User manual M2

Resistance values: 1 kΩ, 10 kΩ, 100 kΩ

Technical features:

- red display with -19999…99999 Digits (optional: green, orange, blue)
- minimal installation depth: 70 mm without plug-in terminal
- min-/max-memory
- 30 adjustable setpoints
- display flashing at threshold value exceedance /threshold value undercut
- zero key to trigger HOLD, TARA
- permanent MIN/MAX-value recording
- volume metering (Totaliser)
- arithmetic function
- zero point slowdown
- programming interlock via access code
- protection class IP65 at the front side
- plug-in screw terminal
- optional: analog output
- optional: 2 relay outputs (change-over contacts)
- optional: digital input

Identification

STANDARD TYPES	ORDER NUMBER
Direct voltage / Direct current Housing size: 96x48 mm	**M2-1VR5B.0006.570BD** **M2-1VR5B.0006.770BD**

Options – break-down purchase order key:

M 2- 1 V R 5 B. 0 0 0 6. 6 7 2 B D

Standard type M-Line

Installation depth
89 mm with plug-in terminal [2]

Housing size
B96xH48xD70 mm [1]

Display type
Voltage, Current, Resistance [V]

Display colour
Blue [B]
Green [G]
Red [R]
Yellow [Y]

Number of digits
5-digit [5]

Digit height
14 mm [B]

Digital input
without [0]
one [I]

Dimension
[D] physical unit

Version
[B] B

Setpoints
[0] no setpoints
[2] 2 relay outputs

Protection class
[1] without keypad, operation on the back
[7] IP65 / plug-in terminal

Supply voltage
[4] 115 VAC
[5] 230 VAC
[6] 10-30 VDC galv.insulated

Measuring input
[6] Resistance

Analog output
[0] without
[X] 0-10 VDC, 0/4-20 mA

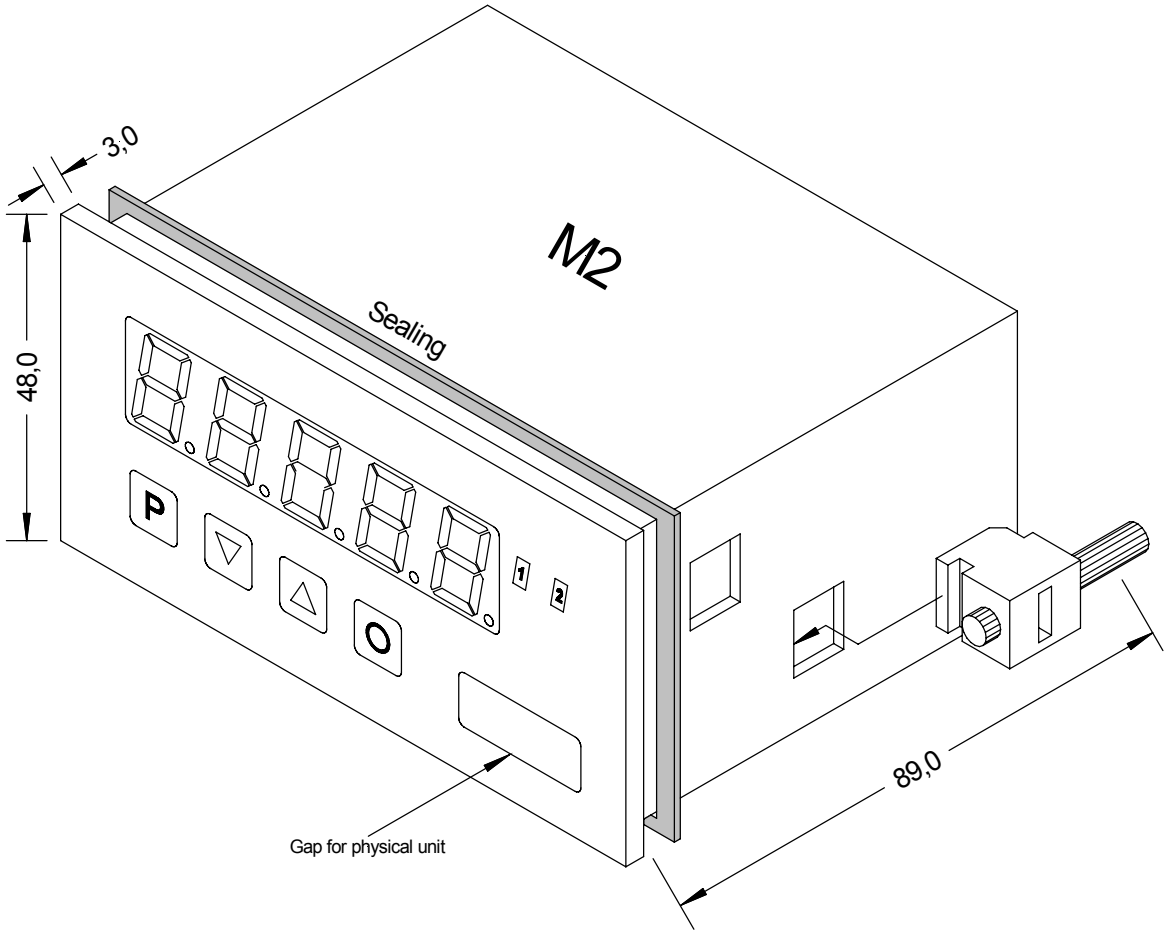
Sensor supply
[0] without

Please state physical unit by order, e.g. m/min.

Contents

1. Assembly

Please read the *Safety advice* on *page 40* before installation and keep this user manual for future reference.



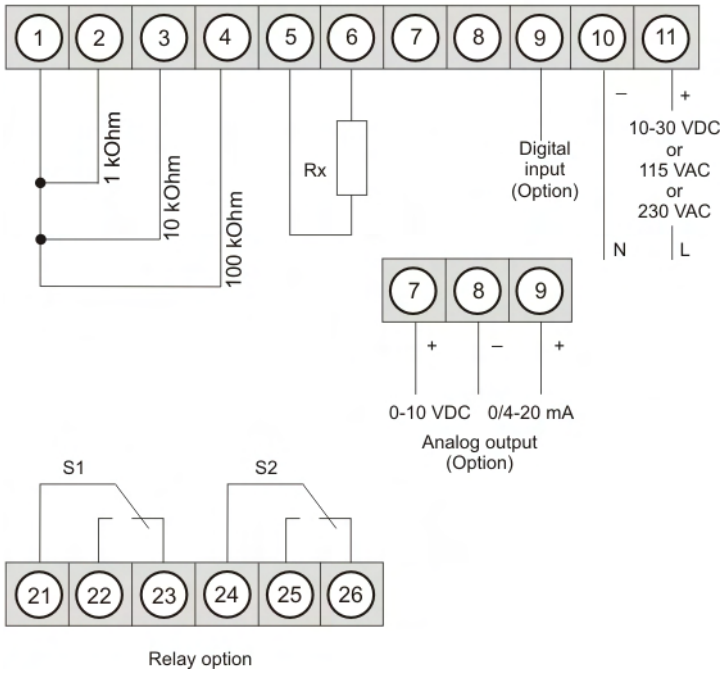
1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

CAUTION! The torque should not exceed 0.1 Nm!

The dimension symbols can be exchanged before installation via a channel on the side!

2. Electrical connection

Type M2-1VR5B.0006.470BD with a supply of 115 VAC
Type M2-1VR5B.0006.570BD with a supply of 230 VAC
Type M2-1VR5B.0006.770BD with a supply of 24 VDC



Relay option

3. Function and operation description

Operation
The operation is divided into three different levels.

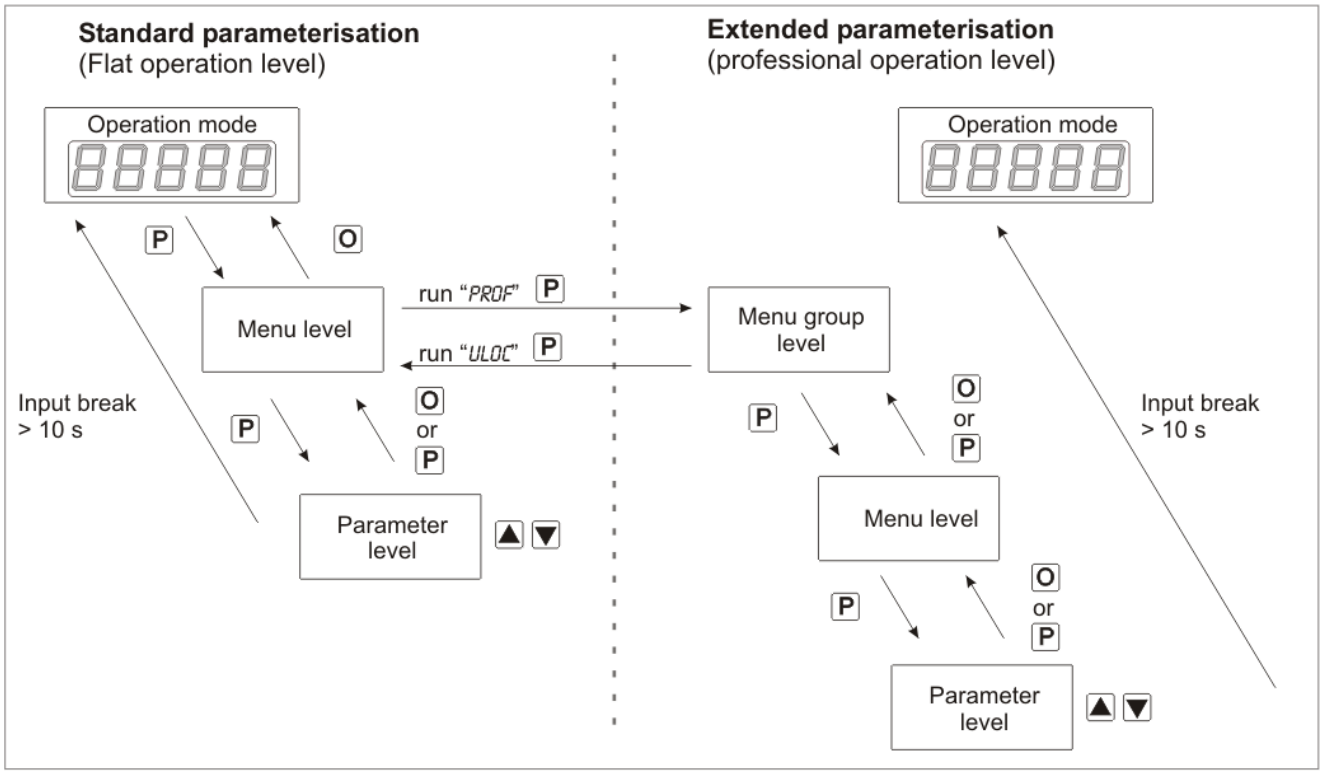
Menu level (delivery status)
This level is for the standard settings of the device. Only menu items which are sufficent to set the device into operation are displayed. To get into the professional level, run through the menu level and parameterise **"***PROF*" under menu item *RUN*.

