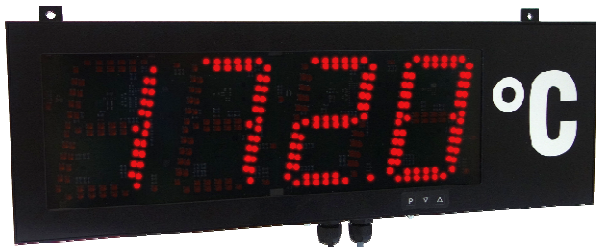# User manual MG – large-size indicator

Interface device: RS232 / RS485 ASCII-protocol

Technical features:

- Red display of -1999…9999 Digits (optional 6 or 8 digits)
- Digit height 57 mm or 100 mm, on request 200 mm
- Protection class IP65
- Built-on housing / Installation housing
- Pressure adjusting membrane for air ventilation and de-airing
- Programming interlock via access code
- Brightness sensor
- Accessories: PC based configuration kit PM-TOOL with CD and USB-plug

Identification

STANDARD TYPES	ORDER NUMBER
Digit height 57 mm	**MG-ADR41.x000.S10xO**
	MG-ADR41.x000.710xO
Digit height 100 mm	**MG-ADR42.x000.S10xO**
	MG-ADR42.x000.710xO

Options – breakdown of order code:

M G - A D R 4 1 . 6 0 0 0 . S 1 0 A O

Standard type M-line

Large-size indicator

Housing type
| Buit-on housing | A |
| Installation housing | B |

Display type
| Digital | D |

Display colour
green	G
red	R
orange	Y
blue	B

Number of digits
4-digit	4
6-digit	6
8-digit	8

Digit height
57 mm	1
100 mm	2
200 mm on request	5

Interface
| RS232 ASCII protocol | 5 |
| RS485 ASCII protocol | 6 |

Dimension
| O | none |
| D | max. 3 signs |

Version
| A | Version A |

Switching points
| 0 | none |

Operation
| 1 | Keys at the front |

Supply voltage
| 7 | 18-36 VDC galv. isolated |
| S | 100-240 VAC |

Measuring input
| 0 | Interface |

Analog output
| 0 | none |

Sensor supply
| 0 | none |

Contents

1. Brief description

The **MG-xD** is controlled via an interface and shows numerics and characters on a 4- to 8-digit 7-segment display.
The version with serial interface RS232/RS485 can be addressed, the RS485 can be operated in a bus system.
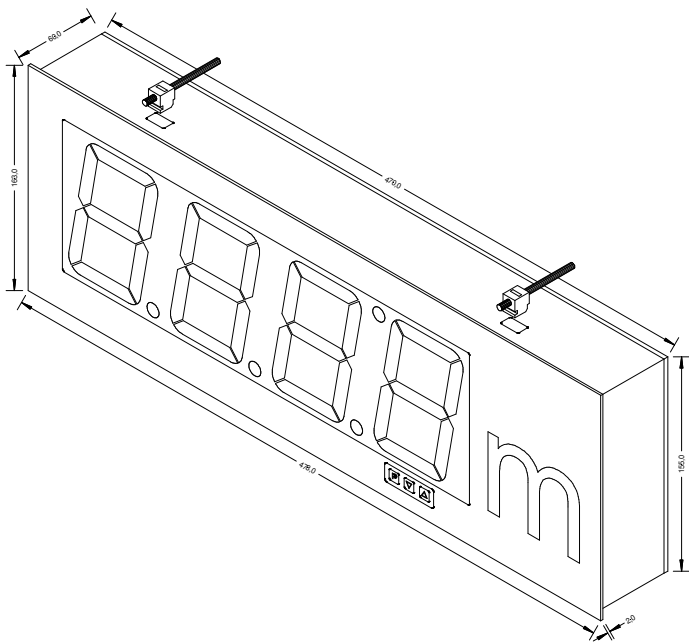
2. Assembly

Before assembly please read the safety instructions on page 15 and keep this manual for future reference.

