
User manual M3

Standard signals 0/4-20 mA, 0-10 VDC



Technical features:

- red display of -19999...99999 digits (optional: green, orange or blue display)
- minimal installation depth: 120 mm without plug-in terminal
- min-/max memory
- 30 parameter driven setpoints
- optical threshold value indication at threshold value exceedance / undercut
- zero-key for triggering of HOLD, TARA
- permanent min-/max-value recording
- volume measurement (totaliser)
- arithmetic function
- zero point slowdown
- programming interlock via access code
- protection class IP65 at the front
- plug-in terminal
- option: sensor supply
- option: digital input
- option: 2 or 4 analog outputs
- option: 2 or 4 relay outputs or 8 PhotoMos outputs
- option: interface RS232 or RS485

Identification

STANDARD TYPES	ORDER NUMBER
Direct current / direct voltage Gehäusegröße: 96x48 mm	M3-1VR5B.0001.470AD M3-1VR5B.0001.570AD M3-1VR5B.0001.670AD

Options – breakdown of order code:

	M	3	-	1	V	R	5	B	0	0	0	1	6	7	2	A	D	
Standard type M-line																		Dimension [D] physical unit
Installation depth 139 mm, incl. plug-in terminal																		Version [A] A
Housing size 96x48x120 mm (WxHxD)																		Setpoints [0] no setpoints [2] 2 relay outputs [4] 4 relay outputs
Type if display V, A																		Protection class [7] IP65 / plug-in Terminal
Display colour Blue Green Red Orange																		Supply voltage [4] 115 VAC [5] 230 VAC [6] 10-30 VDC galv. insulated
Number of digits 5-digit																		Measuring input [1] Direct current, direct voltage
Digit height 14 mm																		Analog output [0] without [X] 1x 0-10 VDC, 0/4-20 mA [Y] 2x 0-10 VDC, 0/4-20 mA
Digital input without 1 digital input (without sensor supply) Interface RS232 Interface RS485																		Sensor supply [0] without [2] 10 VDC / 20 mA (incl. digital input) [3] 24 VDC / 50 mA (incl. digital input)

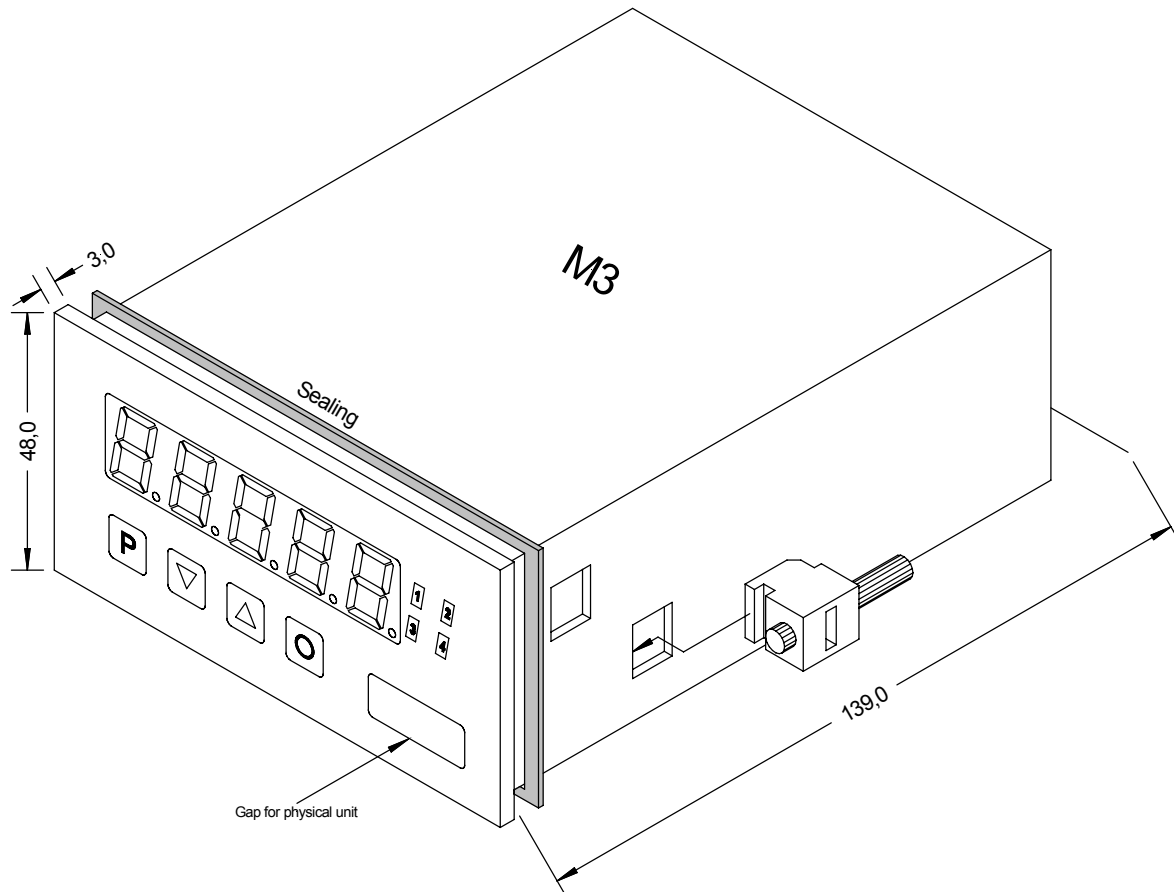
Please state physical unit by order, e.g. m/min.

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1. Assembly

Please read the *Safety advice* on *page 52* before installation and keep this user manual for future reference.



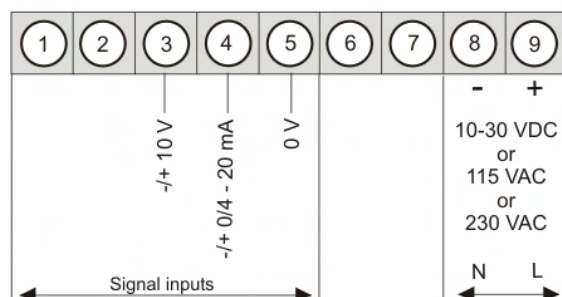
1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

CAUTION! The torque should not exceed 0.1 Nm!

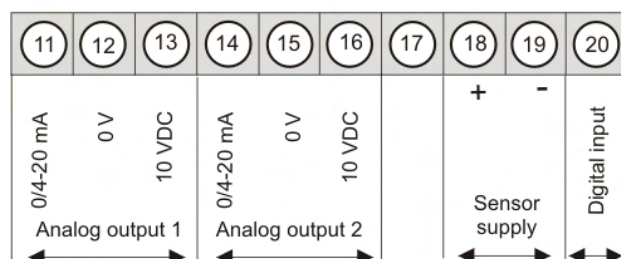
The dimension symbols can be exchanged before installation via a channel on the side!

2. Electrical connection

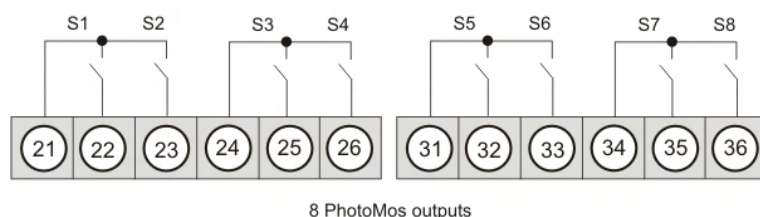
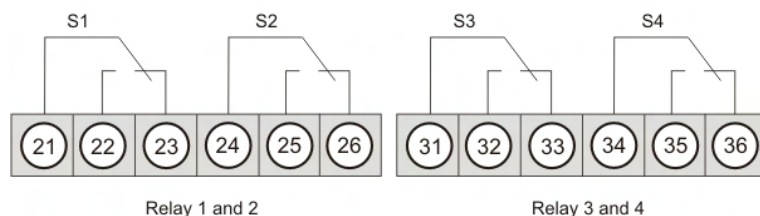
Type M3-1VR5B.0001.470AD with a supply of 115 VAC
 Type M3-1VR5B.0001.570AD with a supply of 230 VAC
 Type M3-1VR5B.0001.670AD with a supply of 10-30 VDC



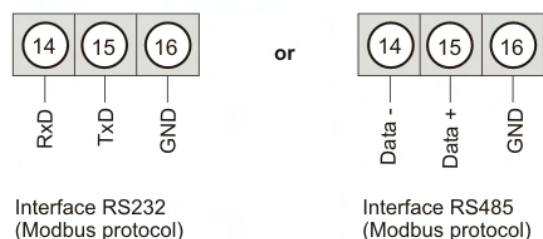
Options:



| | |
 alternatively
 interface RS232 / RS485



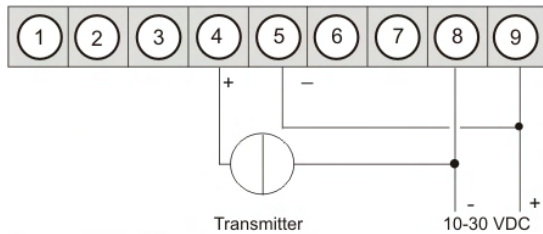
Alternative to analog output 2



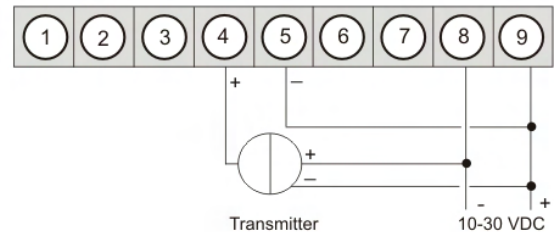
Connection examples

Below please find some connection examples that show practical applications. For devices with current respectively voltage inputs, without sensor supply.

