

Measuring Equipment  
for plastic extrusion



**Operating Instructions  
for  
Measurement Amplifier  
TYP MD21**

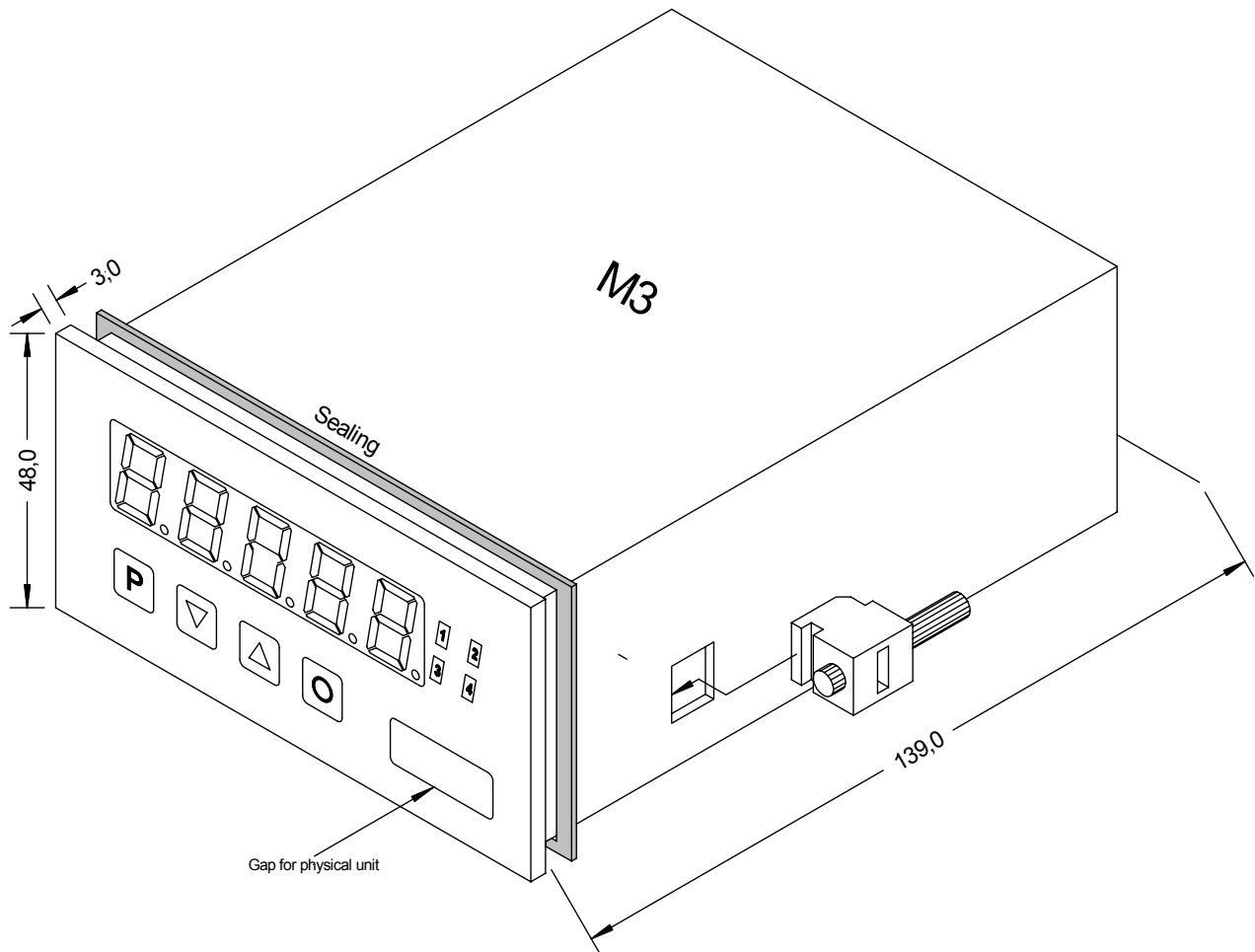


Made in Germany



This instruction manual is only valid for type MD21 Measurement Amplifier. These are precision measurement amplifier that, with appropriate handling, have a long lifetime and provide reproducible measurements. The MD21 should be installed and operated by personnel qualified to install, commission and operate such appliances. The instruction manual should be at hand at all times. Suitable transport and appropriate storage are prerequisites. However, if problems occur, please contact our customer service department.

