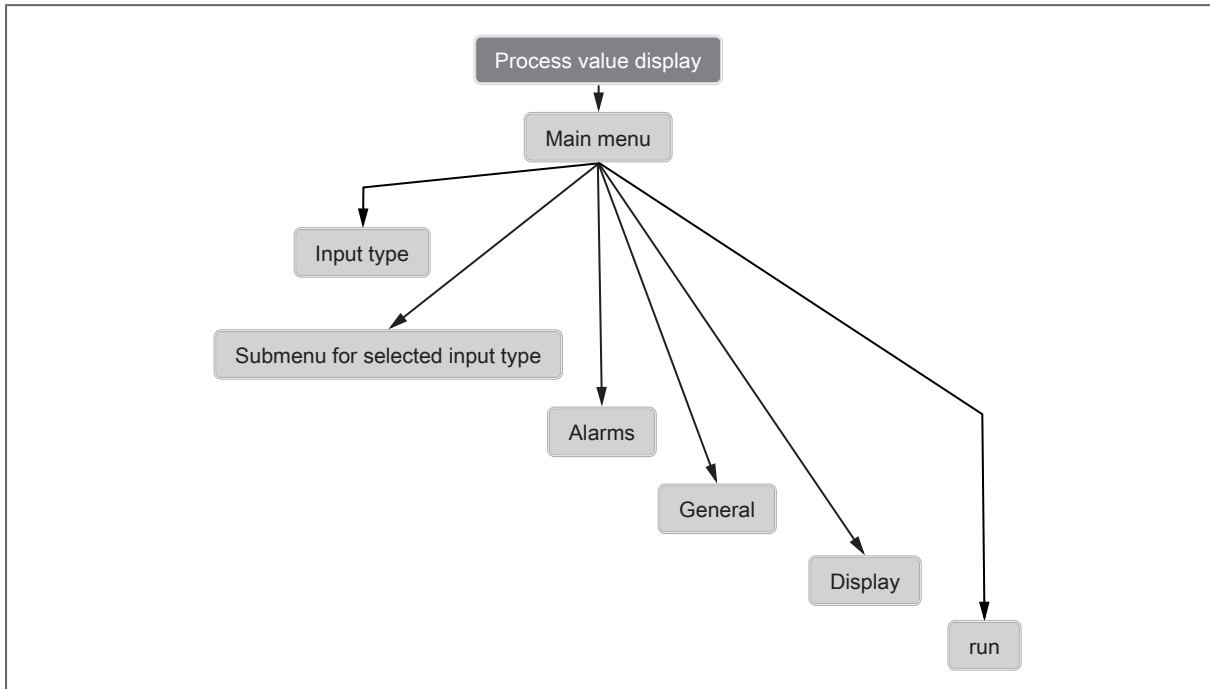


Fig. 34: Menu overview

Press [run] to exit the menu and return from the parameter setting mode to the operating mode.