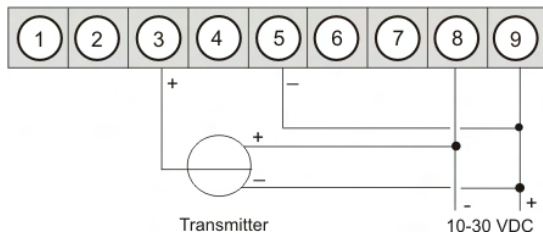
M3 in combination with a 2-wire-sensor 4-20 mA



M3 in combination with a 3-wire-sensor 0/4-20 mA



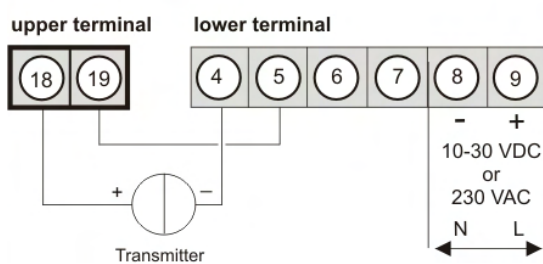
M3 in combination with a 3-wire-sensor 0-10 V



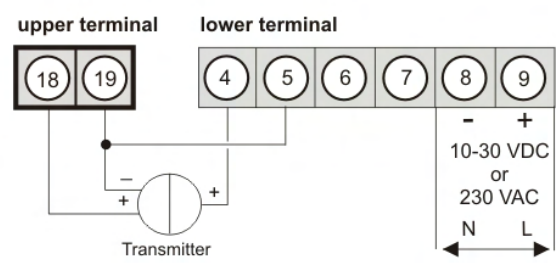
M3 devices

With current respectively voltage input in combination with a 24 VDC sensor supply.

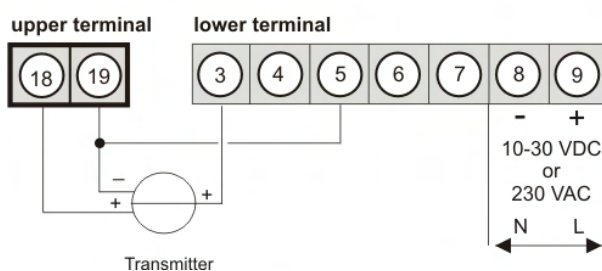
2-wire-sensor 4-20 mA



3-wire-sensor 0-20 mA



3-wire-sensor 0-10 V



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 sufficient 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)

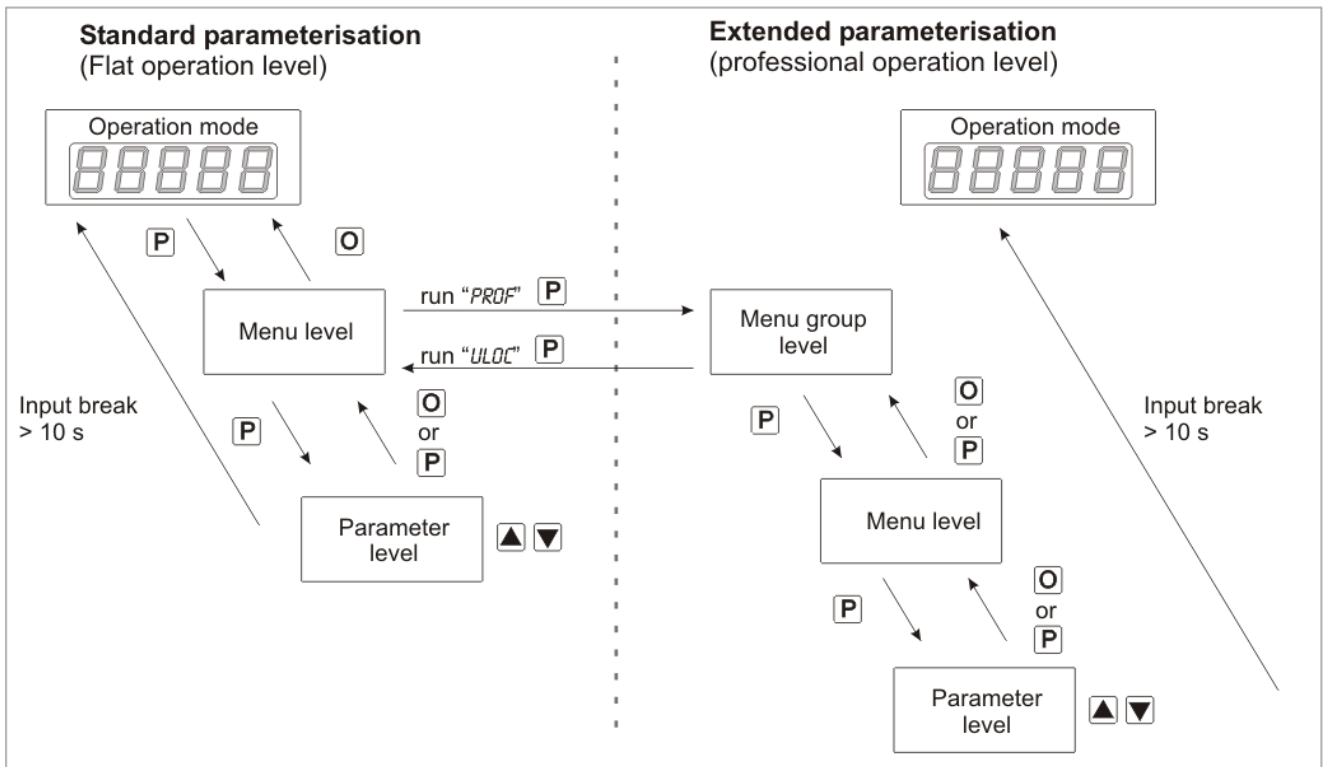
Suited for complex applications as e.g. linkage of alarms, setpoint treatment, totaliser function etc. In this level function groups which allow an extended parameterisation of the standard settings are available. To leave the menu group level, run through this level and parameterise „**ULOC**„ under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

Parameterisation level:

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

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

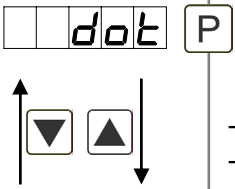
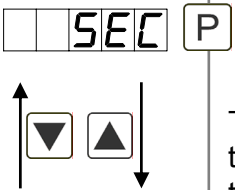
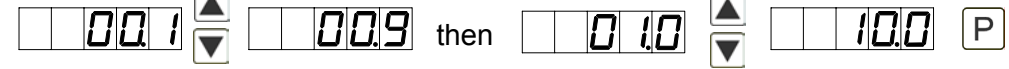
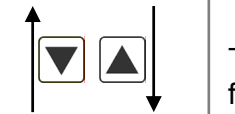
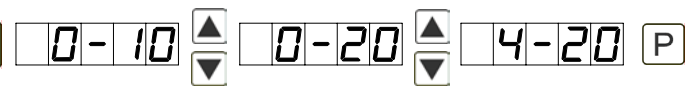
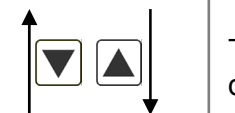
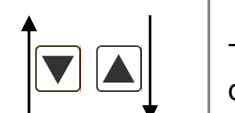
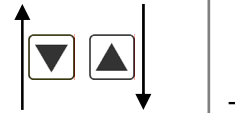
Starting sequence

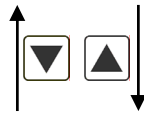
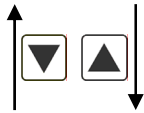
For 1 second during the switching-on process, the segment test (8 8 8 8 8) is displayed followed by an indication of the software type and, after that, also for 1 second the software version. After the starting sequence, the device switches to operation/display mode.

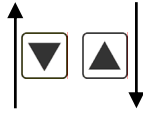
4.2. Standard parameterisation: (Flat operation level)

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:  There are several measuring input options: 0/4-20 mA or 0-10 VDC signals as works calibration (without application of the sensor signal) and SENSU (voltage) or SENSR (current) as sensor calibration (with the sensor applied). Confirm the selection with [P] and the display switches back to menu level.
	Setting the measuring range end value, END:  Set the end value from the smallest to the highest digit with [▲] [▼] and 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. If SENS was selected as input option, you can only select between NOCA and CAL. With NOCA, only the previously set display value is taken over, and with CAL, the device takes over both the display value and the analogue input value.
	Setting up the measuring range start/offset value, OFFS:  Enter the start/offset value from the smallest to the highest digit with [▲] [▼] and confirm each digit with [P]. After the last digit the display switches back to the menu level. If SENS was selected as input option, you can only select between NOCA and CAL. With NOCA, only the previously set display value is taken over, and with CAL, the device takes over both the display value and the analogue input value.

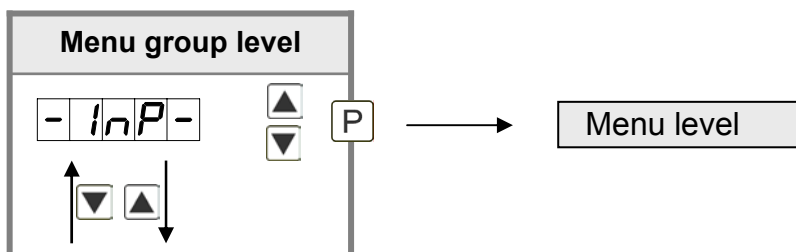
Menu level	Parameterisation level
	Setting the decimal point, <i>DOT</i>:  The decimal point on the display can be moved with [$\blacktriangle$] [$\blacktriangledown$] and confirmed with [P]. The display then switches back to the menu level again.
	Setting up the display time, <i>SEC</i>:  The display time is set with [$\blacktriangle$] [$\blacktriangledown$]. The display moves up in increments of 0.1 sec up to 1 sec and in increments of 1.0 sec up to 10.0 sec. Confirm the selection by pressing the [P] button. The display then switches back to the menu level again.
	Selection of analog output, <i>OUT.RA</i>:  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, <i>OUT.EN</i>:  The final value is adjusted from the smallest digit to the highest digit with [$\blacktriangle$] [$\blacktriangledown$] 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, <i>OUT.OF</i>:  The final value is adjusted from the smallest digit to the highest digit with [$\blacktriangle$] [$\blacktriangledown$] 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 / Limits, <i>LI-1</i>:  This value defines the threshold, that activates/deactivates an alarm.