## 1. Assembly

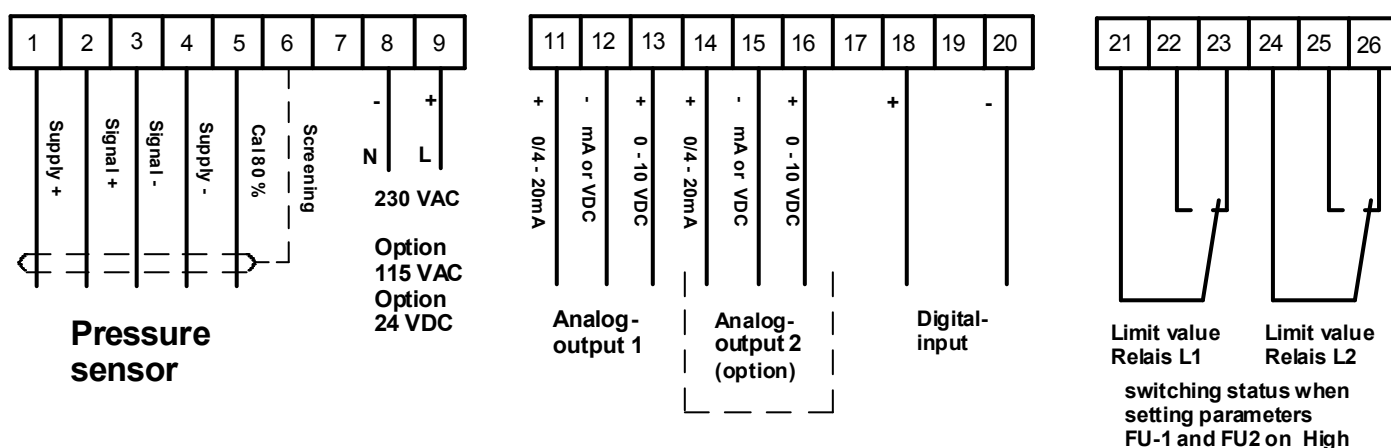


1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

**CAUTION! The torque should not exceed 0.1 Nm!**

## 2. Electrical connection

Work at electrical connections should only be carried out by qualified staff, in accordance with local regulations. The unit has to be connected in accordance with the wiring diagram. Please pay attention to local regulations on installation and operation of electrical equipment.



### CE-sign

For unlimited use of the instrument within the directives for electromagnetic compatibility 89/336/EC measuring wires have to be used with shielded cable and cable's shield connected to earth ground at one end only.

## 4. Setting up the device

### 4.1. Switching-on

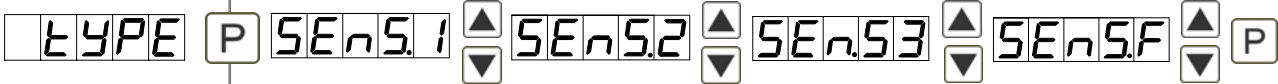

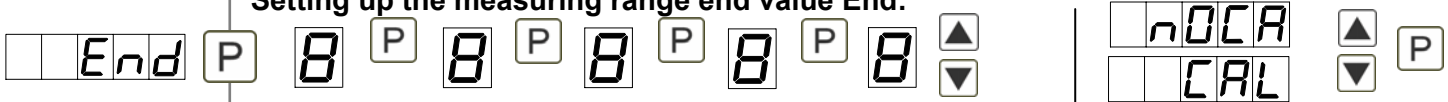



Once the installation is complete, you can start the device by applying the voltage supply. Before, check once again that all electrical connections are correct.


