User Manual M1

Resistance values: 1 kΩ, 10 kΩ, 100 kΩ, 1000 kΩ

Technical features:

- red display of -1999…9999 digits (optional green, orange or blue display)
- minimal installation depth: 27 mm without plug-in terminal
- adjustment via factory default or directly on the sensor signal
- min-/max-value recording
- 10 adjustable setpoints
- display flashing at threshold exceedance / undershooting
- tara-function
- programming interlock via access code
- protection class IP65 at the front
- plug-in terminal
- accessories: pc-based configuration-kit PM-TOOL with CD & USB adapter
  for devices without keypad, for a simple adjustment of standard devices via PC

Identification

STANDARD TYPES	ORDER NUMBER
Direct voltage, resistance Housing size: 48x24 mm	**M1-7VR4A.0x06.770BD**

Options – breakdown of order code:

	M	1-	7	V	R	4	A.	0	8	0	6.	7	7	0	B	D	

Basic type M-Line

Installation depth
54 mm
incl. plug-in terminal
1

Housing size
96x48x25 mm
(without plug-in terminal)
7

Display type
Current, voltage, resistance
V

Display colours
Blue B
Green G
Red R
Orange Y

Number of digits
4-digit
4

Digit height
10 mm
A

Interface
without
0

Operation
D physical unit

Version
B B

Setpoints
0 no setpoints

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

Supply voltage
7 24 VDC galv.insulated

Measuring input
6 Resistance

Analog output
0 without

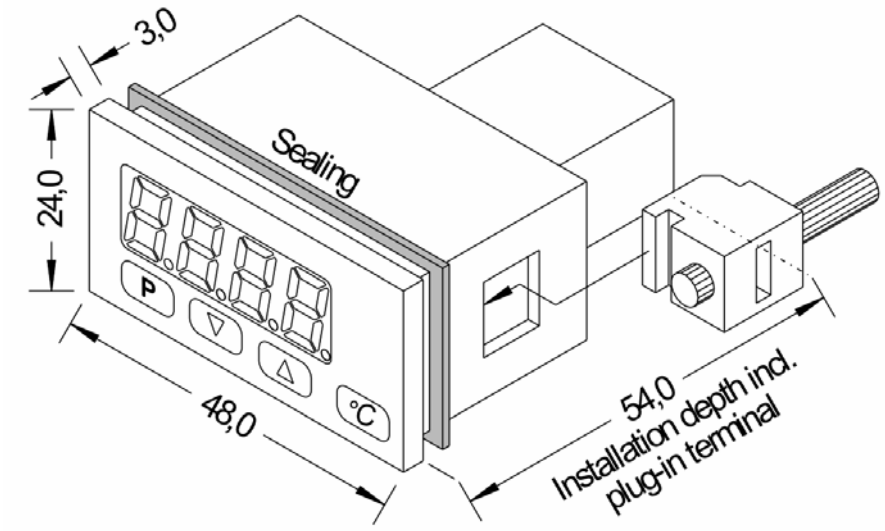
Resistance value
8 1 kOhm
5 10 kOhm
6 1000 kOhm
7 1000 kOhm

Please state physical unit by order, e.g. mm

Contents

1. Assembly

Please read the *Safety instructions* on *page 16* before installation and keep this user manual for future reference.

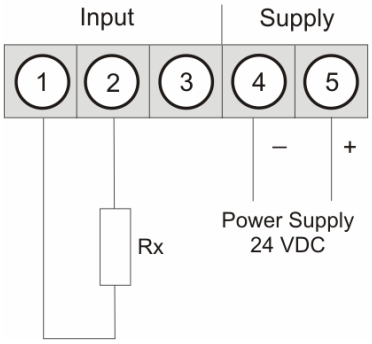


1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

CAUTION! The torque should not exceed 0.1 Nm!

2. Electrical connection

Type M1-7VR4A.0x06.770BD
with a supply of 24 VDC



3. Function and operation description

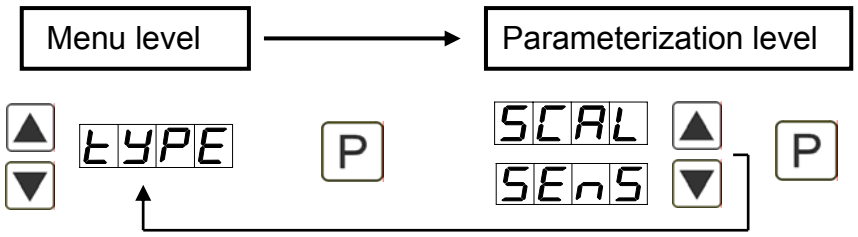
Operation
The operation is divided into two different levels.

