
MGXT operating manual

Temperature metering Pt100, 2-/3-/4-wire



Panel instrument – type MG-BT

Build-up instrument – type MG-AT

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Brief description

1. Brief description

With the **MG-XT**, temperatures can be recorded via a Pt100 resistance sensor. The 4-digit display indicates the measured temperature. During programming, the display is used to show the settings and the user prompts.

2. Safety instructions

Please read the users guide before installation and keep it for future reference.

2.1. Proper use

The **MG-XT** is intended for the evaluation and display of Pt100 sensors without any voltaic link to the object being measured.



Danger! Careless use or improper operation can result in personal injury and/or damage to the equipment.

2.2. Control of the device

The devices 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.

2.3. Installation

The **MG-XT** must be installed by a suitably qualified specialist (e.g. with a qualification in industrial electronics).

2.4. 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.
- The device is not suitable for installation in areas where there is a risk of explosion (hazardous areas).**
- Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.
- The device must not be mounted in the field of direct solar radiation.
- Do not install several devices immediately above one another (ambient temperature; see *technical data*).

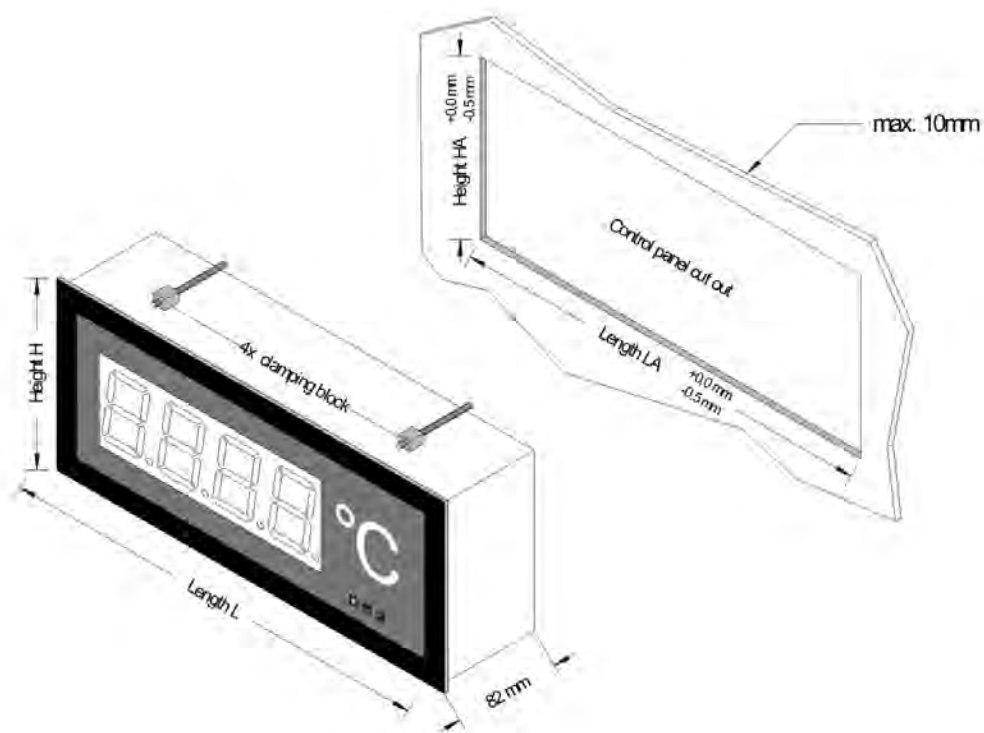
Assembly

3. Assembly

The **MG-XT** is intended for installation in a control panel or as constructive instrument (please indicate which version when ordering).

3.1. Panel instrument - type **MG-BT** (digit height 57 mm and 100 mm)

Before assembly, a cut-out must be made to accommodate the device. The sizes and tolerances are given in the technical data. The device should be installed with the supplied fixtures in line with the drawings.



Display 57 mm

Version B

Number of digits	Length L	Length LA	Height H	Height HA
3-digit with dimension	268mm	262mm	124mm	118mm
4-digit with dimension	316mm	310mm		
5-digit with dimension	364mm	358mm		
6-digit with dimension	412mm	406mm		
7-digit with dimension	460mm	454mm		

Version A

Number of digits	Length L	Length LA	Height H	Height HA
3-digit with dimension	288mm	282mm	144mm	138mm
4-digit with dimension	336mm	330mm		
5-digit with dimension	384mm	378mm		
6-digit with dimension	432mm	426mm		
7-digit with dimension	480mm	474mm		

Display 100 mm

Version B

Number of digits	Length L	Length LA	Height H	Height HA
3-digit with dimension	436mm	430mm	176mm	170mm
4-digit with dimension	526mm	520mm		
5-digit with dimension	616mm	610mm		
6-digit with dimension	706mm	700mm		
7-digit with dimension	796mm	790mm		

