
User Manual M1 - tricolour

Standard signal 0/4-20 mA, 0-10 V



Technical features:

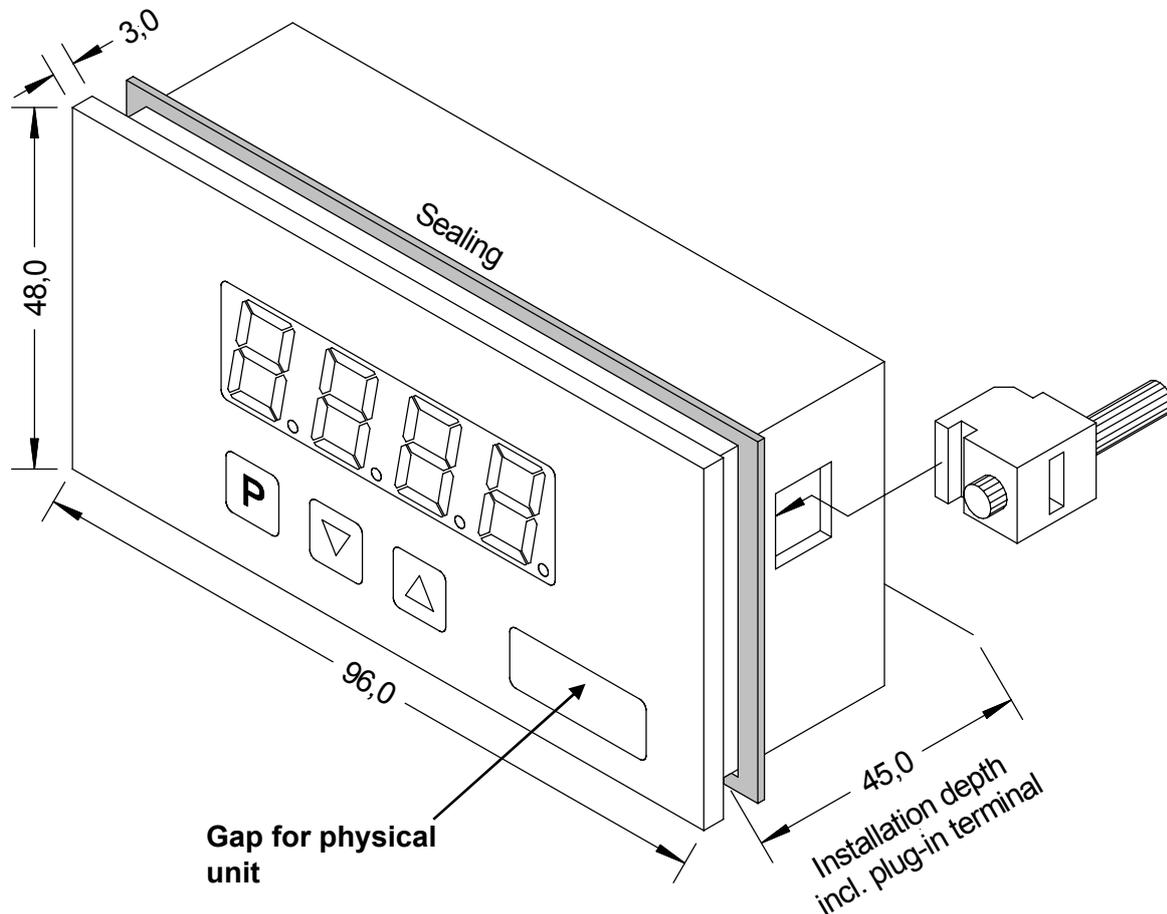
- tricolour display of -1999...9999 digits (red, green, orange switchable via limit values)
- minimal installation depth: 25 mm without plug-in terminal
- adjustment via factory default or directly on the sensor signal
- min-/max-value recording
- 11 adjustable setpoints
- display flashing at threshold exceedance / undershooting
- tara-function
- programming interlock via access code
- protection class IP65 at the front
- plug-in terminal
- 2 relay outputs (change-over-contacts)
- accessories: pc-based configuration-kit PM-TOOL with CD & USB adapter for devices without keypad, for a simple adjustment of standard devices via PC

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1. Assembly

Please read the *Safety advice* on page 20 before installation and keep this user manual for future reference.



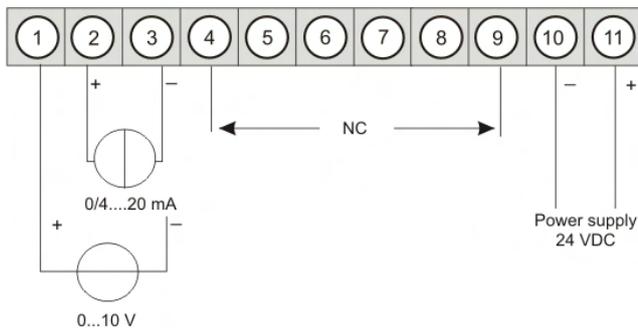
1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

CAUTION! The torque should not exceed 0.1 Nm!