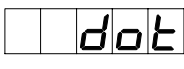



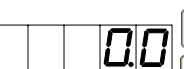

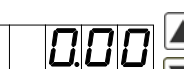







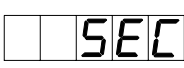

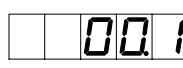

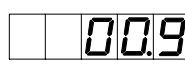
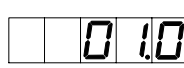

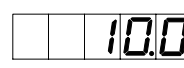

#### Starting sequence

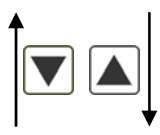

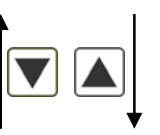

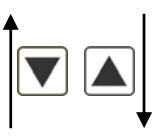

For 1 second during the switching-on process, the segment test (8 8 8 8 8) is displayed, followed by an indication of the software type and, after that, also for 1 second, the software version. After the starting sequence, the device switches to operation/display mode.




### 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
 	<p><b>Selection of the input signal tYPE:</b></p> <p>Available as measuring inputs are SEnS.1 for 1 mV/V, SENS.2 for 2 mV/V and SENS.3 for 3.3 mV/V for known sensor sensibilities. Via SEnS.F each sensor is calibrated and measured up to approx. 4 mV/V. With <b>[P]</b> the selection is confirmed and the device changes back into menu level.</p>
 	<p><b>Setting up the measuring range end value End:</b></p> <p>The final value has to be adjusted from the smallest to the highest digit with <b>[▲]</b> <b>[▼]</b> and needs to be confirmed digit per digit with <b>[P]</b>. A minus sign can only be parametrised on the highest digit. After the last digit, it can then be chosen between <b>nOCA</b> and <b>CAL</b>. With <b>nOCA</b> the display value that has been adjusted bevor can now be taken over, with <b>CAL</b> the matching is done via the measuring section and the analog input value is taken over. It is always adopted to 100%. With <b>[P]</b> the selection is confirmed and the device changes back into menu level.</p>
 	<p><b>Setting up the measuring range start/offset value OFFS:</b></p> <p>The initial value has to be adjusted from the smallest to the highest digit with <b>[▲]</b> <b>[▼]</b> and needs to be confirmed digit per digit with <b>[P]</b>. A minus sign can only be parametrised on the highest digit. After the last digit, it can then be chosen between <b>nOCA</b> and <b>CAL</b>. With <b>nOCA</b> the display value that has been adjusted bevor can now be taken over, with <b>CAL</b> the matching is done via the measuring section and the analog input value is taken over. It is always adopted to 100%. With <b>[P]</b> the selection is confirmed and the device changes back into menu level.</p>

Menu level	Parameterisation level
	<p><b>Setting of the comma / decimal point, dot:</b></p> <p>              </p> <p>The decimal point of the display can be adjusted with [<b>▲</b>] [<b>▼</b>]. With [<b>P</b>] the selection is confirmed and the device changes back into menu level.</p>
	<p><b>Setting of the measuring time, SEC:</b></p> <p>                then               </p> <p>The measuring time is adjusted with [<b>▲</b>] [<b>▼</b>]. The display moves up in increments of 0.1 up to 1 second and in increments of 1.0 up to 10.0 seconds. With [<b>P</b>] the selection is confirmed and the device changes back into menu level.</p>
	<p>flow diagram is shown in <i>chapter 4.4</i>. At AL-1...AL-8 an output can be set and therewith e.g. a switch of the metering point can be done. If no is selected, the [<b>O</b>]-key has no function in the operation mode.</p>