Menu group level (complete function volume)
Suited for complex applications as e.g. linkage of alarms, setpoint treatment, totaliser function etc. In this level function groups which allow an extended parameterisation of the standard settings are availabe. To leave the menu group level, run through this level and parameterise „*ULOC*„ under menu item *RUN*.

Parameterisation level:
Parameter deposited in the menu item can here be parameterised. Functions, that can be changed or adjusted, are always signalised by a flashing of the display. Settings that are made in the parameterisation level are confirmed with **[P]** and thus safed. By pressing the **[O]**-key (zero-key) it leads to a break-off of the value input and to a change into the menu level. All adjustments are safed automatically by the device and it changes into operating mode, if no further key operation is done within the next 10 seconds.

Level	Key	Description
Menu level	P	Change to parameterisation level and deposited values.
	▲ ▼	Keys for up and down navigation in the menu level.
	O	Change into operation mode.
Parameterisation level	P	To confirm the changes made at the parameterization level.
	▲ ▼	Adjustment of the value / the setting.
	O	Change into menu level or break-off in value input.
Menu group level	P	Change to menu level.
	▲ ▼	Keys for up and down navigation in the menu group level.
	O	Change into operation mode or back into menu level.

Function chart:



Underline:

- P **Takeover**
- O **Stop**
- ▲ **Value selection (+)**
- ▼ **Value selection (-)**

4. Setting up the device

4.1. Switching-on

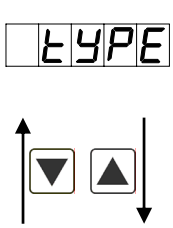
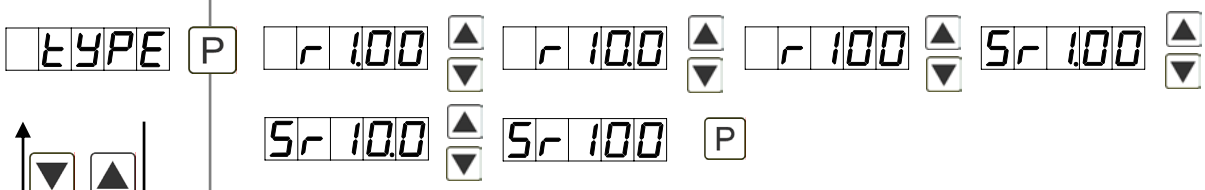
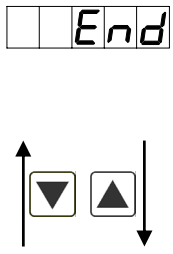
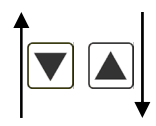
Once the installation is complete, you can start the device by applying the voltage supply. Before, check once again that all electrical connections are correct.

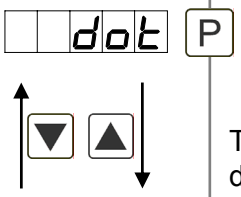
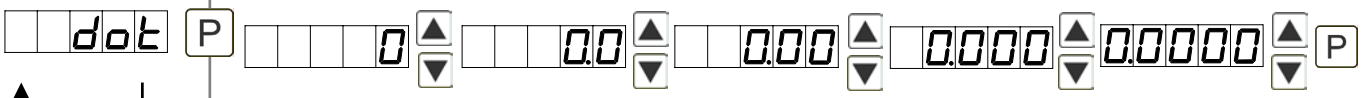
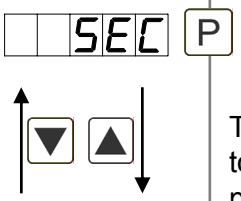
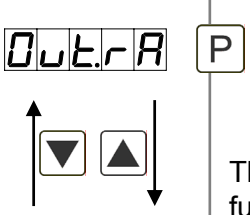
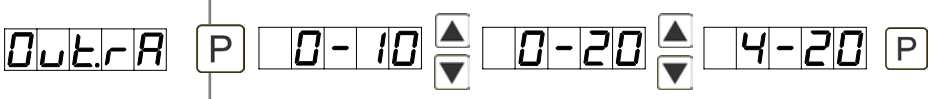
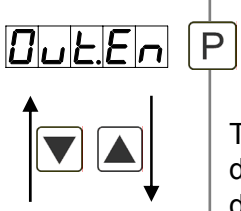
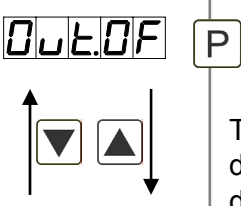
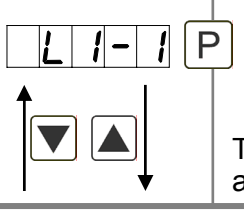
Starting sequence

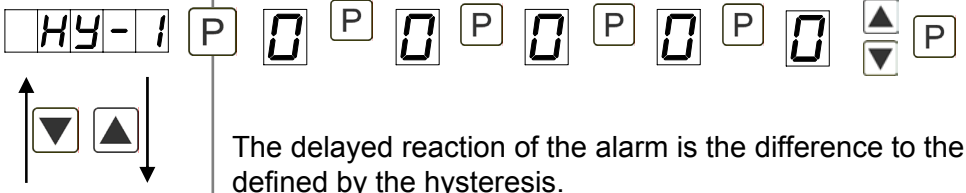
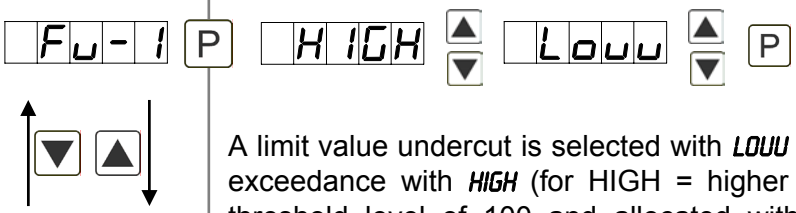
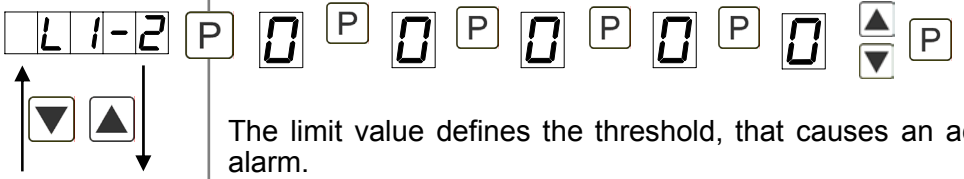
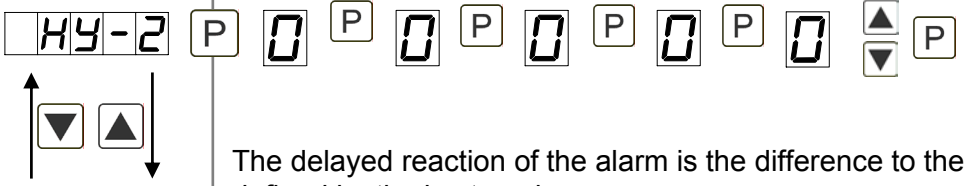
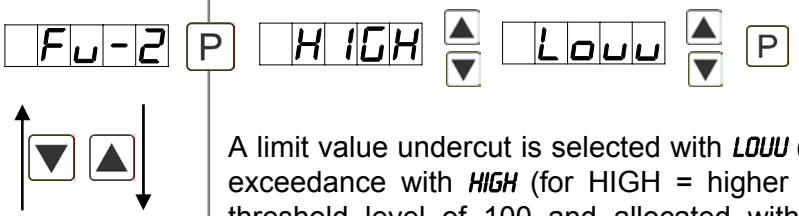
For 1 second during the switching-on process, the segment test (*8 8 8 8 8*) is displayed followed by an indication of the software type and, after that, also for 1 second the software version. After the starting sequence, the device switches to operation/display mode.

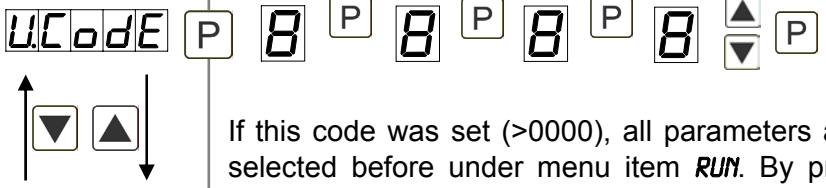
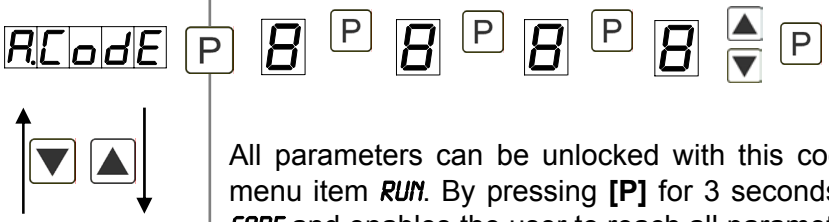
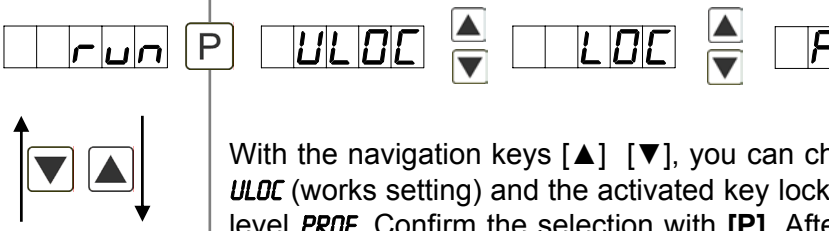
4.2. Standard parameterisation: (Flat operation level)

To parameterize the display, press the **[P]** key in operating mode for 1 second. The display then changes to the menu level with the first menu item *TYPE*.

Menu level	Parameterisation level
	**Selection of the input signal, *TYPE*:**  As input versions, resistance values of 1,10 or 100 kΩ signals as factory calibration (without connected sensor signal) and as sensor calibration (with connected measuring signal) are available. Confirm your selection with **[P]**. The display then switches back to the menu level again.
	**Setting the final value of the measuring range, *END*:**  The final value is adjusted from the smallest to the highest place with [▼] [▲] and confirmed place selective with **[P]**. A minus sign can only be parameterized on the highest place. After the last place the display switches back to the menu level. If *SENS* has been selected, you can then choose between *NOCA* and *CAL*. At *NOCA* the before adjusted value will be taken over, at *CAL* the value alignment via the measuring section takes place and the analog input value is taken over.
	**Setting the initial value of the measuring range, *OFFS*:**  The initial value is adjusted from the smallest to the highest place with [▼] [▲] and confirmed place selective with **[P]**. After the last place the display switches back to the menu level. If *SENS* has been selected, you can then choose between *NOCA* and *CAL*. At *NOCA* the before adjusted value will be taken over, at *CAL* the value alignment via the measuring section takes place and the analog input value is taken over.