Menu level	Parameterisation level
	Hysteresis for limit values, <i>HY-1</i>:  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, <i>FU-1</i>:  A limit value undercut is selected with <i>LOW</i> (for LOW = lower limit value), a limit value exceedance with <i>HIGH</i> (for HIGH = higher limit value). If e.g. limit value 1 is on a threshold level of 100 and allocated with function <i>HIGH</i>, an alarm is activated by reaching of the threshold level. If the threshold value was allocated to <i>LOW</i>, an alarm will be activated by undercutting the threshold value, as long as the hysteresis is zero.
	The same applies to <i>LI-1</i> to <i>LI-2</i> !
	User code (4-digit number-combination, free available), <i>U.CODE</i>:  If this code was set (>0000), all parameters are locked for the user, if <i>LOC</i> has been selected before under menu item <i>RUN</i>. By pressing [P] for 3 seconds in operation mode, the display shows <i>CODE</i>. The <i>U.CODE</i> needs to be entered to get to the reduced number of parameter sets. The code has to be entered before each parameterisation, until the <i>R.CODE</i> (Master code) unlocks all parameters again.
	Master code (4-digit number-combination, free available), <i>R.CODE</i>:  All parameters can be unlocked with this code, after <i>LOC</i> has been activated under menu item <i>RUN</i>. By pressing [P] for 3 seconds in operation mode, the display shows <i>CODE</i> and enables the user to reach all parameters by entering the <i>R.CODE</i>. Under <i>RUN</i> the parameterisation can be activated permanently by selecting <i>ULOC</i> or <i>PROF</i>, thus at an anew pushing of [P] in operation mode, the code needs not to be entered again.

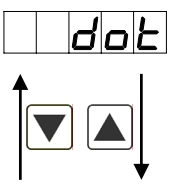
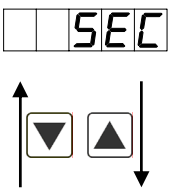
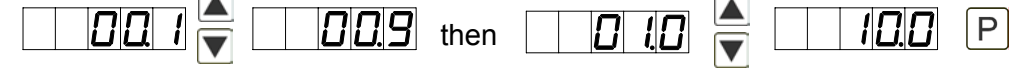
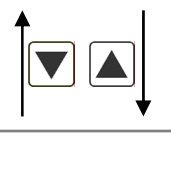
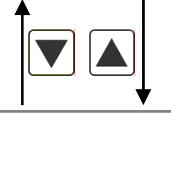
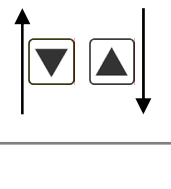
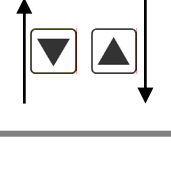
Menu level	Parameterisation level
	Activation / deactivation of the programming lock or completion of the standard parameterization with change into menu group level (complete function range), <i>RUN</i>:  With the navigation keys [▲] [▼], you can choose between the deactivated key lock <i>ULOC</i> (works setting) and the activated key lock <i>LOC</i>, or the change into the menu group level <i>PROF</i>. Confirm the selection with [P]. After this, the display confirms the settings with "- - - -", and automatically switches to operating mode. If <i>LOC</i> was selected, the keyboard is locked. To get back into the menu level, press [P] for 3 seconds in operating mode. Now enter the <i>CODE</i> (works setting <i>1 2 3 4</i>) that appears using [▲] [▼] plus [P] to unlock the keyboard. <i>FAIL</i> appears if the input is wrong. To parameterize further functions <i>PROF</i> 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 <i>INP</i> is shown in the display and thus confirms the change into the extended parameterisation. It stays activated as long as <i>ULOC</i> or <i>LOC</i> is entered in menu group <i>RUN</i>.

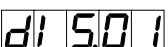
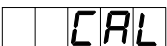
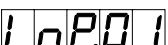
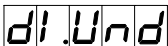
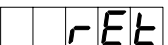
4.3. Extended parametrisation (Professional operation level)

4.3.1. Signal input parameters

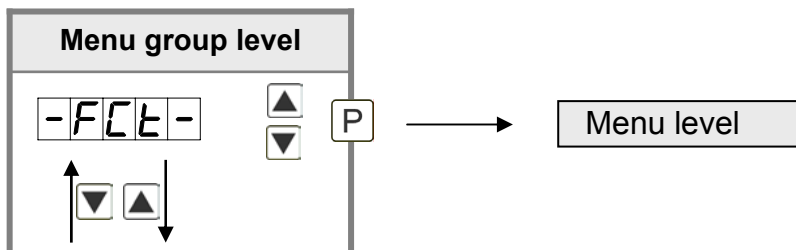


Menu level	Parameterisation level
	Selection of the input signal, <i>TYPE</i>: TYPE P 0-10 0-20 4-20 SENSU SENSAR P There are several measuring input options: 0/4-20 mA or 0-10 VDC signals as works calibration (without application of the sensor signal) and SENSU (voltage) or SENSAR (current) as sensor calibration (with the sensor applied). Confirm the selection with [P] and the display switches back to menu level.
	Setting the measuring range end value, <i>END</i>: End P 8 P 8 P 8 P 8 P 8 NOCA CAL P Set the end value from the smallest to the highest digit with [▲] [▼] and 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. If SENS was selected as input option, you can only select between NOCA and CAL. With NOCA, only the previously set display value is taken over, and with CAL, the device takes over both the display value and the analogue input value.
	Setting up the measuring range start/offset value, <i>OFFS</i>: OFFS P 8 P 8 P 8 P 8 P 8 NOCA CAL P Enter the start/offset value from the smallest to the highest digit with [▲] [▼] and confirm each digit with [P]. After the last digit the display switches back to the menu level. If SENS was selected as input option, you can only select between NOCA and CAL. With NOCA, only the previously set display value is taken over, and with CAL, the device takes over both the display value and the analogue input value.

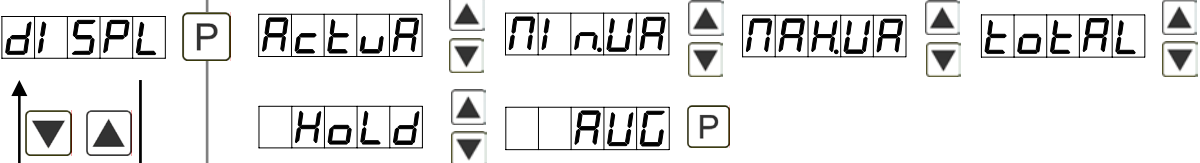
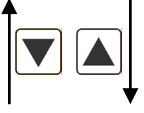
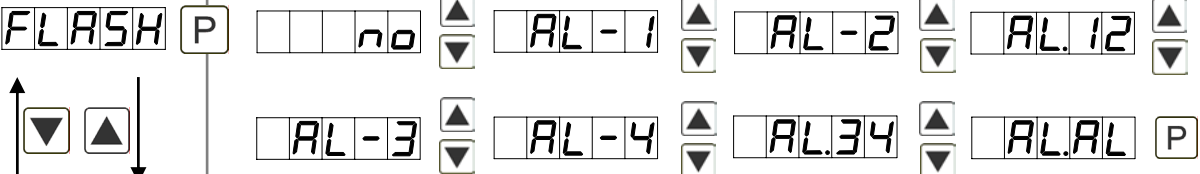
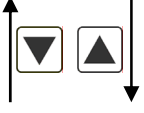
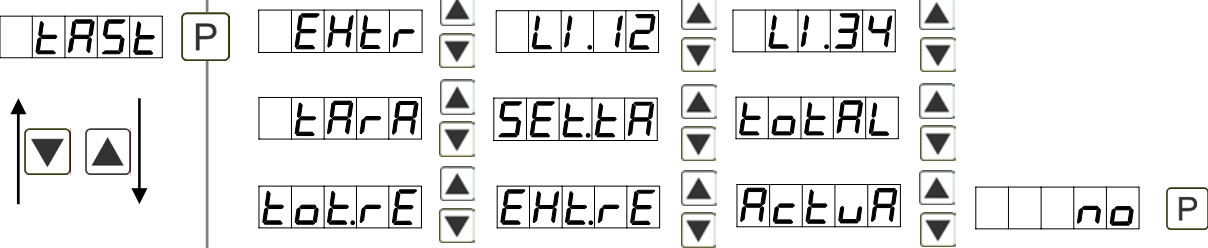
Menu level	Parameterisation level
	Setting the decimal point, <i>DOT</i>:  The decimal point on the display can be moved with [$\blacktriangle$] [$\blacktriangledown$] and confirmed with [P]. The display then switches back to the menu level again.
	Setting up the display time, <i>SEC</i>:  The display time is set with [$\blacktriangle$] [$\blacktriangledown$]. The display moves up in increments of 0.1 sec up to 1 sec and in increments of 1.0 sec up to 10.0 sec. Confirm the selection by pressing the [P] button. The display then switches back to the menu level again.
	Rescaling the measuring input values, <i>ENDR</i>:  With this function, you can rescale the input value of e.g. 19.5 mA (works setting) without applying a measuring signal. If sensor calibration has been selected, these parameters are not available.
	Rescaling the measuring input values, <i>OFFSA</i>:  With this function, you can rescale the input value of e.g. 3.5 mA (works setting) without applying a measuring signal. If sensor calibration has been selected, these parameters are not available.
	Setting up the tare/offset value, <i>TARR</i>:  The given value is added to the linearized value. In this way, the characteristic line can be shifted by the selected amount.
	Setting up the physical unit, <i>UNIT</i>:  One can choose between the above shown physical units. It will be displayed on the 5th digit of the display.