Menu level	Parameterisation level
	<p><b>Selection analog output 1, Out.rA:</b></p> <p>  </p> <p>Three output signals are available: 0-10 VDC, 0-20 mA and 4-20 mA. With function the desired signal can be selected.</p>
	<p><b>Setting the final value of the analog output 1, Out.En:</b></p> <p>  </p> <p>The final value is adjusted from the smallest digit to the highest digit with [▲] [▼] and digit by digit confirmed with [P]. A minus sign can only be parametrised on the highest digit. After the last digit, the device changes back into menu level.</p>
	<p><b>Setting the initial value of the analog output 1, Out.OF:</b></p> <p>  </p> <p>The initial value is adjusted from the smallest digit to the highest digit with [▲] [▼] and digit by digit confirmed with [P]. A minus sign can only be parametrised on the highest digit. After the last digit, the device changes back into menu level.</p>

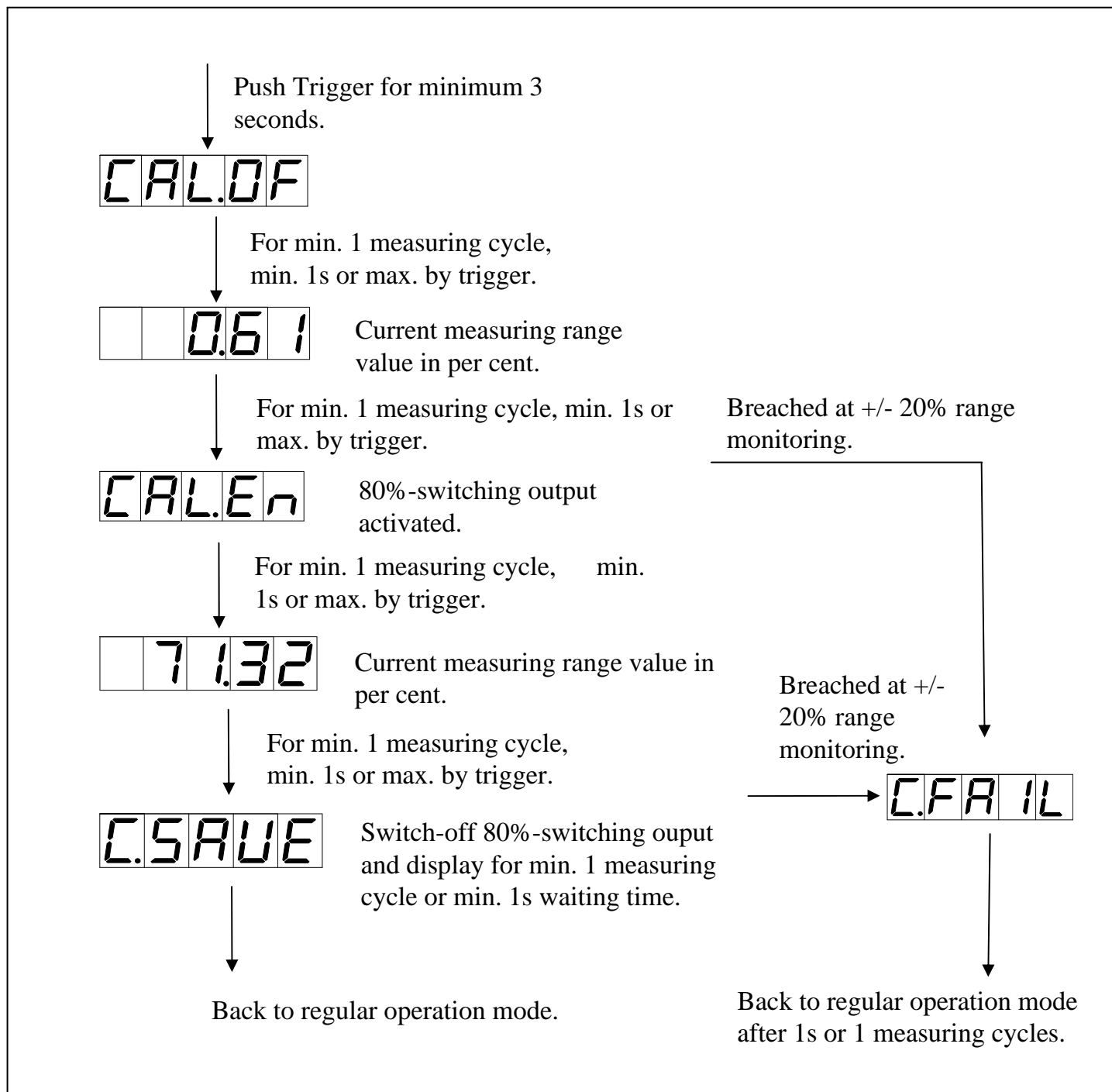
Menu level	Parameterisation level
	<p><b>Threshold values / Limit values, LI-1:</b></p> <p>LI-1 P 0 P 0 P 0 P 0 P 0 P</p> <p>The limit value defines the threshold, that activates/deactivates an alarm.</p>
	<p><b>Hysteresis for Threshold values, HY-1:</b></p> <p>HY-1 P 0 P 0 P 0 P 0 P 0 P</p> <p>The delayed reaction of the alarm is the difference to the threshold value, which is defined by the hysteresis.</p>
	<p><b>Function for threshold value undercut /exceedance, Fu-1:</b></p> <p>Fu-1 P HIGH LOW P</p> <p>A limit value undercut is selected with <b>Low</b> (for LOW = lower limit value), a limit value exceedance with <b>High</b> (for HIGH = higher limit value). If e.g. limit value 1 is on a threshold level of 100 and allocated with function <b>High</b>, an alarm is activated by reaching of the threshold level. If the threshold value was allocated to <b>Low</b>, an alarm will be activated by undercutting the threshold value, as long as the hysteresis is zero.</p>
<p><b>ton-1</b></p>	<p>Indicate delete in sek.</p>
<p><b>HLD-1</b></p>	<p>Hold function</p>
	<p><b>The same applies to LI-1 to LI-2 !</b></p>

