
User manual MB1

Direct voltage/Direct current 0 – 10 VDC, 0/4 – 20 mA

Switchable display colour:

Standard: red/green, optional green/orange or blue/red



Size 72x24 mm (WxH)



Size 48x24 mm (WxH)



Size 96x24 mm (WxH)

Technical features:

- **NEW!!! Bargraph colour red or green, adjustable via code switch**
- minimal installation depth due to a pluggable screw terminal
- parameterisation via HEX-switch and pushbutton
- pre-adjusted input (ex factory) for standard signal 0 to 10 V and 0/4 to 20 mA
- free adjusting on the input signal
- 8 different types of notation, adjustable as bars, dot or curtain
- free selection of direction and notation of the middle (e.g. bars starting from the middle)
- gradually brightness control
- protection class IP65 at the front
- pluggable screw terminal
- optional: colours green/orange, blue/red

Identification

STANDARD-TYPES	ORDER NUMBER
Housing size 96x24 mm	MB1-33RxO.0001.770xD MB1-33RxO.0001.570xD
Housing size 72x24 mm	MB1-52RxO.0001.770xD
Housing size 48x24 mm	MB1-71RxO.0001.770xD

Options – break-down order key:

	M	B	1-	x	x	R	H	O.	0	0	0	1.	7	7	0	x	D	
Standard type M-Line																		Dimension D physical unit
Bargraph		B																Version x internal version
Device series			1															Switching points 0 none
Housing sizes W96xH24xD60 mm W72xH24xD32 mm W48xH24xD30 mm				3	5	7												Protection class 7 IP65 / pluggable terminal
Resolution 10 points 20 points 30 points				1	2	3												Voltage supply 5 230 VAC (only in 96x24 mm) 7 24 VDC galv. isolated
Display colours Green/Orange (switchable) Red/Green (switchable) Blue/Red (switchable)																		Measuring input 1 Standard signal 0/4-20 mA, 0-10 VDC
Layout horizontally vertically																		Analog output 0 none
Digital display none																		Sensor supply 0 none
																		Interface 0 none

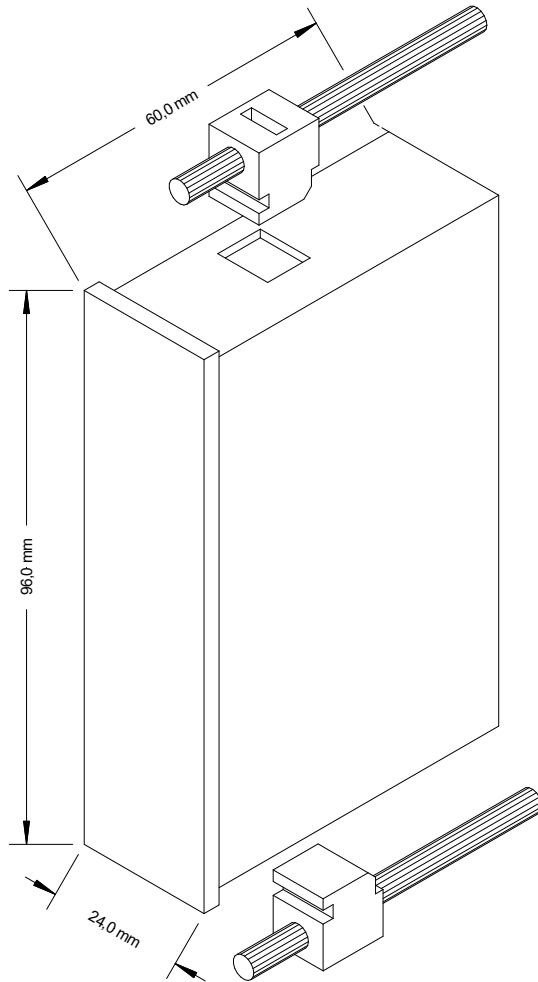
State desired physical unit in your order, e.g m/min.

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1. Assembly

Please read the *Safety advices* on *page 10* 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!