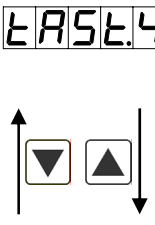
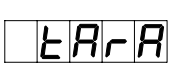
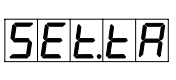
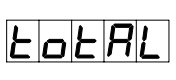
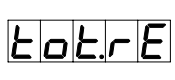
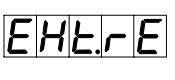
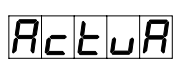
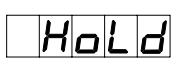
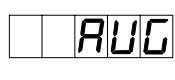
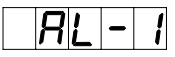
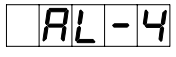
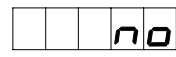
Menu level	Parameterisation level
	Number of additional setpoints, <i>SPCT</i>:        30 additional setpoints can be defined to the initial- and final value, so linear sensor values are not linearised. Only activated setpoint parameters are displayed.
	Display values for setpoints, <i>DIS.01 ... DIS.30</i>:                   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, <i>INP.01 ... INP.30</i>:               The setpoints are allways set according to the selected input signal. The desired analog values can be freely parametrised in ascending order.
	Device undercut, <i>DI.UND</i>:               With this function the device undercut (_ _ _ _) can be defined on a definite value. Exception is input type 4-20 mA, it already shows undercut at a signal <1 mA, so a sensor failure is marked.
	Display overflow, <i>DI.OUE</i>:               With this function the display overflow (^ ^ ^ ^) can be defined on a definite value.
	Back to menu group level, <i>RET</i>:  With [P] the selection is confirmed and the device changes into menu group level „-INP-“.

4.3.2. General device parameters



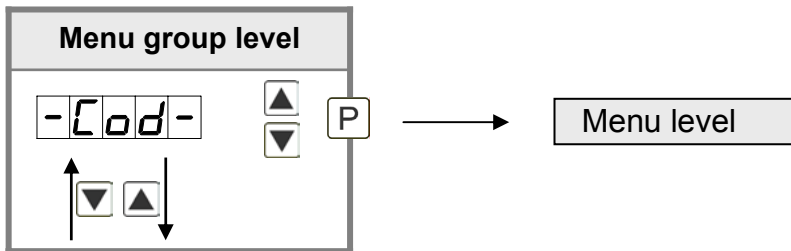
Menu level	Parameterisation level
	Display time, <i>DISC</i>: then The display is set up with [] []. Thereby it jumps until 1 second in increments of 0.1 seconds and until 10.0 seconds in increments of 1.0. With [P] the selection is confirmed and the device changes into menu level.
	Rounding of display values, <i>ROUND</i>: 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.
	Arithmetic, <i>ARITH</i>: Reciprocal Root extraction Square With this function the calculated value, not the measuring value, is shown in the display. With <i>no</i>, no calculation is deposited. With [P] the selection is confirmed and the device changes into menu level.
	Sliding average determination, <i>AVG</i>: Here, the number of the meterings that need to be averaged is preset. The time of averaging results of the product of measuring time <i>SEC</i> and the averaged metering <i>AVG</i>. With the selection of <i>AVG</i> in the menu level <i>DISPL</i>, the result will be shown in the display and evaluated via the alarms.

Menu level	Parameterisation level
	Zero point slowdown, <i>ZERO</i>:  At the zero point tranquilisation, a value range around the zero point can be preset, so the display shows a zero. If e.g. a 10 is set, the display would show a zero in the value range from -10 to +10; below continue with -11 and beyond with +11. The maximum adjustable range of value is 99.
	Display, <i>DISPL</i>:  With this function the current measuring value, 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, <i>FLASH</i>:  A display flashing can be added as additional alarm function either to single or to a combination of off-limit condition. With <i>no</i>, no flashing is allocated.
	Assignment (deposit) of key functions, <i>TAST</i>:  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 <i>EHTr</i>, 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 <i>LI.12</i> or <i>LI.34</i> is choosen, the values of the threshold can be changed during operation without disturbing the operating procedure. With <i>TARA</i> the device is tared to zero and safed permanently as offset. The device confirms the correct taring by showing 00000 in the display. <i>SET.TA</i> switches into the offset value and can be changed via the navigation keys [▲] [▼].

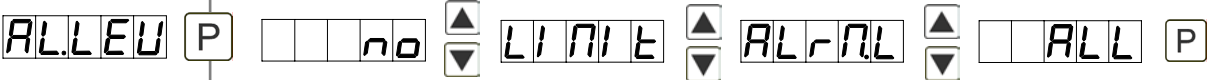
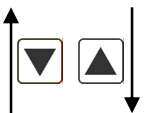
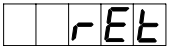
Menu level	Parameterisation level
	Assignment (deposit) of key functions, <i>TAST</i> : Via <i>TOTAL</i> the current value of the totaliser can be displayed for approx. 7 seconds, after this the device jumps back on the parametrised display value. If <i>TOT.RE</i> is deposited, the totaliser can be set back by pressing of the navigation keys [▲] [▼], the device acknowledges this with 00000 in the display. The configuration of <i>EHT.RE</i> deletes the MIN/MAX-memory. Under <i>ACTUA</i> the measuand is shown for approx. 7s, after this the display returns to the parametrised display value. If <i>ABS.UR</i> (Absolute value) was selected, the display shows the value that has been measured since voltage connection, without consideration of a previous taring. If <i>NO</i> is selected, the navigation keys are without any function in the operation mode.
	Special function [O]-key, <i>TAST.4</i>:            For the operation mode, special functions can be deposited on the [O]-Taste. This function is activated by pressing the key. With <i>TARA</i> the device is set temporarily on a parametrised value. The device acknowledges the correct taring with 00000 in the display. <i>SET.TA</i> adds a defined value on to the currently displayed value. Via <i>TOTAL</i> 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 <i>TOT.RE</i> is deposited, the totaliser can be set back by pressing of the navigation keys [▲] [▼], the device acknowledges this with 00000 in the display. <i>EHT.RE</i> deletes the MIN/MAX-memory. If <i>HOLD</i> has been selected, the moment can be hold constant by pressing the [O]-key, and is updated by releasing the key. Advice: <i>HOLD</i> is activated only, if <i>HOLD</i> is selected under parameter <i>DISPL</i>. <i>ACTUA</i> shows the measuring value for approx. 7 seconds, after this the device switches back on the parametrised display value. The same goes for <i>AVG</i>, here the sliding average values will be displayed. At <i>AL-1...AL-4</i> an outout can be set and therewith e.g. a setpoint adjustment can be done. If <i>NO</i> is selected, the [O]-key is without any function in the operation mode.

Menu level	Parameterisation level
dI GIn P  	Special function digital input, DIG.IN: tArA SEtEA LoEAL LoE.rE EHt.rE AcEuA HoLd AUG AL-1 ... AL-4 no P In operation mode, the above shown parameter can be laid on the optional digital input, too. Function description see <i>TAST.4</i>.
rEt  	Back to menu group level, RET: With [P] the selection is confirmed and the device changes into menu group level „- FCT -“.

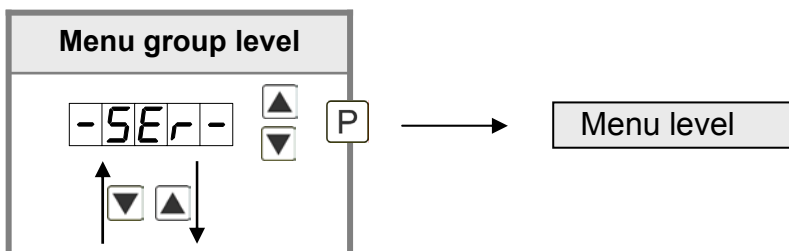
4.3.3. Safety parameters

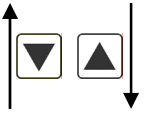
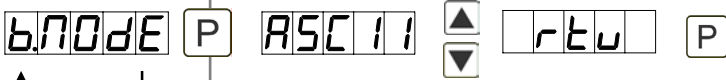


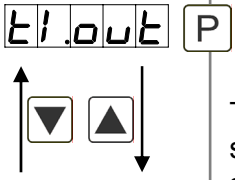
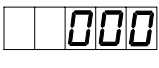
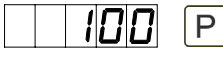
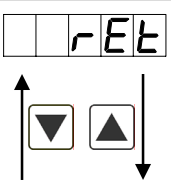
Menu level	Parameterisation level
	User code <i>U.CODE</i>: <i>U.CodE</i> P 0 P 0 P 0 P 0 P Via this code reduced sets of parameters can be set free. A change of the <i>U.CODE</i> can be done via the correct input of the <i>R.CODE</i> (master code).
	Master code, <i>R.CODE</i>: <i>R.CodE</i> P 1 P 2 P 3 P 4 P By entering <i>R.CODE</i> the device will be unlocked and all parameters are released.
	Release/lock analog output parameter, <i>OUT.LE</i>: <i>Out.LE</i> P <i>no</i> <i>En-OF</i> <i>Out.EO</i> <i>ALL</i> P Analog output parameter can be locked or released for the user: - At <i>En-OF</i> the initial or final value can be changed in operation mode. - At <i>Out.EO</i> the output signal can be changed from e.g. 0-20mA to 4-20mA or 0-10VDC. - At <i>ALL</i> analog output parameters are released. - At <i>no</i> all analog output parameters are locked.