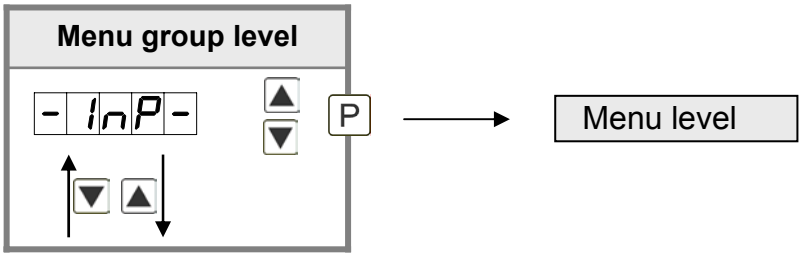
Menu level	Parameterisation level
	**Setting of the decimal point, *DOT*:**  The decimal place of the display can be adjusted with **[▲] [▼]**. Confirm with **[P]**, the display then switches back to the menu level again.
	**Setting the measuring time, *SEC*:**  The measuring time is set with **[▲] [▼]**. The display moves up in increments of 0.1 up to 1 second and in increments of 1.0 up to 10.0 seconds. Confirm the selection by pressing the **[P]** button. The display then switches back to the menu level again.
	**Selection of analog output, *OUT.RA*:**  Three output signals are available: 0-10 VDC, 0-20 mA and 4-20 mA, with this function, the demanded signal is selected.
	**Setting up the final value of the analog output, *OUT.EN*:**  The final value is adjusted from the smallest digit to the highest digit with **[▲] [▼]** and digit by digit confirmed with **[P]**. A minus sign can only be parametrised on the highest digit. After the last digit, the device changes back into menu level.
	**Setting up the initial value of the analog output, *OUT.OF*:**  The final value is adjusted from the smallest digit to the highest digit with **[▲] [▼]** and digit by digit confirmed with **[P]**. A minus sign can only be parametrised on the highest digit. After the last digit, the device changes back into menu level.
	**Threshold values / limit values, *LI-1*:**  The limit value defines the threshold, that caueses an activation/de-activation of the alarm.

Menu level	Parameterisation level
	**Hysteresis for threshold values,** *HY-1:* The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.
	**Function for threshold value undercut /exceedance,** *FU-1:* A limit value undercut is selected with *LOUU* (for LOW = lower limit value), a limit value exceedance with *HIGH* (for HIGH = higher limit value). If e.g. limit value 1 is on a threshold level of 100 and allocated with function *HIGH*, an alarm is activated by reaching of the threshold level. If the threshold value was allocated to *LOW*, an alarm will be activated by undercutting the threshold value, as long as the hysteresis is zero.
	**Threshold values / Limit values,** *LI-2:* The limit value defines the threshold, that causes an activation / deactivation of the alarm.
	**Hysteresis for threshold values,** *HY-2:* The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.
	**Function for threshold value undercut /exceedance,** *FU-2:* A limit value undercut is selected with *LOUU* (for LOW = lower limit value), a limit value exceedance with *HIGH* (for HIGH = higher limit value). If e.g. limit value 1 is on a threshold level of 100 and allocated with function *HIGH*, an alarm is activated by reaching of the threshold level. If the threshold value was allocated to *LOW*, an alarm will be activated by undercutting the threshold value, as long as the hysteresis is zero.

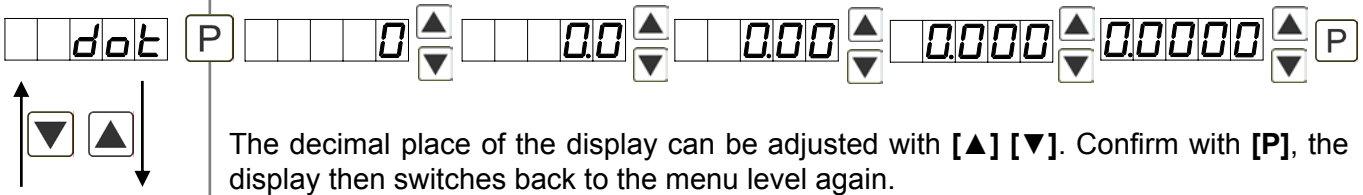
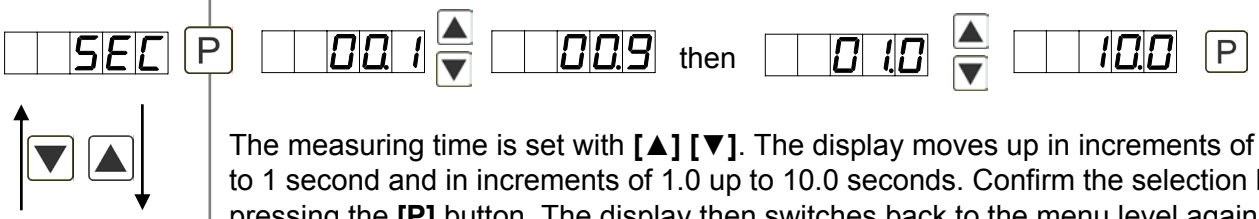
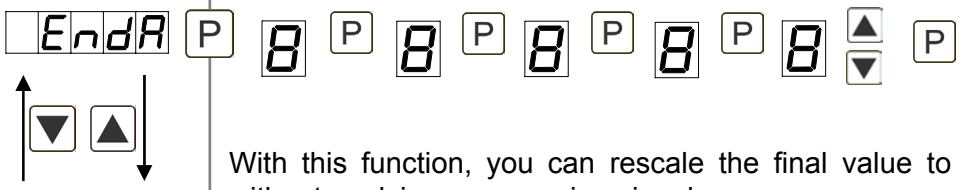
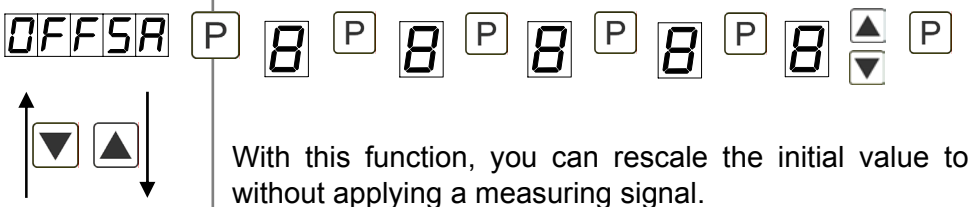
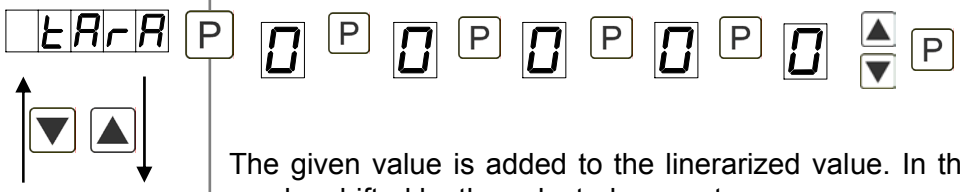
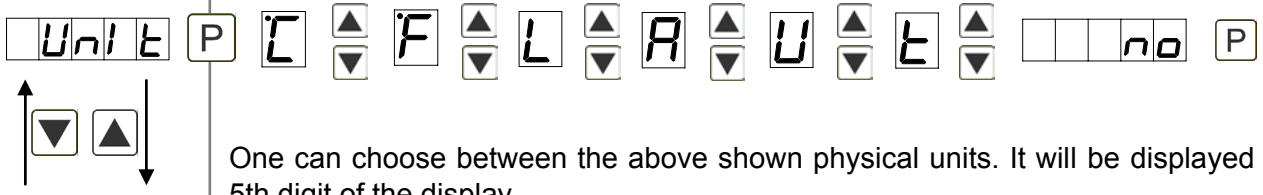
Menu level	Parameterisation level
	**User code (4-digit number-combination, free available), *U.CODE*:** If this code was set (>0000), all parameters are locked for the user, if *LOC* has been selected before under menu item *RUN*. By pressing **[P]** for 3 seconds in operation mode, the display shows *CODE*. The *U.CODE* needs to be entered to get to the reduced number of parameter sets. The code has to be entered befor each parametrisation, until the *A.CODE* (Master code) unlocks all parameters again.
	**Master code (4-digit number-combination, free available), *A.CODE*:** All parameters can be unlocked with this code, after *LOC* has been activated under menu item *RUN*. By pressing **[P]** for 3 seconds in operation mode, the display shows *CODE* and enables the user to reach all parametes by entering the *A.CODE*. Under *RUN* the parametrisation can be activated permanently by selecting *ULOC* or *PROF*, thus at an anew pushing of **[P]** in operation mode, the code needs not to be entered again.
	**Activation / deactivation of the programming lock or completion of the standard parameterization with change into menu group level (complete function range), *RUN*:** With the navigation keys [▲] [▼], you can choose between the deactivated key lock *ULOC* (works setting) and the activated key lock *LOC*, or the change into the menu group level *PROF*. Confirm the selection with **[P]**. After this, the display confirms the settings with **"- - - - -"**, and automatically switches to operating mode. If *LOC* was selected, the keyboard is locked. To get back into the menu level, press **[P]** for 3 seconds in operating mode. Now enter the *CODE* (works setting *1 2 3 4*) that appears using [▲] [▼] plus **[P]** to unlock the keyboard. *FAIL* appears if the input is wrong. To parameterize further functions *PROF* needs to be set. The device confirms this setting with **„- - - - -„** and changes automatically in operation mode. By pressing **[P]** for approx. 3 seconds in operation mode, the first menu group *INP* is shown in the display and thus confirms the change into the extended parameterisation. It stays activated as long as *ULOC* or *LOC* is entered in menu group *RUN*.

