# Users guide MG-XB

Interface unit 4-...8-digit



- **Panel instrument type MG-BB**
- **Construction instrument type MG-AB**

# Contents

## 1. Brief description

The **MG-XB** is triggered via an interface. It displays figures and/or characters on a 4-up to 8-digit, 7- segment display.

The version with a serial interface RS232 / RS485 is addressable and can be operated in a bus system.

The version with a BCD input has a select input, and selection is address-coded. In addition, an SPS mode is supported in which the data are transmitted for display via a synchronous serial protocol. Several displays can be controlled separately via the select input.

## 2. Safety instructions

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

### 2.1. Proper use

The **MG-XB** is intended for displaying figures and characters.

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

### 2.2. 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.

### 2.3. Installation

The **MG-XB** 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.

❑ 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. (see ambient temperature in the technical data)

## 3. Assembly

On front of the **MG-XB** are the operating and display elements. The **MG-XB** is intended for installation in a control panel or as constructive instrument (please indicate which version when ordering).

3.1. **Panel instrument MG-BB** (for 57 mm and 100 mm digit height)

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.
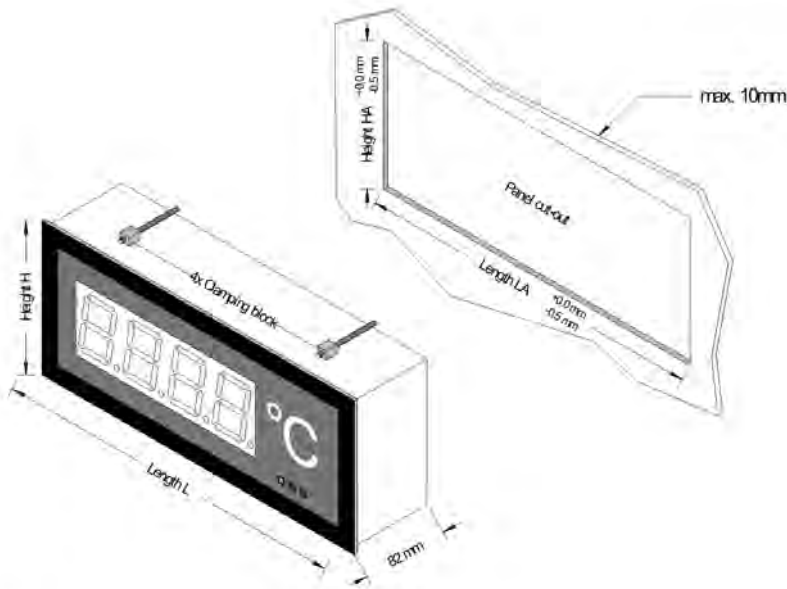


### Anzeige 57 mm

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 | | |

### Anzeige 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 digit | 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.  Construction instrument **MG-AB** (57 mm and 100 mm display height)

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.
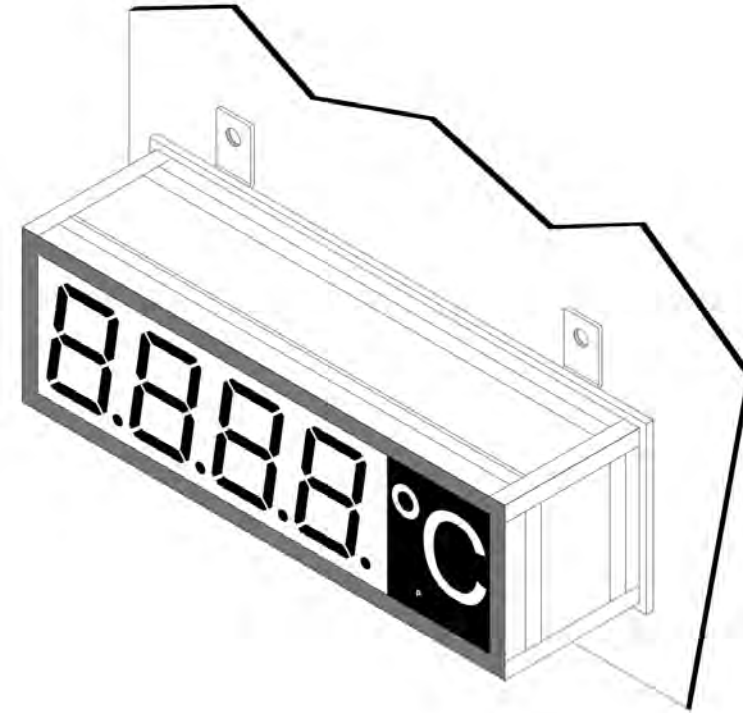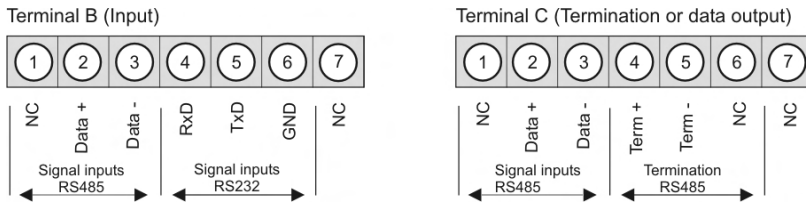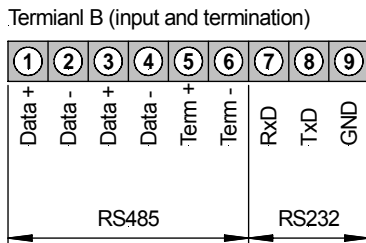
## 4. Electrical connection