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

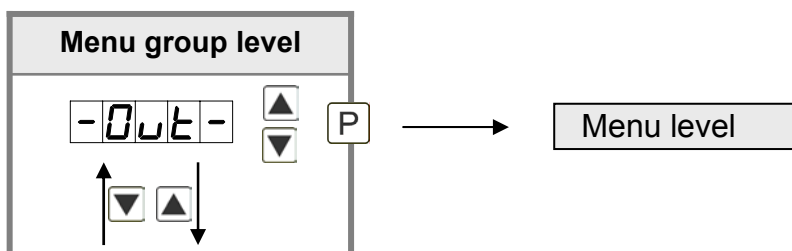
4.3.4. Serial parameters

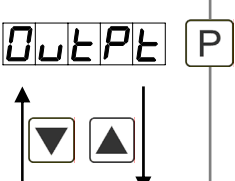
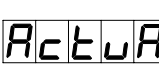
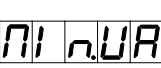
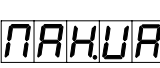
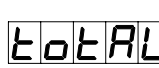
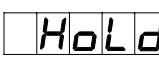
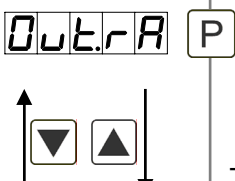
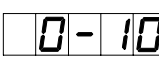
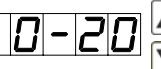
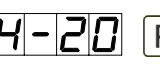


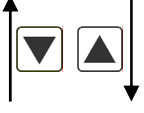
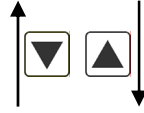
Menu level	Parameterisation level
 	Device address, <i>ADDR</i>: The device address is adjusted from the smallest to the largest digit with the navigation keys [▲] [▼] and confirmed digit per digit with [P]. A device address up to max. 250 is available.
 	ModBus operation type, <i>B.MODE</i>:

Menu level	Parameterisation level
	Timeout, <i>TOUT</i>:   The monitoring of the data transfer is parameterized in seconds up to max. 100 seconds; there is no monitoring with an input of <i>000</i>. The timeout is adjusted from the smallest to the largest digit with the navigation keys [▲] [▼] and confirmed digit per digit with [P]. After the last digit the device changes back into menu level.
	Back to menu group level, <i>REt</i>: With [P] the selection is confirmed and the device changes into menu group level „- SER -“.

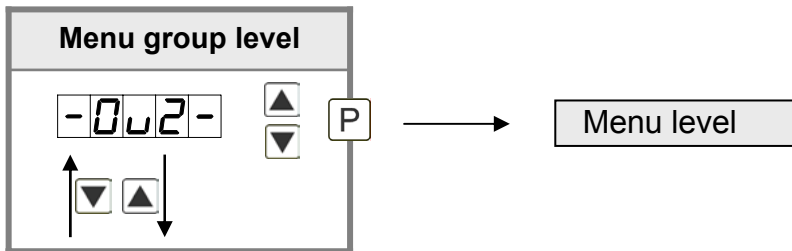
4.3.5. Analog output parameters for analog output 1



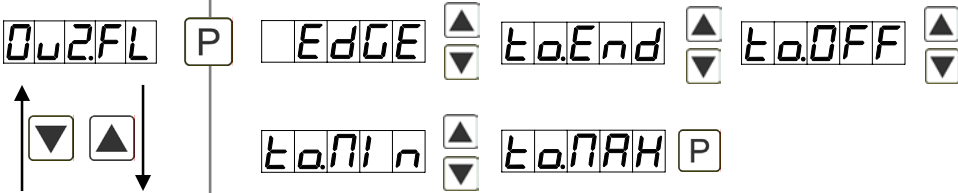
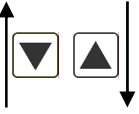
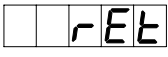
Menu level	Parameterisation level
	Selection reference of analog output, <i>OUTPT</i>:       The analog output signal can refer to different functions, in detail these are the current measurand, the min-value, the max-value or the totaliser-/sum function. If <i>HOLD</i> is selected, the signal of the analog output will be kept. It can be continued processing after a deactivation of <i>HOLD</i>. With [P] the selection is confirmed and the device changes into menu level.
	Selection analog output, <i>OUT.RA</i>:    Three output signals are available 0-10 VDC, 0-20 mA and 4-20 mA. Select the desired signal with this function.

Menu level	Parameterisation level
	Setting the final value of the analog output, <i>OUT.EN</i>: <i>OUT.EN</i> [P] [8] [P] [8] [P] [8] [P] [8] [P] [8] [P] [8] [P] The final value is adjusted from the smallest to the highest digit with [▲] [▼] and confirmed digit per digit with [P]. A minus sign can only be parameterized on the highest digit. After the last digit the device changes back into menu level.
	Setting the initial value of the analog output, <i>OUT.OF</i>: <i>OUT.OF</i> [P] [8] [P] [8] [P] [8] [P] [8] [P] [8] [P] [8] [P] The initial value is adjusted from the smallest to the highest digit with [▲] [▼] and confirmed digit per digit with [P]. A minus sign can only be parameterized on the highest digit. After the last digit the device changes back into menu level.
	Overflow behaviour, <i>O.FLOU</i>: <i>O.FLOU</i> [P] [EDGE] [▲] [▼] [to.END] [▲] [▼] [to.OFF] [▲] [▼] [to.MIN] [▲] [▼] [to.MAX] [P] 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 jumps 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, <i>RET</i>: [] [] [RET] With [P] the selection is confirmed and the device changes into menu group level „- OUT -“.

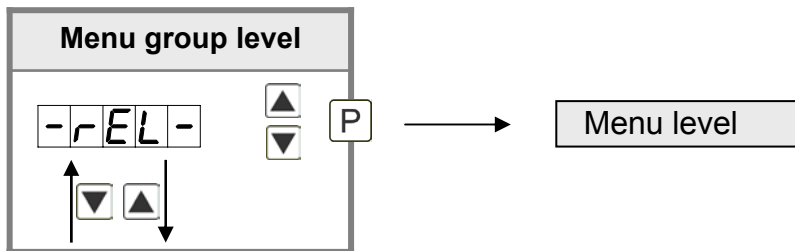
4.3.6. Analog output parameters for analog output 2



Menu level	Parameterisation level
	Selection reference of analog output, <i>OU2PT</i>: The analog output signal can refer to different functions, in detail these are the current measurand, the min-value, the max-value or the totaliser-/sum function. If HOLD is selected, the signal of the analog output will be kept. It can be continued processing after a deactivation of HOLD. With [P] the selection is confirmed and the device changes into menu level.
	Selection analog output, <i>OU2.RA</i>: 3 output signals are available 0-10 VDC, 0-20 mA and 4-20 mA. Select the desired signal with this function.
	Setting the final value of the analog output, <i>OU2.EN</i>: The final value is adjusted from the smallest to the highest digit with [▲] [▼] and confirmed digit per digit with [P]. A minus sign can only be parameterized on the highest digit. After the last digit the device changes back into menu level.

Menu level	Parameterisation level
	Setting the initial value of the analog output, <i>OU2.EN</i>:  The initial value is adjusted from the smallest to the highest digit with [▲] [▼] and confirmed digit per digit with [P]. A minus sign can only be parameterized on the highest digit. After the last digit the device changes back into menu level.
	Overflow behaviour, <i>OU2.FL</i>:  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 jumps 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, <i>RET</i>:  With [P] the selection is confirmed and the device changes into menu group level „-<i>OU2</i> -“.

4.3.7. Relay functions

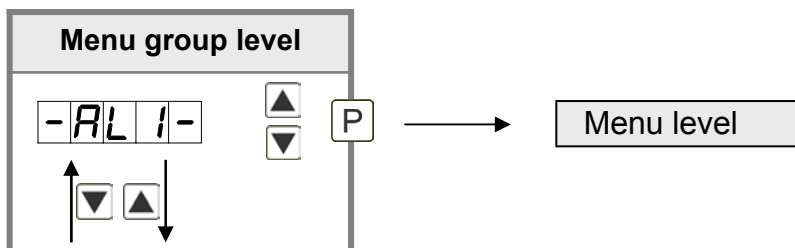


Menu level	Parameterisation level												
REL-1 P ↑ ▼▲ ↓	Alarm relay 1, REL-1: The same applies for relays 2-4 AL-1 AL-4 ▲▼ AL-n1 AL-n4 ▲▼ LOGIC ▲▼ OFF ▲▼ On P Each setpoint (optional) can be linked up via 4 alarms (by default). This can either be inserted at activated alarms <i>AL-1/4</i> or de-activated alarms <i>ALn1/4</i>. If <i>LOGIC</i> is selected, logical links are available in the menu level <i>LOG-1</i> and <i>COM-1</i>. One can only get to these two menu levels via <i>LOGIC</i>, at all other selected functions, these two parameters are overleaped. Via <i>ON/OFF</i> 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 <i>AL-1</i> and <i>AL-2</i>: <table><tr><td> or </td><td>$A1 \vee A2$</td><td>As soon as a selected alarm is activated, the relay operates. Equates to operating current principle.</td></tr><tr><td> nor </td><td>$\overline{A1 \vee A2} = \overline{A1} \wedge \overline{A2}$</td><td>The relay operates only, if no selected alarm is active. Equates to quiescent current principle.</td></tr><tr><td> And </td><td>$A1 \wedge A2$</td><td>The relay operates only, if all selected alarms are active.</td></tr><tr><td> nAnd </td><td>$\overline{A1 \wedge A2} = \overline{A1} \vee \overline{A2}$</td><td>As soon as a selected alarm is not activated, the relay operates.</td></tr></table> With [P] the selection is confirmed and the device changes into menu level.	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.
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.											