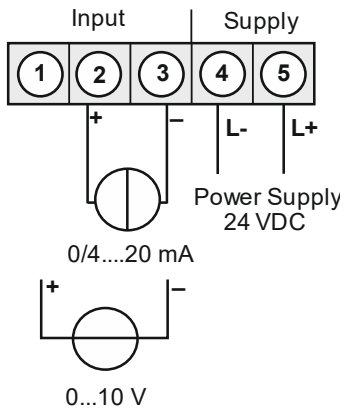
2. Electrical connection

MB1-33xxO.0001.770xD

MB1-52xxO.0001.770xD

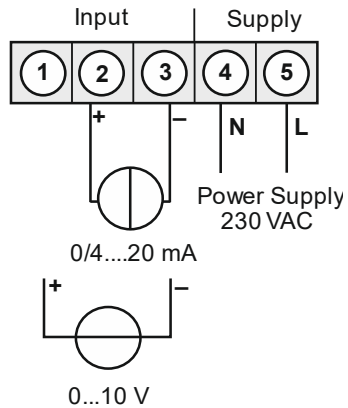
MB1-71xxO.0001.770xD

with a supply of 24 VDC



MB1-33xxO.0001.570xD

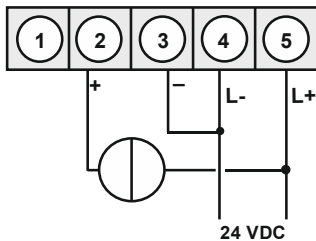
with a supply of 230 VAC



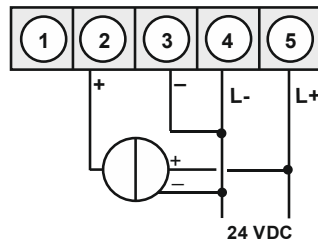
Connection examples

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

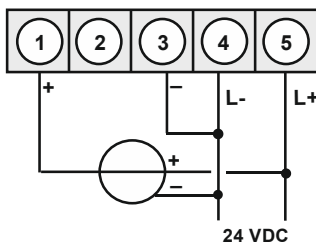
MB1 in combination with a 3-wire-sensor and 4-20 mA



MB1 in combination with a 3-wire-sensor and 0/4-20 mA



MB1 in combination with a 3-wire-sensor 0-10 V



3. Description of functions and operation

Operation

Programming happens via 2 operating elements. A code switch with 9 positions and a pushbutton on the rear side of the device.

Code switch



Access to the 9 levels of the bargraph display happens via the code switch.

Pushbutton

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 segments. Adjustments made at the parameterization level should always be confirmed by pressing the pushbutton to save them.

Description of the operating elements:

Operating elements	
Menu level Code switch	
Parameterisation level Pushbutton	

Operating mode



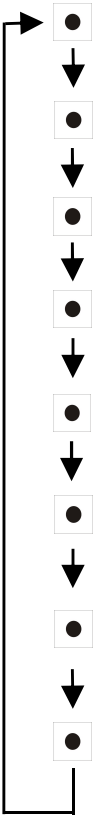
To enter the operating mode, the code switch needs always to be on position 0!


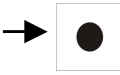

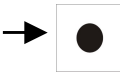



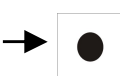



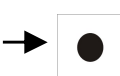




4. Setting up the device

4.1. Switching on

Once the installation is complete, start the device by applying the supply voltage. Check beforehand once again that all the electrical connections are correct.

4.2. Parameterization

Menu level Code switch		Parameterization level Pushbutton
	Operating mode	Without function
	Selection operating type	 <ul style="list-style-type: none"> <li data-bbox="568 491 885 517">Bar function from top to bottom <li data-bbox="568 592 891 617">Bar function from bottom to top <li data-bbox="568 692 891 718">Dot function from bottom to top <li data-bbox="568 759 891 785">Dot function from top to bottom <li data-bbox="568 828 1025 922">Bar function from the middle with alignment: +Signal top/left -Signal bottom/right <li data-bbox="568 963 1025 1058">Bar function from the middle with alignment: +Signal bottom/right -Signal top/left <li data-bbox="568 1099 1025 1158">Bar function „curtain“: from the middle, indicating in both directions <li data-bbox="568 1200 978 1289">Bar function „curtain“: top (left) and bottom (right) indicating in both directions