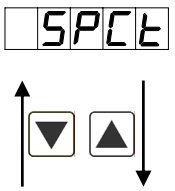
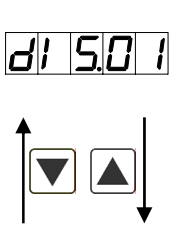
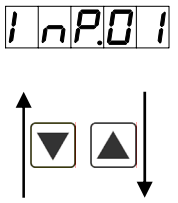
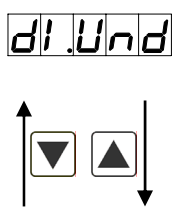
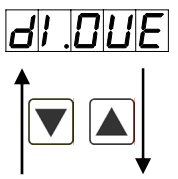
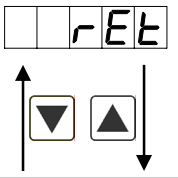
4.3. **Extended parameterisation** (Professional operation level)

4.3.1. Signal input parameters

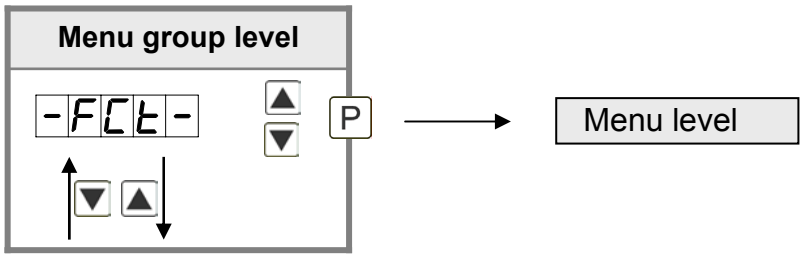


Menu level	Parameterisation level
tYPE P	**Selection of the input signal, *TYPE*:** r 1.00 r 10.0 r 100 Sr 1.00 Sr 10.0 Sr 100 P As input versions, resistance values of 1,10 or 100 kΩ signals as factory calibration (without connected sensor signal) and as sensor calibration (with connected measuring signal) are available. Confirm your selection with **[P]**. The display then switches back to the menu level again.
End P	**Setting the final value of the measuring range, *END*:** 8 P 8 P 8 P 8 P 8 nOCA CAL P The final value is adjusted from the smallest to the highest place with [▼] [▲] and confirmed place selective with **[P]**. A minus sign can only be parameterized on the highest place. After the last place the display switches back to the menu level. If *SENS* has been selected, you can then choose between *NOCA* and *CAL*. At *NOCA* the before adjusted value will be taken over, at *CAL* the value alignment via the measuring section takes place and the analog input value is taken over.
OFFS P	**Setting the initial value of the measuring range, *OFFS*:** 8 P 8 P 8 P 8 P 8 nOCA CAL P The initial value is adjusted from the smallest to the highest place with [▼] [▲] and confirmed place selective with **[P]**. After the last place the display switches back to the menu level. If *SENS* has been selected, you can then choose between *NOCA* and *CAL*. At *NOCA* the before adjusted value will be taken over, at *CAL* the value alignment via the measuring section takes place and the analog input value is taken over.

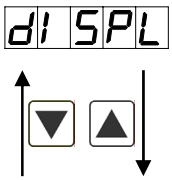
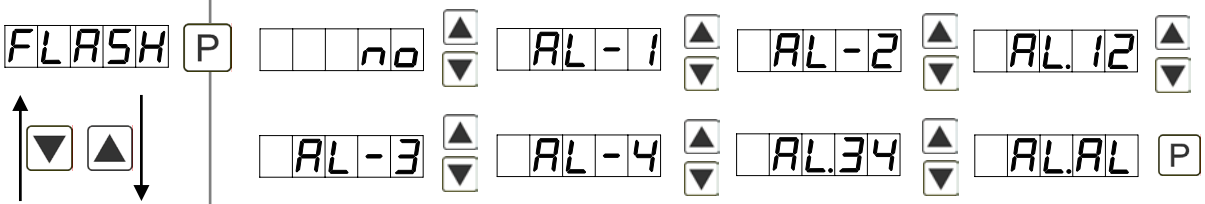
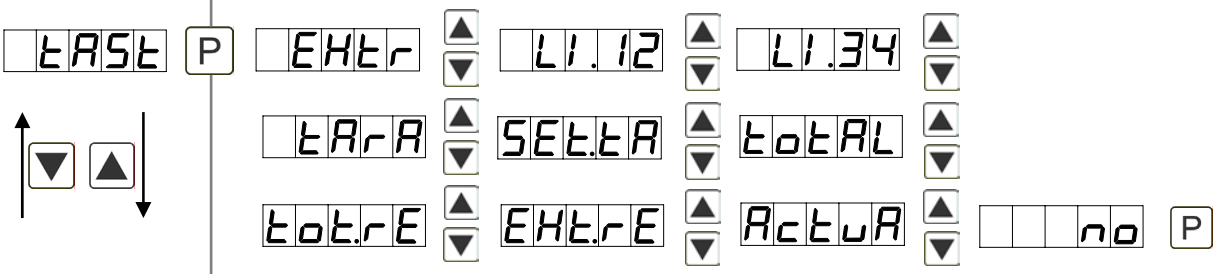
Menu level	Parameterisation level
	**Setting of the decimal point, *DOT*:** The decimal place of the display can be adjusted with **[▲] [▼]**. Confirm with **[P]**, the display then switches back to the menu level again.
	**Setting the measuring time, *SEC*:** The measuring time is set with **[▲] [▼]**. The display moves up in increments of 0.1 up to 1 second and in increments of 1.0 up to 10.0 seconds. Confirm the selection by pressing the **[P]** button. The display then switches back to the menu level again.
	**Rescaling the measuring input values, *ENDA*:** With this function, you can rescale the final value to e.g. 1500 Ohm input signal, without applying a measuring signal.
	**Rescaling the measuring input values, *OFFA*:** With this function, you can rescale the initial value to e.g. 500 Ohm input signal, without applying a measuring signal.
	**Setting up the tare/offset value, *TARA*:** The given value is added to the linerarized value. In this way, the characteristic line can be shifted by the selected amount.
	**Setting up the physical unit, *UNIT*:** One can choose between the above shown physical units. It will be displayed on the 5th digit of the display.

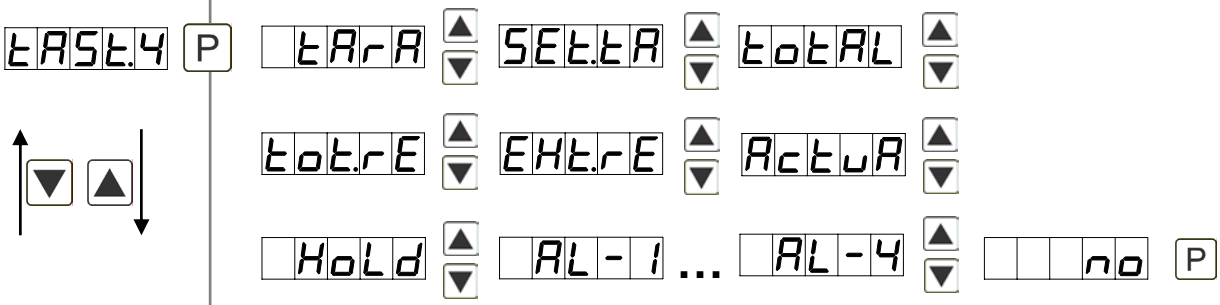
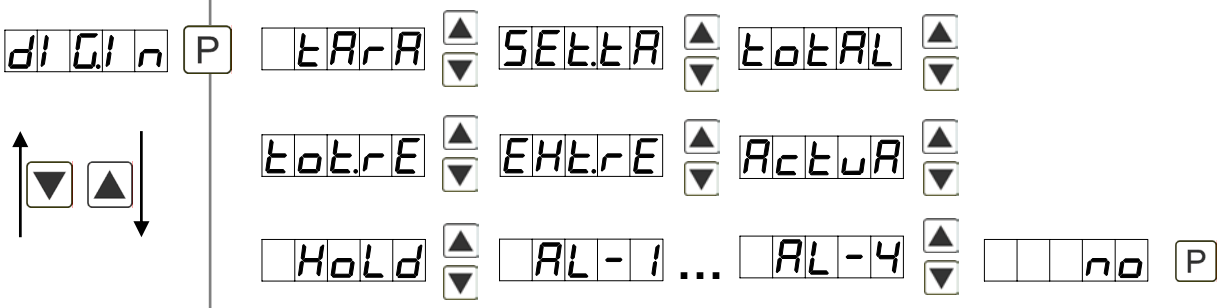
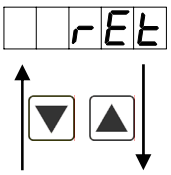
Menu level	Parameterisation level
	**Number of additional setpoints,** *SPCT:*  30 additional setpoints can be defined to the initial- and final value, so linear sensor values are not linearised. Only activated setpoint parameters are displayed.
	**Display values for setpoints,** *DIS.01 ... DIS.30:*  Under this parameter setpoints are defined according to their value. At the sensor calibration, like at Endwert/Offset, one is asked at the end if a calibration shall be activated.
	**Analog values for setpoints,** *INP.01 ... INP.30:*  The setpoints are allways set according to the selected input signal. The desired analog values can be freely parametrised in ascending order.
	**Display underflow** *DI.UND:*  With this function the display underflow (_ _ _ _ _) can be defined to a determinate value.
	**Display overflow,** *DI.OUE:*  With this function the display overflow (‾‾‾‾‾) can be defined to a determinate value.
	**Back to menu group level,** *RET:* With **[P]** the selection is confirmed and the device changes into menu group level *„-INP-“*.

4.3.2. General device parameters

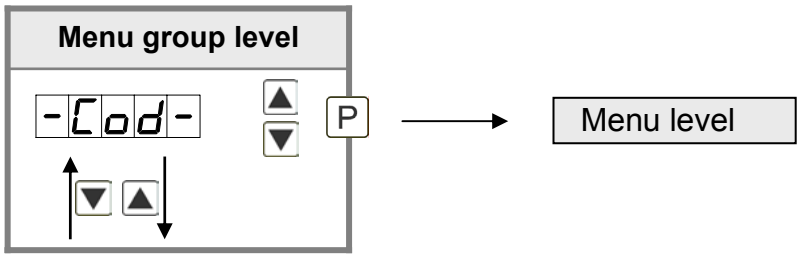


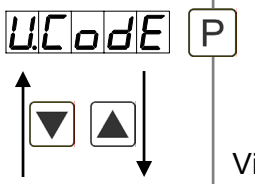
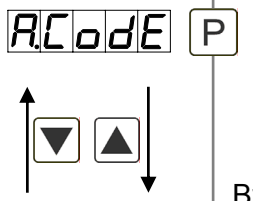
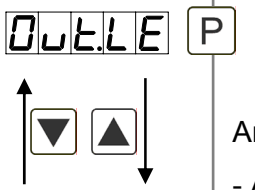
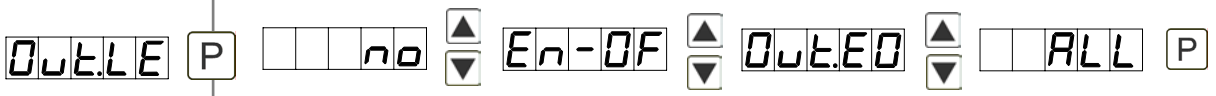
Menu level	Parameterisation level
dI.SEC P 00.1 009 then 010 100 P	**Display time,** *DISEC:* The display is set up with [▲] [▼]. Thereby it jumps until 1 second in increments of 0.1 seconds and until 10.0 seconds in increments of 1.0. With **[P]** the selection is confirmed and the device changes into menu level.
round P 00001 00005 00010 00050 P	**Rounding of display values,** *ROUND:* This function is for instable display values, where the display value is changed in increments of 1-, 5-, 10- or 50. This does not affect the resolution of the optional outputs. With **[P]** the selection is confirmed and the device changes into menu level.
ArItH P no rE2I P (Reciprocal) rAdI C (Root extraction) SQUAr (Square) P	**Arithmetic,** *ARITH:* With this function the calculated value, not the measuring value, is shown in the display. With *NO*, no calulation is deposited. With **[P]** the selection is confirmed and the device changes into menu level.
ZEr0 P 0 P 0 P	**Zero point slowdown,** *ZERO:* With zero point slowdown, a value range around zero can be pre-selected at which the display shows zero. If, for example, a 10 is set, the display would show a zero in the range from -10 to +10 and continue below it with -11 and above it with +11. The maximum adjustable range of value is 99.