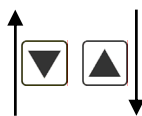
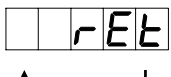
Menu level	Parameterisation level													
COM-1 P AL1 AL2 AL1234 P ↑ ↓ ↩ ↪	Alarms for relay 1, COM-1: The allocation of the alarms to relay 1 happens via this parameter, one alarm or a group of alarms can be chosen. With [P] the selection is confirmed and the device changes into menu level.													
REL-5 P AL-5 AL-8 AL-n5 AL-n8 LOGIC OFF ON P ↑ ↓ ↩ ↪	Alarm relay 5, REL-5: The same applies for relays 6-8 Each setpoint (optional) can be linked up via 4 alarms (by default). This can either be inserted at activated alarms <i>AL1/4</i> or de-activated alarms <i>ALN1/4</i>. If <i>LOGIC</i> is selected, logical links are available in the menu level <i>LOG-1</i> and <i>COM-1</i>. One can only get to these two menu levels via <i>LOGIC</i>, at all other selected functions, these two parameters are overleaped. Via <i>ON/OFF</i> 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-5 P or nor And nAnd P ↑ ↓ ↩ ↪	Logic relay 5, LOG-5: Here, the switching behaviour of the relay is defined via a logic link, the following schema describes these functions with inclusion of <i>AL-1</i> and <i>AL-2</i>: <table><tr><td> or </td><td>$A1 \vee A2$</td><td>As soon as a selected alarm is activated, the relay operates. Equates to operating current principle.</td></tr><tr><td> nor </td><td>$\overline{A1 \vee A2} = \overline{A1} \wedge \overline{A2}$</td><td>The relay operates only, if no selected alarm is active. Equates to quiescent current principle.</td></tr><tr><td> And </td><td>$A1 \wedge A2$</td><td>The relay operates only, if all selected alarms are active.</td></tr><tr><td> nAnd </td><td>$\overline{A1 \wedge A2} = \overline{A1} \vee \overline{A2}$</td><td>As soon as a selected alarm is not activated, the relay operates.</td></tr></table> With [P] the selection is confirmed and the device changes into menu level.		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.
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.												

Menu level	Parameterisation level
	Alarms for relay 5, COM-5: COM-5 P R.1 R.2 R.1234 P The allocation of the alarms to relay 5 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: RET With [P] the selection is confirmed and the device changes into menu group level „-REL -“.

4.3.8. Alarm parameters

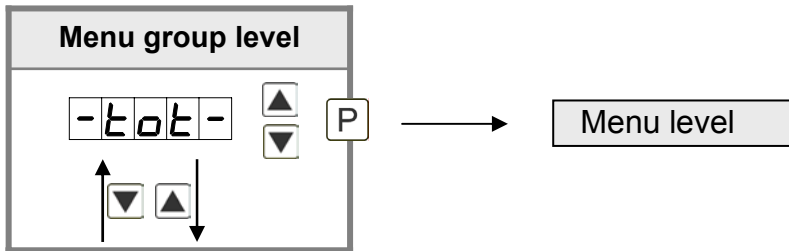


Menu level	Parameterisation level
	Dependency alarm1, ALRM.1: ALRM.1 P ACTUA MINUA MAXUA TOTAL HOLD AUG ENTER P The dependency of alarm 1 can be related to special functions, in detail these are the current measuring value, the MIN-value, the MAX-value or the totaliser-/sum-value. Is <i>HOLD</i> selected, then the alarm is hold and processed just after deactivation of <i>HOLD</i>. <i>ENTER</i> 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.

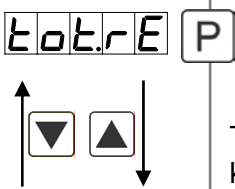
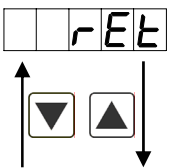
Menu level	Parameterisation level
	Threshold values / Limit values, <i>LI-1</i>:  The limit value defines the threshold, that activates/deactivates an alarm.
	Hysteresis for Threshold values, <i>HY-1</i>:  The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.
	Function for threshold value undercut /exceedance, <i>FU-1</i>:  A limit value undercut is selected with LOW (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.
	Switching-on delay, <i>TON-1</i>:  For limit value 1 one can preset a delayed switching-on of 0-100 seconds.
	Switching-off delay, <i>TOF-1</i>:  For limit value 1 one can preset a delayed switching-off of 0-100 seconds.
	Back to menu group level, <i>RET</i>:  With [P] the selection is confirmed and the device changes into menu group level „-AL1-“.

The same applies for -RL2- to -RL8-.

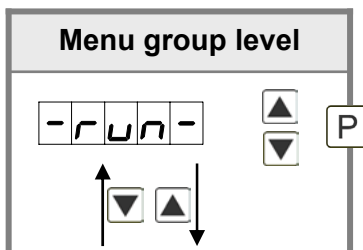
4.3.9. Totaliser (Volume metering)



Menu level	Parameterisation level
Totaliser state, <i>TOTAL</i>: <i>TOTAL</i> P ☐ <i>OFF</i> ☐ <i>STEAD</i> ☐ <i>TEMP</i> P Navigation arrows: ▲ ▼	The totaliser makes measurements on a time base of e.g. l/h possible, at this the scaled input signal is integrated by a time and steadily (select STEAD) or temporarily (select TEMP) saved. If OFF is selected, the function is de-activated. With [P] the selection is confirmed and the device changes into menu level.
Time base, <i>T.BASE</i>: <i>T.BASE</i> P ☐ <i>SEC</i> ☐ <i>min</i> ☐ <i>hour</i> P Navigation arrows: ▲ ▼	Under this parameter the time base of the measurement can be preset in seconds, minutes or hours.
Totaliser factor, <i>FACTO</i>: <i>FACTO</i> P ☐ <i>10⁰</i> ☐ ... ☐ <i>10⁶</i> P Navigation arrows: ▲ ▼	At this the factor ($10^0 \dots 10^6$) respectively the divisor for the internal calculation of the measuring value is assigned.
Setting up the decimal point for the totaliser, <i>TOT.DT</i>: <i>TOT.DT</i> P ☐ <i>0</i> ☐ <i>00</i> ☐ <i>0.00</i> ☐ <i>0.000</i> ☐ <i>0.0000</i> Navigation arrows: ▲ ▼ ☐ <i>0.00000</i> P	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, <i>TOT.RE</i>:  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, <i>RET</i>: With [P] the selection is confirmed and the device changes into menu group level „- TOT -“.

4.3.10. Programming interlock, *RUN*:

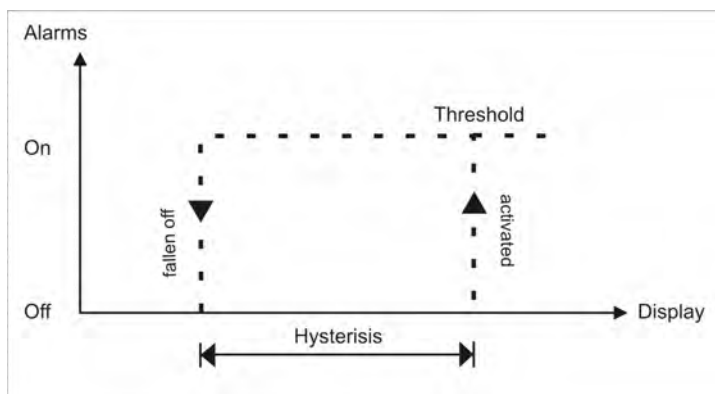


Description see page 11, menu level *RUN*

4.4. Alarms / Relays

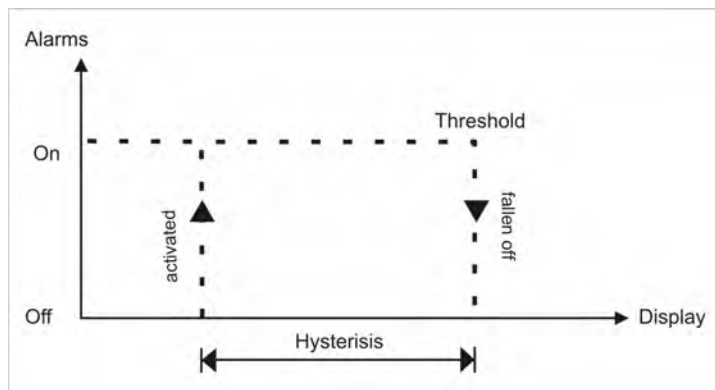
This device has 4 virtual alarms that can monitor one limit value in regard of an undercut or exceedance. Each alarm can be allocated to an optional relay output S1-S2; furthermore alarms can be controlled by events like e.g. Hold or Min-/Max-value.