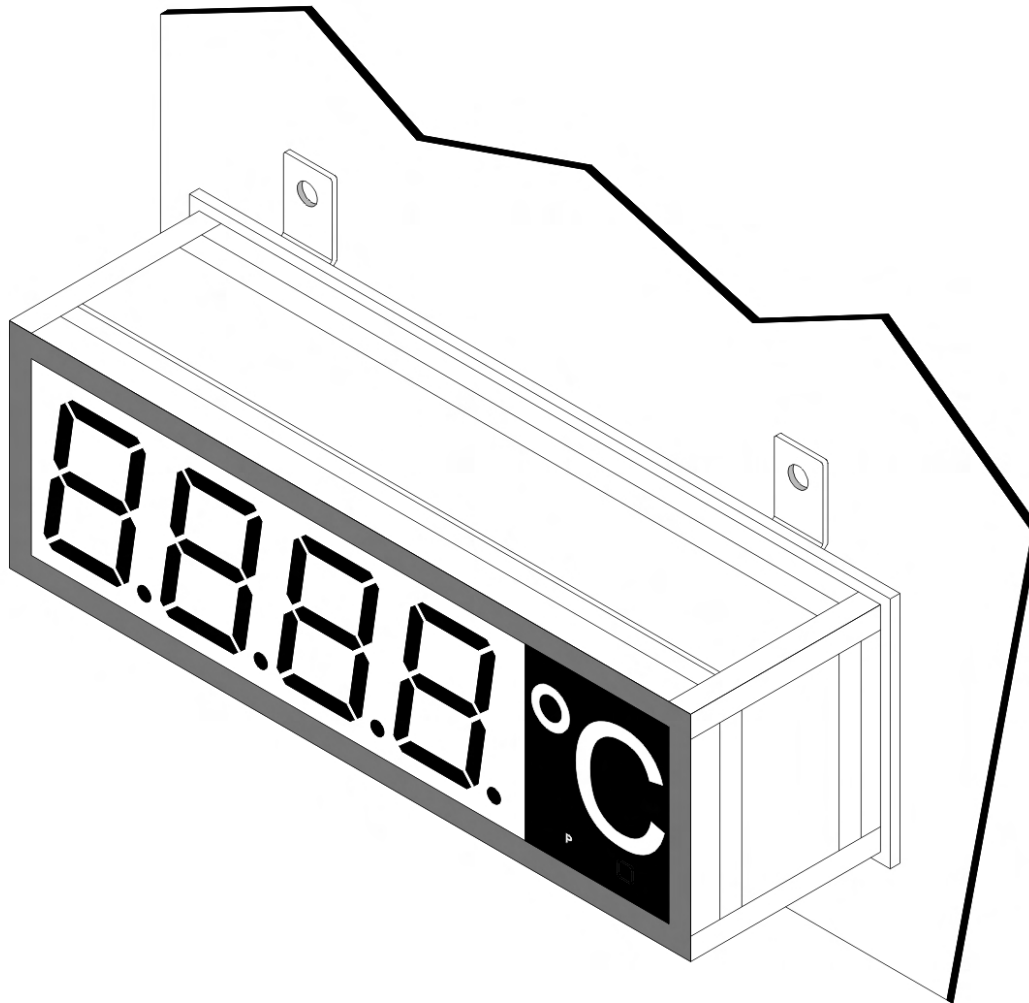
Version A

Number of digits	Length L	Length LA	Height H	Height HA
3-digit with dimension	460mm	454mm	200mm	194mm
4-digit with dimension	550mm	544mm		
5-digit with dimension	640mm	634mm		
6-digit with dimension	730mm	724mm		
7-digit with dimension	820mm	814mm		

Assembly

3.2. Build-up instrument – type **MG-AT** (digit height 57 mm and 100 mm)

For fixing of the device, please use the assembly drillings in the fastening angle. The sizes are equal to the sizes of the panel instruments; the fixing is done via fastening angles at the back side.

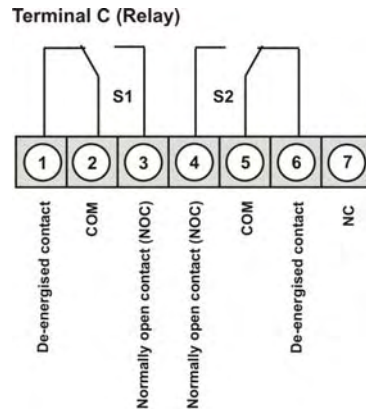
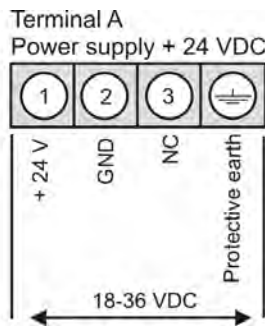
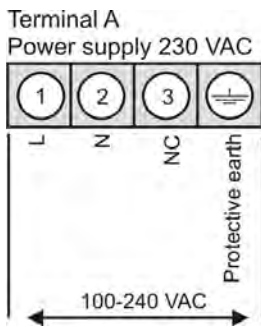
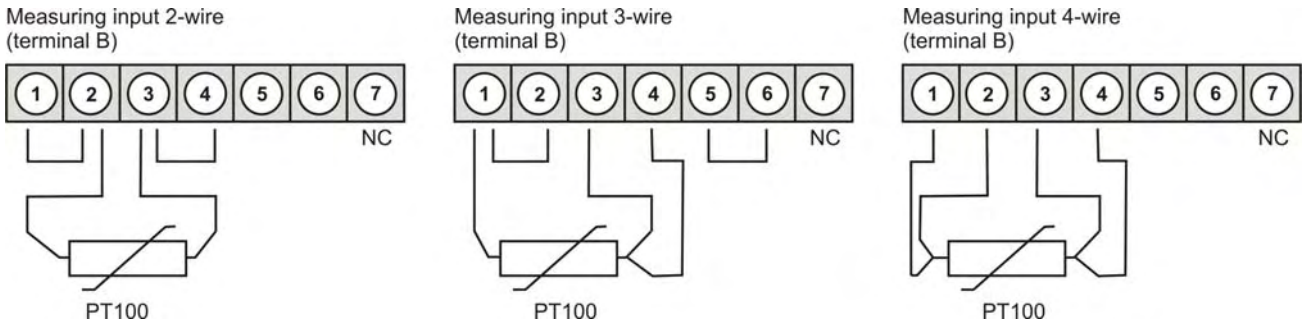