8.1 Input type menu

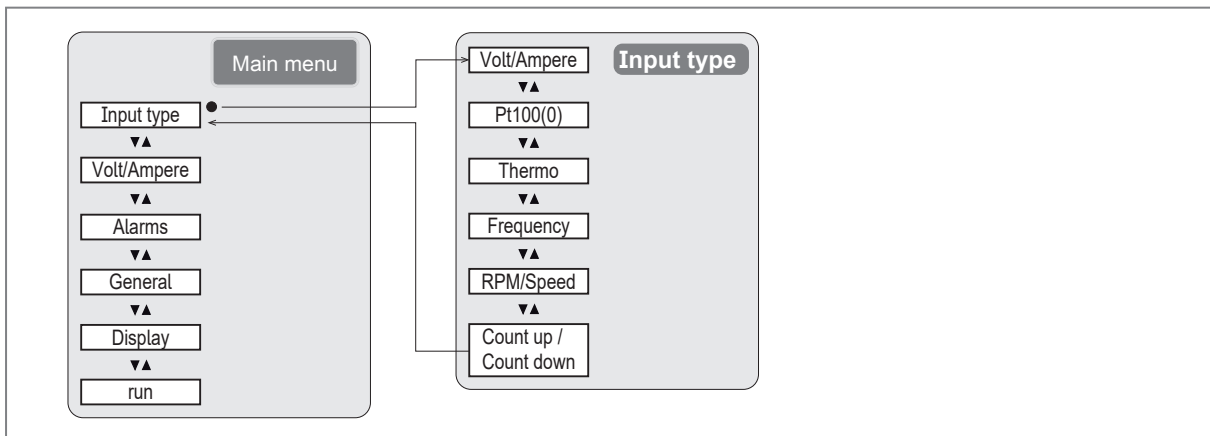


Fig. 35: Menu for input type

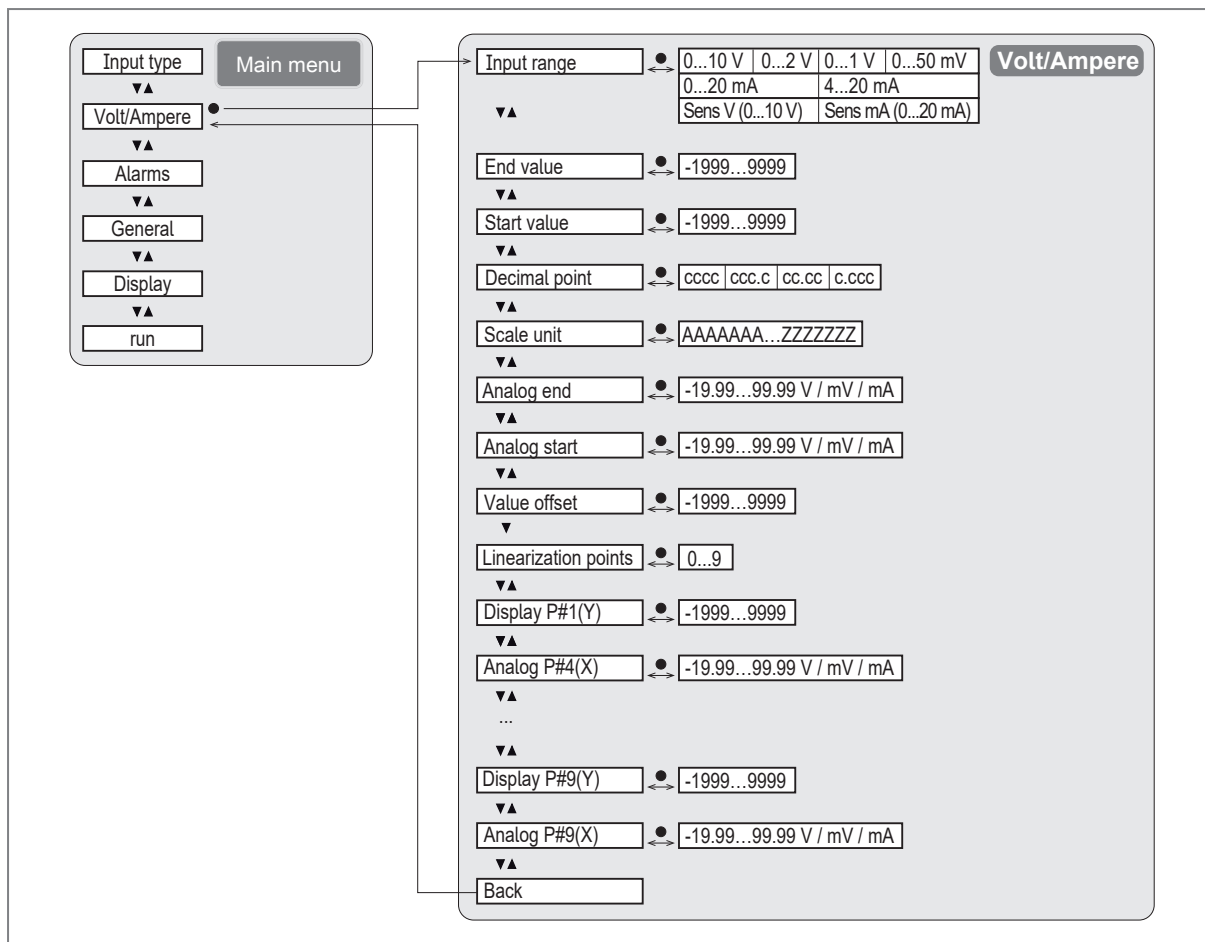


Fig. 36: Menu for input type Volt/Ampere

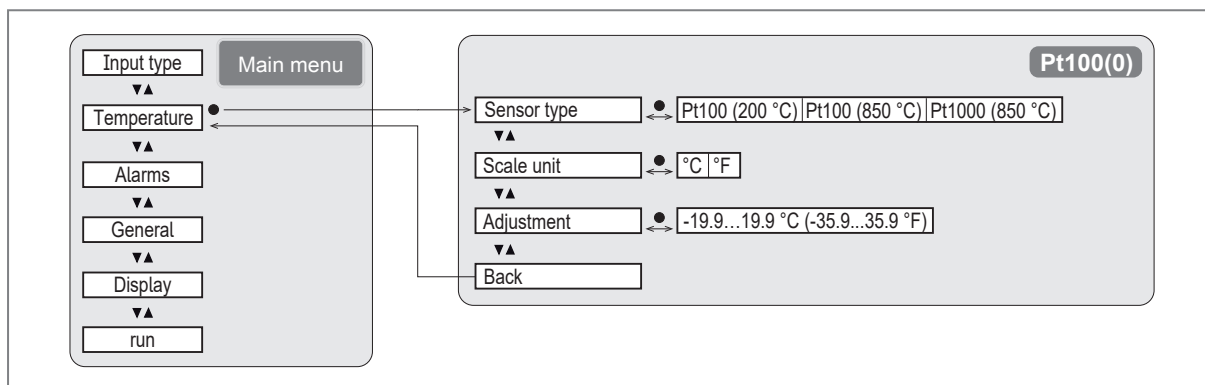


Fig. 37: Menu for input type Pt100(0)