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	P	Change to parameterization level with the relevant parameters
	▲ ▼	For navigation at the menu level
Parameterization level	P	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

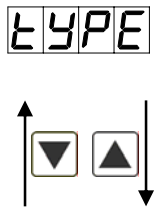
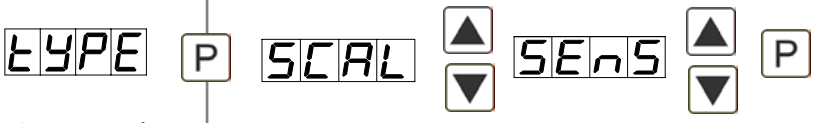
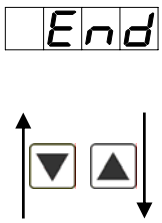
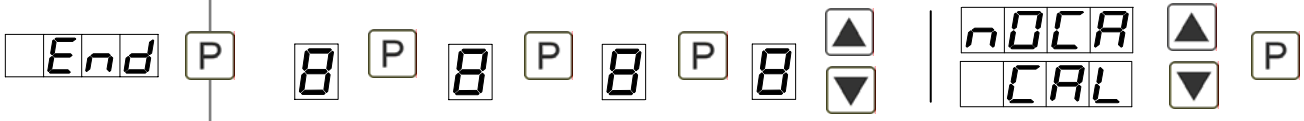
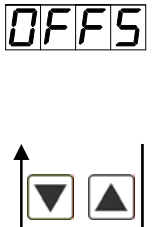
Once the installation is complete, you can start the device by applying the current loop. Check beforehand once again that all the electrical connections are correct.

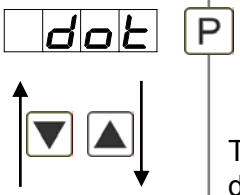
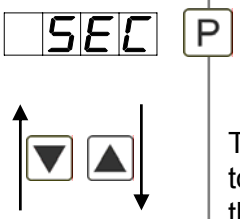
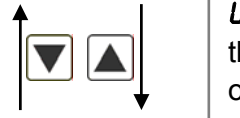
Starting sequence

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. Standard parameterization:

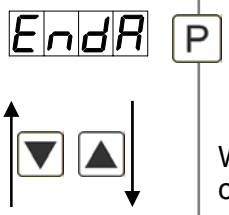
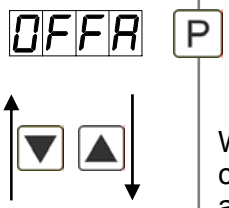
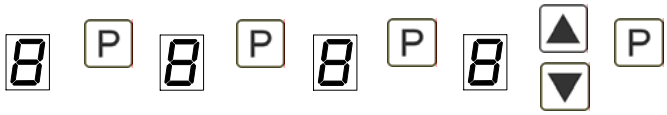
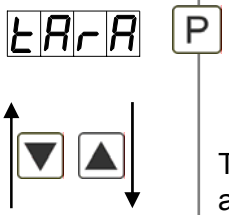
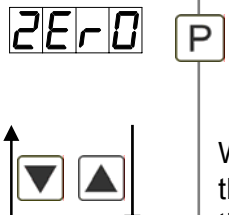
To be able to parameterize the display, press the **[P]** key in operating mode for 1 second. The display then changes to the menu level with the first menu item *TYPE*.