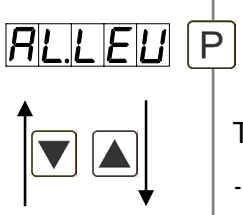
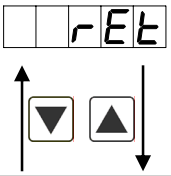
Menu level	Parameterisation level
	**Display,** *DISPL:*  With this function the current measurand, Min-/Max value, totaliser value or the process-controlled Hold-value can be allocated to the display. With **[P]** the selection is confirmed and the device changes into menu level.
	Display flashing, *FLASH:*  A display flashing can be added as additional alarm function either to single or to a combination of off-limit condition. With *NO*, no flashing is allocated.
	Assignment (deposit) of key functions, *TAST:*  For the operation mode, special functions can be deposited on the navigation keys [▲] [▼], in particular this function is made for devices in housing size 48x24 which do not have a 4th key (**[O]**-key). If the MIN-/MAX-memory is activated with *EHTR*, all measured MIN/MAX-values are safed during operation and can be recalled via the navigation keys. The values get lost by re-start of the device. If the threshold value correction *LI.12* or *LI.34* is choosen, the values of the threshold can be changed during operation without disturbing the operating procedure. With *TARA* the device is tared to zero and safed permanently as Offset. The device confirms the correct taring by showing *00000* in the display. *SET.TA* changes into the offset value and can be changed via the navigation keys [▲] [▼]. Via *TOTAL* the current value of the totaliser can be displayed for approx. 7 seconds, after this the device jumps back on the parametrised display value. If *TOT.RE* is deposited, the totaliser can be set back by pressing of the navigation keys [▲] [▼], the device acknowledges this with *00000* in the display. The configuration of *EHT.RE* deletes the MIN/MAX-memory. Under *ACTUA* the measuand is shown for approx. 7s, after this the display returns to the parametrised display value. If *NO* is selected, the navigation keys are without any function in the operation mode.

Menu level	Parameterisation level
	Special function [O]-key, *TAST.4*:  For the operation mode, special functions can be deposited on the **[O]**-key. This function is activated by pressing the key. With *TARA* the device is set temporarily on a parametrised value. The device acknowledges the correct taring with *00000* in the display. *SET.TA* adds a defined value on to the currently displayed value. Via *TOTAL* the current value of the totaliser can be displayed for approx. 7 seconds, after this the device changes back on the parametrised display value. If *TOT.RE* is deposited, the totaliser can be set back by pressing of the navigation keys [▲] [▼], the device acknowledges this with *00000* in the display. *EHT.RE* deletes the MIN/MAX-memory. If *HOLD* has been selected, the moment can be hold constant by pressing the **[O]**-key, and is updated by releasing the key. **Advice:** *HOLD* is activated only, if *HOLD* is selected under parameter *DISPL*. *ACTUA* shows the measuring value for approx. 7 seconds, after this the device changes back on the parametrised display value. At *AL-1...AL-4* there can be set an output and therewith e.g. a setpoint adjustment can be done. If *NO* is selected, the **[O]**-key is without any function in the operation mode.
	Special function digital input, *DIG.IN*:  The above given parameters can be set for the operation mode onto the optional digital input aswell. See function description *TAST.4*.
	**Back to menu group level, *RET*:** With **[P]** the selection is confirmed and the device changes into menu group level *„- FCT -“*.

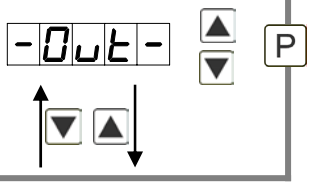
4.3.3. Safety parameters

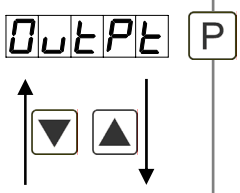


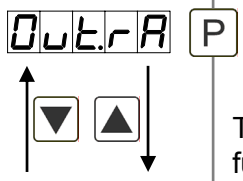
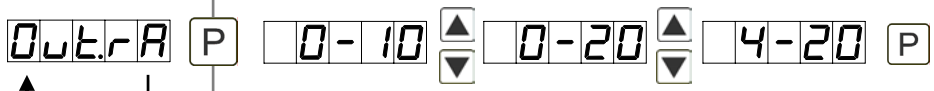
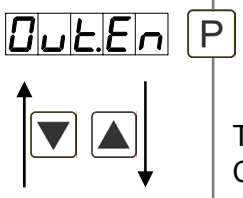
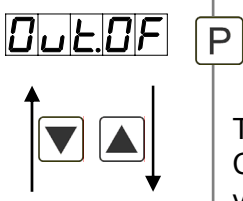
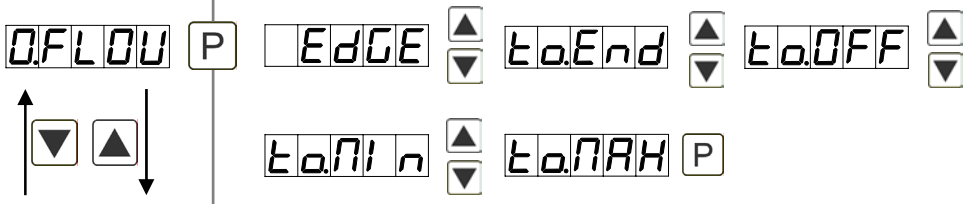
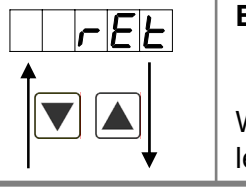
Menu level	Parameterisation level
	**User code** *U.CODE*:  Via this code reduced sets of parameters can be set free. A change of the *U.CODE* can be done via the correct input of the *A.CODE* (master code).
	**Master code,** *A.CODE*:  By entering *A.CODE* the device will be unlocked and all parameters are released.
	**Release/lock analog output parameters,** *OUT.LE*:  Analog output parameters can be locked or released for the user: - At *EN-OF* the initial or final value can be changed in operation mode. - At *OUT.EO* the output signal can be changed from e.g. 0-20mA to 4-20 mA or 0-10 VDC. - At *ALL* analog output parameters are released. - At *NO* all analog outpout parameters are locked.

Menu level	Parameterisation level
	**Release/lock alarm parameters,** *AL.LEU:* This parameter describes the user relase/user lock of the alarm. - *LIMIT*, here only the range of value of the threshold values 1-4 can be changed. - *ALRM.L*, here the range of value and the alarm trigger can be changed. - *ALL*, all alarm parameters are released. - *NO*, all alarm parameters are locked.
	**Back to menu group level, *RET*:** With **[P]** the selection is confirmed and the device changes into menu group level „- *COD* -“.

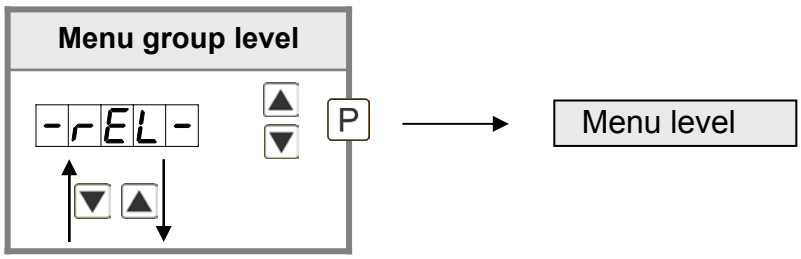
4.3.4. Analog output parameters

Menu group level
 Menu level

Menu level	Parameterisation level
	**Selection reference analog output,** *OUTPT:* The analog output signal can refer to different functions, in detail this are the current measurand, Min-value, Max-value or totaliser-/sum-function. If *HOLD* is selected the signal of the analog output will be hold and processed just after deactivation of *HOLD*. With **[P]** the selection is confirmed and the device changes into menu level.

Menu level	Parameterisation level
	**Selection analog output, *OUT.RA:***  There are 3 output signals availabe: 0-10 VDC, 0-20 mA and 4-20 mA. With this function the demanded signal can be selected.
	**Setting up the final value of the analog output, *OUT.EN:***  The final value can be adjusted from the smallest to the highest digit with [▲] [▼]. Confirm each digit with **[P]**. A minus sign can only be parametrized on the highest value digit. After the last digit, the display switches back to the menu level.
	**Setting up the initial value of the analog output, *OUT.OF:***  The initial value can be adjusted from the smallest to the highest digit with [▲] [▼]. Confirm each digit with **[P]**. A minus sign can only be parametrized on the highest value digit. After the last digit, the display switches back to the menu level.
	Overflow behaviour, *O.FLOU:*  To recognise and evaluate faulty signals, e.g. by a controller, the overflow behaviour of the analog output can be defined. As overflow can be seen either ***EDGE***, that means the analog output runs on the set limits e.g. 4 and 20 mA, or ***TO.OFF*** (input value smaller than initial value, analog output jumps on e.g. 4 mA), ***TO.END*** (higher than final value, analog output switches on e.g. 20 mA). If ***TO.MIN*** or ***TO.MAX*** is set, the analog output jumps on the smallest or highest possible binary value. This means that values of e.g. 0 mA, 0 VDC or values higher than 20 mA or 10 VDC can be reached. With **[P]** the selection is confirmed and the device changes into menu level.
	**Back to menu group level, *RET*:** With **[P]** the selection is confirmed and the device changes into menu group level „- *OUT* -“ .