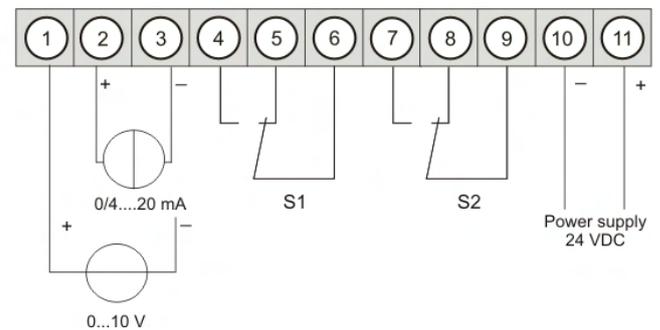
The dimension symbols can be exchanged before installation via a channel on the side!

2. Electrical connection

Type M1-1VT4B.0001.770BD
with a supply of 24 VDC



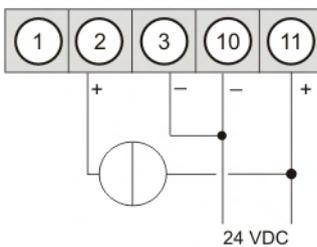
Type M1-1VT4B.0001.772BD
with a supply of 24 VDC



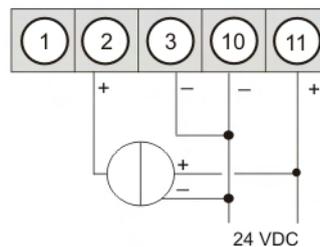
Connection examples:

Below you find some connection examples, which demonstrate some practical applications:

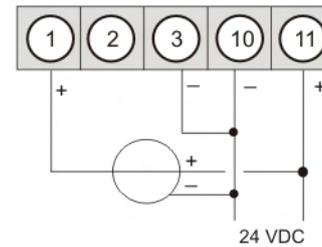
2-wire-sensor 4-20 mA



3-wire-sensor 0/4-20 mA



3-wire-sensor 0-10 V



3. Function and operation description

Operation

The operation is divided into two different levels.

Menu Level

Here it is possible to navigate between the individual menu items.

Parameterization level:

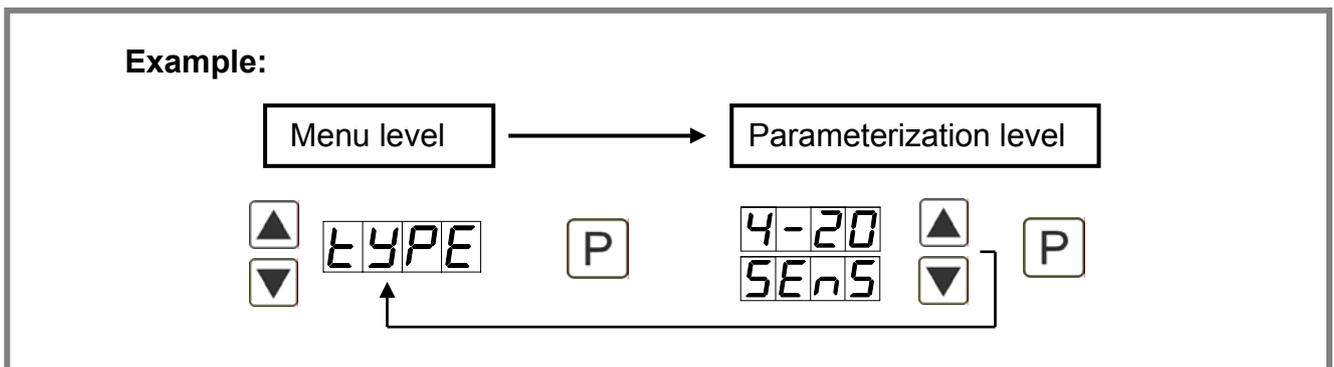
The parameters stored in the menu item can be parameterized here.

Functions that can be adjusted or changed are always indicated with a flashing of the display. Adjustments made at the parameterization level should be always confirmed by pressing the **[P]** key to save them.

However, the display automatically saves all adjustments and then switches to operation mode if no further keys are pressed within 10 seconds.

Level	Button	Description
Menu level		Change to parameterization level with the relevant parameters
	 	For navigation at the menu level
Parameterization level		To confirm the changes made at the parameterization level
	 	To change the value or setting

Example:



Programming via configuration software PM-TOOL-MUSB12

You receive the software on CD incl. an USB-cable with a device adaptor. The connection is done via a 12-pole micromatch connector plug on the back and the PC is connected via an USB connector plug.