Menu level	Parameterisation level
	<p><b>User code (4-digit number-combination, free available), U.CodE:</b></p> <p>U.CodE [P] 8 [P] 8 [P] 8 [P] 8 [▲] [▼] [P]</p> <p>If this code was set (&gt;0000), all parameters are locked for the user, if <b>LOC</b> has been selected before under menu item <b>run</b>. By pressing [<b>P</b>] for 3 seconds in operation mode, the display shows <b>CCode</b>. The <b>U.Code</b> needs to be entered to get to the reduced number of parameter sets.</p>
	<p><b>Activation / deactivation of the programming lock or completion of the standard parameterization with change into menu group level (complete function range), run:</b></p> <p>run [P] UL0C [▲] [▼] LOC [▲] [▼] ProF [P]</p> <p>With the navigation keys [<b>▲</b>] [<b>▼</b>], you can choose between the deactivated key lock <b>Uloc</b> (works setting) and the activated key lock <b>Loc</b>, or the change into the menu group level <b>ProF</b>. Confirm the selection with [<b>P</b>]. After this, the display confirms the settings with "- - - -", and automatically switches to operating mode. If <b>Loc</b> was selected, the keyboard is locked. To get back into the menu level, press [<b>P</b>] for 3 seconds in operating mode. Now enter the <b>CODE</b> (works setting <b>1 2 3 4</b>) that appears using [<b>▲</b>] [<b>▼</b>] plus [<b>P</b>] to unlock the keyboard. <b>FAIL</b> appears if the input is wrong. To parameterize further functions <b>ProF</b> needs to be set. The device confirms this setting with „- - - -“, and changes automatically in operation mode.</p>



#### 4.4. Sensor calibration offset / final value

The device has an automatic calibration at mass pressure sensors, where an integrated switching output operates an often available 80% calibration. Like this offset and final value are adjusted, and the sensor can be applied directly after this. The calibration can be done via the 4th key or the digital input, depending on the parameterisation.