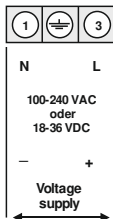Built-on housing:
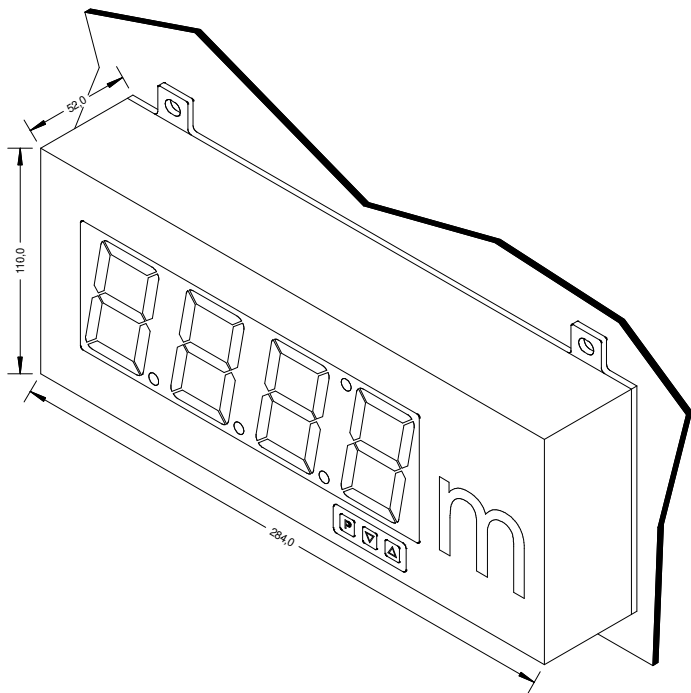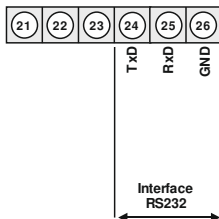
Installation housing:

3. Electrical connection

3.1. Terminal pin assignment

Type		
Type **MG-ADR41.5(6)000.S10xO**	57 mm	Supply 100-240 VAC
Type **MG-ADR41.5(6)000.710xO**	57 mm	Supply 18-36 VDC
Type **MG-ADR42.5(6)000.S10xO**	100 mm	Supply 100-240 VAC
Type **MG-ADR42.5(6)000.710xO**	100 mm	Supply 18-36 VDC

Terminal A:

| 1 | ⏚ | 3 |

N   L

100-240 VAC
oder
18-36 VDC

−   +

Voltage
supply

Terminal C: **MG-xDR41.5000.x10A0 / RS232**

| 21 | 22 | 23 | 24 | 25 | 26 |

TxD   RxD   GND

Interface
RS232

MG-xDR41.6000.x10A0 / RS485

| 21 | 22 | 23 | 24 | 25 | 26 |

Term -   Term +   Data +   Data -   GND

Interface
RS485

Terminal D:

| 31 | 32 | 33 | 34 | 35 | 36 |

Δ   ∇   P
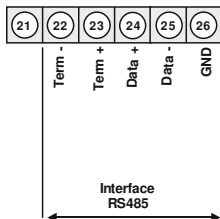
Connection of external keypad
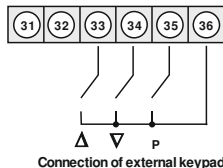
3.2. Connection examples

3.2.1. RS232

One device can be connected to the RS232 up to a maximum distance of 3 m (57600 baud). At lower transmission speeds, the cable length may increase.

Standard assignment of the serial interface:

2 RxD
3 TxD
5 GND

Connection example to the serial interface of a PCs
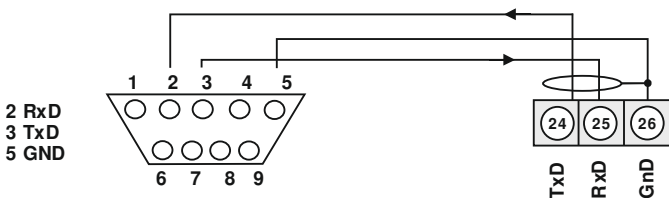
3.2.2 RS485

A maximum of 32 devices can be connected to the RS485, which are arranged in a line to a bus line. A termination is required at both ends of the data line. An existing termination in the control must be activated. The maximum permissible length of the data line is 1000 m.

On the last device of the bus line it is possible to connect the termination with two bridges to the bus line.
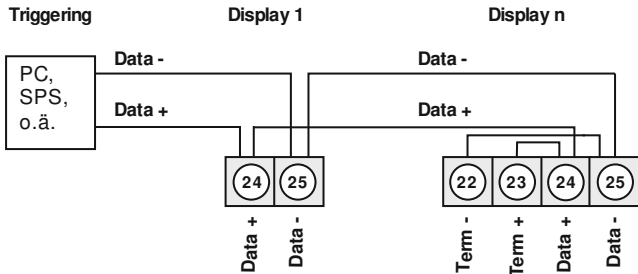
Connection of several displays to one RS485 bus line.