The electrical connection is made on the rear or the top of the unit.
The electrical connection will depend on which version has been ordered. All the possible connections for the **MG-XB** are described below.

### 4.1. Connection position serial RS232 / RS485

Constructive instrument **MG-AB**

Terminal B (Input)



Terminal C (Termination or data output)



Panel instrument **MG-BB**

Termianl B (input and termination)



### 4.1.1. RS485

A maximum of 32 units can be connected to the RS485, arranged in a straight line to form a bus line. A termination is needed at both ends of the data line. Any termination existing in the control system must be activated. The maximum permissible length of the data line is 1,000 m.

To simplify the connection, the terminals are duplicated. On the last unit of the bus line, the possibility exists of switching the termination to the bus line with two bridges.
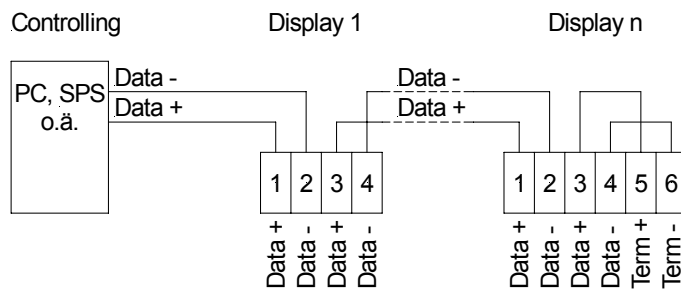


*Connection of several displays to one RS485 busline for **MG-BB** devices.*

# Electrical connection

## 4.1.2. RS232

A maximum of 1 unit up to a distance of max 3 m can be connected to the RS232. The RxD and TxD lines are, in the following example, consistently labelled with the signal designation of the PC layout.
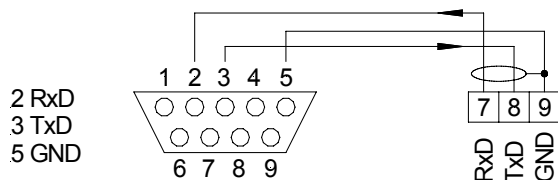
Default setting a serial interface of a PC:



2 RxD
3 TxD
5 GND

1 2 3 4 5
6 7 8 9

7 8 9
RxD TxD GND

*Example of a connection to the serial interface of a PC*

## 4.2. Connection positions **BCD**

The terminal assignments for different designs are represented in the following connection diagrams:

### Constructive instrument **MG-AB**



Terminal B

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Select | A0 | A1 | A2 | NC | GND | NC |

Signal inputs BCD

Terminal C

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Data 0 | Data 1 | Data 2 | Data 3 | NC | GND | NC |

Signal inputs BCD
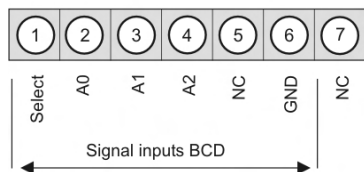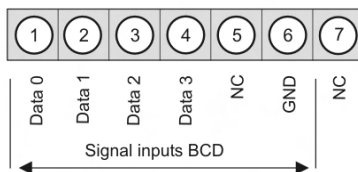
### Panel meter **MG-BB**