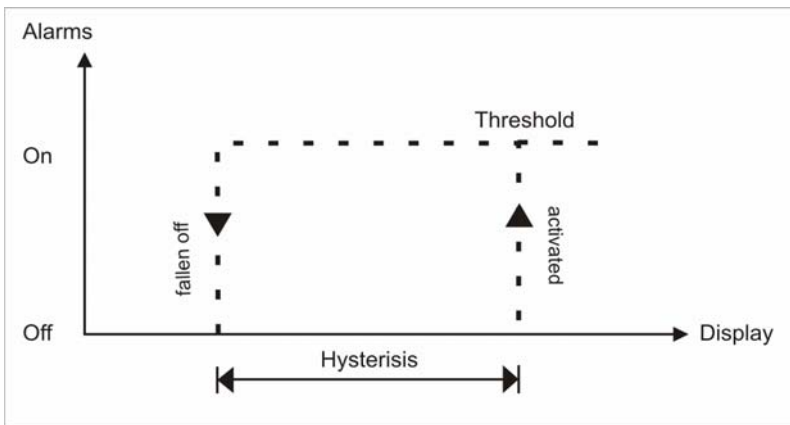


If a special input range **SENS.1**, **SENS.2**, **SENS.3** was selected under **type**, a checking of the range is done for offset and final value. At an undercut/exceedance of +/- 20% of adjustment range, an **C.FAIL** is given out.

### 4.5. Alarms / Relays

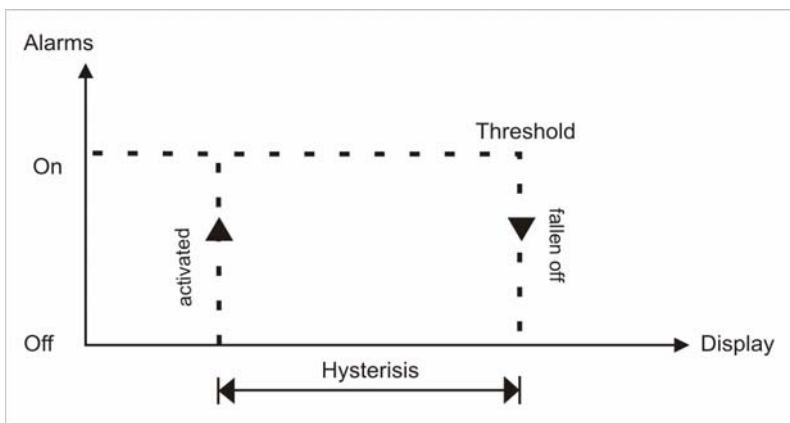
This device has 4 virtual alarms that can monitor one limit value in regard of an undercut or exceedance. Each alarm can be allocated to an optional relay output S1-S2; furthermore alarms can be controlled by events like e.g. Hold or Min-/Max-value.

Function principle of alarms / relays	
<b>Alarm / Relay x</b>	De-activated, instantaneous value, min-/max-value, hold-value, totaliser value
<b>Switching threshold</b>	Threshold / limit value of the change-over
<b>Hysteresis</b>	Broadness of the window between the switching thresholds
<b>Working principle</b>	Operating strom / Quiescent current