Electrical connection

4. Electrical connection

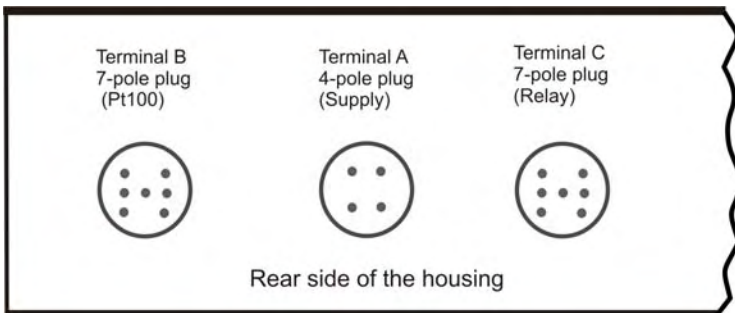
All signals that are needed for operation can be connected on the rear or the top side of the device. All possible connection details of the **MG-XT** are given below.

4.1. Terminal pin assignment Pt100, 2-/3-/4-wire – build-up instruments type MG-AT



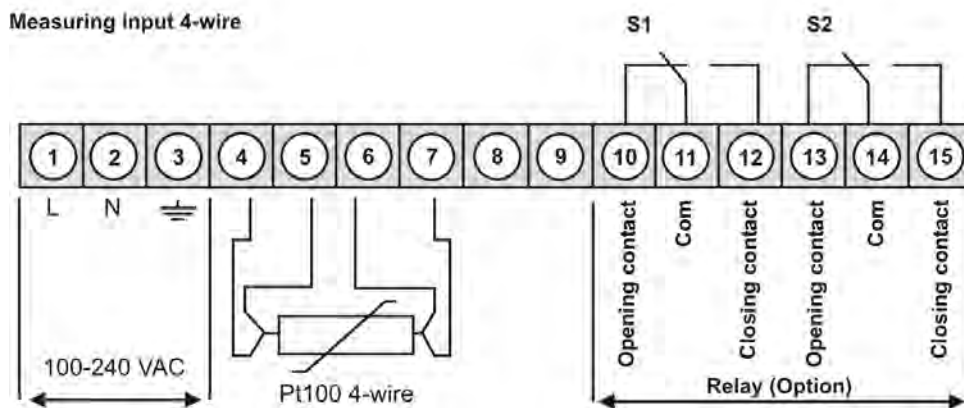
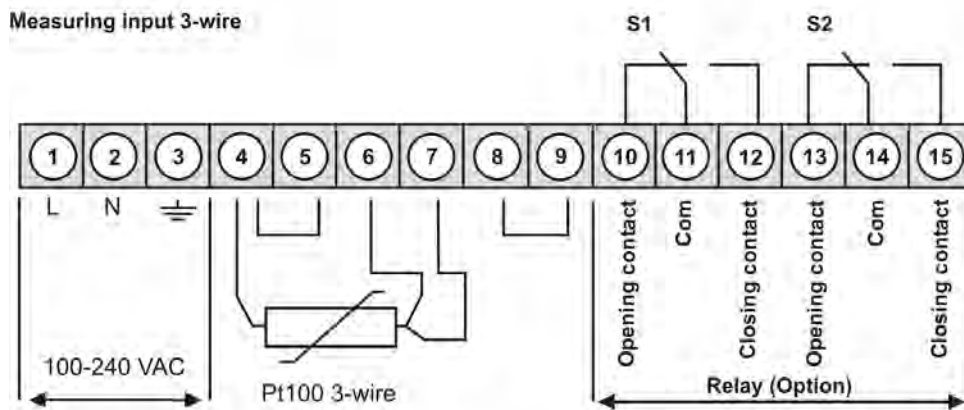
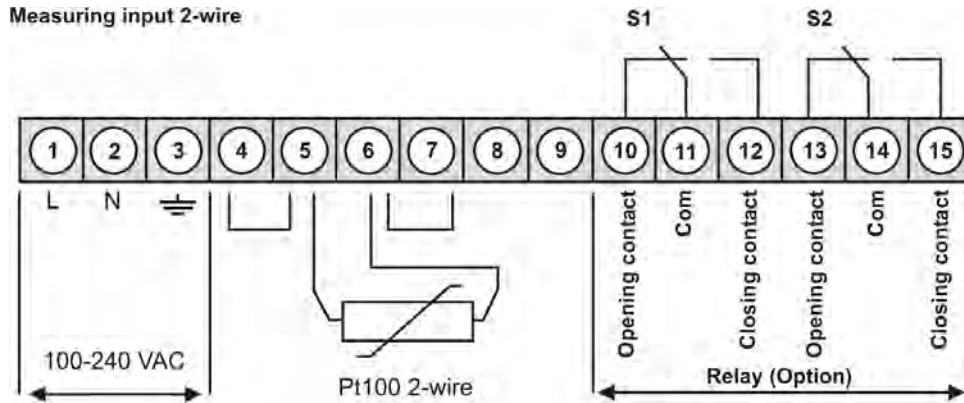
Position of the connection terminals (MG-AT)