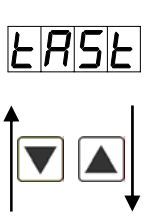
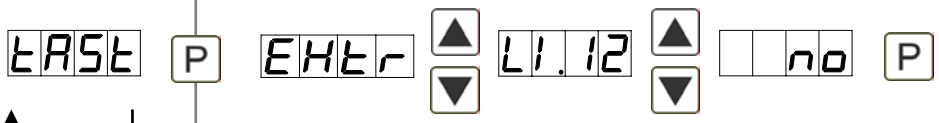
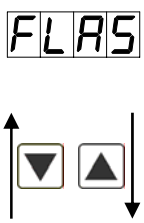
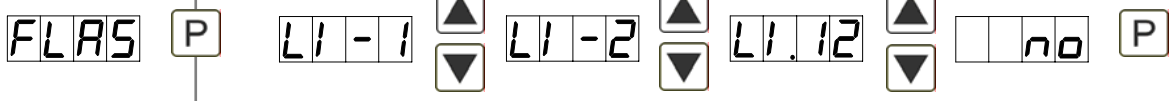
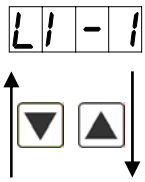
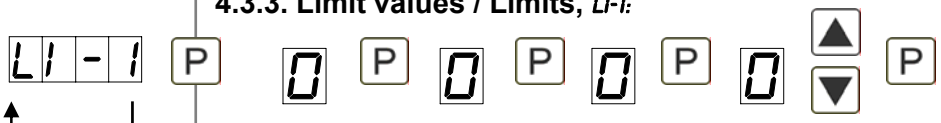
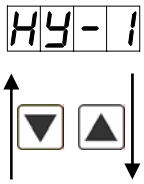
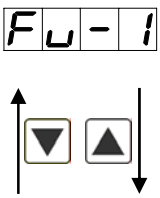
Menu level	Parameterization level
	**Selection of the input signal, *TYPE*:**  As input versions, resistance values of 1, 10, 100 or 1000 kΩ signals as factory calibration (without connected sensor signal) and *SENS* (with connected measuring signal) as sensor calibration are available. Confirm with **[P]**. The display then switches back to the menu level again.
	**Setting the final value of the measuring range, *END*:**  The final value is adjusted from the lowest to the highest place with [▼] [▲] and confirmed place selective with **[P]**. A minus sign can only be parameterized on the highest place. After the last place the display switches back to the menu level. If *SENS* has been selected, you can then choose between *NOCA* and *CAL*. At *NOCA* the before adjusted value will be taken over, at *CAL* the value alignment via the measuring section takes place and the analog input value is taken over.
	**Setting the initial value of the measuring range, *OFFS*:**  The initial value is adjusted from the lowest to the highest place with [▼] [▲] and confirmed place selective with **[P]**. After the last place the display switches back to the menu level. If *SENS* has been selected, you can then choose between *NOCA* and *CAL*. At *NOCA* the before adjusted value will be taken over, at *CAL* the value alignment via the measuring section takes place and the analog input value is taken over.

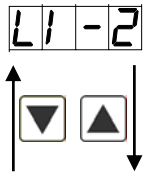
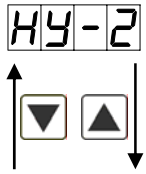
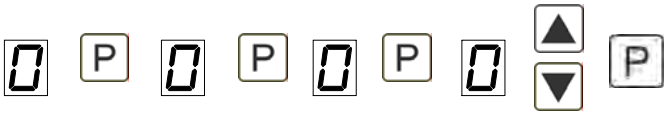
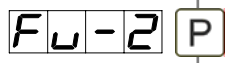
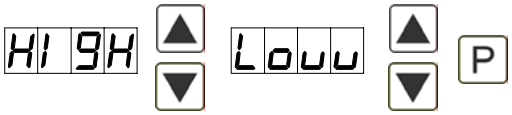
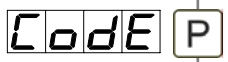
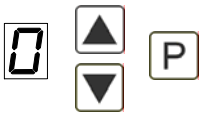
Menu level	Parameterization level
	**Setting the decimal place / sign of physical unit, *END*:**  The decimal place and the physical unit are set with [▼] [▲]. Confirm with **[P]**, the display then switches back to the menu level again.
	**Setting the display time, *SEC*:**  The display time is set with [▲] [▼]. The display moves up in increments of 0.1 sec up to 1 sec and in increments of 1.0 to 10.0 seconds. Confirm the selection by pressing the **[P]** button. The display then switches back to the menu level again.
	**Activation / deactivation of the programming lock and completion of the standard parameterization, *RUN*:**  With the aid of the [▲] [▼] keys, you can choose between the deactivated key lock *ULOC* (works setting) and the activated key lock *LOC*. Make the selection with **[P]**. After this, the display confirms the settings with **"- - - -"**, and automatically switches to operating mode. If *LOC* was selected, the keyboard is locked. To get back into the menu level, you must press **[P]** for 3 seconds in operating mode. You must now enter the *CODE* (works setting *1 2 3 4*) that appears using the [▲] [▼] keys plus **[P]** to unlock the keyboard. *FAIL* appears if the input is wrong.

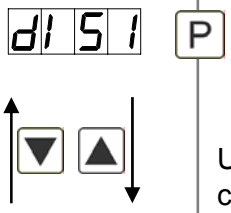
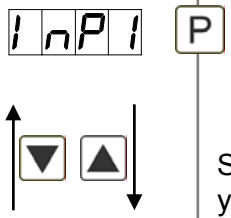
4.3. Extended parameterization

By pressing the [▲] & [▼] buttons during standard parameterization for one second, the display switches to the extended parameterization mode. Operation is the same as in standard parameterization.