System requirements: PC with USB interface

Software: Windows XP, Windows Vista

4. Setting up the device

4.1. Switching on

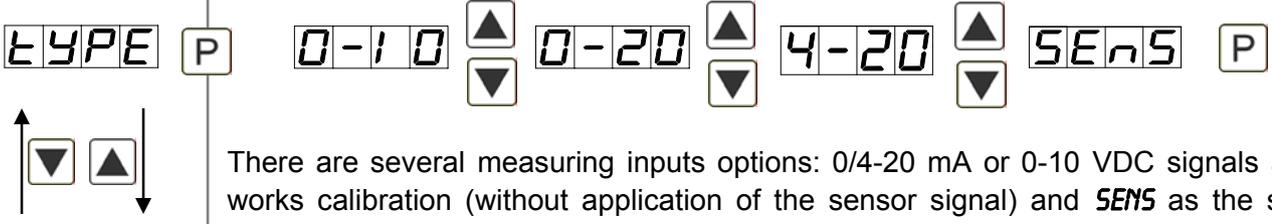
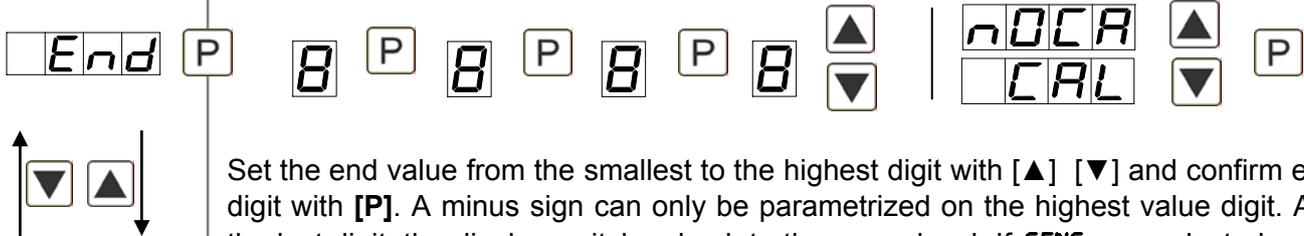
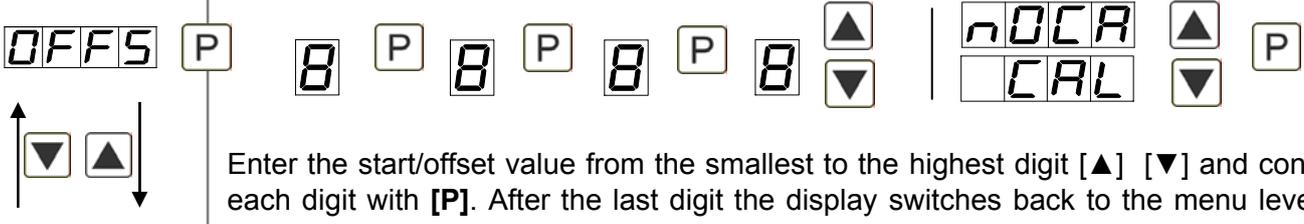
Once the installation is complete, you can start the device by applying the current loop. Check beforehand once again that all the electrical connections are correct.

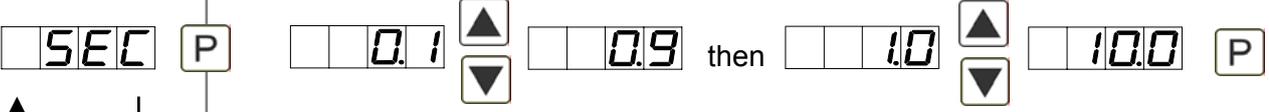
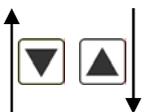
Starting sequence

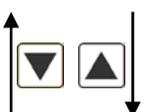
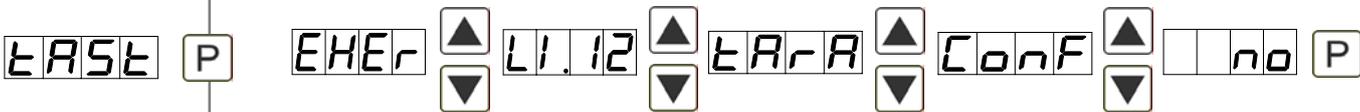
For 1 second during the switching-on process, the segment test (8 8 8 8) is displayed, followed by an indication of the software type and, after that, also for 1 second, the software version. After the start-up sequence, the device switches to operation/display mode.

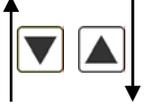
4.2. Parameterization:

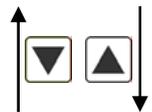
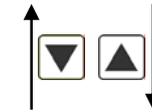
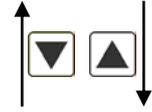
To be able to parameterize the display, press the [P] key in operating mode for 1 second. The display then changes to the menu level with the first menu item *TYPE*.