Menu level / Code switch	Parameterization level / Pushbutton
 <p>Sensor calibration Application of the signal input/final value e.g. 10 V.</p>	 <p>The display flashes until the value has been taken over by keystroke.</p>
 <p>Sensor calibration Application of the signal input/final value 0 V.</p>	 <p>The display flashes until the value has been taken over by keystroke.</p>
 <p>Factory calibration Allocation measuring input 0 – 10 V, without application of the sensor signal.</p>	 <p>The display flashes until the input has been allocated by keystroke.</p>
 <p>Factory calibration Allocation measuring input 0 – 20 mA, without application of the sensor signal.</p>	 <p>The display flashes until the input has been allocated by keystroke.</p>
 <p>Factory calibration Allocation measuring input 4 – 20 mA, without application of the sensor signal.</p>	 <p>The display flashes until the input has been allocated by keystroke.</p>
 <p>Display position Final value</p>	 <p>By keystroke you can limit the final value at any position of the display e.g. on 50 instead of 100 on the scale.</p>
 <p>Display position Initial value</p>	 <p>By keystroke you can limit the initial value at any position of the display e.g. on 50 instead of 0 on the scale.</p>
 <p>Brightness adjustment / Choice of colour</p>	 <p>The colour (red / green) and the brightness can be changed in 9 steps by keystroke.</p>

4.3. Bargraph display during parameterisation - MB1-33RxO.0001.7(5)70xD

Illustration of operation mode MB1-3/30 points bargraph										
30										
29										
28										
27										
26										
25										
24										
23										
22										
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11										
10										
9										
8										
7										
6										
5										
4										
3										
2										
1										
Bar function from top/left to bottom/right										
Bar function from bottom/right to top/left										
Dot operation from top/left to bottom/right										
Dot operation from the bottom up										
Bar function from the middle with +signal to bottom/right										
Bar function from the middle with +signal to top/left										
Bar function "curtain" from the middle in both directions										
Bar function "curtain" top/left and bottom/right in both directions										
Sensor calibration final value										
Sensor calibration Offset										
Factory calibration 0-10 V										
Factory calibration 0-20 mA										
Factory calibration 4-20 mA										
Display position final value										
Display position Offset										
Brightness regulation, bargraph colour										
Code sw itch	operation mode:	1	2	3	4	5	6	7	8	9

MB1-52RxO.0001.770xD

Illustration of operation mode MB 1-5/20 points bargraph	
20	
19	
18	
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14	
13	
12	
11	
10	
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8	
7	
6	
5	
4	
3	
2	
1	
Bar function from top/left to bottom/right	
Bar function from bottom/right to top/left	
Dot operation from top/left to bottom/right	
Dot operation from the bottom up	
Bar function from the middle with +signal to bottom/right	
Bar function from the middle with +signal to top/left	
Bar function "curtain" from the middle in both directions	
Bar function "curtain" top/left and bottom/right in both directions	
Sensor calibration final value	
Sensor calibration Offset	
Factory calibration 0-10 V	
Factory calibration 0-20 mA	
Factory calibration 4-20 mA	
Display position final value	
Display position Offset	
Brightness regulation, bargraph colour	
Code sw itch operation mode: 1	
2	
3	
4	
5	
6	
7	
8	
9	

MB1-71RxO.0001.770xD

Illustration of operation mode MB1-7/10 points bargraph									
10									
9									
8									
7									
6									
5									
4									
3									
2									
1									
Bar function from top/left to bottom/right									
Bar function from bottom/right to top/left									
Dot operation from top/left to bottom/right									
Dot operation from the bottom up									
Bar function from the middle with +signal to bottom/right									
Bar function from the middle with +signal to top/left									
Bar function "curtain" from the middle in both directions									
Bar function "curtain" from bottom/left and bottom/right in both directions									
Sensor calibration final value									
Sensor calibration Offset									
Factory calibration 0-10 V									
Factory calibration 0-20 mA									
Factory calibration 4-20 mA									
Display position final value									
Display position Offset									
Brightness regulation, bargraph colour									
Code sw itch operation mode: 1	2	3	4	5	6	7	8	9	