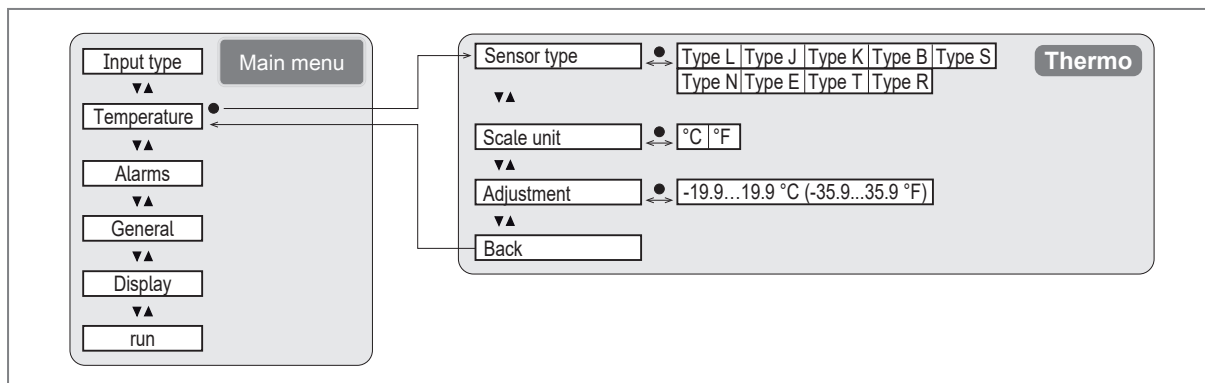


Fig. 38: Menu for input type Thermo

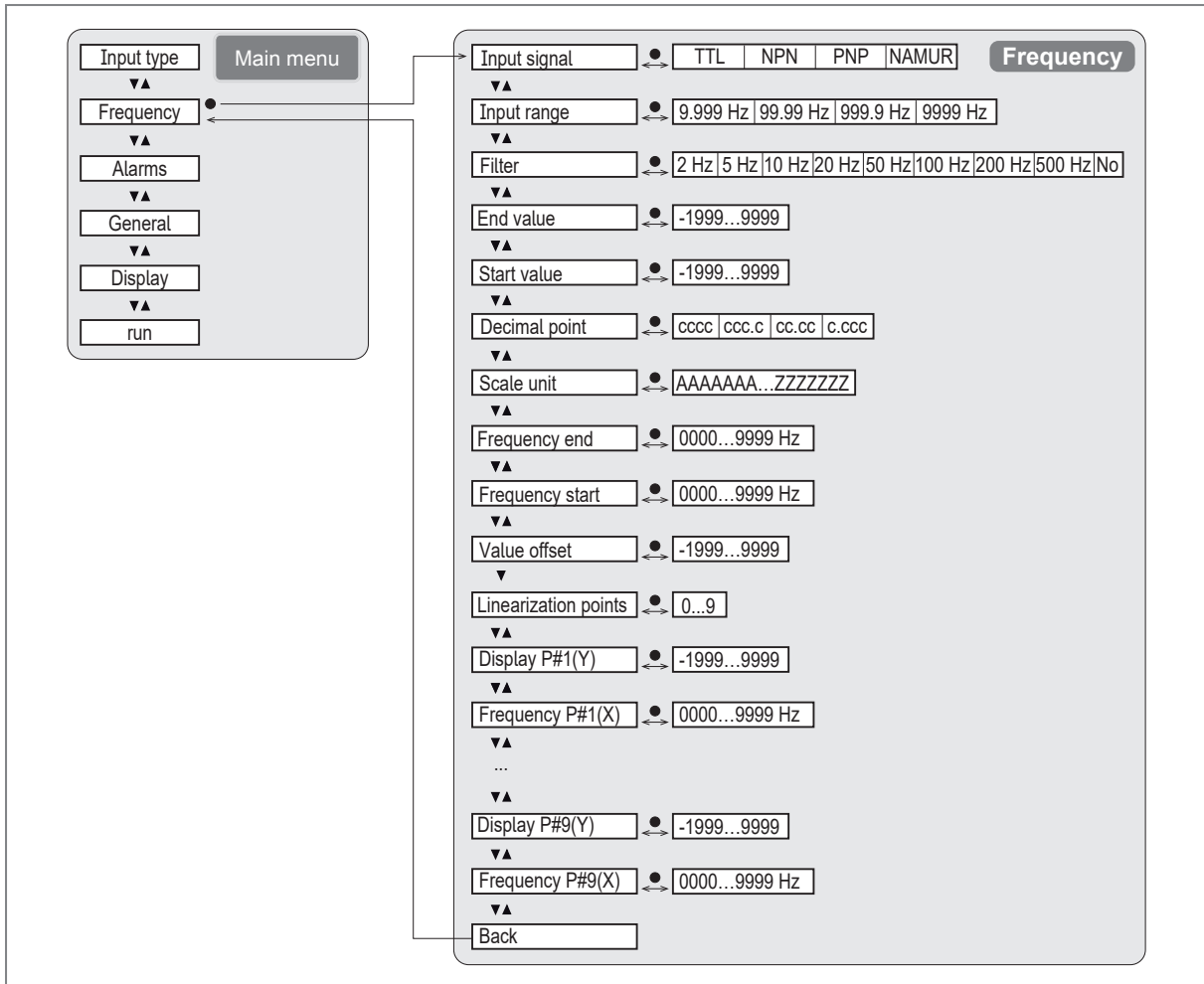


Fig. 39: Menu for input type Frequency

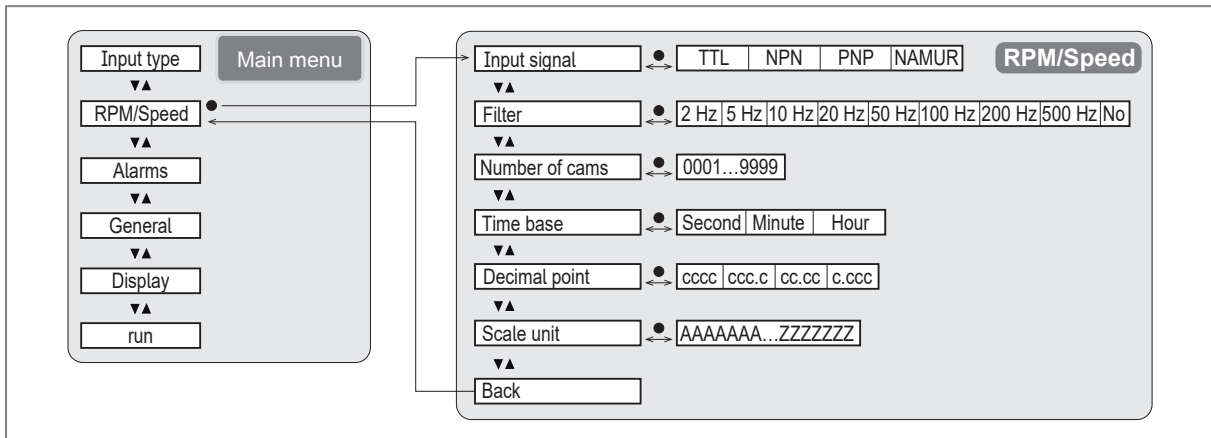


Fig. 40: Menu for input type RPM/Speed

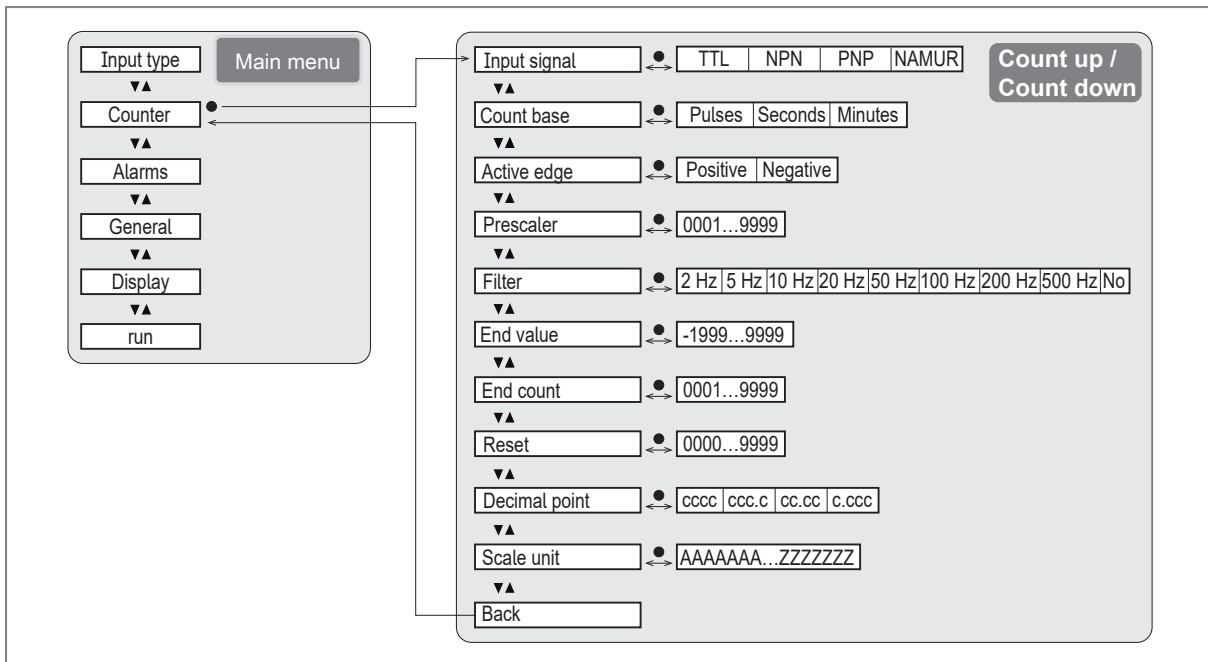


Fig. 41: Menu for input type Count up / Count down

8.2 Alarms menu

The parameters for alarms A1...A8 are identical. The following figure only shows the parameters of A1.