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

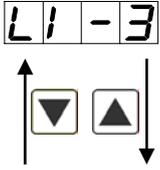
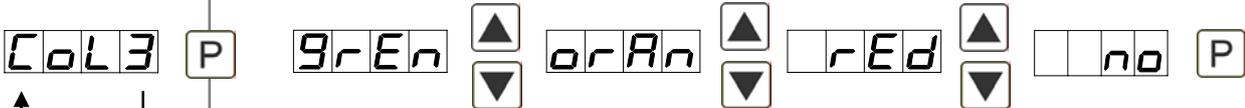
Menu level	Parameterization level
	<p>Setting the decimal point, DOT:</p> <p></p> <p>The decimal point on the display can be moved with [▲] [▼] and confirmed with [P]. The display then switches back to the menu level again.</p>
	<p>Setting the display time, SEC:</p> <p></p> <p>The display time is set with [▲] [▼]. The display moves up in increments of 0.1 up to 1 second and in increments of 1.0 to 10.0 seconds. Confirm the selection by pressing the [P]. The display then switches back to the menu level again.</p>
	<p>Sliding average determination, AVG:</p> <p></p> <p>The numbers of the included individual measurements for the average determination can be selectect from 1 to 50. The product of the selected number (<i>AVG</i>) and the preset measuring time (<i>SEC</i>) is the total average time. The result will be displayed and evaluated for the alarms.</p>
	<p>Setting the standard colour, COL:</p> <p></p> <p>Here, the standard colour of the display can be set without off-limit condition. The colours red, green and orange are available.</p>
	<p>Activation / deactivation of the programming lock and completion of the standard parameterization, RUN:</p> <p></p> <p>With the aid of the [▲] [▼] keys, you can choose between the deactivated key lock <i>ULOC</i> (works setting) and the activated key lock <i>LOC</i>. Make 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, you must press [P] for 3 seconds in operating mode. You must now enter the <i>CODE</i> (works setting 1 2 3 4) that appears using the [▲] [▼] keys plus [P] to unlock the keyboard. <i>FAIL</i> appears if the input is wrong.</p>

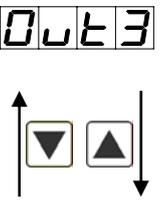
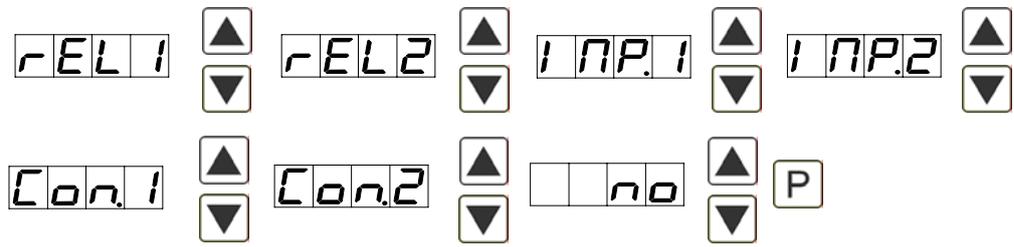
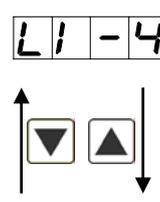
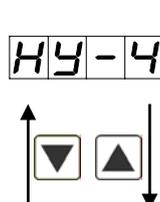
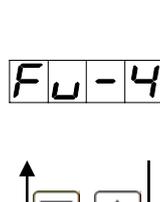
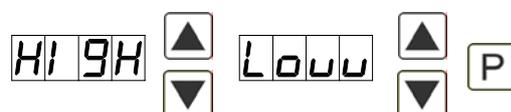
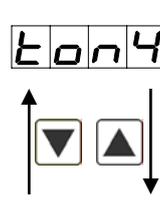
Menu level	Parameterization level
	<p>Rescaling the measuring input values, <i>ENDR</i>:</p> <p></p> <p>With the aid of this function, you can rescale the input value of e.g. 19,5 mA (works setting) without applying a measuring signal. If sensor calibration has been selected, these parameters are not available.</p>
	<p>Rescaling the measuring input values, <i>OFFR</i>:</p> <p></p> <p>With the aid of 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.</p>
	<p>Setting the tare/offset value, <i>TARR</i>:</p> <p></p> <p>The given value is added to the linerarized value. In this way, the characteristic line can be shifted by the selected amount.</p>
	<p>Zero point slowdown, <i>ZERO</i>:</p> <p></p> <p>With zero point slowdown, a value range around zero can be preselected 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.</p>
	<p>4.2.1. MIN/MAX value inquiry - Assignment of key functions, <i>TAST</i>:</p> <p></p> <p>Here, you can enter for the operating mode either a MIN/MAX value inquiry, a threshold value correction or a tara-function on the arrow keys.</p> <p>If the MIN/MAX memory is activated with <i>EHER</i>, the measured MIN/MAX values will be saved during operation and can be called up via the arrow keys [▲] [▼]. The values are lost if the device is restarted.</p> <p>If the threshold value correction <i>LI.1</i> is selected, the limit values can be changed during operation without hindering the operating procedure.</p> <p>With the tara-function the device can be set on a temporarily parameterized value. This function is activated by pushing the two arrow keys [▼] [▲] simultaneously. The device receipts the correct taring by showing "0000" in the display. If a set point confirmation via the navigation keys is desired, then <i>CONF</i> needs to be parametrised. The selection of the relays is done in the menu level under <i>OUT1 - OUT4</i>.</p> <p>If <i>NO</i> is parameterized, the arrow keys [▼] [▲] have no function in operating mode.</p>