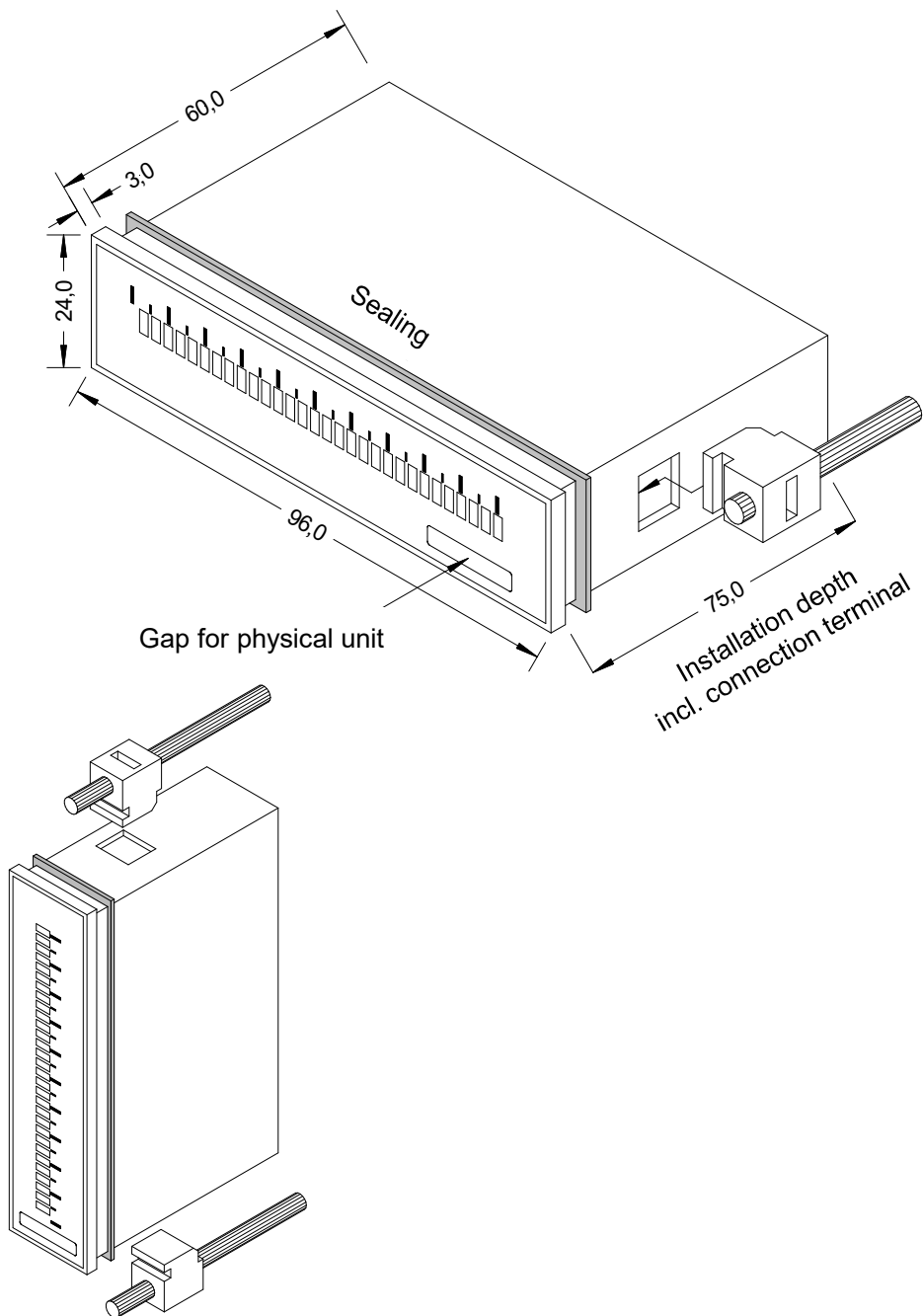
5. Factory settings

Code switch	
Position 1	Bar operation from the bottom up
Position 2	-
Position 3	-
Position 4	Measuring input 0 – 10 V
Position 5	-
Position 6	-
Position 7	100 %
Position 8	0 %
Position 9	Brightness, bargraph colour red, level 10