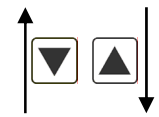
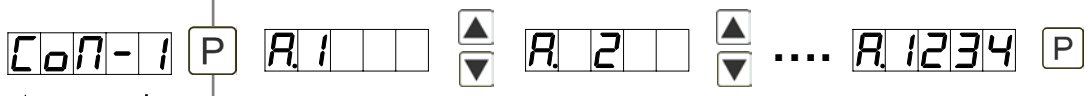
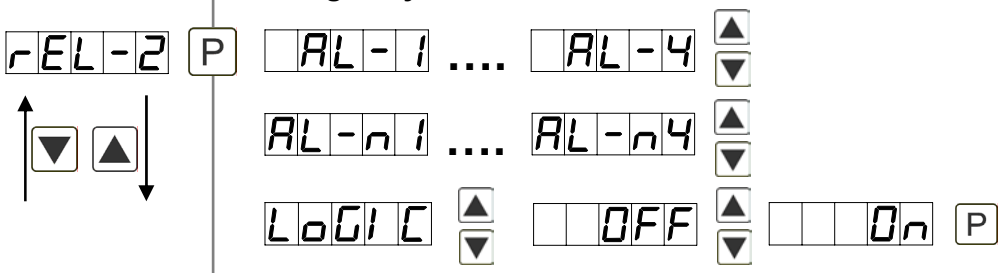
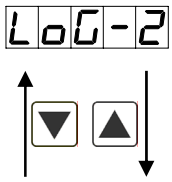
4.3.5. Relay functions



Menu level	Parameterisation level
rEL-1 P	**Alarm relay 1,** *REL-1:* AL-1 .... AL-4 AL-n1 .... AL-n4 LoGIC OFF On P Each setpoint (optional) can be linked up via 4 alarms (by default). This can either be inserted at activated alarms *AL1/4* or de-activated alarms *ALN1/4*. If *LOGIC* is selected, logical links are available in the menu level *LOG-1* and *COM-1*. One can only get to these two menu levels via *LOGIC*, at all other selected functions, these two parameters are overleaped. Via *ON/OFF* the setpoints can be activated/de-activated, in this case the output and the setpoint display are set/not set on the front of the device. With **[P]** the selection is confirmed and the device changes into menu level.
LoG-1 P	**Logic relay 1,** *LOG-1* or nor And nAnd P Here, the switching behaviour of the relay is defined via a logic link, the following schema describes these functions with inclusion of *AL-1* and *AL-2*:

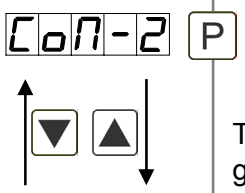
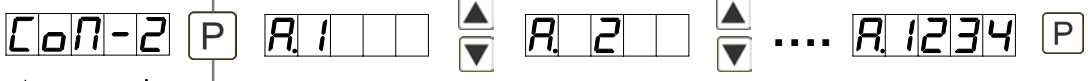
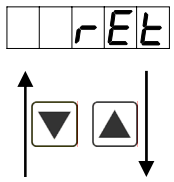
or	$A1 \vee A2$	As soon as a selected alarm is activated, the relay operates. Equates to operating current principle.
nor	$\overline{A1 \vee A2} = \overline{A1} \wedge \overline{A2}$	The relay operates only, if no selected alarm is active. Equates to quiescent current principle.
And	$A1 \wedge a2$	The relay operates only, if all selected alarms are active.
nAnd	$\overline{A1 \wedge A2} = \overline{A1} \vee \overline{A2}$	As soon as a selected alarm is not activated, the relay operates.

With **[P]** the selection is confirmed and the device changes into menu level.

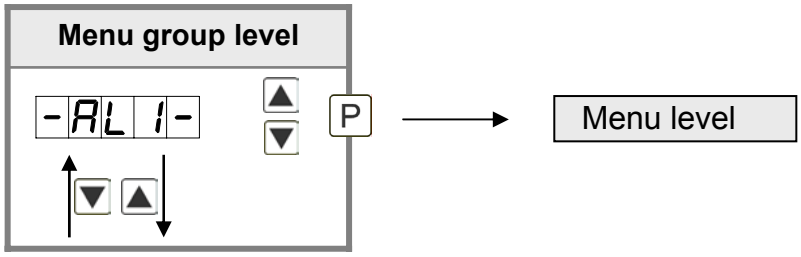
Menu level	Parameterisation level
	**Alarms for relay 1,** *COM-1:*  The allocation of the alarms to relay 1 happens via this parameter, one alarm or a group of alarms can be chosen. With **[P]** the selection is confirmed and the device changes into menu level.
	Alerting relay 2, *REL-2:*  Each setpoint (optional) can be linked up via 4 alarms (by default). This can either be inserted at activated alarms *AL1/4* or de-activated alarms *ALN1/4*. If *LOGIC* is selected, logical links are available in the menu level *LOG-1* and *COM-1*. One can only get to these two menu levels via *LOGIC*, at all other selected functions, these two parameters are overleaped. Via *ON/OFF* the setpoints can be activated/de-activated, in this case the output and the setpoint display are set/not set on the front of the device. With **[P]** the selection is confirmed and the device changes into menu level.
	**Logic relay 2,** *LOG-2:*  Here, the switching behaviour of the relay is defined via a logic link, the following schema describes these functions with inclusion of *AL-1* and *AL-2*:

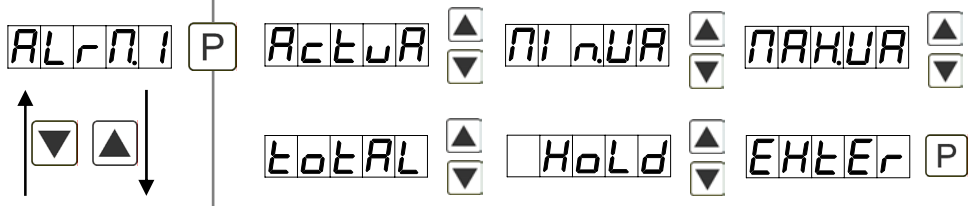
or	*A1* v *A2*	As soon as a selected alarm is activated, the relay operates. Equates to operating current principle.
nor	$\overline{A1 \vee A2} = \overline{A1} \wedge \overline{A2}$	The relay operates only, if no selected alarm is active. Equates to quiescent current principle.
And	A1 ∧ a2	The relay operates only, if all selected alarms are active.
nAnd	$\overline{A1 \wedge A2} = \overline{A1} \vee \overline{A2}$	As soon as a selected alarm is not activated, the relay operates.

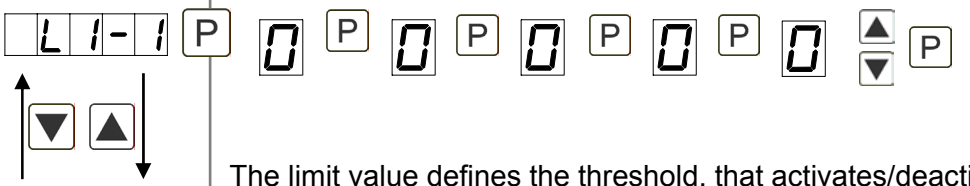
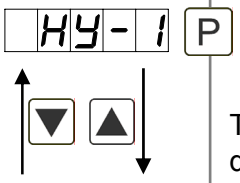
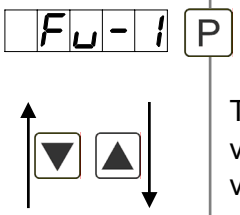
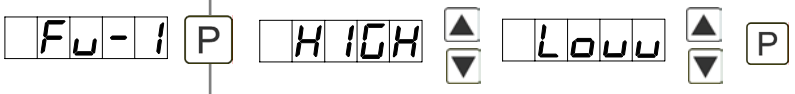
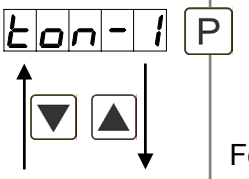
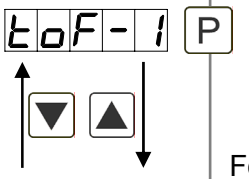
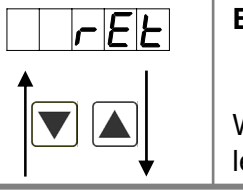
With **[P]** the selection is confirmed and the device changes into menu level.

Menu level	Parameterisation level
	**Alarms for relay 2,** *COM-2:*  The allocation of the alarms to relay 2 happens via this parameter, one alarm or a group of alarms can be chosen. With **[P]** the selection is confirmed and the device changes into menu level.
	**Back to menu group level,** *RET*: With **[P]** the selection is confirmed and the device changes into menu group level „- *REL* -“.

4.3.6. Alarm parameters

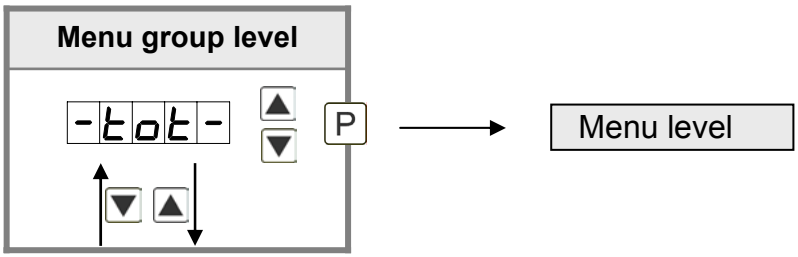


Menu level	Parameterisation level
	Dependency alarm1, *ALRM.1:*  The dependency of alarm 1 can be related to special functions, in detail these are the current measurand, the MIN-value, the MAX-value or the totaliser-/sum-value. Is *HOLD* selected, then the alarm is hold and processed just after deactivation of *HOLD*. *EHTER* causes the dependency either by pressing the **[O]**-key on the front of the housing or by an external signal via the digital input. With **[P]** the selection is confirmed and the device changes into menu level.

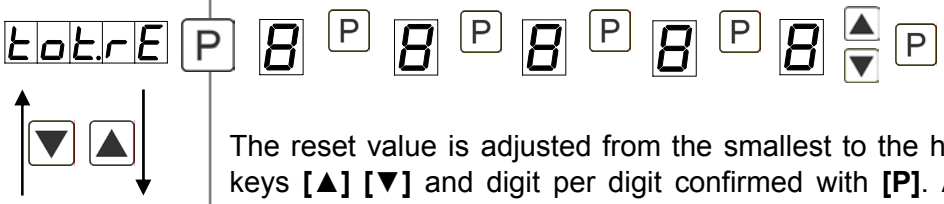
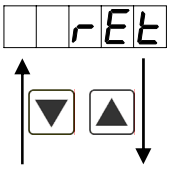
Menu level	Parameterisation level
	Threshold values / Limit values, *LI-1:*  The limit value defines the threshold, that activates/deactivates an alarm.
	**Hysteresis for threshold values,** *HY-1:*  The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.
	**Function if display falls below / exceeds limit value,** *FU-1:*  The limit value undercut can be selected with ***LOUU*** (LOW = lower limit value) and limit value exceedance can be selected with ***HIGH*** (HIGH = upper limit value). If e.g. limit value 1 is on a switching threshold of 100 and occupied with function „*HIGH*“, the alarm will be activated by reaching the threshold. If the limit value is allocated to „*LOW*“, an alarm will be activated by undercut of the threshold.
	**Switching-on delay, ton-*1:***  For limit value 1 one can preset a delayed switching-on of 0-100 seconds.
	**Switching-off delay,** *TOF-1:*  For limit value 1 one can preset a delayed switching-off of 0-100 seconds.
	**Back to menu group level,** *RET*: With **[P]** the selection is confirmed and the device changes into menu group level „*- RLI -*“ .

The same applies to *-RL2-* to *-RL4-*.