Terminal B (BCD inputs)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| Select | A2 | A1 | A0 | Data 3 | Data 2 | Data 1 | Data 0 | GND |

Inputs BCD
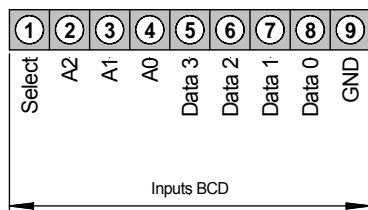
# Electrical connection

## 4.2.1. BCD

The following section describes the positions of the terminals with the aid of an example.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| Select | A2 | A1 | A0 | Data 3 | Data 2 | Data 1 | Data 0 | GND |
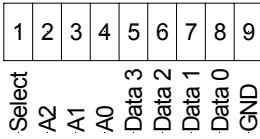
Via **"Select"**, select the display for receiving data. This signal is LOW-active, which means that the line can also remain unswitched. Lines A2...A0 are for selecting the display position. Via the Data3...Data0 lines, characters are transmitted. The GND connection is the common reference for all signals.

## 4.3. Connection positions SPS
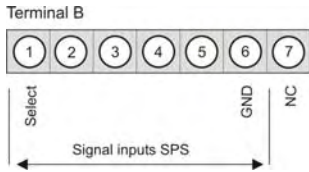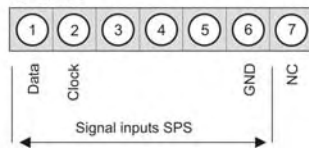
Constructive instrument **MG-AB**                    Panel meter **MG-B**
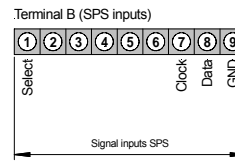


## 4.3.1. SPS

The following diagram shows the terminal pattern for the SPS control

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| Select | | | | | | Clock | Data | GND |
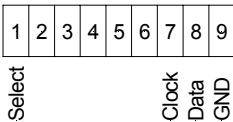
## 4.4. Terminal connection power supply for all models
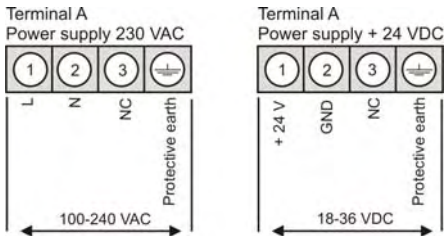


## 4.5. Position of connection terminals
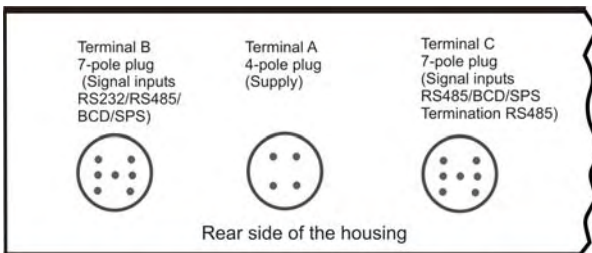
## 5. Operating and display elements

The devices are configured via 3 keys; depending on the size of the housing, the unit has a 4-…8-digit 7-segment display.
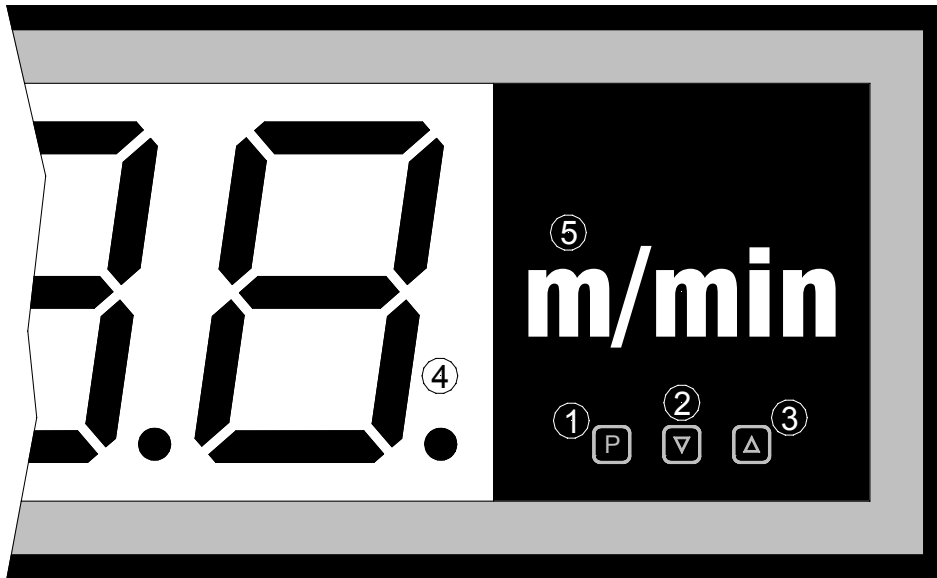