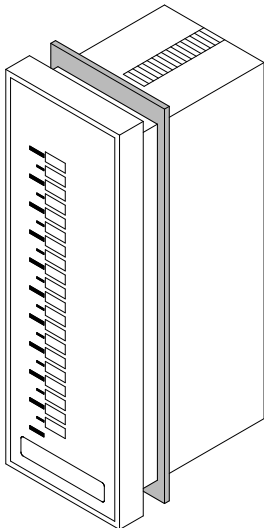
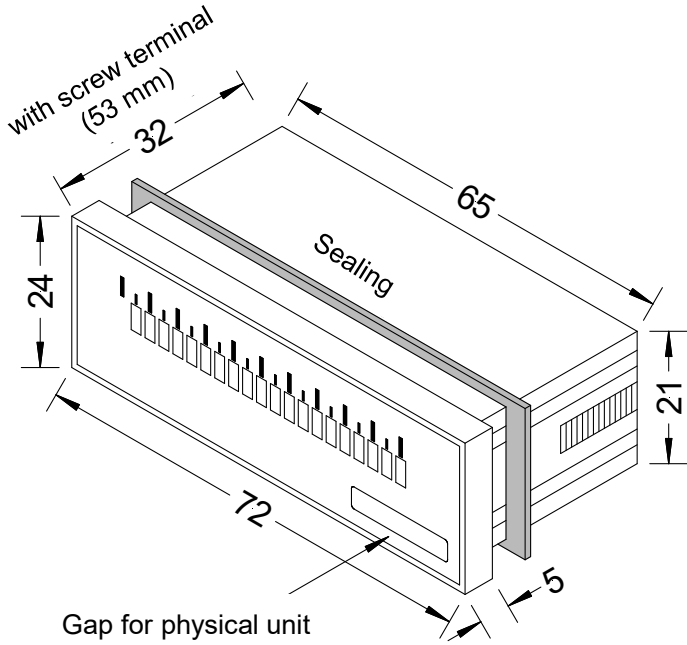
6. Technical data

Housing				
Dimensions				
96x24 mm	96x24x60 mm (WxHxD)			
	96x24x75 mm (WxHxD) including plug-in terminal			
72x24 mm	72x24x32 mm (WxHxD)			
	72x24x53 mm (WxHxD) including plug-in terminal			
48x24 mm	48x24x30 mm (WxHxD)			
	48x24x55 mm (WxHxD) including plug-in terminal			
Panel cut-out				
96x24 mm	92.0 ^{+0.8} x 22.2 ^{+0.3} mm			
72x24 mm	68.0 ^{+0.7} x 22.2 ^{+0.3} mm			
48x24 mm	45.0 ^{+0.8} x 22.2 ^{+0.6} mm			
Wall thickness	up to 3 mm			
Fixing	screw elements			
Material	PC Polycarbonate, black			
Sealing material	EPDM, 65 Shore, black			
Protection class	standard IP65 (front), IP00 (rear side)			
Weight	approx. 100 g			
Connection	plug-in terminal; wire cross section up to 2.5 mm ²			
Display				
Bargraph segments	2x4 mm (WxB)			
Segment colour	red/green selectable, optionally green/orange, blue/red			
Display range	30/20/10 points bargraph display			
Overflow	all segments are flashing, except the last 3			
Underflow	flashing of the first 3 bargraph elements			
Display time	equals measuring time approx. 100 ms			
Input	Meas. range	Ri	Measuring error	Digit
-22...24 mA	4 – 20 mA	~100 Ω	0.5 % of final value	±1
-12...12 VDC	0 – 10 VDC	~200 kΩ	0.5 % of final value	±1
Temperature drift	100 ppm / K			
Measuring time	approx. 100 ms			
Measuring principle	Voltage-/frequency conversion			
Resolution	14 Bit (at 0.1 sec measuring time)			