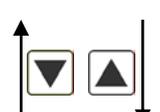
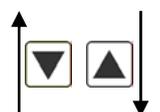
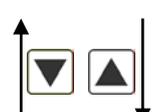
Menu level	Parameterization level
<p>FLAS P</p> 	<p>4.2.2. Flashing of display, FLAS:</p> <p>LI-1 LI-2 LI.12 LI-3 LI-4 LI.34 LI-R no P</p> <p>Here, a flashing of the display can be added as an extra alarm function, either be related to the single limit values LI-1...LI-4, pairwise to LI.12 or LI.34 or can be related to all limit values LI-R. With NO (works setting) the device is without flashing function.</p>
<p>LI-1 P</p> 	<p>4.2.3. Limit value / Limit, LI-1:</p> <p>0 P 0 P 0 P 0 P</p> <p>For all four limit values, different values can be parameterized. With this, the parameters for each limit value are called up one after the other.</p>
<p>HY-1 P</p> 	<p>Hysteresis for limit values, HY-1:</p> <p>0 P 0 P 0 P 0 P</p> <p>For all limit values, a hysteresis function exists that reacts according to the settings (threshold exceedance / threshold undercut).</p>
<p>FU-1 P</p> 	<p>Function if display falls below / exceeds limit value, FU-1:</p> <p>HIGH LOW P</p> <p>The limit value undercut can be selected with LOW (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.</p>
<p>ton1 P</p> 	<p>Switching-on delay, ton1:</p> <p>0 P 0 P 0 P 0 P</p> <p>Here, for limit value 1 a delayed switching-on of 0-6000 s can be given.</p>

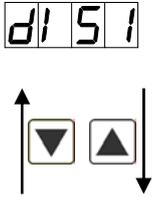
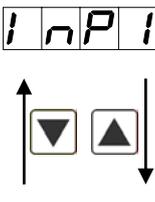
Menu level	Parameterization level
	<p>Switching-off delay, <i>TOF1</i>:</p> <p>TOF1 P 0 P 0 P 0 P 0  P</p> <p>Here for limit value 1 a delayed switching-off of 0-6000 s can be given.</p>
	<p>Colour switch on limit value 1, <i>COL1</i>:</p> <p>COL1 P grEn  orAn  rEd  no P</p> <p>With function an off-limit condition can be emphasised by a colour change of the display.</p>
	<p>Choice of setpoints, <i>OUT1</i>:</p> <p>OUT1 P rEL1  rEL2  iNP.1  iNP.2 </p> <p>Con.1  Con.2  no  P</p> <p>Via the limit value setpoint S1 (=REL1) or setpoint 2 (=REL2) can be activated. If further limit values impact on the same setpoint, this equates to an OR-function, this means the first applied off-limit condition sets the output. Additionally a fleeting contact <i>IMP.1</i> (1 second) can be output onto setpoint S1 or <i>IMP.2</i> (1 sec), or onto setpoint S2 at an off-limit condition. If a set point confirmation via the navigation keys is desired, then <i>COM.1</i> (relay 1) or <i>COM.2</i> (relay 2) needs to be selected. By choosing „no“ the setpoints are deactivated.</p>
	<p>Limit values /Limits, <i>LI-2</i>:</p> <p>LI-2 P 0 P 0 P 0 P 0  P</p> <p>For all values, different values can be parameterized. With this, the parameters for each limit value are called up one after the other.</p>
	<p>Hysteresis for limit values, <i>HY-2</i>:</p> <p>HY-2 P 0 P 0 P 0 P 0  P</p> <p>For all limit values, a hysteresis function exists that reacts according to the settings (threshold exceedance / threshold undercut).</p>

Menu level	Parameterization level
<p>FU-2 P</p> <p>↑ ↓</p>	<p>Function if display falls below / exceeds limit value, FU-2:</p> <p>HIGH ▲ ▼ LOW ▲ ▼ P</p> <p>To indicate if the value falls below the lower limit value, LOW can be selected (LOW = lower limit value) and if it goes above the upper limit value, HIGH can be selected (HIGH = upper limit value). LOW corresponds to the quiescent current principle and HIGH to the operating current principle.</p>
<p>tOn2 P</p> <p>↑ ↓</p>	<p>Switching-on delay, TON2:</p> <p>0 P 0 P 0 P 0 ▲ ▼ P</p> <p>Here, for limit value 1 a delayed switching-on of 0-6000 s can be given.</p>
<p>tOf2 P</p> <p>↑ ↓</p>	<p>Switching-off delay, TOF2:</p> <p>0 P 0 P 0 P 0 ▲ ▼ P</p> <p>Here for limit value 1 a delayed switching-off of 0-6000 s can be given.</p>
<p>CoL2 P</p> <p>↑ ↓</p>	<p>Colour switch on limit value 1, COL2:</p> <p>GrEn ▲ ▼ orAn ▲ ▼ rEd ▲ ▼ no P</p> <p>With function an off-limit condition can be emphasised by a colour change of the display.</p>
<p>Out2 P</p> <p>↑ ↓</p>	<p>Choice of setpoints, OUT2:</p> <p>REL1 ▲ ▼ REL2 ▲ ▼ IMP.1 ▲ ▼ IMP.2 ▲ ▼</p> <p>Con.1 ▲ ▼ Con.2 ▲ ▼ no ▲ ▼ P</p> <p>Via the limit value setpoint S1 (=REL1) or setpoint 2 (=REL2) can be activated. If further limit values impact on the same setpoint, this equates to an OR-function, this means the first applied off-limit condition sets the output. Additionally a fleeting contact IMP.1 (1 second) can be output onto setpoint S1 or IMP.2 (1 sec), or onto setpoint S2 at an off-limit condition. If a set point confirmation via the navigation keys is desired, then CON.1 (relay 1) or CON.2 (relay 2) needs to be selected. By choosing „no“ the setpoints are deactivated.</p>