4. Operation and display elements

The display has 3 keys with which you can parameterize the device. Functions that can be adjusted or changed are always signaled with a flashing display. Settings made in the parameter level are always confirmed with a **[P]** and thus saved. However, the display also automatically saves all adjustments and switches to operating mode if no further key presses occur within 10 seconds.

Key symbol	Function in operation mode	Function at parameterisation
Program key **[P]**	Change into parameterisation with the program key **[P]**.	Change to the deposited value or value assumption.
Minus key **[▼]**	none	Change between parameters and change of parameters in the value-level.
Plus key **[▲]**	none	Change between parameters and change of parameters in the value-level.
Minus key **[▼]** and Plus key **[▲]**	none	Exit the parameterization.

Example:

| Parameter | ⟶ | Range of values |

[▲]
[▼] `P0` **[P]**

| 0 |
| 1 |
| 2 |
| 3 |

[▲]
[▼] **[P]**
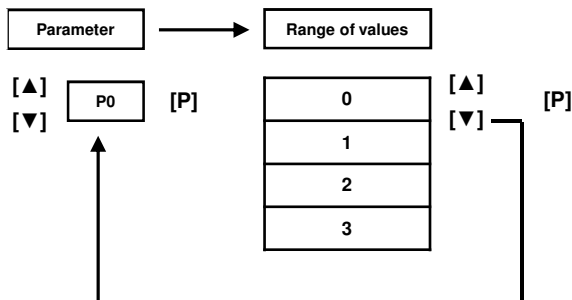
4.1. Programming via configuration software PM-TOOL MUSB:

The software comes on CD incl. an USB-cable with a Micro-USB connector plug. The connection happens after opening the operating flap (rear side of the housing) via a Micro-USB connector plug and the PC is connected via an USB connector plug.

System requirements: **PC with USB-interface**
Software: **Windows XP, Windows VISTA**

With this tool the device configuration can be created, readout and saved on the PC. Via the easy to handle program surface the parameter can be changed, whereat the mode of operation and the possible selection options can be preset via the program.

CAUTION!
During parameterisation with a connected measuring signal, make sure that the measuring signal has no mass supply to the programming plug. The programming adapter is galvanically not isolated and directly connected with the PC. Via polarity of the input signal, a current can discharge via the adapter and destroy the device as well as other connected components!

5. Setting up the device

5.1. Switching on

Once the installation is complete, start the device by applying the voltage supply. 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 operating/display mode.
In the operating mode the display shows "**rdY**" or the last valid text.

6. Parameterisation

All program numbers (P) are listed in the program number table with function, value range and default values.

6.1. Basic functions

Parameter	Function	Range of value	Default			
			0	1	2	3
P0	Presets	0 = User configuration 1 = Preset 1 2 = Preset 2 3 = Preset 3	0	0	0	0
P2	Baud rate	1 = 300 Baud 2 = 1200 Baud 3 = 2400 Baud 4 = 4800 Baud 5 = 9600 Baud 6 = 19200 Baud 7 = 38400 Baud 8 = 57600 Baud 9 = 115200 Baud	5	5	5	5
P3	Data type	1 = 7 bit + parity + 2 stop bit 2 = 7 bit + no pParity + 2 stop bit 3 = 8 bit + no parityt + 2 stop bit 4 = 8 bit + no parity + 1 stop bit 5 = 8 bit + parity + 1 stop bit 6 = 7 bit + parity + 1 stop bit	4	3	3	3
P4	Parity	1 = even 2 = odd	2	2	2	2
P5	Address length	0 = no addressing 1 = binäry addressing via one Byte (0..255) 2 = 2-digit ASCII-addressing 3 = 3-digit ASCII-addressing	0	0	2	0
P6 (only for P5 > 0)	Address	[0]00 = Address 0 [0]01 = Address 1 ... and so on to [9]99 = all addresses in the data string are accepted 255 = all addresses in the data string are accepted (only for P5 = 1)	[0]00			
P7	Decimal point	0 = no decimal point 1 = decimal point in the 1. decade ... and so on to 8 = decimal point in the 8. decade If fewer characters are sent than the set decimal point update, there will be no display update and a confirmation by NAK (depending on the setting in P13).	0	0	0	0