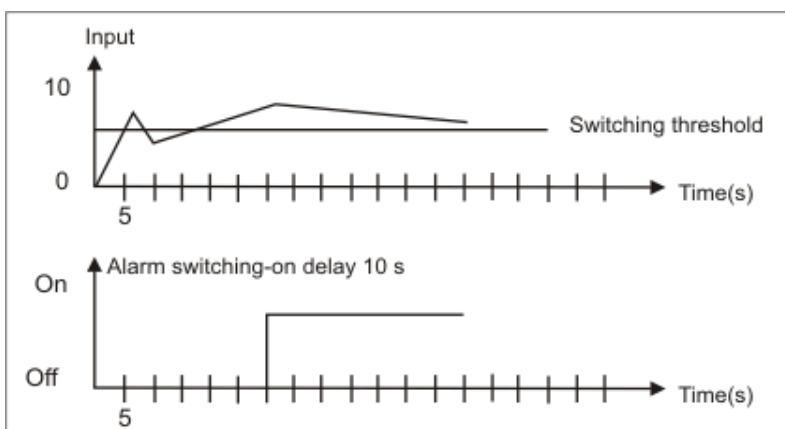
#### Operating current

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

## 6. Technical data

<b>Housing</b>	
<b>Dimensions</b>	96x48x120 mm (BxHxT)
	96x48x139 mm (BxHxT) including plug-in terminal
Panel cut-out	92.0 <sup>+0.8</sup> x 45.0 <sup>+0.6</sup> mm
Wall thickness	up to 15 mm
Fixing	screw elements
Material	PC Polycarbonate, black, UL94V-0
Sealing material	EPDM, 65 Shore, black
Protection class	standard IP65 (front), IP00 (back)
Weight	approx. 300 g
Connection	plug-in terminal; wire cross section up to 2.5 mm <sup>2</sup>
<b>Display</b>	
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
<b>Input</b>	
Sensor sensitivity	1mV/V, 2mV/V, 3.3mV/V
Measuring bridge	250-500 Ω / 20-40 mA
Measuring error	0.2% of measuring range in electromagnetic dominated environment, 1% of measuring range in industrial environment with strong disturbing source
Digital input	< 24 V OFF, 10 V ON, max. 30 VDC R <sub>i</sub> ~ 5 kΩ
Sensor calibration	always required
Temperature drift	100 ppm / K
<b>Accuracy</b>	
Measuring time	0.1...10.0 seconds
Measuring principle	U/F-conversion
Resolution	approx. 18 Bit at 1s measuring time, 3.3 mV/V measuring range

<b>Output</b>	
Sensor supply	24 VDC / 50 mA; 10 VDC / 20 mA
Analog output	0/4-20 mA or 0-10 VDC 16 Bit switchable
Switching output	
Relay Switching cycles	with change-over contacts 250 VAC / 5 AAC; 30 VDC / 5 ADC 30 x 10 <sup>3</sup> at 5 AAC, 5 ADC ohm resistive load 10 x 10 <sup>6</sup> mechanically Diversity according to DIN EN50178 / Characteristics according to DIN EN60255
<b>PhotoMos outputs</b>	8 normally open (NO) contacts 30 VDC/AC, 0,4 A
<b>Power pack</b>	230 VAC +/- 10 % max. 10 VA 10-30 VDC galv. insulated, max. 4 VA
<b>Memory</b>	EEPROM
Data life	≥ 100 years
<b>Ambient conditions</b>	
Working temperature	0...50°C
Storing temperature	-20...80°C
Climatic density	relative humidity 0-80% on years average without dew
<b>EMV</b>	EN 61326
<b>CE-sign</b>	Conformity according to directive 2004/108/EG
<b>Safety standard</b>	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 **MD21-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 **MD21-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"> <li>• The input has a very high measurement, check the measuring circuit.</li> <li>• With a selected input with a low voltage signal, it is only connected on one side or the input is open.</li> <li>• Not all of the activated setpoints are parameterised. Check if the relevant parameters are adjusted correctly.</li> </ul>
2.	<p>The unit permanently shows underflow.</p> 	<ul style="list-style-type: none"> <li>• The input has a very low measurement, check the measuring circuit .</li> <li>• With a selected input with a low voltage signal, it is only connected on one side or the input is open.</li> <li>• Not all of the activated setpoints are parameterised. Check if the relevant parameters are adjusted correctly.</li> </ul>
3.	<p>The word "<b>HELP</b>" lights up in the 7-segment display.</p>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
4.	<p>Program numbers for parameterising of the input are not accessible.</p>	<ul style="list-style-type: none"> <li>• Programming lock is activated</li> <li>• Enter correct code</li> </ul>
5.	<p>"<b>Err1</b>" lights up in the 7-segment display</p>	<ul style="list-style-type: none"> <li>• Please contact the manufacturer if errors of this kind occur.</li> </ul>
6.	<p>The device does not react as expected.</p>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>



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