Operating and display elements

| | | |
|---|---|---|
| 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 [▼] | The minus key is used exclusively in programming mode for setting parameters. |
| 3 | Plustaste [▲] | The plus key is used exclusively in programming mode for setting parameters. |
| 4 | 7-segment display | The 7-segment display shows digits/characters as they are received, or, during the programming operation, program numbers or parameters. |
| 5 | Dimension window | Here, a physical unit can be included according to the customer's preferences. |

## 6. Programming

This section deals with the programming and parameterisation of the **MG-XB**. It also describes the special features and effects of the individual parameters of the program numbers.

The 4-digit display is always used in these examples. The keys are shown below the display, although their position may deviate from this in the actual layout of the unit. If so, you can take the position and function of the keys from chapter 5 *Operating and display elements.*

The display shows the program numbers (PN) right aligned, as a 3-digit number with a **P** at the front.
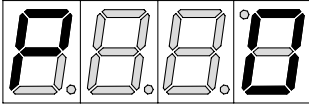
Example: Display of program number 0

6.1. Programming procedure

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

## Change to programming mode

Pushing the [**P**] key changes to programming mode. The unit goes to the lowest available program number. If the programming lock is activated, the key must be pushed for at least 1 second.
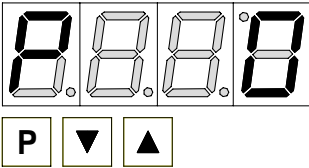
**Example:**
Change to programming mode by pushing key [**P**]. The first released program number (PN) appears, in this case PN0.

## Changing to other program numbers

To change between individual program numbers, hold the [**P**] key down and push 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.
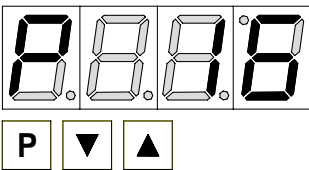
**Example:**

A 40 is parametrised under PN16.
Hold the [P] key down and press the [▲] key several times. PN16 appears in the display. Under this parameter, you can change the number of plus and minus signs to be ignored.

## Change to the parameter

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

# Programming
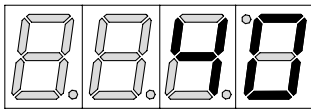
**Example:**
By pushing the [▼] or [▲] key, the currently stored value for PN16 appears in the display.
In this case, it is 40.

## 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 pushed. Once the highest digit has been set and confirmed with [P], the lowest digit will begin to flash again.
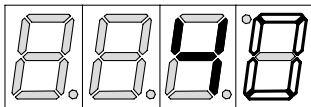
**Example:**
The 0 is flashing this is the lowest digit and asks if you want to change it. Let us assume the figure is to be changed from 40 to 60.
Briefly push the [P] key to move to the next digit.
The 4 begins to flash. Change the figure by pushing [▲] or [▼] to change the digit from 4 to 6.

## Saving parameters
**All parameters** must be acknowledged by the user by pushing 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.
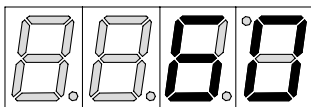
**Example:**
Save the parameters by pushing [**P**] for 1 second.
**All** the **newly entered data are confirmed** by the unit. If no confirmation is received, the relevant parameters have not been saved.
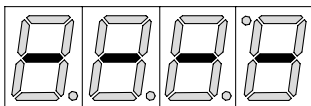
**Example:**
You receive confirmation from the unit that the changes have been saved through the appearance of horizontal bars in the middle segments.

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

# Programming

6.2. Units with a serial interface

Units with a serial interface are parameterised via program numbers. The main program numbers are described in detail below. Further information and value ranges are given in the program number table.

**Basic settings PN0 for interface units**

With the basic setting (PN0), presets or a predefined configuration are loaded as given under "Default" in the program number table.