Advice: The position of the connection terminals may vary for devices with serial numbers < 1130XXXX



Electrical connection

4.2. Terminal pin assignment Pt100, 2-/3-/4-wire –panel instruments type MG-BT

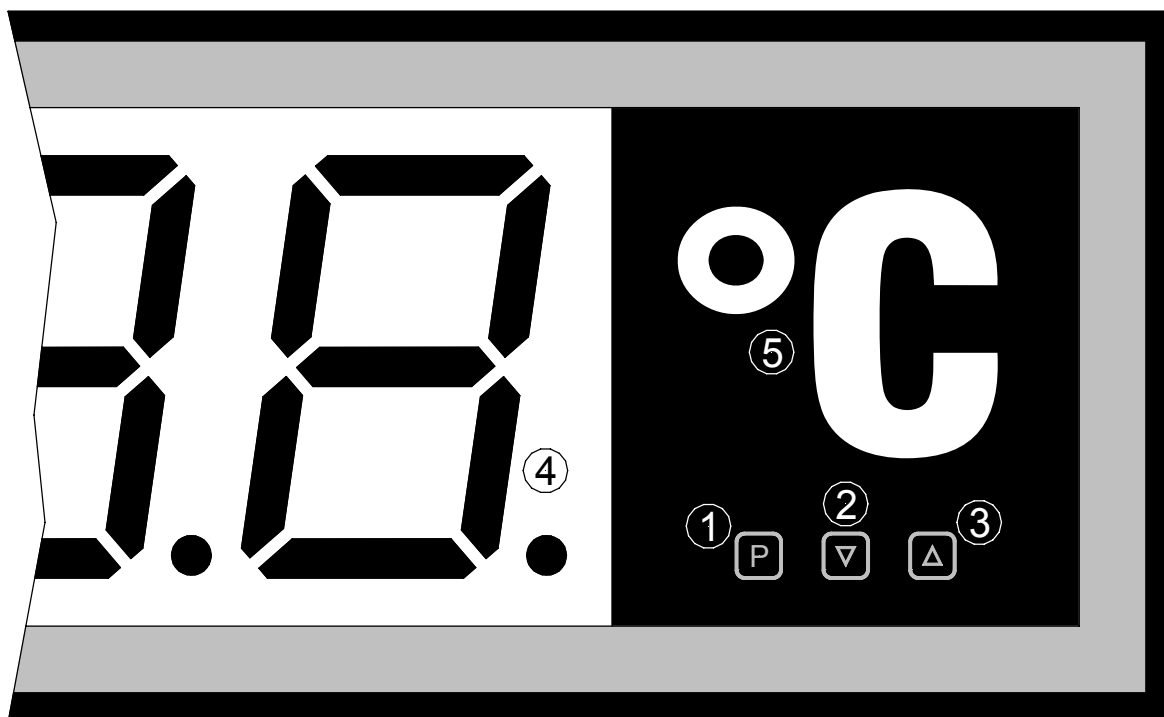


Operation

5. Operating / display elements

This unit is operated via the [P], [▲] and [▼] keys and has a 4-digit 7-segment display.

5.1. Operating and display elements



- | | |
|---------------------|---|
| 1 Programm key [P] | With the program key, you can call up the programming mode or perform various functions in the programming mode. |
| 2 Minus key [▼] | With the decrease key, you can call up the MIN memory or alter parameters in the programming mode. |
| 3 Plus key [▲] | With the increase key, you can call up the MAX memory or alter parameters in the programming mode. |
| 4 7-Segment-display | The 7-segment display displays measurements or, during programming, the program numbers or parameters. |
| 5 Dimension window | The dimension window shows the factory-set physical unit for the measurement. Here, a physical unit can be placed according to customer preferences. |

Operation

5.2. Switching on

Before switching on you have to check all the electrical connections to make sure they are correct. On completion of the installation, the device can be switched on by applying the power supply.

5.3. Starting sequence

During the switching-on process a segment test is performed for approx. 1 second, whereby all LED on the front (including alarm LED) are triggered. After this, the type of software is indicated for approx. 1 second and then, also for 1 second, the software version. After the starting procedure, the unit changes to operation/display mode.

5.4. MIN/MAX-memory

The measured minimum and maximum values are saved in a volatile memory in the unit and get lost when the unit is switched off.

You can call up the contents of the memory by pushing (less than 1 second) the [▲] or [▼] key. The relevant value is indicated for approx. 7 seconds. By briefly pressing the same key again, you will return immediately to the display mode.

[▲] ⇒ Display of the MAX value

[▼] ⇒ Display of the MIN value

You can erase the value shown in the display by simultaneously operating the [▲] & [▼] keys. The erasure is acknowledged by horizontal bars.

The content of the memory is lost when the unit is switched off.

5.5. Overflow and underflow

An overflow of the display is indicated by horizontal bars at the top of the 7-segment display.