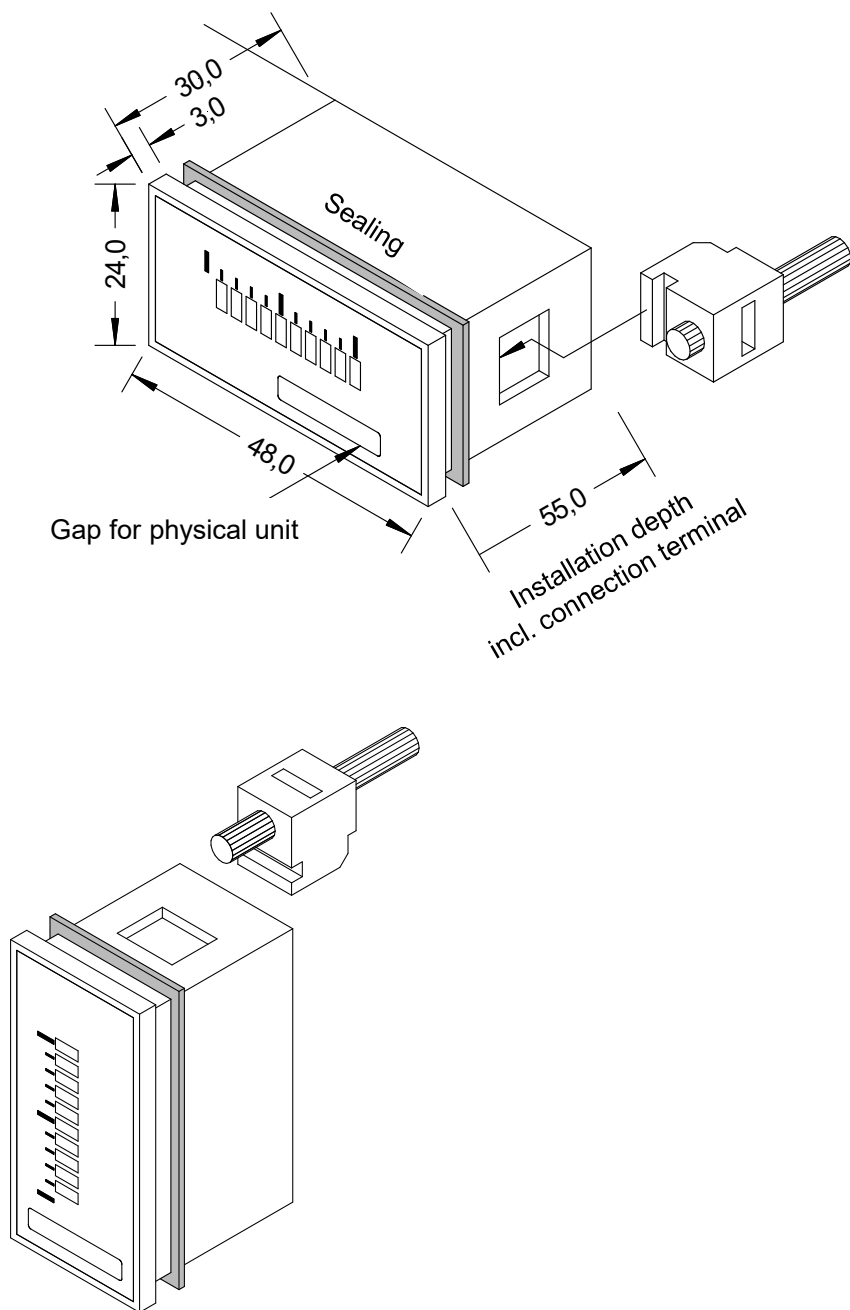
Power pack	
	230 VAC $\pm 10\%$ 50/60 Hz, max. 3 VA 24 VDC galv. isolated, $\pm 10\%$, max. 2 VA
Memory	
	EEPROM
Data life	≥ 100 years
Ambient conditions	
Working temperature	0...60°C
Storing temperature	-20...80°C
Weathering resistance	relative humidity 0-80% on years average without dew
EMV	
	EN 61326, EN 55011
CE-sign	
	Conformity according to directive 2014/30/EU
Safety regulation	
	according to low voltage directive 2014/35/EU, EN 61010, EN 50554-1

Housing dimensions:**MB1-33RxO.0001.7(5)70xD**

MB1-52RxO.0001.770xD



MB1-71RxO.0001.770xD



7. Safety advices

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

Proper use

The **MB1**-device is designed for the evaluation and display of standard signals.



Danger! Careless use or improper operation can result in personal injury and/or cause 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 **MB1**-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 0.5 A 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.
- Galvanically isolated 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 two bargraph segments at the top are flashing.	<ul style="list-style-type: none"> • The input has a very high measurement, check the measuring circuit. • With a selected input with a low sensor 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 parameter are adjusted correctly.
2.	The unit permanently indicates underflow. The two bargraph segments at the bottom are flashing.	<ul style="list-style-type: none"> • The input has a very low measurement, check the measuring circuit. • With a selected input with a low sensor 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 parameter are adjusted correctly.
3.	Bargraph stays on alternating design.	<ul style="list-style-type: none"> • Please contact the manufacturer if errors of this kind occur.