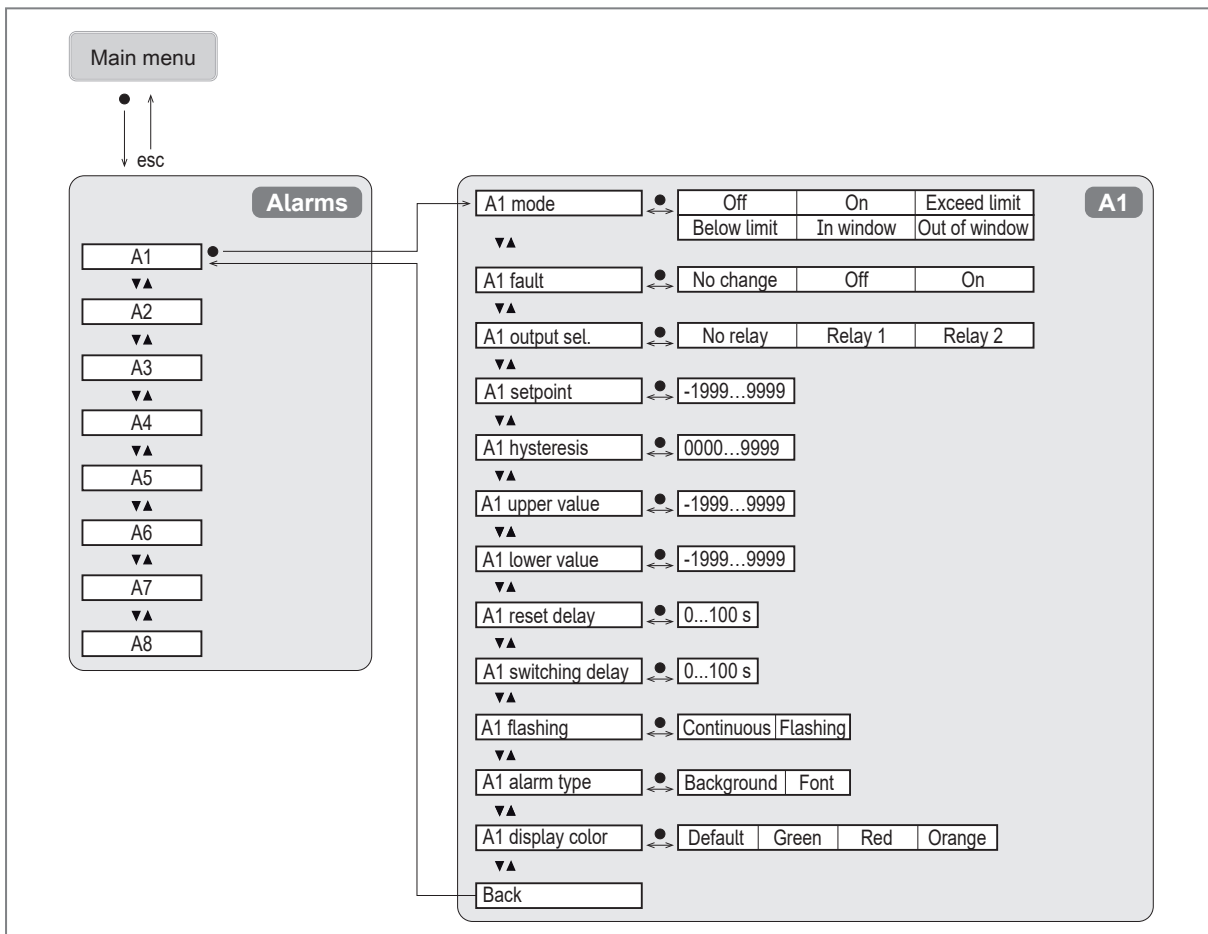


Fig. 42: Alarms menu

8.3 General menu

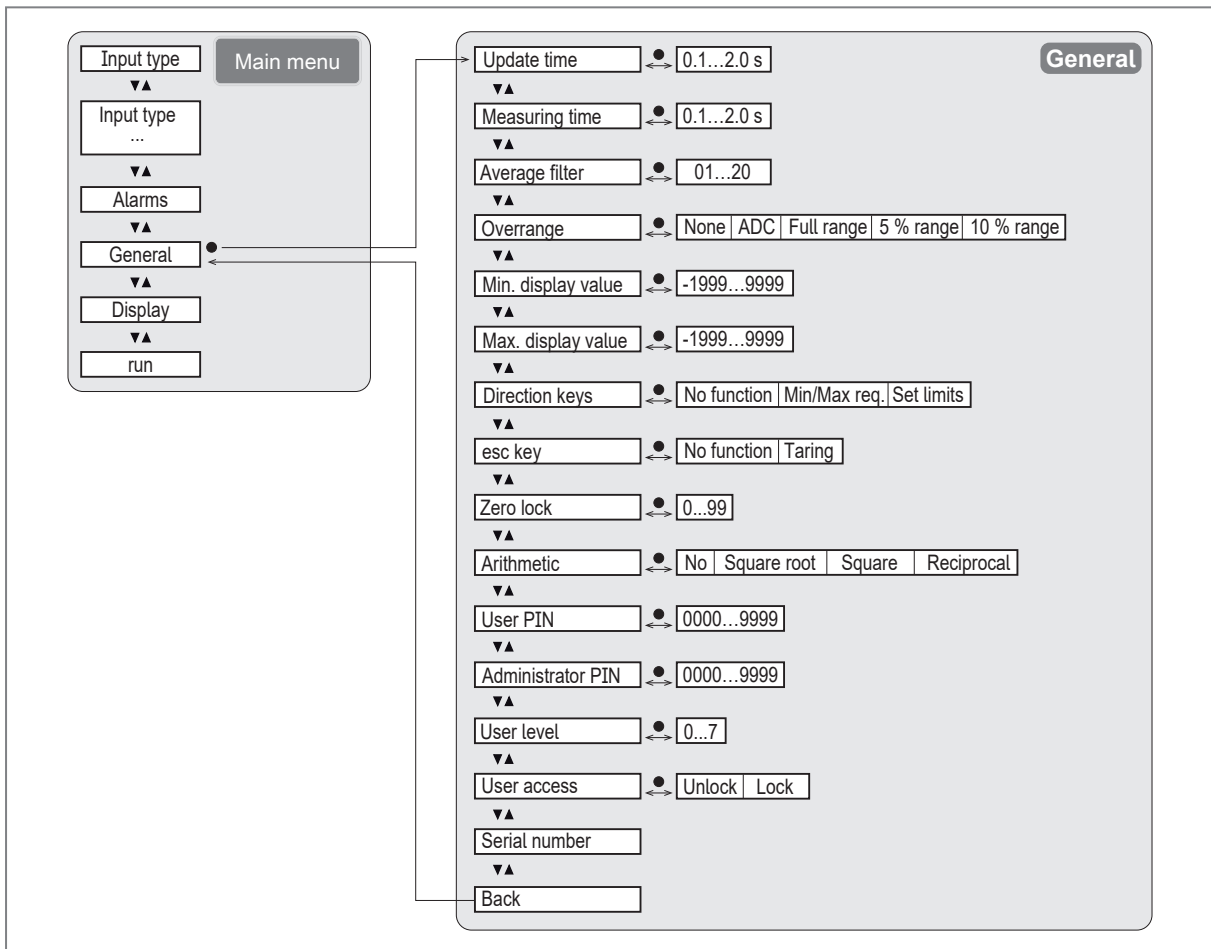


Fig. 43: General menu

8.4 Display menu

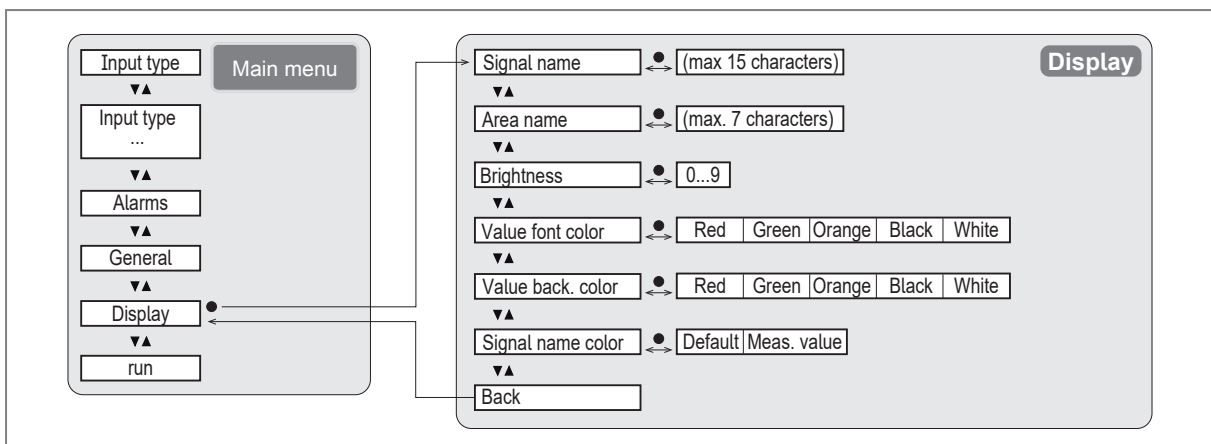


Fig. 44: Display menu

9 Parameter setting

Parameters can be set before installation or during operation.



If you change parameters during operation, this will influence the function of the plant.

- ▶ Ensure that there will be no malfunctions in your plant.

During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameter until the parameter setting has been completed.



Depending on the parameter setting, the parameters available in the menu may change.

Parameter setting process in general:

Intention		Action
Change from the operating to the parameter setting mode		[●] > 1 s
Change to the submenu		Press [▼] / [▲] to navigate to the submenu (e.g. "Display"), then press [●] < 1 s.
Select the requested parameter		Press [▼] / [▲] to navigate to the parameter (e.g. "Value font color"), then press [●] < 1 s.
Modify the parameter value	Select parameter value	Press [▼] / [▲] to navigate to the parameter value (e.g. "Green"). Press [●] < 1 s to save the value.
	Enter numerical value	Press [●] < 1 s to jump to the desired position. Press [▼] / [▲] to change the value and press [●] > 1 s to save it.
	Enter text	Press [●] < 1 s to jump to the desired position. Press [▼] / [▲] to change the value, long press [▼] / [▲] for special and lower case letters. Press [●] > 1 s to save all characters to the left of the selected position. All other characters are removed.
Return to the next higher menu level		[esc] OR menu item [Back]
Return to the operating mode		> 30 seconds (timeout) OR press [esc] repeatedly. OR From the main menu: menu item [run]

9.1 Input type

The parameter [Input type] defines the type of input signal. The following settings are possible:

Value	Description
Volt/Ampere	Voltage/current measurement
Pt100(0)	Temperature measurement via Pt100 or Pt1000
Thermo	Temperature measurement via thermocouple
Frequency	Frequency measurement
RPM/Speed	Speed measurement
Count up / Count down	Counter

Tab. 1: Input type

9.1.1 Volt/Ampere

The unit displays the measured voltage or current value.

In addition, it is possible to calibrate the unit via the connected measuring section.

Carry out a calibration (optional):

- ✓ [Input type] [Volt/Ampere] is selected.
- ▶ Select [Input range] and set the desired measuring range:
 - Sens V (0...10 V input)
 - Sens mA (0...20 mA input)
- ▶ Select [End value] or [Start value].
- ▶ Enter the measured value to be displayed at the current input value (analogue value).
- ▶ Confirm [Sens.Calib] with [Yes] to start the calibration and accept the current analogue input value as [Analog start] or [Analog end].
OR
cancel [Sens.Calib] with [no] to use the set [Analog start] or [Analog end] value without any changes.



Calibration makes it possible to assign the current analogue input value as an [Analog start] or [Analog end] value to the set [Start value] or [End value].

Example: A distance sensor (4...20 mA) is to determine the drilling depth. Max. drilling depth: 80 mm

- ✓ [Input type] [Volt/Ampere] is selected.
- ▶ Bring the drill to the surface of the workpiece (0 mm drilling depth).
- ▶ Select [Input range] [Sens mA].
- ▶ Select [Start value].
- ▶ Enter 0 as [Start value].
- ▶ Confirm [Sens.Calib] with [Yes].
 - ▷ The unit assigns the display value 0 to the analogue input value.
- ▶ Move the tool 80 mm further (80 mm drilling depth).
- ▶ Select [Sens.Calib].
- ▶ Select [End value].
- ▶ Enter 80 as [End value].
- ▶ Confirm [Sens.Calib] with [Yes].
 - ▷ The unit assigns the display value 80 to the analogue input value.
- ▷ In the operating mode, the unit calculates the drilling depth from the analogue input value and displays it in mm.