Function principle of alarms / relays	
Alarm / Relay x	Deactivated, 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



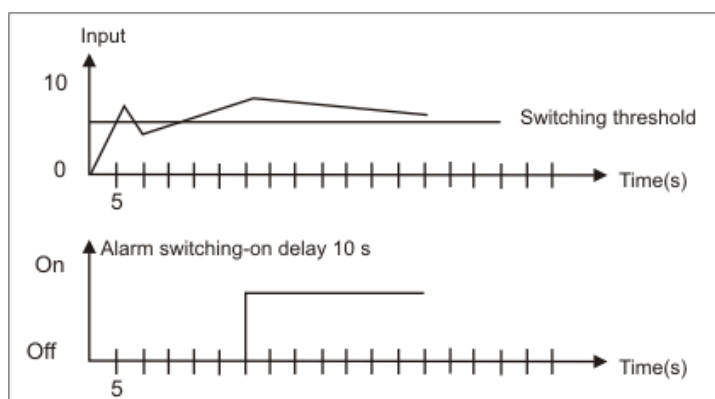
Operating current

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 seconds 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 parametrization (flat operation level)

Parameter	Menu items					Default values
Type of input	0...10 V	0...20 mA	4...20 mA	Sensor calibration V	Sensor calibration A	Sensor calibration V
Final value	19999	to	99999			10000
Offset	19999	to	99999			0
Decimal point	0	to	00000			0
Measuring time	0.1 second	to	10.0 seconds			1.0 seconds
Analog output range	0...10 V	0...20 mA	4...20 mA			4...20 mA
Analog output final value	19999	to	99999			10000
Analog output initial value	19999	to	99999			00000
Limit value 1	19999	to	99999			2000
Hysteresis 1	00000	to	99999			00000
Operation type 1	Undercut	Exceedance				Exceedance
Limit value 2	19999	to	99999			3000

Parameter	Menu items					Default values
H4-2 Hysteresis 2	00000	to	99999			00000
Fu-2 Operation type 2	Low	HIGH				HIGH Exceedance
UCode User code	0000	to	9999			0000
RCode Master code	0000	to	9999			1234
run run	ULOC Standard operation	LOC Parameter lock	Prof Professional operation			ULOC Standard operation

Extended parametrisation (professional operation flat level)

Signal input parameters

- InP -

Parameter	Menu items					Default values
tYPE Type of input	0-10 0...10 V	0-20 0...20 mA	4-20 4...20 mA	SEnSU Sensor calibration V	SEnSA Sensor calibration A	SEnSU Sensor calibration V
End Final value	19999	to	99999			10000
OFFS Offset	19999	to	99999			0
dot Decimal point	0	to	00000			0
SEC Measuring time	0.1 0.1 seconds	to	10.0 10.0 Seconds			1.0 1.0 seconds
EndR Analog final value	19999	to	99999			10000

Parameter	Menu items					Default values
OFFSA Analog final value	19999	to	99999			0
ERRR Display offset	19999	to	99999			0 Exceedance
Unit Display unit	no none	C F L A U t °C °F L A U t				no none
SPct Number of setpoints	00	to	30			00
DIS01 Display value 1	19999	to	99999			
INP01 Analog value 1	19999	to	99999			
...						
d15.30 Display value 30	19999	to	99999			
INP.30 Analog value 30	19999	to	99999			
dUnd Display underflow	19999	to	99999			19999
dOUE Display overflow	19999	to	99999			99999
rEt						

General device parameters

-Fct-

Parameter	Menu items					Default values
di. SEC Display time	00.1 0.1 seconds	to	10.0 10 seconds			0.10 1 second
round Round a value	0000.1 no rounding	0000.5 in steps of 5	000.10 in steps of 10	000.50 in steps of 50		0000.1 no rounding
ArITH Arithmetic	no none	rE2IP reciprocal value	rAdIE root extraction	SQUAr squaring down		no none
AUG Sliding average value	00.1	to	100			10
2ER0 Zero point tranquilisation	00 no tranquilisation	to	99 at x-digit display = zero			00 no tranquilisation
di SPL Default display	ActuA Current measurand AUG Sliding average value	ni nUA Minimum	MAHUA Maximum	toTAL Totaliser	HoLD Hold	ActuA Current measurand
FLASH Flashing at	no no AL-4 Alarm 4	AL-1 Alarm 1 AL.34 Alarm 3 + 4	AL-2 Alarm 2 AL.AL Alarm 1...4	AL.12 Alarm 1 + 2	AL-3 Alarm 3	no no

Parameter	Menu items					Default values
LAST Functions Up- /Down-key	no no SEt.tA Set tara value	EHEr Extremum (min/max) tOtAL Totaliser value	LI.12 Alarm limit 1+2 tOt.rE Totaliser reset	LI.34 Alarm limit 3+4 EHE.rE Extremum reset	tArA Tara function Ac.tuA Display measurand	no no
LAST.4 Special function 4th key	no Extremum reset AL-2 Alarm 2	tArA Tara function Ac.tuA Display measurand AL-3 Alarm 3	SEt.tA Set tara value HoLd Hold AL-4 Alarm 4	tOtAL Totaliser value AUG Sliding average value	tOt.rE Totaliser reset AL-1 Alarm 1	no no
dIG.in Digital input	no Extremum reset AL-2 Alarm 3	tArA Tara function Ac.tuA Display measurand AL-3 Alarm 3	SEt.tA Set tara value HoLd Hold AL-4 Alarm 4	tOtAL Totaliser value AUG Sliding average value	tOt.rE Totaliser reset AL-1 Alarm 1	no no
ret						

Safety parameters

-Cod-

Parameter	Menu items					Default values
UCodE User code	0000	to	9999			0000
ACodE Administrator code	0000	to	9999			1234
OutLE Analog output level	no Not changeable	En-OF Range of value	OutEO Range of value & source	ALL All parameters		ALL All parameters
ALLEU Alarm level	no Not changeable	LI nI t Limit value	ALrNL Range of value & source	ALL All parameters		ALL All parameters
ret						

Serial parameters

-SEr-

Parameter	Menu items					Default values
Addr Device address	001	to	250			001
bNODE Communi- cation mode	ASCII	rtu				ASCII
tiout Timeout	000 No monitoring	to	100 X seconds no traffic			000 No monitoring
ret						

Analog output parameters 1

-OUT-

Parameter	Menu items					Default values
OUTPt Source	ACTUA Current measurand AUC Sliding average value	MINUA Minimum	MAXUA Maximum	TOTAL Totaliser	HOLD Hold	ACTUA Current measurand
OUTrA Output range	0-10 0...10 mA	0-20 0...20 mA	4-20 4...20 mA	x seconds no traffic		4-20 4...20 mA
OUTEn Final value	19999	to	99999			10000
OUTOF Initial value	19999	to	99999			00000
OFLOU Overflow behaviour	EDGE Run to threshold value	toEnd Switch to final value	toOFF Switch to start	toMIN Switch to smallest value	toMAX Switch to highest value	EDGE Run to threshold value
RET						

Analog output parameter 2

-002-

Parameter	Menu items					Default values
002Pt Source	ActUA Current measurand AUG Sliding average value	MinUA Minimum	MaxUA Maximum	total Totaliser	Hold Hold	ActUA Current measurand
002rA Output range	0-10 0...10 mA	0-20 0...20 mA	4-20 4...20 mA	x seconds no traffic		4-20 4...20 mA
002En Final value	19999	to	99999			10000
002OF Initial value	19999	to	99999			00000
002FL Overflow behaviour	EDGE Run to threshold value	toEnd Switch to final value	toOFF Switch to start	toMin Switch to smallest value	toMax Switch to highest value	EDGE Run to threshold value
ret						

Relay functions

-rEL-

Parameter	Menu items					Default values
rEL-1 Relay function1	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-1 at alarm 1
LoG-1 Logic relay 1	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if not at least 1 alarm		or active if at least 1 alarm
CoN-1 Alarm combination relay 1	A.1 Alarm 1 etc. up to	A.2 Alarm 2 A.1234 Alarm 1+2+3+4	A.12 Alarm 1 + 2	A.3 Alarm 3	Alarm 1 + 3	A.1 Alarm 1
rEL-2 Relay function 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 Logic relay 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 Alarm combination relay 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 active if at least 1 alarm

Parameter	Menu items					Default values
REL-3 Relay function 3	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-3 at alarm 1
LOG-3 Logic relay 3	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if not at least 1 alarm		or active if at least 1 alarm
CON-3 Alarm combination relay 3	A.1 Alarm 1 etc. up to	A.2 Alarm 2 A.1234 Alarm 1+2+3+4	A.12 Alarm 1 + 2	A.3 Alarm 3	Alarm 1 + 3	A.3 Alarm 1
REL-4 Relay function 4	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-4 at alarm 3
LOG-4 Logic relay 4	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if not at least 1 alarm		or active if at least 1 alarm
CON-4 Alarm combination relay 4	A.1 Alarm 1 etc. up to	A.2 Alarm 2 A.1234 Alarm 1+2+3+4	A.12 Alarm 1 + 2	A.3 Alarm 3	Alarm 1 + 3	A.4 Alarm 1

Parameter	Menu items					Default values
REL-5 Relay function 5	AL-5 at alarm 1 AL-n5 not alarm 1 LOGIC via logic	to to OFF declined	AL-8 at alarm 4 AL-n8 not alarm 4 on activated			AL-5 at alarm 1
LOG-5 Logic relay 5	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if not at least 1 alarm		or active if at least 1 alarm
CON-5 Alarm combi- nation relay 5	AS Alarm 1 etc. up to	A. 6 Alarm 2 AS678 Alarm 1+2+3+4	AS6 Alarm 1 + 2	A. 7 Alarm 3	AS 7 Alarm 1 + 3	AS Alarm 1
REL-6 Relay function 6	AL-5 at alarm 1 AL-n5 not alarm 1 LOGIC via logic	to to OFF declined	AL-8 at alarm 4 AL-n8 not alarm 4 on activated			AL-5 at alarm 3
LOG-6 Logic relay 6	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if not at least 1 alarm		or active if at least 1 alarm
CON-6 Alarm combi- nation relay 6	AS Alarm 1 etc. up to	A. 6 Alarm 2 AS678 Alarm 1+2+3+4	AS6 Alarm 1 + 2	A. 7 Alarm 3	AS 7 Alarm 1 + 3	AS Alarm 1