An underflow of the display is indicated by horizontal bars at the bottom of the 7-segment display.

5.6. Limit value monitoring

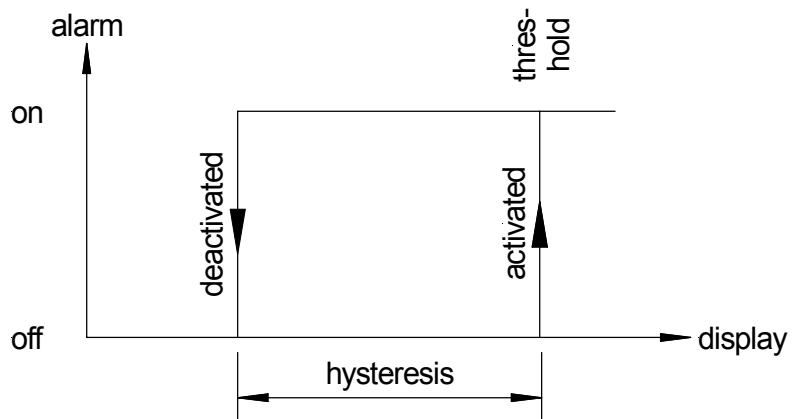
The limit value monitoring has the following properties::

Limit value alarm x	deactivated, activated
Limit value	threshold of limit value monitoring
Hysteresis	Width of the window between the switch thresholds
Operating principle	active above SP value / active below SP value
Switch-on delay	Time between reaching the limit value alarm and the resultant switching on of the limit value alarm.
Switch-off delay	Time between reaching the limit value alarm and the resultant switching off of the limit value alarm.

Operation

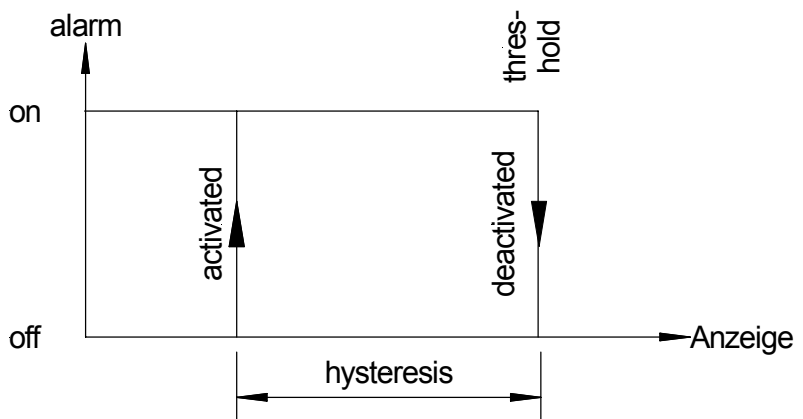
Exceedence

The limit value alarm is off below the limit value and switched on on reaching the limit value.



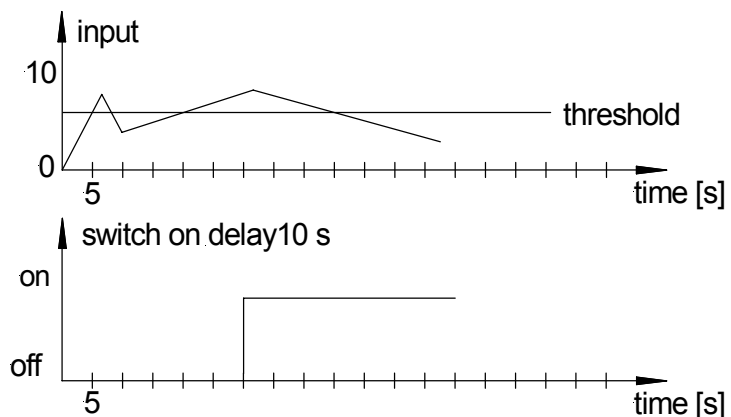
Undershooting

The limit value alarm is on below the limit value and switched off on reaching the limit value.



Alarm delay

The alarm is on e.g. 10 seconds after reaching the limit value; briefly exceeding the limit value does not lead to the alarm being switched on. The switch-off delay works in a similar manner, in other words, it keeps the alarm output switched on until the parameterised time has elapsed.



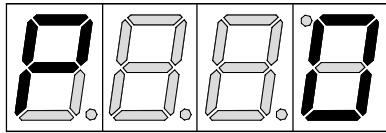
5.6.1. Optical response, flashing display

The switching on of one or more alarm outputs can also be set to trigger a flashing of the display to enhance the optical response.

Programming

6. Programming

The display shows the program numbers (PN) right-aligned, as a 3-digit number with a **P** at the front.



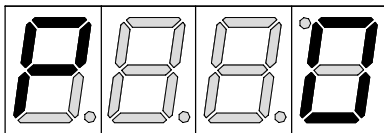
Display of e.g. program number 0

6.1. Programming procedure

The entire programming of the **MG-XT** is done by the steps described below.

Changing from programming to operating mode

By pushing the [**P**] key it changes into programming mode. The unit goes to the lowest available program number. When the programming lock is activated, the key must be pressed for at least 1 second.

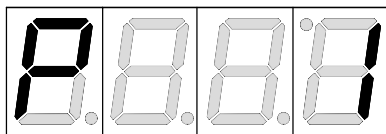


Example:

Change to programming mode by pushing key [**P**]. The first released program number (PN) appears, in this case PN0.