Parameter	Function	Range of values	Default			
			0	1	2	3
P8 (only for P7 = 0)	Decimal point presetting	0 = Suppress decimal points 1 = Decimal point can be specified at any position and number in the string. 2 = The position is specified as ASCII value at the end of the string. 3 = The position is specified as Bit position at the end of the string. For P8 = 2,3 the sent decimal point position is greater than the number of characters sent, there is no display update and acknowledgment with NAK (depending on the setting in P13). P = 8 ! = 1 All decimal points in the character text are ignored. It should be noted that in P7 and P8, the decimal point positions indicate the display digit and not the number of decimal places.	1	1	1	1
6.1.1. Protocol definition						
P10	Protocol	1 = none / CR (start / stopp) 2 = STX / EXT (start / stopp) 3 = user-defined stopp sign 4 = user-defined start-/stopp signs	1	1	2	0
P11 (only for P10 = 4)	Start sign	ASCII character value (decimal)	0	0	0	0
P12 (only for P10 =3/4)	Stopp sign	ASCII character value (decimal)	0	0	0	0
P13	Protocol answer	1 = none 2 = send ACK (0x06), also in case of error 3 = send only ACK (0x06), no confirmation is sent in case of an error 4 = send ACK (0x06) or NAK (80x15) 5 = always send P14, also in case of error 6 = only send P14, no confirmation is sent in case of an error 7 = send P14 or P15	1	1	1	1
P14 (only for P13 = 3/4)	Answer byte	ASCII character value (decimal)	0	0	0	0
P15 (only for P13 = 4)	Error answer byte	ASCII character value (decimal)	0	0	0	0
P16	Number of ignored signs	0...63	0	0	0	0

Parameter	Function	Range of values	Default			
			0	1	2	3
P17	Sign suppression (uncounted)	0 = no sign suppressed >0 = ASCII-sign (decimal), which is totally ignored by the device	LF	LF	0	0
P18	Sign suppression (counted)	0 = no sign suppressed >0 = ASCII-sign (decimal), which is automatically replaced by a space	0	0	0	0
P19	Time out until the display of crossbars	0 = no time out 1...60 = Number of seconds until time out	0	0	0	0
P20	Pre-zeros suppression	0 = Pre-zeros are displayed („000.0") 1 = Pre-zeros are suppressed („0.0") For numbers with more leading zeros than existing display digits, will result in a dark display. (Space !)	1	1	1	1
P21	Flashing function	0,0 = no flashing 0,1 ... 2,0 = flashing interval in seconds	0,0		0,0	
P22	Flashing signs	0 = constant flashing (if P21 > 0,0) >0 = select ASCII-sign (decimal) for flashing function	0	0	0	0
P30	Check sum	0 = no check sum 1 = 8bit Check sum by addition via total telegram 2 = 16bit Check sum by 16 Bit addition via total telegram 3 = 8bit Check sum by simple XOR-connection Suppressed signs (P17) are not taken into account in the check sum calculation!	0	0	0	0
P31	Initial value of check sum	Byte-value 00h…FFh for initial value of check sum (decimal)	00	00	00	00
P51	Access-Code	(0)(0)00 Can have 2 ... 4 entry points, depending on the existing display points.	0	0	0	0
P58	Brightness	0 = auto (brightness sensor) 1…9 = fix adjusted brightness 10 = brightness sent to address, value of 1 …9	5	5	5	5
run	Programming interlock see page 12, chapter 6.3					

6.2. Interface protocol (RS232/RS485)

The display has 4 to 8 digits (decades) One, tenner ... counted from right to left.

The order of the data packets in the basic structure must correspond to the following example. The display should show "123456" on a device with "address 25". A sign suppression is not described in this example. The checksum (P30) is made up of the sum of the transmitted characters which is normalized to a value smaller than 256 (8 bits).

Sum (Data byte 0...8) = 414 (dec.)
$\Rightarrow$ 414 > 256
$\Rightarrow$ 414 – 256 = 158 (checksum)

Data byte	0	1	2	3	4	5	6	7	8	9	10
	Start sign	Address		HT	ZT	T	H	Z	E	Check-sum	END
P	PN10 = 2	PN6 = 25								PN30 = 1	PN10 = 2
Byte (dec) ASCII	2 STX	50 „2"	53 „5"	49 „1"	50 „2"	51 „3"	52 „4"	53 „5"	54 „6"	158	3 ETX

For a 4-decade display, data bytes 3 and 4 must not be transferred.

6.2.1. ASCII character set

The following table shows the ASCII characters in decimal representation, as they are required in the parameterization of the device:

6.2.2. Special LED

1.) The degree sign is displayed only if it is the penultimate character in the text ("12.3 * C" becomes 12.3 ° C).