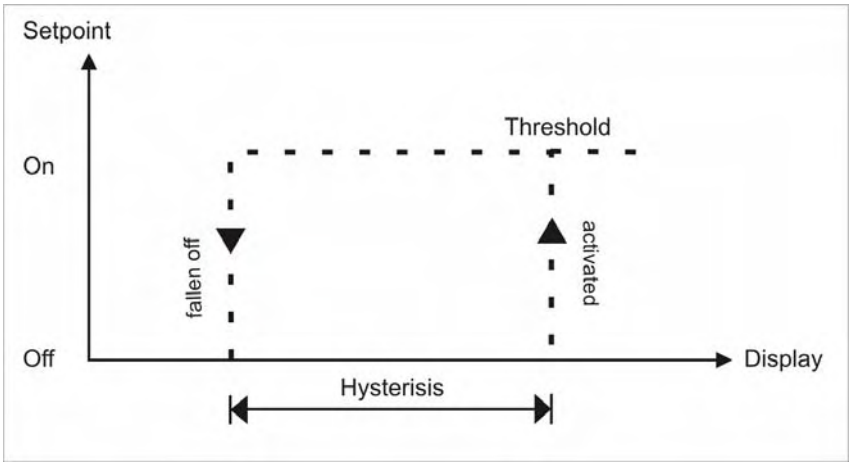
Menu level	Parameterization level
	**Rescaling of measuring input values, *ENDA:***  With this function the final value e.g. 1500 Ω (factory setting) can be rescaled without connecting of a measuring signals. At selected sensor calibration these parameters are not available.
	**Rescaling of measuring input values, *OFFA:***  With this function the initial value e.g. 500 Ω (factory setting) can be rescaled without connecting of a measuring signals. At selected sensor calibration these parameters are not available..
	**Setting of Tara value / Offset value, *TARA:***  The preset value is add to the linearized value. This way, the characteristic line can be adjusted according to the selected value.
	. **Zero point tranquilization, *ZERO:***  With zero point tranquilization, 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.

Menu level	Parameterization level
	**4.3.1. MIN/MAX value inquiry - Assignment of key functions,** *TAST:*  Here, you can enter for the operating mode either a MIN/MAX value inquiry or a threshold value correction on the arrow keys. If the MIN/MAX memory is activated with ***EHER***, 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. If the threshold value correction ***LI.1*** is selected, the limit values can be changed during operation without hindering the operating procedure. If ***NO*** is parameterized, the arrow keys **[▼] [▲]** have no function in operating mode.
	**4.3.2. Flashing of display,** *FLAS:*  Here, flashing of the display can be added as an extra alarm function, either to the first limit value (select: ***LI-1***), the second limit value (select: ***LI-2***) or to both limit values (select: ***LI-12***). With ***NO*** (works setting), no flashing is assigned at all.
	**4.3.3. Limit values / Limits,** *LI-1:*  For both limit values, two different values can be parameterized. With this, the parameters for each limit value are called up one after the other.
	**Hysteresis for limit values,** *HY-1:*  For both limit values, a hysteresis function exists that reacts according to the functional principle (operating current / quiescent current).
	**Function if display falls below / exceeds limit value,** *FU-1:*  To indicate if the value falls below the lower limit value, ***LOUU*** 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.

Menu level	Parameterization level
	**Limit value /Limits,** *LI-2:*  For both limit values, two different values can be parameterized. With this, the parameters for each limit value are called up one after the other.
	**Hysteresis for limit values,** *HY-2:*  For both limit values, a hysteresis function exists that reacts according to the functional principle (operating current / quiescent current).
 	**Function if display falls below / exceeds limit value,** *FU-2:*  To indicate if the value falls below the lower limit value, ***LOUU*** 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.
 	**Setting the code,** *CODE:*  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 ***RUN***.
 	**4.3.4. Set points - Number of additional set points,** *SPCT:*  In addition to the start and end value, 8 extra set points can be defined to linearize non-linear sensor values. Only the activated set point parameters are displayed.