In the simplest case, a preset is loaded with which a communication can be built up. Should it be necessary to adjust the parameters of a preset, a preset should be loaded which is the nearest to the requirements. The selected preset configuration is not stored but is reset to zero when a renewed change is made to the parameter. By altering the parameter, the current configuration is saved as the user configuration. This configuration can now be adapted according to requirements.

**Interface PN1 = 0**

The interface (PN1) can be switched to various operating modes. This is useful, for example, when configuring a unit outside the target application.

This means that the unit, which is in principle equipped with RS232 and RS485, can, for configuration via the RS232, be switched to the configuration mode that allows complete access to all parameters of the unit via a simplified protocol.

**Interface PN1 > 0**

If the interface (PN1) is parameterised to 1 (RS232) or 2 (RS485), all the communication parameters of the unit are activated and must be adhered to. Only in these two modes is normal display operation possible.

6.3. Units with BCD input

**Mode PN1**

With BCD units, the BCD-Multiplex (PN1 = 0) and SPS (PN1 = 1) modes can be selected via PN1.

**Character set PN9**

With units having a BCD input, the character set can be altered via PN9 because the units do not have the full ASCII character set. The possibilities for display are given in chapter 11, appendix "A" BCD.

## 7. Program 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 0 | 1 | 2 | 3 |
|----|----------|-----------------|---|---|---|---|
| **Basic functions** | | | | | | |
| 0 | Basic configuration (Default configuration) | 0 = user configuration<br>1 = preset 1<br>2 = preset 2<br>3 = preset 3 | | 0 | 0 | 0 |
| 1 | Interface (**only interface**) | 0 = RS232 in configuration mode<br>1 = RS232<br>2 = RS485 | | 0 | 0 | 0 |
| 1 | Operating mode (**only BCD / SPS**) | 0 = BCD – multiplex<br>1 = SPS | | 0 | 0 | 0 |
| 2 | Baudrate | 1 =　　300 baud<br>2 =　1200 baud<br>3 =　2400 baud<br>4 =　4800 baud<br>5 =　9600 baud<br>6 = 19200 baud<br>7 = 38400 baud<br>8 = 57600 baud | | 5 | 5 | 5 |
| 3 | Data format | 1 = 7 bit + parity　　+ 2 stopbits<br>2 = 7 bit + no parity　+ 2 stopbits<br>3 = 8 bit + no parity　+ 2 stopbits<br>4 = 8 bit + no parity　+ 1 stopbit<br>5 = 8 bit + no parity　+ 1 stopbit<br>6 = 7 bit + parity　　+ 1 stopbit | | 3 | 3 | 3 |
| 4 | Parity | 1 = even<br>2 = odd | | 2 | 2 | 2 |
| 5 | Address length | 0 = no address<br>1 = binary address via a byte (0..255)<br>2 = 2-digit ASCII address<br>3 = 3-digit ASCII address | | 0 | 2 | 0 |
| 6 | Address ( only where P5 > 0 ) | [0]00 = address 0<br>[0]01 = address 1<br>　　... etc. up to<br>[9]99 = all addresses in the<br>　　　data string are accepted | [0]00 | | | |
| 7 | Decimal point | 0 = no decimal point<br>1 = decimal point in the 1$^{st}$ decade<br>2 = decimal point in the 2$^{nd}$ decade<br>　　... etc. up to<br>8 = decimal point in the 8$^{th}$ decade | | 0 | 0 | 0 |