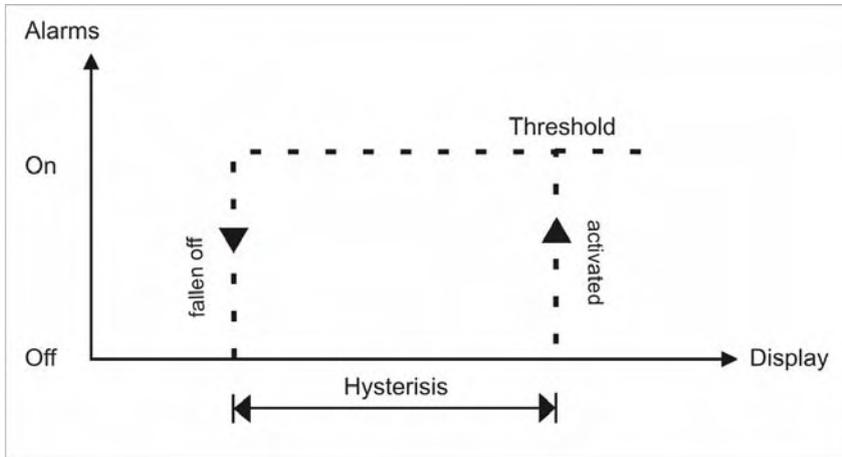
Menu level	Parameterization level
	<p>Limit values /Limits, <i>LI-3</i>:</p>  <p>For all values, different values can be parameterized. With this, the parameters for each limit value are called up one after the other.</p>
	<p>Hysteresis for limit values, <i>HY-3</i>:</p>  <p>For all limit values, a hysteresis function exists that reacts according to the settings (threshold exceedance / threshold undercut).</p>
	<p>Function if display falls below / exceeds limit value, <i>FU-3</i>:</p>  <p>To indicate if the value falls below the lower limit value, <i>LOWU</i> can be selected (LOW = lower limit value) and if it goes above the upper limit value, <i>HIGH</i> can be selected (HIGH = upper limit value). LOW corresponds to the quiescent current principle and HIGH to the operating current principle.</p>
	<p>Switching-on delay, <i>TON3</i>:</p>  <p>Here, for limit value 1 a delayed switching-on of 0-6000 s can be given.</p>
	<p>Switching-off delay, <i>TOF3</i>:</p>  <p>Here for limit value 1 a delayed switching-off of 0-6000 s can be given.</p>
	<p>Colour switch on limit value 1, <i>COL3</i>:</p>  <p>With function an off-limit condition can be emphasised by a colour change of the display.</p>

Menu level	Parameterization level
	<p>Choice of setpoints, <i>OUT3</i>:</p>  <p>Via the limit value setpoint S1 (=REL1) or setpoint 2 (=REL2) can be activated. If further limit values impact on the same setpoint, this equates to an OR-function, this means the first applied off-limit condition sets the output. Additionally a fleeting contact <i>IMP.1</i> (1 second) can be output onto setpoint S1 or <i>IMP.2</i> (1 sec), or onto setpoint S2 at an off-limit condition. If a set point confirmation via the navigation keys is desired, then <i>CON.1</i> (relay 1) or <i>CON.2</i> (relay 2) needs to be selected. By choosing „no“ the setpoints are deactivated.</p>
	<p>Limit values /Limits, <i>LI-4</i>:</p>  <p>For all values, different values can be parameterized. With this, the parameters for each limit value are called up one after the other.</p>
	<p>Hysteresis for limit values, <i>HY-4</i>:</p>  <p>For all limit values, a hysteresis function exists that reacts according to the settings (threshold exceedance / threshold undercut).</p>
	<p>Function if display falls below / exceeds limit value, <i>FU-4</i>:</p>  <p>To indicate if the value falls below the lower limit value, <i>LOWU</i> can be selected (LOW = lower limit value) and if it goes above the upper limit value, <i>HIGH</i> can be selected (HIGH = upper limit value). LOW corresponds to the quiescent current principle and HIGH to the operating current principle.</p>
	<p>Switching-on delay, <i>TON4</i>:</p>  <p>Here, for limit value 1 a delayed switching-on of 0-6000 s can be given.</p>