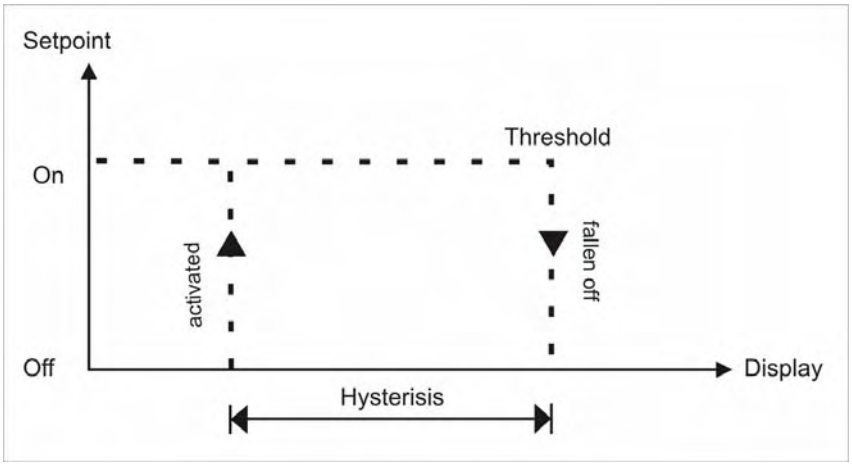
Menu level	Parameterization level
	**Display values for set points,** *DIS1 ... DIS5:*  Under this parameter the setpoints are defined on a value basis. At the sensor calibration one will be asked at the end (like at Endwert/Offset, too), if a calibration shall be triggered.
	**Analogue values for set points,** *INP1 ... INP8:*  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.

Functional principle of the setpoints



Limit value exceedance "HIGH"

The setpoint S1-S2 is off below the threshold and on on reaching the threshold.



Limit value undercut "LOW"

The setpoint S1-S2 is on below the threshold and switched off on reaching the threshold.

Alarms / optical setpoint display

An activated set point 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
Operating principle	Limit value exceedance / limit value undercut

5. Factory settings

5.1. Default values

Parameter	Menu items				Default
tYPE	SCAL	SEnS			SEnS
End	-999	to	9999		1000
OFFS	-999	to	9999		0000
dot	0000	to	0.000		0
SEC	0.1	to	10.0		1.0
run	ULOC	LOC			ULOC
OFFA	-.999	to	9.999		
EndA	-.999	to	9.999		
OFFA	-9.99	to	99.99		
EndA	-9.99	to	99.99		
OFFA	-99.9	to	999.9		
EndA	-99.9	to	999.9		
OFFA	-999	to	9999		
EndA	-999	to	9999		
tArA	-999	to	9999		0000
2Er0	00	to	99		0
tASt	no	EHtr	LI.12		no
FLAS	no	LI-1	LI-2	LI 12	no
LI-1	-999	to	9999		0200
HY-1	0000	to	9999		0000
Fu-1	Louu	HI 9H			HI 9H
LI-2	-999	to	9999		0300
HY-2	0000	to	9999		0
Fu-2	Louu	HI 9H			HI 9H
CodE	0000	to	9999		1234
SPCt	0	to	8		0
dI S1	-999	to	9999		
InP1	-999	to	9999		
dI S2	-999	to	9999		
InP2	-999	to	9999		
dI S3	-999	to	9999		
InP3	-999	to	9999		

Parameter	Menu items				Default
di 54	-999	to	9999		
inP4	-999	to	9999		
di 55	-999	to	9999		
inP5	-999	to	9999		
di 56	-999	to	9999		
inP6	-999	to	9999		
di 57	-999	to	9999		
inP7	-999	to	9999		
di 58	-999	to	9999		
inP8	-999	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			
48x24	48x24x27 mm (BxHxT)		
	48x24x54 mm (BxHxT) including plug-in terminal		
Panel cut-out			
48x24	$45.0^{+0.6}$ x $22.2^{+0.3}$ 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	10 mm		
Segment colour	red		
Display range	-1999 to 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**	**Measuring fault**	**Digit**
0…1.1 kΩ	1 kΩ	0.5 % of measuring range	±1
0…11 kΩ	10 kΩ	0.5 % of measuring range	±1
0…110 kΩ	100 kΩ	0.5 % of measuring range	±1
0…1100 kΩ	1000 kΩ	0.5 % 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		
Power pack	24 VDC +/- 10 % max. 1 VA		
Memory	EEPROM		
Data life	≥ 100 years		

Ambient conditions	
Working temperature	0…60°C
Storing temperature	-20…85°C
Weathering resistance	relative humidity 0-80% on years average without dew
EMV	EN 61326
CE-sign	Conformity to directive 2004/108/EG
Safety standard	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.

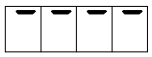
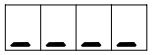
Installation

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.	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.	"*ERR1*" lights up in the 7-segment display	• Please contact the manufacturer if errors of this kind occur.
6.	The device does not react as expected.	• If you are not sure if the device has been parameterised before, then follow the steps as written in *chapter 5.2.* and set it back to its delivery status.