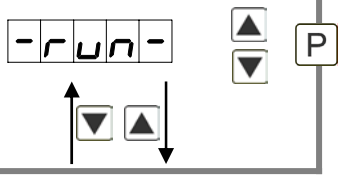
4.3.7. Totaliser (Volume metering)



Menu level	Parameterisation level
totAL P OFF SteAd tEMP P	**Totaliser state,** *TOTAL:* The totaliser makes measurements on a time base of e.g. z.B. l/h possible, at this the scaled input signal is integrated by a time and steadily (select *STEAD*) or temporarily (select *TEMP*) safed. If *OFF* is selected, the function is de-activated. With **[P]** the selection is confirmed and the device changes into menu level.
t.bASE P SEC Min hour P	**Time base,** *T.BASE:* Under this parameter the time base of the measurement can be preset in seconds, minutes or hours.
FActo P 10^0 ... 10^6 P	**Totaliser factor,** *FACTO*: At this the factor (10^0…10^6) respectively the divisor for the internal calculation of the measuring value is assigned.
tot.dt P 0 0.0 0.00 0.000 0.0000 P	**Setting up the decimal point for the totaliser,** *TOT.DT:* The decimal point of the device can be adjusted with the navigation keys **[▲] [▼]**. With **[P]** the selection is confirmed and the device changes into menu level.

Menu level	Parameterisation level
	Totaliser reset, *TOT.RE:*  The reset value is adjusted from the smallest to the highest digit with the navigation keys **[▲] [▼]** and digit per digit confirmed with **[P]**. After the last digit, the display switches back to the menu level. The activator for the reset is parameter driven via the 4th key or via the optional digital input.
	**Back to menu group level,** *RET*: With **[P]** the selection is confirmed and the device changes into menu group level „- *TOT* -“ .

4.3.8. Programming interlock, *RUN*:

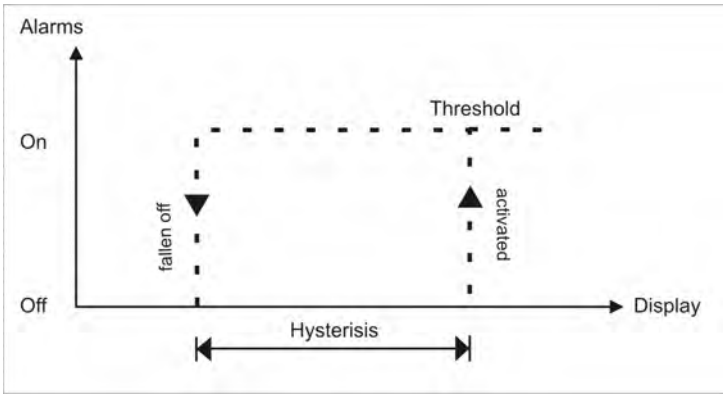
Menu group level


Description see page 11, menu level *RUN*

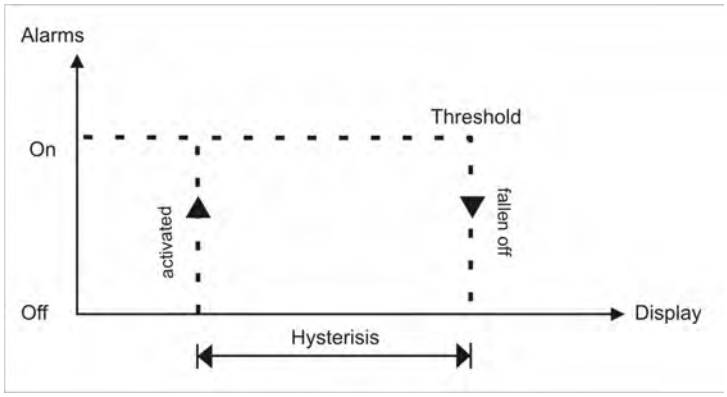
4.4. Alarms Relays

This device has 4 virtual alarms that can monitor one limit value in regard of an undercut or exceedance. Each alarm can be allocated to an optional relay output S1-S2; furthermore alarms can be controlled by events like e.g. Hold or Min-/Max-value.

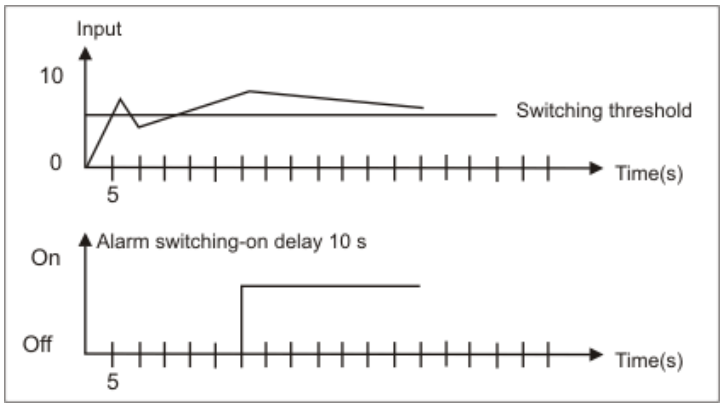
Function principle of alarms / relays	
Alarm / Relay x	De-activated, instantaneous value, Min-/Max-value, Hold-value, totaliser value
Switching threshold	Threshold / limit value of the change-over
Hysteresis	Broadness of the window between the switching thresholds
Working principle	Operating strom / Quiescent current



Operating current
By operating current the alarm S1-S2 is off below the threshold and on on reaching the threshold.



Quiescent current
By quiescent current the alarm S1-S2 is on below the threshold and switched off on reaching the threshold.



Switching-on delay
The switching-on delay is activated via an alarm and e.g. switched 10 seonds after reaching the switching threshold, a short-term exceedance of the switching value does not cause an alarm, respectively does not cause a switching operation of the relay. The switching-off delay operates in the same way, keeps the alarm / the relay switched longer for the parametrised time.

5. Factory settings

5.1. Default values

Standard parameterisation (flat operation level)

Parameter	Menu items					Default value
tYPE Type of input	r 1.00 0...1 kΩ Sr 100 Sensor 0...100 kΩ	r 10.0 0...10 kΩ	r 100 0...100 kΩ	Sr 1.00 Sensor 0...1 kΩ	Sr 10.0 Sensor 0...10 kΩ	Sr 1.00 Sensor 0...1 kΩ
End Final value	-9999	to	99999			10000
OFFS Offset	-9999	to	99999			0
dot Display of decimal point	0	to	0.0000			0
SEC Measuring time	0.1 0.1 second	to	10.0 10.0 seconds			1.0 1.0 second
Out.rA Analog output range	0-10 0…10 V	0-20 0…20 mA	4-20 4…20 mA			4-20 4…20 mA
Out.En Final value of analog output	-9999	to	99999			10000
Out.0F Initial value of analog output	-9999	to	99999			00000
L 1-1 Limit value 1	-9999	to	99999			2000
HY-1 Hysteresis 1	00000	to	99999			00000
Fu-1 Operating type 1	Louu Undercut	HIGH Exceedance				HIGH Exceedance

Parameter	Menu items					Default value
L1-2 Limit value 2	-19999	to	99999			3000
HY-2 Hysteresis 2	00000	to	99999			00000
Fu-2 Operating type 2	Louu Undercut	HIGH Exceedance				HIGH Exceedance
U.CodE User code	0000	to	9999			0000
A.CodE Master code	0000	to	9999			1234
run run	ULOC Standard operation	LOC Parameters interlock	PrOF Professional operation			ULOC Standard operation

Extended parameterisation (professional operation level)

Signal input parameters

-InP-

Parameter	Menu items					Default value
tYPE Type of input	r 1.00 0...1 kΩ Sr 100 Sensor 0...100 kΩ	r 10.0 0...10 kΩ	r 100 0...100 kΩ	Sr 1.00 Sensor 0...1 kΩ	Sr 10.0 Sensor 0...10 kΩ	Sr 1.00 Sensor 0...1 kΩ
End Final value	-19999	to	99999			10000
OFFS Offset	-19999	to	99999			0
dot Display of decimal point	0	to	0.0000			0

Parameter	Menu items					Default value
SEC Measuring time	0.1 0.1 second	to	10.0 10.0 seconds			1.0 1.0 second
EndA Analog final value	-9999	to	99999			10000
OFFSA Analog offset value	-9999	to	99999			0
tArA Display offset	-9999	to	99999			0 Exceedance
Unit Display unit	no no	°C °F L A U t °C °F L A U t				no no
SPCt Number of setpoints	00	to	30			00
dI S.01 Display value 1	-9999	to	99999			
InP.01 Analog value 1	-9999	to	99999			
...						
d 15.30 Display value 30	-9999	to	99999			
InP.30 Analog value 30	-9999	to	99999			
d 1.Und Display underflow	-9999	to	99999			-9999
d 1.OUE Display overflow	-9999	to	99999			99999
rEt						

General parameters

-FCt-

Parameter	Menu items					Default value
di.SEC	00.1	to	10.0			01.0
Display time	0.1 second		10 seconds			1 second
round	00001	00005	00010	00050		00001
Round a value	No rounding	Increments of 5	Increments of 10	Increments of 50		No rounding
ArIth	no	rE2IP	rAdIE	SQUAr		no
Arithmetic	none	Reciprocal value	Root extraction	Squaring down		none
2Er0	00	to	99			00
Zero point slowdown	No slowdown		at x-digit display = zero			No slowdown
diSPL	ActuA	MI n.UA	MAX.UA	totAL	HoLd	ActuA
Default display	Current measurand	Minimum	Maximum	Totaliser	Hold	Current measurand
FLASH	no AL-4	AL-1 AL.34	AL-2 AL.AL	AL.12	AL-3	no
Flashing at	no Alarm 4	Alarm 1 Alarm 3 + 4	Alarm 2 Alarm 1…4	Alarm 1 + 2	Alarm 3	no
tASt	no SEt.tA	EHtr totAL	LI.12 tot.rE	LI.34 EHt.rE	tArA ActuA	no
Up-/Down-key functions	no Set Tara value	Extremum (min/max) Totaliser value	Alarm limit 1+2 Totaliser reset	Alarm limit 3+4 Extremum reset	Tara function Display measurand	no
tASt.4	no EHt.rE AL-3	tArA ActuA AL-4	SEt.tA HoLd	totAL AL-1	tot.rE AL-2	no
Special function 4th key	no Extremum reset Alarm 3	Tara function Display measurand Alarm 4	Set Tara value Hold	Totaliser value Alarm 1	Totaliser reset Alarm 2	no

Parameter	Menu items					Default value
d IG. In	no	tArA	SEt.tA	totAL	tot.rE	no
Digital input	no	Tara function	Set Tara value	Totaliser value	Totaliser reset	no
	EHt.rE	ActuA	HoLd	AL-1	AL-2	
	Extremum reset	Display measurand	Hold	Alarm 1	Alarm 2	
	AL-3	AL-4				
	Alarm 3	Alarm 4				
rEt						

Safety parameters

-CodE-

Parameter	Menu items					Default value
U.CodE	0000		9999			0000
User code		to				
A.CodE	0000	to	9999			1234
Administrator code						
OutLE	no	En-0F	OutE0	ALL		ALL
Analog output level	Not changeable	Range of value	Range of value&source	All parameters		All parameters
ALLEU	no	LIMIt	ALrN.L	ALL		ALL
Alarm level	Not changeable	Limit value	Range of value&source	All parameters		All parameters
rEt						