# Program table

| PN | Function | Range of values | Default 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| 8 | Decimal point (only where PN7 = 0 ) | 0 = Suppress decimal points<br>1 = Decimal point can be given at any desired position and in any desired number in the string<br>2 = Position is given at the end of the string as an ASCII value<br>3 = Position is given at the end of the string as a bit position | | 1 | 1 | 1 |
| 9 | Character set (**only BCD / SPS**) | 0...9<br>See appendix A | | 0 | 0 | 0 |
| **Protocol definition** | | | | | | |
| 10 | Protocol | 1 = None/ CR   (Start/Stop)<br>2 = STX / EXT   (Start/Stop)<br>3 = User-defined stop symbol<br>4 = User-defined start/stop symbol | | 1 | 2 | 0 |
| 11 | Start symbol (only where PN10 = 4) | ASCII value (decimal) | | 0 | 0 | 0 |
| 12 | Stop symbol (only where PN10 =3/4 ) | ASCII value (decimal) | | 0 | 0 | 0 |
| 13 | Protocol reply | 1 = none<br>2 = STX/ETX<br>3 = User-defined answer byte<br>4 = User-defined answer/error byte | | 1 | 1 | 1 |
| 14 | Answer byte (only with PN13 = 3/4) | ASCII value (hexadecimal) | | 0 | 0 | 0 |
| 15 | Error reply byte (only with PN13 = 4) | ASCII value (hexadecimal) | | 0 | 0 | 0 |
| 16 | Number of ignored symbols | 0...63 | | 0 | 0 | 0 |
| 17 | Symbol suppression (uncounted) | 0   = No symbol suppressed<br>>0  = ASCII symbol ( decimal ), which is completely ignored by the unit | | L F | 0 | 0 |
| 18 | Symbol suppression (counted) | 0   = No symbol suppressed<br>>0  = ASCII symbol ( decimal ), which is automatically replaced by a blank | | 0 | 0 | 0 |
| 19 | Time-out until display of horizontal bar | 0      = No time-out<br>1...60 = Number of seconds until time-out | | 0 | 0 | 0 |
| 20 | Pre-zero suppression | 0 =  Pre-zeros are displayed ("000,0" )<br>1 =  Pre-zeros are faded out ("   0,0" ) | | 1 | 1 | 1 |
| 21 | Flash function | 0.0 = No flashing<br>0.1 ... 2.0 seconds flashing interval | | 0,0 | | |
| 22 | Flashing character | 0   = Constant  flashing (when PN21 > 0.0 )<br>>0 = Select ASCII symbol (decimal ) for flash function | | 0 | 0 | 0 |

# Program table

| PN | Function | Range of values | Default 0 | 1 | 2 | 3 |
|----|----------|-----------------|-----------|---|---|---|
| 30 | Test total | 0 = No test total<br>1 = 8 bit test total by addition over the entire telegram<br>2 = 16 bit test sum through 16 bit addition over entire telegram<br>3 = 8 bit test total through simple XOR link-up | | 0 | 0 | 0 |
| 31 | Starting value of the test total | Byte value 00h...FFh for test total start value | | 00 | | |
| 40 | Number of segments counted from the lowest digit position upwards | 1 = 1 segment active<br>2 = 2 segments active<br>3 = 3 segments active<br>4 = 4 segments active<br>5 = 5 segments active<br>6 = 6 segments active<br>7 = 7 segments active<br>8 = 8 segments active | max. active segments | | | |
| 50 | Programming lock | 00...99 | 00 | | | |
| 51 | Authorisation code | 00...99 | 00 | | | |
| 52 | Programming mode enable/disable | 0 = Configuration mode **NOT** activatable via interface<br>1 = Configuration mode activatable via interface | | 0 | 0 | 0 |
| 60 | Serial number | | fix | | | |

## 8. Interface protocol

The display can have 4-…8-digit (decades), ones, tens…counted from right to left.



HT    ZT    T    H    Z    E
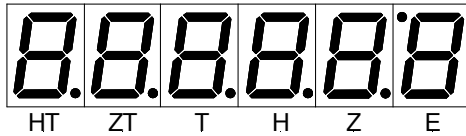
*Example: 6 digits*

### 8.1. Serial RS232/RS485

The sequence of the data packages must correspond in their basic structure to the following example. On the display, "123456" is to be shown on a unit with "Address 25". The suppression of plus or minus signs is not described in this example. The test total (PN30) is formed from the sum of the transmitted symbols, which is standardised to a value smaller than 256 (8 bit).

Total (data bytes 0...8) = 414 (dec.)
$\Rightarrow$ 414 > 256
$\Rightarrow$ 414 – 256 = 158 (test total)

| 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 |
| PN | 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 |

In a display with 4 decades, the data bytes 3 and 4 must not be transmitted.

### 8.2. BCD address coded

The data must be transferred according to the following procedure:
I. Switch the BCD code to the relevant lines.
II. Subsequently or simultaneously address the display position via the three address lines.
III. To conclude the communication, switch select to LOW and the data from the unit directly to the display.
IV. The address signal must be ready unchanged for at least 10 ms together with the activated 10 ms select signal so the symbol can be received. Otherwise, symbols selected via the data lines are ignored. If the level changes to one of the lines, the address is not correctly recognised and the holding time $t_1$ will restart.