Parameter setting:

- ✓ [Input type] [Volt/Ampere] is selected.
- ▶ Select [Input range] and set the desired measuring range:
 - 0...10 V
 - 0...2 V
 - 0...1 V
 - 0...50 mV
 - 0...20 mA
 - 4...20 mA

- ▶ Select [End value] and set the value displayed at the analogue input value [Analog end]. [Analog end] is the final value of the measuring range by default, but it can be adjusted.
 - -1999...9999
- ▶ Select [Start value] and set the value displayed at the analogue input value [Analog start]. This is the initial value of the measuring range by default, but it can be adjusted.
 - -1999...9999
- ▶ Select [Decimal point] and set the position of the decimal point in the display:
 - cccc
 - ccc.c
 - cc.cc
 - c.ccc
- ▶ Select [Scale unit] and enter the unit of the measured value.
A maximum of 7 characters is possible.



To enter the characters via the unit keys:
see [Parameter setting](#) (→ [19](#))

- ▶ Select [Analog end] and enter the analogue input value at which the [End value] is to be displayed:
 - -19.99...99.99 V / mV / mA
- ▶ Select [Analog start] and enter the analogue input value at which the [Start value] is to be displayed:
 - -19.99...99.99 V / mV / mA

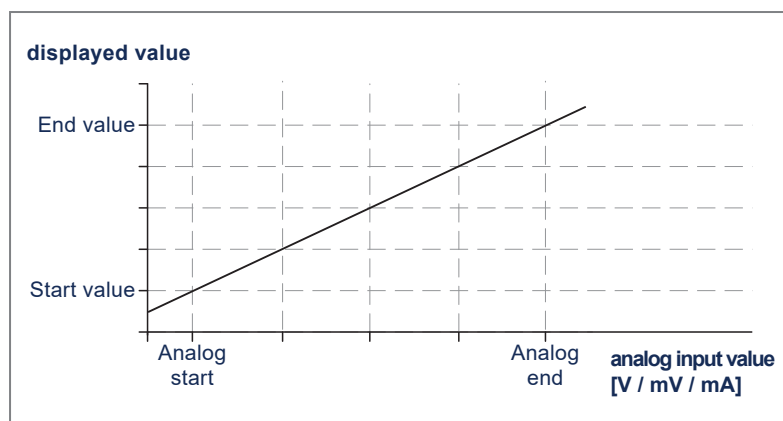


Fig. 45: Application [Analog start] / [Analog end]

- ▶ Optionally select [Value offset] and set the value for the display offset:
 - -1999...9999
- ▶ Select [Linearization points] and set the desired number of linearization points:
 - 0...9

For the number of linearization points configured under [Linearization points], configure [Display P#x(Y)] and [Analog P#x(X)] respectively:

- ▶ Select [Display P#x(Y)] and set the display value for the corresponding analogue value of the relevant linearization point:
 - -1999...9999
- ▶ Select [Analog P#x(X)] and set the analogue value for the corresponding display value of the relevant linearization point:
 - -19.99...99.99 V / mV / mA

9.1.2 Pt100(0)

The unit displays the temperature value measured via a Pt100 or Pt1000 resistance thermometer.

Parameter setting:

✓ [Input type] [Pt100(0)] is selected.

▶ Select [Sensor type] and set the type/temperature range of the thermometer:

Value	Description
Pt100 (200 °C)	Pt100; -50.0...200.0 °C
Pt100 (850 °C)	Pt100; -200...850 °C
Pt1000 (850 °C)	Pt1000; -200...850 °C

Tab. 2: sensor type

▶ Select [Scale unit] and enter the unit of the measured value:

- °C
- °F

▶ Optionally select [Adjustment] and set the value for the offset:

- -19.99...19.99 °C
- OR
- -35.9...35.9 °F

9.1.3 Thermo

The unit displays the temperature value measured via thermocouple.

Parameter setting:

✓ [Input type] [Thermo] is selected.

▶ Select [Sensor type] and set the type/temperature range of the thermometer:

- Type L
- Type J
- Type K
- Type B
- Type S
- Type N
- Type E
- Type T
- Type R

▶ Select [Scale unit] and enter the unit of the measured value:

- °C
- °F

▶ Optionally select [Adjustment] and set the value for the offset:

- -19.99...19.99 °C
- OR
- -35.9...35.9 °F

9.1.4 Frequency

The unit displays the measured frequency.

Parameter setting:

✓ [Input type] [Frequency] is selected.

▶ Select [Input signal] and set the type of input signal:

- TTL
- NPN
- PNP
- NAMUR

▶ Select [Input range] and set the frequency range:

Value	Description
9.999 Hz	0.000...9.999 Hz
99.99 Hz	0.00...99.99 Hz
999.9 Hz	0.0...999.9 Hz
9999 Hz	0...9999 Hz

Tab. 3: Input range

▶ Select [Filter] and set the desired input filter to avoid interference signals:

- 2 Hz
- 5 Hz
- 10 Hz
- 20 Hz
- 50 Hz
- 100 Hz
- 200 Hz
- 500 Hz
- No

▶ Select [End value] and set the value to be displayed at the input frequency [Frequency end]:

- -1999...9999

▶ Select [Start value] and set the value to be displayed at the input frequency [Frequency start]:

- -1999...9999

▶ Select [Decimal point] and set the position of the decimal point in the display:

- cccc
- ccc.c
- cc.cc
- c.ccc

▶ Select [Scale unit] and enter the unit of the measured value.
A maximum of 7 characters is possible.



To enter the characters via the unit keys:
see [Parameter setting](#) (→ [19](#))

▶ Select [Frequency end] and enter the analogue input value at which the [End value] is to be displayed:

- 0000...9999 Hz

▶ Select [Frequency start] and enter the analogue input value at which the [Start value] is to be displayed:

- 0000...9999 Hz

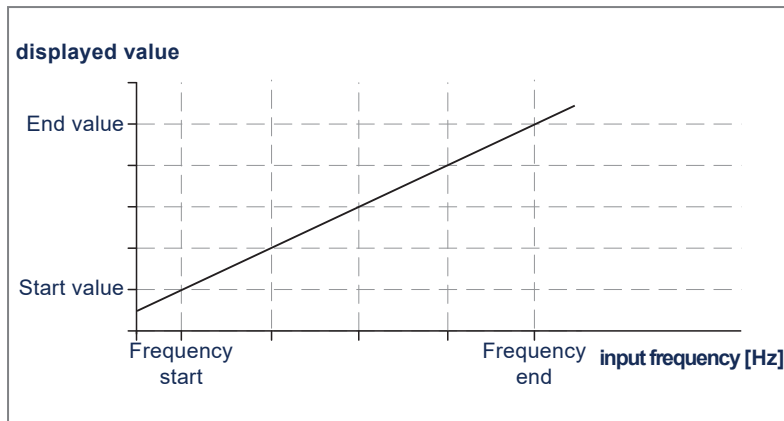


Fig. 46: Application [Frequency start] / [Frequency end]

► Optionally select [Value offset] and set the value for the display offset:

- -1999...9999

► Select [Linearization points] and set the desired number of linearization points:

- 0...9

For the number of linearization points configured under [Linearization points], configure [Display P#x(Y)] and [Frequency P#x(X)] respectively:

► Select [Display P#x(Y)] and set the display value for the corresponding frequency value of the relevant linearization point:

- -1999...9999

► Select [Frequency P#x(X)] and set the frequency value for the corresponding display value of the relevant linearization point:

- 0000...9999 Hz

9.1.5 RPM/Speed

The unit displays the measured speed.

Parameter setting:

✓ [Input type] [RPM/Speed] is selected.

► Select [Input signal] and set the type of input signal:

- TTL
- NPN
- PNP
- NAMUR

► Select [Filter] and set the desired input filter to avoid interference signals:

- 2 Hz
- 5 Hz
- 10 Hz
- 20 Hz
- 50 Hz
- 100 Hz
- 200 Hz
- 500 Hz
- No

- ▶ Select [Number of cams] and set the number of pulses per revolution:
 - 0001...9999
- ▶ Select [Time base] and set the time base for the speed unit:
 - Second
 - Minute
 - Hour
- ▶ Select [Decimal point] and set the position of the decimal point in the display:
 - cccc
 - ccc.c
 - cc.cc
 - c.ccc
- ▶ Select [Scale unit] and enter the unit of the measured value.
A maximum of 7 characters is possible.



To enter the characters via the unit keys:
see [Parameter setting](#) (→ [□ 19](#))

9.1.6 Count up / Count down

The unit counts pulses, seconds or minutes and displays the current counter reading. With [Input type] = [Count up] the unit counts up, with [Count down] the unit counts down.