Change to other program numbers

To change between individual program numbers, hold the [**P**] key down and press the [**▲**] key for changing to a higher program number or the [**▼**] key for changing to a lower number. By keeping the keys pushed, e.g. [**P**] & [**▲**], the display will begin, after approx. 1 second, to automatically run through the program numbers.

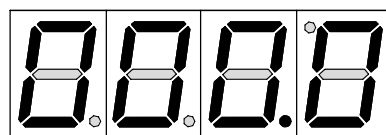


Example:

A 0 is parameterised under PN0. (Pt100 calibration)
Hold the [**P**] key down and press the key [**▲**] four times.
The display shows PN5. Under this parameter, the characteristic curve can be adjusted to the real measuring temperature.

Change to the parameter

Once the program number appears in the display, you can press the [**▼**] or [**▲**] key to get to the parameters set for this program number. The currently stored parameters are displayed.



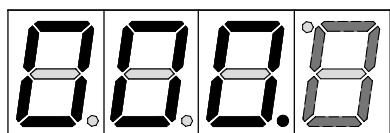
Example:

By pressing the [**▼**] or [**▲**] key, the currently stored value for PN1 appears in the display.
In this case, it is 000,0.

Programming

Changing a parameter

After changing to the parameter, the lowest digit of the respective parameter flashes on the display. The value can be changed with the [▲] or [▼] key. To move to the next digit, the [P] key must be briefly pressed. Once the highest digit has been set and confirmed with [P], the lowest digit will begin to flash again.



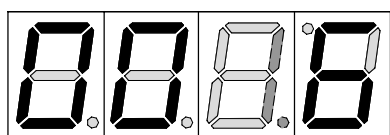
Example:

The 0 is flashing; this is the lowest value digit and, by flashing, it is asking for a figure to be entered. In our example, the value is to be changed from 000,0 to 001,6. You can change the value by changing the figure from 0 to 6 using the [▲] or [▼] key. To move to the next digit, the [P] key must be briefly pressed. The 0 begins to flash.

Change the value from 0 to 1 using the [▲] or [▼] key. The other digits need no change.

Saving parameters

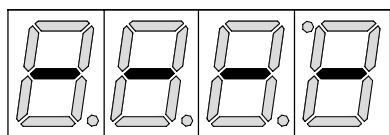
All parameters must be by the user by pressing the [P] key for one second. The changed parameters are then taken over as the current operating parameters and saved in the EEPROM. This is confirmed by horizontal bars lighting up in the display.



Example:

Save the parameters with pressing the key [P] for 1 second.

All the newly entered data are confirmed by the unit. If no confirmation is received, the relevant parameters have not been saved.



Example:

You receive a confirmation from the unit that the changes have been saved through the appearance of horizontal bars in the middle segments.

6.1.1. Change to operating mode

If no key is pressed in programming mode for approx. 7 seconds, the unit automatically returns to operating mode.

6.2. Measuring input

The MG-Xt is equipped with a measuring input for Pt100 sensors, which makes it possible to measure temperatures directly.

Programming

6.2.1. **Factory calibration**

The unit has to be pre-calibrated directly for the Pt100 input so that no subsequent adjustment is generally required on site.

6.2.2. **Sensor calibration**

There is no need to alter the calibration. If the calibration is changed unintentionally, the original value can be reset to the factory setting by means of a reset.

6.2.3. **Sensor linearisation**

The Pt100 sensor has been linearised ex factory, so that there is no need for any subsequent alteration to the characteristic curve.

Programming

7. Device parameter

The **MG-XT** has a number of unit parameters with which the function of the indicator can be adjusted to the relevant measuring tasks. Because of the large number of these settings and the limited possibility of displaying them on the 7-segment display, the parameters have been given consecutive numbers.

7.1.1. Measuring input PN0

Here, the sensor calibration (PN0 = 0) is activated so that the Pt100 sensor can be measured.

7.1.2. Scaling PN1 and PN2

End and start values of the temperature range, which is set ex works.

7.1.3. Decimal point PN3

This parameter must not be changed.

7.1.4. Rounding PN4

The rounding function is used for tranquilization of very disturbed signals for the viewer. The resolution of the display is limited by simple rounding on 5, 10, 50, 100, 500, 1000. If PN4=5, then we come to the following display sequence while rising input signal: 0, 5, 10, 15, 20, 25, 30, 35, 40...

If PN5=10 is selected, there is always a "0" displayed on the last digit. This can be very reasonable for physical values like e.g. mbar, so that the depiction of the display is coherent.

7.1.5. Offset shift PN5

With this parameter, the characteristic curve can be adjusted to the real measuring temperature. To do this, the difference between the display value and the reference value must be entered in PN5. For example, using a reference sensor, 25.6 °C has been measured at the measuring point, but the display shows 24.3 °C. In this case, the difference of +1.3° (the plus sign is not displayed) must be entered and confirmed in PN5.

7.1.6. Zero point suppression PN10

A zero point suppression is not necessary and so has not to be changed.

7.1.7. Indication time PN13

The display time is the time set to elapse between updating the display. The longer the time between two display cycles, the calmer the appearance of the display. A display time of 1 second is generally considered to be pleasant to work with. If a longer time is set for the display time than for the measuring time, there will be no averaging of the measurements made during the display time. The display will always be updated with the last measured value.