Menu level	Parameterization level
	<p>Switching-off delay, <i>TOF4</i>:</p> <p><i>TOF4</i> P 0 P 0 P 0 P 0  P</p> <p>Here for limit value 1 a delayed switching-off of 0-100 s can be given.</p>
	<p>Colour switch on limit value 1, <i>COL4</i>:</p> <p><i>COL4</i> P grEn  orAn  rEd  no P</p> <p>With function an off-limit condition can be emphasised by a colour change of the display.</p>
	<p>Choice of setpoints, <i>OUT4</i>:</p> <p><i>OUT4</i> P rEL1  rEL2  INP.1  INP.2 </p> <p>Con.1  Con.2  no P</p> <p>Via the limit value setpoint S1 (=REL1) or setpoint 2 (=REL2) can be activated. If further limit values impact on the same setpoint, this equates to an OR-function, this means the first applied off-limit condition sets the output. Additionally a fleeting contact <i>IMP.1</i> (1 second) can be output onto setpoint S1 or <i>IMP.2</i> (1 sec), or onto setpoint S2 at an off-limit condition. If a set point confirmation via the navigation keys is desired, then <i>CON.1</i> (relay 1) or <i>CON.2</i> (relay 2) needs to be selected. By choosing „no“ the setpoints are deactivated.</p>
	<p>4.2.4. Setting the code, <i>CODE</i>:</p> <p><i>CODE</i> P 1 P 2 P 3 P 4  P</p> <p>With this setting, it is possible to select an individual code (works setting 1 2 3 4 for locking the keyboard. To lock/release the key, proceed according to menu item <i>RUN</i>.</p>
	<p>4.2.5. Setpoints - Number of additional setpoints, <i>SPCT</i>:</p> <p><i>SPCT</i> P 0  P</p> <p>In addition to the start and end value, 9 extra setpoints can be defined to linearize non-linear sensor values. Only the activated setpoint parameters are displayed.</p>

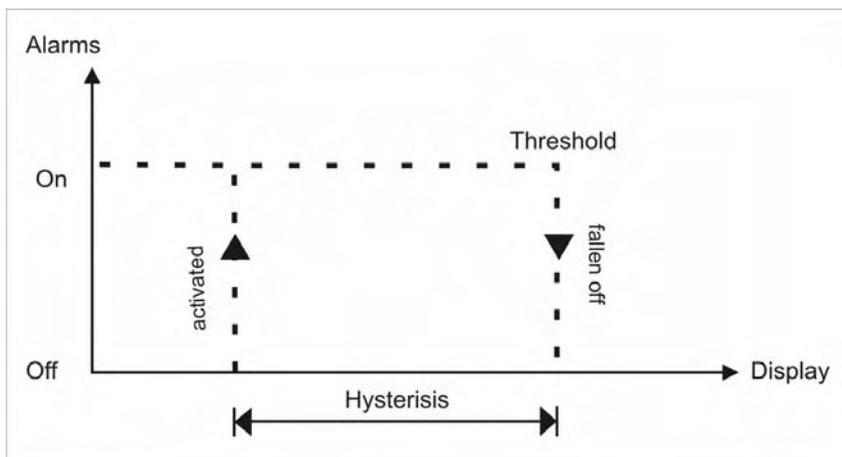
Menu level	Parameterization level
	<p data-bbox="352 331 906 365">Display values for set points <i>DIS1 ... DIS9</i>:</p>  <p data-bbox="352 501 1481 604">Under this parameter the setpoints are defined on a value basis. At the sensor calibration one will be asked at the end (like at Endwert/Offset, too), if a calibration shall be triggered.</p>
	<p data-bbox="352 627 935 660">Analogue values for set points <i>INP1 ... INP9</i>:</p>  <p data-bbox="352 801 1481 904">Setpoints are only displayed under works calibration (4-20 mA). Here you can choose your analog values. The entry of constantly rising values need to be done self-contained.</p>

Functional principle of the alarms



Limit value exceedance “HIGH”

By limit value exceedance the alarm S1-S2 is off below the threshold and on on reaching the threshold.



Limit value undercut “LOW”

By limit value undercut the alarm S1-S2 is on below the threshold and switched off on reaching the threshold.

Alarms / optical limit value display

Limit values can be optically indicated by flashing of the 7-segment display.