Parameter setting:

- ✓ [Input type] [Count up] or [Count down] is selected.
- ▶ Select [Input signal] and set the type of input signal:
 - TTL
 - NPN
 - PNP
 - NAMUR
- ▶ Select [Count base] and set the counter type:
 - Pulses
 - Seconds
 - Minutes
- ▶ Select [Active edge] and set the triggering signal edge for the counter:

Value	Description
Positive	Pulse counting on rising signal edge; time counting during high signal
Negative	Pulse counting on falling signal edge; time counting during low signal

Tab. 4: Active edge

- ▶ Select [Prescaler] and set the prescaler to be able to process higher frequencies:
 - 0001...9999



This parameter is only relevant for [Count base] = [Pulse].

Example:

If [Prescaler] = 10, the unit continues counting at every 10th pulse.

- ▶ Select [Filter] and set the desired input filter to avoid interference signals:

- 2 Hz
 - 5 Hz
 - 10 Hz
 - 20 Hz
 - 50 Hz
 - 100 Hz
 - 200 Hz
 - 500 Hz
 - No
- ▶ Select [End value] and set the value to be displayed after reaching the final value of the measuring range:
- -1999...9999
- ▶ Select [End count] and set the count at which the [End value] value is displayed:
- 0001...9999
- ▶ Select [Reset] and set the value to be set by a reset:
- 0000...9999



If [Reset] = 0, a reset will set the count to the start value.

If [Reset] = 1...9999, the count will be reduced by the set value with [Input type] [Count up], or increased by the set value with [Input type] [Count down].

- ▶ Select [Decimal point] and set the position of the decimal point in the display:
- cccc
 - ccc.c
 - cc.cc
 - c.ccc
- ▶ Select [Scale unit] and enter the unit of the measured value.
A maximum of 7 characters is possible.



To enter the characters via the unit keys:
see [Parameter setting](#) (→ [19](#))

9.2 Alarms

Alarms are configured under [Alarms]. A maximum of 8 alarms can be configured (A1...A8). As the configuration options for the 8 alarms are identical, the alarm is called Ax here.

If several alarms are present at the same time, the alarm with the highest number is displayed and the corresponding configuration is used.

Parameter setting:

- ✓ The alarm Ax is selected.
- ▶ Select [Ax mode] and set when this alarm should be active:

Value	Description
Off	The alarm is off. No other parameters are displayed for this alarm.
On	The alarm is activated in operating mode.
Exceed limit	The alarm is activated when the switch point is exceeded.

Value	Description
Below limit	The alarm is activated when the switch point is not reached.
In window	The alarm is activated in the specified window.
Out of window	The alarm is activated outside the specified window.

Tab. 5: Ax mode

► Select [Ax fault] and set which state the alarm displays in the event of an internal error of the unit:

Value	Description
No change	Retain current alarm
Off	No alarm
On	Alarm active

Tab. 6: Ax fault

► Select [Ax output sel.] and set the relay to be switched with this alarm:

- No relay
- Relay 1
- Relay 2

► Select [Ax setpoint] and set the switch point for this alarm:

- -1999...9999



The parameter [Ax setpoint] is only available in [Ax mode] [Exceed limit] and [Below limit]. It can be combined with the parameter [Ax hysteresis].

► Select [Ax hysteresis] and set the hysteresis for the switch point [Ax setpoint]:

- 0000...9999



The parameter [Ax hysteresis] is only available in [Ax mode] [Exceed limit] and [Below limit].

► Select [Ax upper value] and set the upper limit for the window function:

- -1999...9999

► Select [Ax lower value] and set the lower limit for the window function:

- -1999...9999



The parameters [Ax upper value] and [Ax lower value] are only available in [Ax mode] [In window] and [Out of window].

► Select [Ax reset delay] and set the switch-off delay for this alarm:

- 0...100 s

► Select [Ax switching delay] and set the switch-on delay for this alarm:

- 0...100 s



The parameters [Ax reset delay] and [Ax switching delay] are only available in [Ax mode] [Exceed limit], [Below limit], [In window] and [Out of window].

A delayed switch-off and switch-on of the alarm can be configured separately for the switch points.

The internal time counter is not stored permanently and reset by a device start.

► Select [Ax flashing] and set the flashing of the display for this alarm:

- Continuous
- Flashing



This setting affects either the font colour or the background colour. This depends on [Ax alarm type].

- ▶ Select [Ax alarm type] and set whether the alarm is to be indicated via background colour or font colour:
 - Background
 - Font
- ▶ Select [Ax display color] and set the colour for the indication of this alarm:
 - Default (corresponds to the values of [Value font color] and [Value back. color] in the display parameters)
 - Green
 - Red
 - Orange



This setting affects either the font colour or the background colour. This depends on [Ax alarm type].

9.3 General parameters / Safety parameters – General

The menu item [General] is used to configure general device settings and manage access authorisations.

Parameter setting:

- ✓ The menu item [General] is selected.
- ▶ Select [Update time] and set the update rate of the digital display:
 - 0.1...2.0 s
- ▶ Select [Measuring time] and set the period of time for which you want to determine the average value of the input signal:
 - 0.1...2.0 s

Over the set time, the display carries out an averaging of the input value. At higher measuring times, a higher resolution and measuring accuracy is achieved. Thus, the displayed value will be more steady. With very short measuring times, higher or more frequent jumps in the digital display may occur.



The parameter [Measuring time] is only available with [Input type] [Volt/Ampere], [Frequency] and [RPM/Speed].

For [Input type] [Pt100(0)] and [Thermo] a fixed value of 1 s applies.

For [Input type] [Count up] / [Count down] a fixed value of 100 ms applies.

- ▶ Select [Average filter] and set the number of measurements for the moving averaging:
 - 01...20

This additional averaging of the last measured values will steady the display.



The parameter [Average filter] is only available with [Input type] [Volt/Ampere], [Frequency] and [RPM/Speed].

For [Input type] [Pt100(0)] and [Thermo], a fixed value of 10 applies.

For [Input type] [Count up] / [Count down] a fixed value of 0 applies.

- ▶ Select [Overrange] and set when the unit should indicate overflow and underflow for current and voltage measurements. Overflow is displayed via [OL], underflow via [UL]:

Value	Description
None	No indication of overflow or underflow. In these cases, the unit continues to display the highest / lowest value.
ADC	[OL] is indicated if [Max. display value] is exceeded. [UL] is indicated if [Min. display value] is not reached.
Full range	[OL] is indicated if [Analog end] is exceeded. [UL] is indicated if [Analog start] is not reached. (see Volt/Ampere (→ □ 20))
5 % range	[OL] is indicated if [Analog end] exceeds the set measuring range by 5%. [UL] is indicated if [Analog start] undercuts the set measuring range by 5%. Example: Measuring range = [Analog end] - [Analog start] = 20 mA - 0 mA = 20 mA, of which 5% = 1 mA (see Volt/Ampere (→ □ 20))
10 % range	[OL] is indicated if [Analog end] exceeds the set measuring range by 10%. [UL] is indicated if [Analog start] undercuts the set measuring range by 10%. Example: Measuring range = [Analog end] - [Analog start] = 20 mA - 0 mA = 20 mA, of which 10% = 2 mA (see Volt/Ampere (→ □ 20))

Tab. 7: Overrange



The parameter [Overrange] is only available with [Input type] [Volt/Ampere], [Frequency] and [RPM/Speed].

With [Input range] [4...20 mA], underflow cannot be deactivated. With [Overrange] = [None] or [ADC], the unit will always display an analogue input value < 1 mA as UL.

► Select [Min. display value] and set the display value for underflow for current and voltage measurements:

- -1999...9999



The parameters [Min. display value] and [Max. display value] are only available with [Input type] [Volt/Ampere] and with [Overrange] = [ADC].

With [Input range] [4...20 mA], the unit will already indicate an underflow at an input signal < 1 mA to indicate a sensor failure.

► Select [Max. display value] and set the display value for overflow for current and voltage measurements:

- -1999...9999



The parameter [Max. display value] is only available with [Input type] [Volt/Ampere].

► Select [Direction keys] and set the function for the keys [▲] and [▼]:

Value	Description
No function	No function of these keys in operating mode
Min/Max req.	In operating mode, the maximum value is indicated with [▲], the minimum value with [▼].
Set limits	In operating mode, limit values are changed with [▲] and [▼].