Analog output parameters

-OUt-

Parameter	Menu items						Default value
OutPt	ActuA	MI nUA	MAXUA	totAL	HoLd		ActuA
Source	Current measurand	Minimum	Maximum	Totaliser	Hold		Current measurand
Out.rA	0-10	0-20	4-20				4-20
Output range	0...10 mA	0...20 mA	4...20 mA				4...20 mA
Out.En	-19999	to	99999				10000
Final value							
Out.OF	-19999	to	99999				00000
Initial value							
O.FLOU	EdGE	to.End	to.OFF	to.MI n	to.MAX		EdGE
Overflow behaviour	Run on limit value	Change to final value	Change to initial value	Change to smallest value	Change to highest value		Run on limit value
rEt							

Relay functions

-rEL-

Parameter	Menu items					Default value
rEL-1	AL-1	to	AL-4			AL-1
Relay function1	at alarm 1		at alarm 4			at alarm 1
	AL-n1	to	AL-n4			
	not alarm 1		not alarm 4			
	LoGIC	OFF	on			
	via logic	declined	activated			
LoG-1	or	nor	And	nAnd		or
Logic relay 1	active if at least 1 alarm	active if no alarm	active if all alarms	active if not at least 1 alarm		active if at least 1 alarm

Parameter	Menu items					Default value
CoN-1	A.1	A.2	A.12	A.3		A.1
Alarm combination relay 1	Alarm 1 etc. up to	Alarm 2 A.1234 Alarm 1+2+3+4	Alarm 1 + 2	Alarm 3	Alarm 1 + 3	Alarm 1
rEL-2	AL-1 At alarm 1 AL-n1 not alarm 1 LoGIC via logic	to to OFF declined	AL-4 at alarm 4 AL-n4 not alarm 4 on activated			AL-2 at alarm 2
LoG-2	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if at least 1 alarm not		or active if at least 1 alarm
CoN-2	A.1 Alarm 1 to	A.2 Alarm 2 A.1234 Alarm 1+2+3+4	A.12 Alarm 1+2	A.3 Alarm 3	A.13 Alarm 1+3	A.2 aktive if at least 1 alarm
rEt						

Alarm parameters

-AL 1-

Parameter	Menu items					Default value
ALrN.1 Alarm source 1	ActuA Current measurand EHtEr External input (DigIn/Tast4)	MI nUA Minimal measurand	MAHUA Maximal measurand	totAL Totaliser	HoLd Hold	ActuA Current measurand
L 1-1 Limit value 1	-9999	to	99999			2000
HY-1 Hysteresis 1	00000	to	99999			00000
Fu-1 Function 1	Louu Undercut	HIGH Exceedance				HIGH Exceedance
ton-1 Activation delay 1	000 no	to	100 100 seconds			000 no
toF-1 De-activation delay 1	000 no	to	100 100 seconds			000 no
rEt						

-AL2-

Parameter	Menu items					Default value
ALrN.2 Alarm source 2	ActuA Current measurand EHtEr External digital input (DigIn/Tast4)	MI n.UA Minimal measurand	MAH.UA Maximal measurand	totAL Totaliser	HoLd Hold	ActuA Current measurand
L 1-2 Limit value 2	-19999	to	99999			3000
HY-2 Hysteresis 2	00000	to	99999			00000
Fu-2 Function 2	LouU Undercut	H IGH Exceedance				H IGH Exceedance
ton-2 Activation delay 2	000 no	to	100 100 seconds			000 no
toF-2 De-activation delay 2	000 no	to	100 100 seconds			000 no
rEt						

-AL3-

Parameter	Menu items					Default value
ALrN3 Alarm source 3	ActuA Current measurand EHtEr External digital input (DigIn/Tast4)	MI n.UA Minimal measurand	MAH.UA Maximal measurand	totAL Totaliser	HoLd Hold	ActuA Current measurand
LI -3 Limit value 3	-19999	to	99999			4000
HY-3 Hysteresis 3	00000	to	99999			00000

Parameter	Menu items					Default value
Fu-3 Function 3	Louu Undercut	HIGH Exceedance				HIGH Exceedance
ton-3 Activation delay 3	000 no	to	100 100 seconds			000 no
toF-3 De-activation delay 3	000 no	to	100 100 seconds			000 no
rEt						

-AL4-

Parameter	Menu items					Default value
ALrM.4 Alarm source 4	ActuA Current measurand EHtEr external digital input (DigIn/Tast4)	MI nUA Minimal measurand	MAXUA Maximal measurand	totAL Totaliser	HoLd Hold	ActuA Current measurand
LI -4 Limit value 4	-19999	to	99999			5000
HY-4 Hysteresis 4	00000	to	99999			00000
Fu-4 Function 4	Louu Undercut	HIGH Exceedance				HIGH Exceedance
ton-4 Activation delay 4	000 no	to	100 100 seconds			000 no
toF-4 De-activation delay 4	000 no	to	100 100 seconds			000 no
rEt						

Totaliser (Volume metering)

-tot-

Parameter	Menu items					Default value
totAL	OFF	StEAd	tEMP			OFF
Totaliser state	Off	Permanent saving	Quick saving			Off
t.bASE	SEC	Min	hour			SEC
Time base	Seconds	Minutes	Hours			Seconds
FACto	1 0^0	to	1 0^6			1 0^0
Divisor	10^0=1		10^6			10^0=1
tot.dt	0	to	0.0000			0
Internal decimal places						
tot.rE	00000	to	99999			00000
Totaliser reset						
rEt						

5.2. Reset to default values

To return the unit to a **defined basic state**, a reset can be carried out to the default values.

The following procedure should be used:

- Switch off the power supply
- Press button [**P**]
- Switch on voltage supply and press **[P]-**button until „- - - - -“ is shown in the display.

With reset, the default values of the program table are loaded and used for subsequent operation. This puts the unit back to the state in which it was supplied.

Caution! All application-related data are lost.

6. Technical data

Housing			
Dimensions	96x48x70 mm (BxHxD)		
	96x48x89 mm (BxHxD) incl. plug-in terminal		
Panel cut-out	$92.0^{+0.8}$ x $45.0^{+0.6}$ mm		
Wall thickness	up to 15 mm		
Fixing	Screw elements		
Material	PC Polycarbonate, black, UL94V-0		
Sealing material	EPDM, 65 Shore, black		
Protection class	Standard IP65 (Front side), IP00 (Back side)		
Weight	approx. 200 g		
Connection	Plug-in terminal; wire cross section up to 2.5 mm^2		
Display			
Digit height	14 mm		
Segment colour	Red (optional green, orange, blue)		
Range of display	-19999 to 99999		
Setpoints	One LED per setpoints		
Overflow	Horizontal bars at the top		
Underflow	Horizontal bars at the bottom		
Display time	0.1 to 10.0 seconds		
Input	**Measuring range**	**Measuring error**	**Digit**
0…1,1 kΩ	0…1 kΩ	0,1 % of measuring range	±1
0…11 kΩ	0…10 kΩ	0,1 % of measuring range	±1
0…110 kΩ	0…100 kΩ	0,1 % of measuring range	±1
Digital input	< 24 V OFF, 10 V ON, max. 30 VDC R_I ~ 5 kΩ		
Drift of temperature	100 ppm / K		
Measuring time	0,1…10,0 seconds		
Measuring principle	U/F-converter		
Resolution	approx. 18 Bit at 1 second measuring time		
Output			
Analog output	0/4-20 mA or 0-10 VDC 16 Bit switchable		
Switching outputs			
Relay with change-over contact Switching cycles	250 VAC / 5 AAC; 30 VDC / 5 ADC 30 x 10^3 at 5 AAC, 5 ADC ohm resistive load 10 x 10^6 mechanically Diversity according to DIN EN50178 / Characteristics according to DIN EN60255		

Power pack	230 VAC +/- 10 % max. 10 VA 10-30 VDC galvanic insulated, max. 4 VA
Memory	EEPROM
Data life	≥ 100 years
Ambient conditions	
Working temperature	0…50°C
Storing temperature	-20…80°C
Weathering resistance	relative humidity 0-80% on years average without dew
EMV	EN 61326
CE-sign	Conformity to directive 2004/108/EG
Safety standard	EN 61010; EN 60664-1

7. Safety advices

Please read the following safety advice and the assembly *chapter 1* before installation and keep it for future reference.

Proper use

The **M2-device** is designed for the evaluation and display of sensor signals.

Danger! Careless use or improper operation can result in personal injury and/or damage to the equipment.

Control of the device

The panel meters are checked before dispatch and sent out in perfect condition. Should there be any visible damage, we recommend close examination of the packaging. Please inform the supplier immediately of any damage.

Installation

The **M2-device** must be installed by a suitably **qualified specialist** (e.g. with a qualification in industrial electronics).

Notes on installation

- There must be no magnetic or electric fields in the vicinity of the device, e.g. due to transformers, mobile phones or electrostatic discharge.
- The **fuse rating** of the supply voltage should not exceed a value of **6A N.B. fuse**.
- Do not install **inductive consumers** (relays, solenoid valves etc.) near the device and **suppress** any interference with the aid of RC spark extinguishing combinations or free-wheeling diodes.
- Keep input, output and supply lines separate from one another and do not lay them parallel with each other. Position “go” and “return lines” next to one another. Where possible use twisted pair. So, you receive best measuring results.
- Screen off and twist sensor lines. Do not lay current-carrying lines in the vicinity. Connect the **screening on one side** on a suitable potential equaliser (normally signal ground).
- The device is not suitable for installation in areas where there is a risk of explosion.
- Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.
- The terminal area of the devices is part of the service. Here electrostatic discharge needs to be avoided. Attention! High voltages can cause dangerous body currents.
- Galvanic insulated potentials within one complex need to be placed on a appropriate point (normally earth or machines ground). So, a lower disturbance sensibility against impacted energy can be reached and dangerous potentials, that can occur on long lines or due to faulty wiring, can be avoided.

8. Error elimination

	Error description	Measures
1.	The unit permanently indicates overflow. 	• The input has a very high measurement, check the measuring circuit. • With a selected input with a low voltage signal, it is only connected on one side or the input is open. • Not all of the activated setpoints are parametrised. Check if the relevant parameters are adjusted correctly.
2.	The unit permanently shows underflow. 	• The input has a very low measurement, check the measuring circuit . • With a selected input with a low voltage signal, it is only connected on one side or the input is open. • Not all of the activated setpoints are parametrised. Check if the relevant parameters are adjusted correctly.
3.	The word "*HELP*" lights up in the 7-segment display.	• The unit has found an error in the configuration memory. Perform a reset on the default values and re-configure the unit according to your application.
4.	Program numbers for parameterising of the input are not accessible.	• Programming lock is activated • Enter correct code
5.	"*ERR1*" lights up in the 7-segment display	• Please contact the manufacturer if errors of this kind occur.
6.	The device does not react as expected.	• If you are not sure if the device has been parameterised before, then follow the steps as written in *chapter 5.2.* and set it back to its delivery status.