7.1.8. Measuring time PN14

The measuring time corresponds to the conversion time of the A/D conversion, which determines the response time of the alarm outputs. The longer the conversion time, the smaller the influence of disturbances and the higher the resolution of the measured signal.

7.1.9. Security settings, user level PN50 to PN52

With the parameters in the security settings, access to the program numbers is regulated through the setting of various user levels. The user levels divide the access into various levels. The user is only given access to the settings authorised by the system operator, such as the setting of thresholds. The lower the figure for the user level given under PN52, the lower the level of security of the unit parameters against user intervention.

User level (PN52 =)		0	1	2	3	4	5	6	7	8
Access to:	PN:									
Locking code / user level	51, 52	X								
Measuring input parameters	0 ... 18	X	X	X						
Linearisation parameters for measuring input	100 ... 110	X	X	X						
Setting parameters of alarm outputs	59, 60, 63 ... 65, 70, 73 ... 75	X	X	X	X	X				
Hysteresis of the alarm outputs	62, 72	X	X	X	X	X	X			
Threshold of the alarm outputs	61, 71	X	X	X	X	X	X	X		
Access code	50	X	X	X	X	X	X	X	X	X
Serial number	200	X	X	X	X	X	X	X	X	X

Programming

The user levels 1, 3 and 7 are reserved user levels, at which access to the higher numbered user level is active.

The parameterised user level PN52 is active as long as the locking code PN51 and the access code PN50 are different. On delivery both parameters are set to 0000, so that the programming lock is deactivated.

On changing to programming mode, the unit jumps to the first authorised program number. If the user level PN52 is parameterised to 3, access is granted to the program numbers of the threshold monitoring, but it is not possible to change the measuring input (PN0) at this user level.

In order to obtain access to all program numbers at a later stage (equal to user level 0) the 4-digit locking code stored under PN51 to activate access under PN50 must be entered again and confirmed by pressing button [P] for about 1 sec. Access to all program numbers is then granted.

Caution! If the locking code becomes lost, the unit can be reset without data loss by the manufacturer to the default value 0000.

7.1.10. Display flashing PN59

By activating the display flashing, various alarm states can be optically reinforced. The trigger for the display flashing can be freely assigned to the alarm outputs.

7.1.11. Limit value alarm PN60 to PN75

You can influence the behaviour of the limit value alarms via various program numbers. The data refer to the scaled measurement and are updated with the set measuring time. A description of the various parameters is given in *Section 5.6 Limit value monitoring*. At the option "relay output", alarms will be displayed via a change-over contact!

7.1.12. Linearisation PN100 to PN110

For the PT100 measurement, a linearisation to 10 calibration points is set ex works. There is no need to change the calibration points – it could lead to a falsification of the original Pt100 characteristic curve!

7.1.13. Serial number PN200

Under PN200 the 4-digit serial number can be called up that allows allocation to the production process and the manufacturing procedure. This parameter can only be viewed.

Program number table

8. Program number table

The program table lists all the program numbers (PN) with their function, range of values, default values and user level.

PN	Function	Range of values	Default	User level
Channel 1				
0	Measuring input The parameters 1 to 4 make no use of the factory calibration .	Temperature with Pt100 0 = Pt100 calibration 1 = not used 2 = not used 3 = not used 4 = not used	0	2
1	Final value / full scale	-999...9999	850,0	2
2	Zero point / offset	-999...9999	-99,9	2
3	Number of decimal places	0 = 0 1 = 0,0 2 = 0,00 3 = 0,000	1	2
4	Rounding	0 = 1 1 = 5 2 = 10 3 = 50 4 = 100 5 = 500 6 = 1000	0	2
5	Wire and sensor adjustment	-999...9999	000,0	2
10	Zero point suppression	0...999	0	2
Generell settings				
13	Indication time	0,1 ... 10,0	1,0	2
14	Measuring time	0,1 ... 10,0	1,0	2
Safety settings				
50	Programming lock	0000...9999	0000	8
51	Access code	0000...9999	0000	0
52	User level	1...8	8	0
Flashing of the LED display				
59	Display flashing (approx. 0.5 seconds) No flashing Flashing at limit value 1 Flashing at limit value 2 Flashing at limit value 1 and 2	0 no flashing 1 flashes at 1 2 flashes at 2 3 flashes at 1 and 2	0	4

Program number table

PN	Function	Wertebereich	Default	User level
Limit value alarm 1				
60	Limit value alarm 1	0 = deactivated 1 = activated	1	4
61	Limit value	-999...9999	1000	6
62	Hysteresis	1...9999	1	5
63	Monitoring principle limit value	0 = Exceedence 1 = Undershooting	1	4
64	Switch delay in seconds	0...1000 seconds	1	4
65	Type of delay	0 none 1 switch-on delay 2 switch-off delay 3 switch-on/-off delay	0	4
Limit value 2				
70	Limit value 2	0 = deactivated 1 = activated	1	4
71	Limit value	-999...9999	1000	6
72	Hysteresis	1...9999	1	5
73	Monitoring principle limit value	0 = Exceedence 1 = Undershooting	1	4
74	Switch delay in seconds	0...1000 seconds	1	4
75	Type of delay	0 none 1 switch-on delay 2 switch-off delay 3 switch-on/-off delay	0	4
Linearisation				
100	Number of additional calibration points	0...10	10	2
101 ... 110	Calibration points of the Pt100-characteristic line	-999...8500	fix	2
Information				
200	Serial number	0...9999	0	8