Tab. 8: Direction keys

► Select [esc key] and set the function for the [esc] key:

Value	Description
No function	No function of this key in operating mode
Taring	In operating mode, press [▲] to perform taring (offset).

Tab. 9: esc key



The parameter [esc key] is only available with [Input type] [Volt/Ampere], [Frequency] and [RPM/Speed].

► Select [Zero lock] and set the desired value for zero point steadying:

- 0...99

This forces the display to indicate a value of “0” for very small input values. With the input values 0...99, the last two digits of the 4-digit digital display can be steadied.



The parameter [Zero lock] is only available with [Input type] [Volt/Ampere], [Frequency] and [RPM/Speed].

► Select [Arithmetic] and configure the unit to indicate the measured value or a calculated value in the display:

Value	Description
No	Indication of the measured value
Square root	Indication of the calculation value Root(Measured value*Final value)
Square	Display of the calculation value (Display value) ² /Final value
Reciprocal	Indication of the calculation value Final value/Measured value

Tab. 10: Arithmetic

The denominator of fractions should not be 0 because a division by 0 is not possible. It creates an undefined state and the display indicates overflow.



The parameter [Arithmetic] is only available with [Input type] [Volt/Ampere], [Frequency] and [RPM/Speed].

► Select [User PIN] and set the 4-digit PIN code required to access the user menu:

- 0000...9999

User menu = restricted parameter setting mode

Administrator menu = full access to all parameters



Parameter setting options can be restricted via the user menu. The range of the user menu is configured via the parameter [User level].

When leaving the parameter setting mode from the user menu, the user is asked whether the user PIN should be activated (Lock) or not (Unlock).

If the user menu is exited with Unlock, the unit will open the user menu – or the administrator menu, if this is also unlocked – without a PIN request the next time the user changes into parameter setting mode.

► Select [Administrator PIN] and set the 4-digit PIN code required to access the administrator menu:

- 0000...9999



The administrator menu contains all parameter setting options.

When leaving the parameter setting mode from the administrator menu, the user is asked whether the user PIN should be activated (Lock) or not (Unlock).

If the administrator menu is exited with Unlock, the unit will open the administrator menu without a PIN request the next time the user changes into parameter setting mode.

► Select [User level] and configure the range of the user menu:

Can configure	User level						
	1	2	3	4	5	6	7
Serial number query [General] > [Serial number]	•	•	•	•	•	•	•
Alarm thresholds [Ax upper value], [Ax lower value]	•	•	•	•	•	•	—
Alarm hysteresis [Ax hysteresis]	•	•	•	•	•	—	—
All alarm parameters [Ax...]	•	•	•	•	—	—	—
Type of input signal [Input type] and all corresponding subparameters	•	•	—	—	—	—	—
Update rate [General] > [Update time]	•	•	—	—	—	—	—
Key functions [▲] / [▼] [General] > [Direction keys]	•	•	—	—	—	—	—

Tab. 11: User level

- ▶ Select [User access] and set whether the user PIN is required for the next opening of the user menu:

Value	Description
Unlock	No user PIN is required.
Lock	User PIN is required.

Tab. 12: User access

- ▶ Select [Serial number] to display the serial number of the unit.

9.4 Parameters for the indication of measured values – Display

The indication of the measured value is configured via the menu item [Display].

Parameter setting:

- ✓ The menu item [Display] is selected.
- ▶ Select [Signal name] and define the signal name to be indicated at the top of the display. A maximum of 15 characters is possible (or less depending on the character width).
- ▶ Select [Area name] and set the signal context to be indicated in the lower left corner of the display. A maximum of 7 characters is possible.
- ▶ Select [Brightness] and set the brightness of the background light:
 - 0...9
- ▶ Select [Value font color] and set the font colour of the displayed value:
 - Red
 - Green
 - Orange
 - Black
 - White
- ▶ Select [Value back. color] and set the background colour of the displayed value:
 - Red
 - Green
 - Orange
 - Black

- White

▶ Select [Signal name color] and set the font colour of the signal name in the event of an alarm:

Value	Description
Default	In the event of an alarm, the font colour of the signal name remains white.
Meas. value	Use the value from [Ax display color] for the font colour of the signal name in the event of an alarm

Tab. 13: Signal name color

9.5 Restore factory settings

In order to put the unit into a defined basic state, it is possible to perform a reset and restore the factory settings as follows:

- ▶ Disconnect the unit from the voltage supply.
- ▶ Press the [●] key and reconnect the unit with the voltage supply. Hold down the [●] key until the unit displays [Reset config].
- ▶ Select [YES] to restore the factory settings.
All user-specific settings will be lost.
 OR
 [NO] to cancel the operation and keep the user-specific settings.

10 Operation

After switching the supply voltage on, the unit displays the software version for 3 seconds. Then the unit switches into operating mode. Display indications correspond to the parameter setting.

Alarms are visually reported in the display via a colour change of the background and font. A display overflow is displayed via [OL], a display underflow via [UL] (if configured).

Switched-on relays are displayed as follows:

- ① Relay 1 switched on
- ② Relay 2 switched on

In operating mode, the keys can be used to perform the following functions:

Key	Function
[esc]	Special function for voltage, current and frequency measurements: Hold down < 1 s to perform taring (offset), if configured. This function tares the current display to zero and stores it as an offset. The value is lost when the unit is restarted.
[▲]	Display the maximum value or change the upper limit value (depending on the key function configured)
[▼]	Display the minimum value or change the lower limit value (depending on the key function configured)
[▲] + [▼]	Hold down < 1 s to exit the maximum/minimum value display.
[•]	Hold down > 1 s → Change to parameter setting mode

11 Troubleshooting

Error	Cause	Troubleshooting
The unit permanently indicates overflow.	The measured value at the input is too high.	Check the measuring circuit.
	The display range of 9999 or the preset measuring range was exceeded.	Check the supporting points, the selected input type and the signal range.
	Not all of the activated supporting points are configured.	Check if the relevant parameters are set correctly.
The unit permanently indicates underflow.	The measured value at the input is too small.	Check the measuring circuit.
	The display range of -1999 or the preset measuring range was underrun.	Check the settings.
	Not all of the activated supporting points are configured.	Check if the relevant parameters are set correctly.
	The wrong input type is selected. (Only temperature measurements and 4...20 mA display this error message).	Check that the correct input type is selected.
	Incorrect wiring	Check the wiring, contacts and connections.
The unit shows [HELP] in the display.	Error in the configuration memory	Restore the factory settings and newly configure the unit.
The parameters for parameter setting of the input are not available.	The programming lock is activated.	Enter the correct code.
The unit shows [Config error] in the display.	Error when checking the checksum for the configuration, error in the user settings	Restore the factory settings and newly configure the unit.
The unit shows [Reset settings] and [Restart system] in the display.	Configuration error	Select [Restart system] to restart the unit. Select [Reset settings] to restore the factory settings. Newly configure the unit.
The unit does not respond as expected.	Current parameterization of the unit is not known.	Restore the factory settings and newly configure the unit.
Higher constant measurement deviations for thermocouple measurement	Environmental influences	Remove strong sources of heat or cold from the immediate vicinity of the unit.
	Local heating due to increased switching capacity of the relay switching points	Reduce the switching capacity of the relay switching points to as far as possible below 10 mA. If the deviations during operation are permanent and constant, the cold junction measurement can be corrected via the offset.

12 Maintenance, repair and disposal

Cleaning the unit:

- ▶ Disconnect the unit from the voltage supply.
- ▶ Clean the unit from dirt using a soft, chemically untreated and dry micro-fibre cloth.

The unit is maintenance-free.