Functional principle of the alarms	
Alarm	Deactivated, display value
Threshold	Threshold/limit value for switch over
Hysteresis	Width of the window between the thresholds
Function	Limit value exceedance / limit value undercut

5. Factory settings

5.1. Default values

Parameter	Menu items				Default
TYPE	SEnS	0-10	0-20	4-20	SEnS
End	1999	to	9999		1000
OFFS	1999	to	9999		0000
dot	0	to	0.000		0
SEC	00.1	to	10.0		0.10
AUG	01	to	50		01
CoL	GrEn	orAn	rEd		GrEn
run	ULOC	LOC			ULOC
EndA	1999	to	9999		1000
OFFA	1999	to	9999		0
tArA	1999	to	9999		0
ZEro	00	to	100		000
tASt	no	EHt	L1.12	tArA	no
	ConF				
FLAS	no	L1-1	L1-2	L1.12	no
	L1-3	L1-4	L1.34	L1-A	
L1-1	1999	to	9999		0200
HY-1	0000	to	9999		0000
Fu-1	Lowu	HI 9H			HI 9H
tOn1	0000	to	6000		0000
tOf1	0000	to	6000		0000
CoL1	GrEn	orAn	rEd	no	no
Out1	rEL1	rEL2	INP.1	INP.2	rEL1
	Con1	Con2	no		
L1-2	1999	to	9999		0300
HY-2	0000	to	9999		0000
Fu-2	Lowu	HI 9H			HI 9H
tOn2	0000	to	6000		0000
tOf2	0000	to	6000		0000
CoL2	GrEn	orAn	rEd	no	no
Out2	rEL1	rEL2	INP.1	INP.2	rEL2
	Con1	Con2	no		
L1-3	1999	to	9999		0400

5. Factory settings

Parameter	Menu items				Default
HY-3	0000	to	9999		0000
FU-3	LOWU	HI GH			HI GH
ton3	0000	to	6000		0000
toF3	0000	to	6000		0000
COL3	GrEn	orAn	rEd	no	no
Out3	rEL1	rEL2	INP.1	INP.2	no
	Con1	Con2	no		
LI-4	4999	to	9999		0500
HY-4	0000	to	9999		0000
FU-4	LOWU	HI GH			HI GH
ton4	0000	to	6000		0000
toF4	0000	to	6000		0000
COL4	GrEn	orAn	rEd	no	no
Out4	rEL1	HI GH	INP.1	INP.2	no
	Con1	Con2	no		
Code	0000	rEL2	9999		1234
SPCE	0	to	9		0
diS1	4999	to	9999		
INP1	4999	to	9999		
diS2	4999	to	9999		
INP2	4999	to	9999		
diS3	4999	to	9999		
INP3	4999	to	9999		
diS4	4999	to	9999		
INP4	4999	to	9999		
diS5	4999	to	9999		
INP5	4999	to	9999		
diS6	4999	to	9999		
INP6	4999	to	9999		
diS7	4999	to	9999		
INP7	4999	to	9999		
diS8	4999	to	9999		
INP8	4999	to	9999		
diS9	4999	to	9999		
INP9	4999	to	9999		

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				
96x48	96x48x25 mm (BxHxD)			
	96x48x45 mm (BxHxD) including plug-in terminal			
Panel cut-out				
96x48	92.0 ^{+0.8} x 45.0 ^{+0.6} mm			
Insulation thickness	up to 3 mm			
Fixing	snap-in screw element			
Material	PC Polycarbonate, black, UL94V-0			
Sealing material	EPDM, 65 Shore, black			
Protection class	standard IP65 (front), IP00 (back side)			
Weight	approx. 100 g			
Connection	plug-in terminal; wire cross section up to 2.5 mm ²			
Display				
Digit height	14 mm			
Segment colour	Red, green, orange switchable via limit values			
Display range	-1999 bis 9999			
Setpoints	optical display flashing			
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 fault	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	~ 200 kΩ	0.1 % of measuring range	±1
Temperature drift	100 ppm / K			
Measuring time	0.1...10.0 seconds			
Measuring principle	U/F-conversion			
Resolution	approx. 18 Bit at 1 second measuring time			
Switching outputs	Type	Switching contact		
	Relay with change-over contact	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 EN 50178 / Characteristics according to DIN EN 60255			

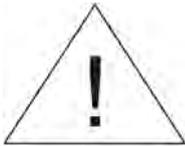
Power pack	24 VDC +/- 10 % max. 2 VA
Memory	EEPROM
Data life	≥ 100 years
Ambient conditions	
Working temperature	0...60°C
Storing temperature	-20...80°C
Climatic density	relative humidity 0-80% on years average without dew
EMV	EN 61326
CE-sign	Conformity to directive 2004/108/EG
Safety standard	according to low voltage directive 2006/95/EG EN 61010; EN 60664-1

7. Safety advice

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

Proper use

The **M1-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 **M1-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.	<p>The unit permanently indicates overflow.</p> 	<ul style="list-style-type: none"> • 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.	<p>The unit permanently shows underflow.</p> 	<ul style="list-style-type: none"> • 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.	<p>The word "HELP" lights up in the 7-segment display.</p>	<ul style="list-style-type: none"> • 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.	<p>Program numbers for parameterising of the input are not accessible.</p>	<ul style="list-style-type: none"> • Programming lock is activated • Enter correct code
5.	<p>"ERRT" lights up in the 7-segment display</p>	<ul style="list-style-type: none"> • Please contact the manufacturer if errors of this kind occur.
6.	<p>The device does not react as expected.</p>	<ul style="list-style-type: none"> • 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.