2.) The colon is only displayed if it is on the 3rd, 5th and/or 7th position (for example on the 3rd digit "18:30"). Assumed that the display has a corresponding number of digits.

6.3. Programming interlock „run"

If the display is in the released state **UnL**, after the program numbers run is displayed at the end of the parameterization. The programming interlock can be activated via this menu item by selecting **Loc**.

After the confirmation of **Loc**, the code is queried during the next parameterization attempt. Entering the code automatically returns the function to **UnL**. In this released state, no code is requested at the beginning of the parameter and the display switches from the operating mode to the parameterization mode after 1 second by pressing **[P]**.

If the parameter lock is activated, the display can not reset to factory settings.

After pressing the **[P]** key for 3 seconds, the display shortly displays **Cod** and switches to 2- to 4-digit code entry. The initial value is always **0000**. After the correct **Cod** has been confirmed with **[P]**, the display switches directly into program number P0. In the event of a faulty input, the display will show **FAL** for 1 second and then switch back to operating mode via **run**.

After the successful entry of a code, the display is again in the **UnL** state and must be locked again for operators with **Loc**.

7. Technical data

Housing	
Size built-on housing	57 mm display: 248 x 110 x 52 mm (BxHxD)
	100 mm display: 470 x 155 x 58 mm (BxHxD)
Size installation housing	57 mm display
	100 mm display: 478 mm x 155 mm x 60 mm (BxHxD) $474^{-0.5}$ mm x $159^{-0.5}$ mm (BxH) = Panel cutout
Material	Aluminium, black, powder-coated
Protection class	IP65 completely
Connection (plug intern) Plug A: Plug C: Plug D:	High strength cable gland, rear side of housing 3-pole plug-in terminal for voltage supply 6-pole plug-in terminal for interface 6-pole plug-in terminal for external keypad (optional)
Weight	57 mm display (4-digit): approx. 1.3 kg 100 mm display (4-digit): approx. 2.7 kg
Display	
Display	Power LEDs
Digit height	57 mm, 100 mm
Segment colour	Red, green (orange, blue on demand)
Number of digits	4, optional 6 or 8 digits
Display range	-1999 to 9999
Overflow	horizontal bars at the top
Under flow	horizontal bars at the bottom
Display time	0.01 to 2.0 seconds
Application area	interior
Interface serial	
Protocol	parametrizable ASCII protocol
Baud rate	300,1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Interfaces	RS232 / RS485 parametrizable
Wire length RS232	max. 3 m at 57600 baud (the lower the baud rate, the longer cable lengths are possible)
Wire length RS485	max. 1000 m
Bus subscriber	max. 32
Termination	can be activated via terminal

Power pack	
Supply	100-240 VAC 50/60 Hz, DC ±10%
	18-36 VDC, galv. isolated
Power consumption	max. 50 VA
Memory	EEPROM
Data preservation	≥ 100 years at 25°C
Ambient conditions	
Working temperature	-20°C…+50°C
Storing temperature	-30°C…+70°C
Weathering resistance	relative humidity 0-75% on years average without dew
EMV	EN 61326
CE-marking	conformity according to directive 2014/30/EU
Safety standards	according to low voltage directive 2014/35/EU;
	EN 61010; EN 60664-1

8. Safety advices

Please read the following safety advices and the assembly chapter 2 before installation and keep it for future reference.

Proper use

The **MG-XD-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 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 **MG-XD-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 6 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 each other and do not lay them parallel with each other. Position "go" and "return lines" next to one another. Where possible use twisted pair. So, the best measuring results can be received.
- 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 an 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.

9. Error elimination

Below is a list of measures and procedures for handling errors and their possible causes:

11.1. Questions and answers

1. After switching on, the device shows continuously „rdY"
- Send a valid command to the device.
- Check the setting of the device address.

2. The device shows „Err"
- In case of a Bus error **„Err"** is shown in the display.

3. The device shows „Er.1"
- Memory error. Confirm with **[P]** and restart the device. If the error can not be acknowledged, the device must be returned to the manufacturer.

4. Protocol error
- They are shown via parameterization of P13 via the bus.

5. The device does not respond to commands via the serial interface.
- Check (interface cable) the connection between control and device.
- Check the setting of Baud rate and interface.
- Check the setting of the device address.

6. The display of the device is dark.
- Check the auxiliary voltage of the device.
- Change into programming mode with the **[P]** key. If a change is possible, the device permanently receives blank spaces or empty data packets. The device has a defect that can only be solved by the manufacturer.