- ▶ After use, dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

13 Factory settings

13.1 Input type – Parameters for measuring signals

Parameter		Factory settings	User settings
Input type [Volt/Ampere]	Input range	0...10 V	<ul style="list-style-type: none"> • 0...10 V • 0...2 V • 0...1 V • 0...50 mV • 0...20 mA • 4...20 mA • Sens V (0...10 V input) • Sens mA (0...20 mA input)
	End value	1000	-1999...9999
	Start value	0000	-1999...9999
	Decimal point	cccc	<ul style="list-style-type: none"> • cccc • ccc.c • cc.cc • c.ccc
	Scale unit		AAAAAAA...ZZZZZZ
	Analog end	10.00 V	-19.99...99.99 V / mV / mA
	Analog start	0.00 V	-19.99...99.99 V / mV / mA
	Value offset	0	-1999...9999
	Linearization points	0	0...9
	Display P#1(Y)	0100	-1999...9999
	Analog P#1(X)	01.00 V	-19.99...99.99 V / mV / mA
	Display P#2(Y)	0100	-1999...9999
	Analog P#2(X)	01.00 V	-19.99...99.99 V / mV / mA
	Display P#3(Y)	0100	-1999...9999
	Analog P#3(X)	01.00 V	-19.99...99.99 V / mV / mA
	Display P#4(Y)	0100	-1999...9999
	Analog P#4(X)	01.00 V	-19.99...99.99 V / mV / mA
	Display P#5(Y)	0100	-1999...9999
	Analog P#5(X)	01.00 V	-19.99...99.99 V / mV / mA
	Display P#6(Y)	0100	-1999...9999
	Analog P#6(X)	01.00 V	-19.99...99.99 V / mV / mA
	Display P#7(Y)	0100	-1999...9999
	Analog P#7(X)	01.00 V	-19.99...99.99 V / mV / mA
Display P#8(Y)	0100	-1999...9999	
Analog P#8(X)	01.00 V	-19.99...99.99 V / mV / mA	
Display P#9(Y)	0100	-1999...9999	
Analog P#9(X)	01.00 V	-19.99...99.99 V / mV / mA	
Input type [Pt100(0)]	sensor type	Pt100 (200 °C)	<ul style="list-style-type: none"> • Pt100 (200 °C) • Pt100 (850 °C) • Pt1000 (850 °C)
	Scale unit	°C	<ul style="list-style-type: none"> • °C • °F

Parameter		Factory settings	User settings
Input type [Pt100(0)]	Adjustment	00.0 °C (00.0 °F)	-19.9...19.9 °C (-35.9...35.9 °F)
Input type [Thermo]	Sensor type	Type K	<ul style="list-style-type: none"> • Type L • Type J • Type K • Type B • Type S • Type N • Type E • Type T • Type R
	Scale unit	°C	<ul style="list-style-type: none"> • °C • °F
	Adjustment	00.0 °C (00.0 °F)	-19.9...19.9 °C (-35.9...35.9 °F)
Input type [Frequency]	Input signal	PNP	<ul style="list-style-type: none"> • TTL • NPN • PNP • NAMUR
	Input range	9999 Hz	<ul style="list-style-type: none"> • 9.999 Hz • 99.99 Hz • 999.9 Hz • 9999 Hz
	Filter	No	<ul style="list-style-type: none"> • 2 Hz • 5 Hz • 10 Hz • 20 Hz • 50 Hz • 100 Hz • 200 Hz • 500 Hz • No
	End value	1000	-1999...9999
	Start value	0000	-1999...9999
	Decimal point	cccc	<ul style="list-style-type: none"> • cccc • ccc.c • cc.cc • c.ccc
	Scale unit		AAAAAAA...ZZZZZZ
	Frequency end	9999 Hz	0000...9999 Hz
	Frequency start	0000 Hz	0000...9999 Hz
	Value offset	0000	-1999...9999
	Linearization points	0	0...9
	Display P#1(Y)	0	-1999...9999
	Frequency P#1(X)	0 Hz	0000...9999 Hz
	Display P#2(Y)	0	-1999...9999
	Frequency P#2(X)	0 Hz	0000...9999 Hz
Display P#3(Y)	0	-1999...9999	
Frequency P#3(X)	0 Hz	0000...9999 Hz	
Display P#4(Y)	0	-1999...9999	
Frequency P#4(X)	0 Hz	0000...9999 Hz	

Parameter		Factory settings	User settings
Input type [Frequency]	Display P#5(Y)	0	-1999...9999
	Frequency P#5(X)	0 Hz	0000...9999 Hz
	Display P#6(Y)	0	-1999...9999
	Frequency P#6(X)	0 Hz	0000...9999 Hz
	Display P#7(Y)	0	-1999...9999
	Frequency P#7(X)	0 Hz	0000...9999 Hz
	Display P#8(Y)	0	-1999...9999
	Frequency P#8(X)	0 Hz	0000...9999 Hz
	Display P#9(Y)	0	-1999...9999
Frequency P#9(X)	0 Hz	0000...9999 Hz	
Input type [RPM/Speed]	Input signal	PNP	<ul style="list-style-type: none"> • TTL • NPN • PNP • NAMUR
	Filter	No	<ul style="list-style-type: none"> • 2 Hz • 5 Hz • 10 Hz • 20 Hz • 50 Hz • 100 Hz • 200 Hz • 500 Hz • No
	Number of cams	0001	0001...9999
	Time base	Minute	<ul style="list-style-type: none"> • Second • Minute • Hour
	Decimal point	cccc	<ul style="list-style-type: none"> • cccc • ccc.c • cc.cc • c.ccc
	Scale unit		AAAAAAA...ZZZZZZ
Input type [Count up] / [Count down]	Input signal	PNP	<ul style="list-style-type: none"> • TTL • NPN • PNP • NAMUR
	Count base	Pulses	<ul style="list-style-type: none"> • Pulses • Seconds • Minutes
	Active edge	Positive	<ul style="list-style-type: none"> • Positive • Negative
	Prescaler	0001	0001...9999
	Filter	No	<ul style="list-style-type: none"> • 2 Hz • 5 Hz • 10 Hz • 20 Hz • 50 Hz • 100 Hz • 200 Hz • 500 Hz • No

Parameter		Factory settings	User settings
Input type [Count up] / [Count down]	End value	1000	-1999...9999
	End count	1000	0001...9999
	Reset	0000	0000...9999
	Decimal point	cccc	<ul style="list-style-type: none"> • cccc • ccc.c • cc.cc • c.ccc
	Scale unit		AAAAAAA...ZZZZZZ

13.2 Alarms – Parameters for alarms A1...A8

Parameter	Factory settings	User settings
Ax mode	Off	<ul style="list-style-type: none"> • Off • On • Exceed limit • Below limit • In window • Out of window
Ax fault	No change	<ul style="list-style-type: none"> • No change • Off • On
Ax output sel.	Relay 1	<ul style="list-style-type: none"> • No relay • Relay 1 • Relay 2
Ax setpoint	0100	-1999...9999
Ax hysteresis	0000	0000...9999
Ax upper value	0150	-1999...9999
Ax lower value	0100	-1999...9999
Ax reset delay	0 s	0...100 s
Ax switching delay	0 s	0...100 s
Ax flashing	Continuous	<ul style="list-style-type: none"> • Continuous • Flashing
Ax alarm type	Font	<ul style="list-style-type: none"> • Background • Font
Ax display color	Default	<ul style="list-style-type: none"> • Default • Green • Red • Orange

13.3 General – General parameters / Safety parameters

Parameter	Factory settings	User settings
Update time	1.0 s	0.1...2.0 s
Measuring time	1.0 s	0.1...2.0 s
Average filter	01	01...20

Parameter	Factory settings	User settings
Overrange	ADC	<ul style="list-style-type: none"> • None • ADC • Full range • 5 % range • 10 % range
Min. display value	-1999	-1999...9999
Max. display value	9999	-1999...9999
Direction keys	No function	<ul style="list-style-type: none"> • No function • Min/Max req. • Set limits
esc key	No function	<ul style="list-style-type: none"> • No function • Taring
Zero lock	0	0...99
Arithmetic	no	<ul style="list-style-type: none"> • No • Square root • Square • Reciprocal
User PIN	0000	0000...9999
Administrator PIN	1234	0000...9999
User level	7	1...7
User access	Unlock	<ul style="list-style-type: none"> • Unlock • Lock
Serial number		

13.4 Display – Parameters for the indication of measured values

Parameter	Factory settings	User settings
Signal name		(max. 15 characters)
Area name		(max. 7 characters)
Brightness	7	0...9
Value font color	White	<ul style="list-style-type: none"> • Red • Green • Orange • Black • White
Value back. color	Black	<ul style="list-style-type: none"> • Red • Green • Orange • Black • White
Signal name color	Default	<ul style="list-style-type: none"> • Default • Meas. value