Parameter	Menu items					Default values
REL-7 Relay function 7	AL-5 at alarm 1 AL-n5 not alarm 1 LOGIC via logic	to to OFF declined	AL-8 at alarm 4 AL-n8 not alarm 4 on activated			AL-5 at alarm 1
LOG-7 Logic relay 7	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if not at least 1 alarm		or active if at least 1 alarm
CON-7 Alarm combi- nation relay 7	AS Alarm 1 etc. up to	A. 6 Alarm 2 AS678 Alarm 1+2+3+4	AS6 Alarm 1 + 2	A. 7 Alarm 3	AS 7 Alarm 1 + 3	AS Alarm 1
REL-8 Relay function 8	AL-5 at alarm 1 AL-n5 not alarm 1 LOGIC via logic	to to OFF declined	AL-8 at alarm 4 AL-n8 not alarm 4 on activated			AL-5 at alarm 3
LOG-8 Logic relay 8	or active if at least 1 alarm	nor active if no alarm	And active if all alarms	nAnd active if not at least 1 alarm		or active if at least 1 alarm
CON-8 Alarm combi- nation relay 8	AS Alarm 1 etc. up to	A. 6 Alarm 2 AS678 Alarm 1+2+3+4	AS6 Alarm 1 + 2	A. 7 Alarm 3	AS 7 Alarm 1 + 3	AS Alarm 1
RET						

Alarm parameters

-AL 1-

Parameter	Menu items					Default values
ALrN.1 Alarm source 1	ActUA Current measurand AUC Sliding average value	NI nUA Minimum measurand EHtEr External input (DigIn/Tast4)	NAHUA Maximum measurand	toTAL Totaliser	HoLd Hold	ActUA Current measurand
L 1-1 Limit value 1	19999	to	99999			2000
HY-1 Hysteresis 1	00000	to	99999			00000
Fu-1 Function 1	LowU Undercut	HIGH Exceedance				HIGH Exceedance
ton-1 Activation delay 1	000 none	to	100 100 seconds			000 none
toF-1 Deactivation delay 1	000 none	to	100 100 seconds			000 none
REt						

-AL2-

Parameter	Menu items					Default values
ALrN2 Alarm source 2	ActuA Current measurand AUG Sliding average value	MinUA Minimum measurand EXTER External input (DigIn/Tast4)	MaxUA Maximum measurand	total	Hold	ActuA Current measurand
L1-2 Limit value 2	49999	to	99999			3000
HY-2 Hysteresis 2	00000	to	99999			00000
Fu-2 Function 2	LowU Undercut	HIGH Exceedance				HIGH Exceedance
ton-2 Activation delay 2	000 none	to	100 100 seconds			000 none
toF-2 Deactivation delay 2	000 none	to	100 100 seconds			000 none
Ret						

-AL3-

Parameter	Menu items					Default values
ALrN3 Alarm source 3	ActuA Current measurand AUG Sliding average value	MinUA Minimum measurand EXTER External input (DigIn/Tast4)	MaxUA Maximum measurand	total	Hold	ActuA Current measurand
L1-3 Limit value 3	49999	to	99999			4000
HY-3 Hysteresis 3	00000	to	99999			00000

Parameter	Menu items					Default values
FU-3 Function 3	LOW Undercut	HIGH Exceedance				HIGH Exceedance
ton-3 Activation delay 3	000 none	to	100 100 seconds			000 none
toF-3 Deactivation delay 3	000 none	to	100 100 seconds			000 none
RET						

-AL4-

Parameter	Menu items					Default values
ALFN4 Alarm source 4	ACTUA Current measurand AUC Sliding average value	MINUA Minimum measurand EXTER External input (DigIn/Tast4)	MAXUA Maximum measurand	TOTAL Totaliser	HOLD Hold	ACTUA Current measurand
LI-4 Limit value 4	49999	to	99999			5000
HY-4 Hysteresis 4	00000	to	99999			00000
FU-4 Function 4	LOW Undercut	HIGH Exceedance				HIGH Exceedance
ton-4 Activation delay 4	000 none	to	100 100 seconds			000 none
toF-4 Deactivation delay 4	000 none	to	100 100 seconds			000 none
RET						

Alarm parameters

-AL5-

Parameter	Menu items					Default values
ALrN5 Alarm source 5	ActUA Current measurand AUC Sliding average value	MI nUA Minimum measurand EHtEr External input (DigIn/Tast4)	MAHUA Maximum measurand	toTAL Totaliser	HoLd Hold	ActUA Current measurand
LI-5 Limit value 5	19999	to	99999			6000
HY-5 Hysteresis 5	00000	to	99999			00000
FU-5 Function 5	LowU Undercut	HIGH Exceedance				HIGH Exceedance
ton-5 Activation delay 5	000 none	to	100 100 seconds			000 none
toF-5 Deactivation delay 5	000 none	to	100 100 seconds			000 none
Ret						

-AL6-

Parameter	Menu items					Default values
ALrN6 Alarm source 6	ActuA Current measurand AUG Sliding average value	MinuA Minimum measurand EHtEr External input (DigIn/Tast4)	MAHuA Maximum measurand	toTAL Totaliser	HoLD Hold	ActuA Current measurand
LI-6 Limit value 6	19999	to	99999			7000
HY-6 Hysteresis 6	00000	to	99999			00000
Fu-6 Function 6	Lowu Undercut	HIGH Exceedance				HIGH Exceedance
ton-6 Activation delay 6	000 none	to	100 100 seconds			000 none
toF-6 Deactivation delay 6	000 none	to	100 100 seconds			000 none
Ret						

-AL7-

Parameter	Menu items					Default values
ALrN7 Alarm source 7	ActuA Current measurand AUG Sliding average value	MinuA Minimum measurand EHtEr External input (DigIn/Tast4)	MAHuA Maximum measurand	toTAL Totaliser	HoLD Hold	ActuA Current measurand
LI-7 Limit value 7	19999	to	99999			8000
HY-7 Hysteresis 7	00000	to	99999			00000

Parameter	Menu items					Default values
Fu-7 Function 7	Low Undercut	HIGH Exceedance				HIGH Exceedance
ton-7 Activation delay 7	000 none	to	100 100 seconds			000 none
toF-7 Deactivation delay 7	000 none	to	100 100 seconds			000 none
ret						

-ALB-

Parameter	Menu items					Default values
ALrN8 Alarm source 8	ActuA Current measurand AUC Sliding average value	MinUA Minimum measurand EXtEr External input (DigIn/Tast4)	MAxUA Maximum measurand	toTAL Totaliser	HoLd Hold	ActuA Current measurand
LI-8 Limit value 8	49999	to	99999			90000
HY-8 Hysteresis 8	00000	to	99999			00000
Fu-8 Function 8	Low Undercut	HIGH Exceedance				HIGH Exceedance
ton-8 Activation delay 8	000 none	to	100 100 seconds			000 none
toF-8 Deactivation delay 8	000 none	to	100 100 seconds			000 none
ret						

Totaliser (Volume metering)

- tot -

Parameter	Menu items					Default values
tOTAL Totaliser state	OFF Off	StERd Permanent storage	tENP Loose storage			OFF Off
t.bASE Time base	SEC Seconds	Min Minutes	hour Hours			SEC Seconds
FACto Divisor	10^0 $10^0=1$	to	10^6 10^6			10^0 $10^0=1$
tOt.dE Decimal places	0	to	0.00000			0
tOt.rE Totaliser Reset	000000	to	999999			000000
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	96x48x120 mm (BxHxD)			
	96x48x139 mm (BxHxD) incl. plug-in terminal			
Panel cut-out	92.0 ^{+0,8} x 45.0 ^{+0,6} mm			
Wall thickness	to 15 mm			
Fixing	screw elements			
Material	PC Polycarbonate, black, UL94V-0			
Sealing material	EPDM, 65 Shore, black			
Protection class	standard IP65 (Front), IP00 (Back side)			
Weight	approx. 300 g			
Connection	plug-in terminal; wire cross section up to 2.5 mm ²			
Display				
Digit height	14 mm			
Segment colour	red (optional blue/green/orange)			
Range of display	-19999 to 99999			
Setpoints	one LED per setpoint			
Overflow	horizontal bars at the top			
Underflow	horizontal bars at the bottom			
Display time	0.1 to 10.0 seconds			
Input	Measuring range	Ri	Measuring error	Digit
min -22...max 24 mA	0/4-20 mA	100 Ω	0.1 % of measuring range	±1
min -12...max 12 VDC	0...10 VDC	100 kΩ	0.1 % of measuring range	±1
Digital input	< 2,4 V OFF, 10 V ON, max. 30 VDC R _I ~ 5 kΩ			
Accuracy				
Temperature drift	100 ppm / K			
Measuring time	0.1...10.0 seconds			
Measuring principle	U/F-converter			
Resolution	approx. 18 Bit at 1s measuring time			

Output	
Sensor supply	24 VDC / 50 mA; 10 VDC / 20 mA
Analog output	0/4-20 mA or 0-10 VDC 16 Bit switchable
Switching outputs	
Relay with change-over contacts 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
PhotoMos outputs	8 normally open (NO) contacts 30 VDC/AC, 0,4 A
Power supply	230 VAC +/- 10 % max. 10 VA 10-30 VDC galv. insulated, max. 4 VA
Memory	EEPROM
Data life	≥ 100 years
Ambient conditions	
Working temperature	0...50°C
Storing temperature	-20...80°C
Climatic density	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 **M3-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 **M3-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 parameterised. 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 parameterised. 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.	"ERRT" 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 <i>chapter 5.2.</i> and set it back to its delivery status.