Technical data

9. Technical data

Housing dimension Build-up instrument (without plug)

Version A

57 mm display	W 336 x H 144 x D 82 mm
100 mm display	W 550 x H 200 x D 82 mm

Version B

57 mm display	W 316 x H 124 x D 82 mm
100 mm display	W 526 x H 176 x D 82 mm

Fixing	per screw/clasp fixing
Housing material	Aluminium, black, powder-coated
Protection	IP65
Weight	
57 mm display	approx. 3.0 kg
100 mm display	approx. 5. kg

Connection 57/100 mm display

Type of plug:	Circular plug-in connector Binder-Series 693
Cable admission:	PG9 (6.0 to 9.5 mm)
Protection class:	IP65
Mechanic life expectancy:	> 500 contact durability
Connection type:	Screws

Connection

Voltage supply:

Number of poles:	3 + PE
Cable cross section:	0.5 to 2.5 mm (AWG 20...14)
Rating:	400 V
Rating current:	12 A

Connection

Inputs / Outputs:

Number of poles:	7
Cable cross section:	0.34 to 1.5 mm (AWG 22...16)
Rating:	250 V
Rating current:	8 A

Technical data

Housing dimension

Panel meter

(without plug)

Version A

57 mm display
100 mm display

W 336 x H 144 x D 82 mm
W 550 x H 200 x D 82 mm

Version B

57 mm display
100 mm display

W 316 x H 124 x D 82 mm
W 526 x H 176 x D 82 mm

(with plug)

Version A/B

100 mm display

W ... x H ... x D **104 mm**

Assembling cut-out

57 mm display
100 mm display

W 330.0^{-0.5} x H 138.0^{-0.5} mm
W 544.0^{-0.5} x H 194.0^{-0.5} mm

Version B

57 mm display
100 mm display

W 310.0^{-0.5} x H 118.0^{-0.5} mm
W 520.0^{-0.5} x H 170.0^{-0.5} mm

Weight

57 mm display
100 mm display

approx. 3.0 kg
approx. 5.0 kg

Connection

57/100 mm display

4-pole adaptable screw terminal for voltage supply for line diameter by 2.5 mm²
9-pole adaptable screw terminal for voltage supply for line diameter by 1.5 mm²

Display

Display
Digit height
Segment colour
Number of digits
Display range
Overflow
Indication time
Field of application

7-segment LED
57 mm, 100 mm, 200 mm
red
4 digits
-99.9...850.0
horizontal bars at the top
0.1...10.0 seconds
Indoor

Measuring input

Measuring range
Measuring cycle
Wire resistance
Resolution

Measuring error 850°C

-99.9...850.0
max. 10 measurements per second
≤ 50 Ohm per wire
approx. 20 bit at 1 second measuring time
± 0,1 % of final value ; ± 3 digit equals max. 1K

Accuracy	Temperature coefficient	~ 130 ppm/K
	Measuring principle	Voltage-/frequency converter
Power supply		
Supply voltage (galvanic insulated)	Multi voltage power supply unit (galvanic insulated)	100-240 VAC nominal voltage +/-10%, 50/60 Hz 18-36 VDC
Power consumption	max. 30 VA	
Memory		
Data life	Parameter memory EEPROM >20 years	
Ambient conditions		
Working temperature	0...60 °C	
Storage temperature	-20...80 °C	
Climatic resistance	rel. humidity ≤75 % on year average without dew	
EMV		
CE-sign	DIN 61326 Conformity to 89/336/EWG	
Safety standard	DIN 61010	

Technical data

Ambient conditions

Working temperature	0...60 °C
Storing temperature	-20...80 °C
Climatic resistance	rel. humidity \leq 75 % on year average without dew

Power supply unit

Supply voltage (galvanic insulated)	Multi voltage power supply unit 85-264 VAC / 50/60 Hz 18-36 VDC
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Power consumption	max. 25 VA
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EMV CE-sign	DIN 61326 conformity to 89/336/EWG
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Safety standard	DIN 61010
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Trouble shooting

10. Trouble shooting

The following list gives the recommended procedure for dealing with faults and locating their possible cause.

10.1. Question and answers

- I. The unit permanently indicates overflow „----“.
 - The input has a very high measurement, check the measuring circuit.
- II. The unit permanently indicates underflow „_ _ _ _“.
 - The input has a very low measurement, check the measuring circuit.
- III. The device shows “HELP” in the 7-segment display.
 - The unit has found an error in the configuration memory. Perform a reset on the default values and reconfigure the unit according to your application.
- IV. Program numbers for parameterisation the input are not available.
 - The program lock is set to a user level that does not permit access.
- V. „Err1“ lights up in the 7-segment display.
 - This error can only be eliminated by the manufacturer.

10.2. Reset on 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:

- I. Switch off the power supply
- II. Press button [P]
- III. Switch on the power supply and press [P] for further approx. 2 seconds

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! This is only possible when the programming lock PN50 allows access to all PNs or “HELP” is shown in the display.

Caution! All application-related data are lost.

Notes

11. Notes