# Interface protocol
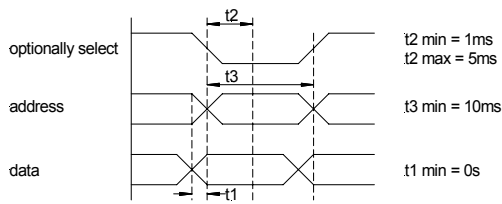


*Signal process for transmitting a BCD-Codes*

3 Address lines  A0, A1, A2
4 Data lines  Data0 ($2^0$), Data1 ($2^1$), Data2($2^2$), Data3($2^3$)

|  | A2 | A1 | A0 |
|---|---|---|---|
| No input | 0 | 0 | 0 |
| **O**nes | 0 | 0 | 1 |
| **T**ens | 0 | 1 | 0 |
| **H**undreds | 0 | 1 | 1 |
| **T**housands | 1 | 0 | 0 |
| **T**en **T**housands | 1 | 0 | 1 |
| **H**undred Thousands | 1 | 1 | 0 |
| Decimal point | 1 | 1 | 1 |

| Parameter | min. |
|---|---|
| **Holding time** for 1 address ($t_1$) | 10ms |
| Pause between 2 addresses | 3ms |

The BCD code must be available at the positive edge of the address lines

An overview of the various character sets and depictable symbols can be found in the "*appendix A BCD*". The decimal point can be freely positioned, whereby a 1 on the data lines in the units position (for e.g. „°C"), a 2 in the tens position, ...represents a decimal point. The decimal point is erased again when a character is written in the decimal point position.

## 8.3. SPS

The following timing diagrams apply for the control.

| PARAMETER |  | min. |
|---|---|---|
| Delay Select–Clock | $t_1$ | 1,5 ms |
| Delay Select |  | 10 ms |
| Holding time clock | $t_2$ | 1,5 ms |
| Pause time clock | $t_3$ | 1,5 ms |
| Data must be available at the positive edge of the CLOCK signal. | | |
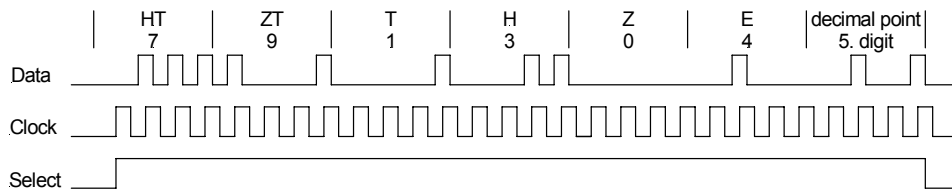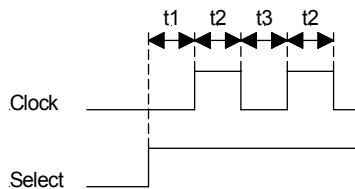
# Interface protocol

The 'Select' signal can be given after the last positive clock edge or after its respective negative edge of the last clock signal. 'Select' must be active during the entire transmission phase and must contain the right number of positive clock edges so that the data can be accepted. Every display position is coded in 4 bits, and the highest value bit must be transmitted first. The length of the telegram diversifies with the amount of the existing digits, e.g. by a 4-digit display are 4 nibbles for the single characters and 1 nibble for the position of the decimal point, which need to be transferred at the same time. The respective form of the display corresponds to the BCD control and is character set-dependent, see appendix "A" BCD.

## 9. Technical data

Housing dimension
Construction
instrument
(without plug)

**Version A**

| | |
|---|---|
| 57 mm display | 336 x 144 x 82 mm (WxHxD) |
| 100 mm display | 550 x 200 x 82 mm (WxHxD) |

**Version B**

| | |
|---|---|
| 57 mm display | 316 x 124 x 82 mm (WxHxD) |
| 100 mm display | 526 x 176 x 82 mm (WxHxD) |

| | |
|---|---|
| Fixing | per fastening angle on the backside |
| Material | Aluminium, black, powder-coated |
| Protective system | IP65 |

Weight

| | |
|---|---|
| 57 mm display | approx. 3.0 kg |
| 100 mm display | approx. 5.0 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 to1.5 mm (AWG 22...16) |
| Rating: | 250 V |
| Rating current: | 8 A |

# Technical data

| | | |
|---|---|---|
| **Dimensions mounting housing** (without plug terminals) | **Version A** 57 mm display 100 mm display **Version B** 57 mm display 100 mm display | W 336 x H 144 x D 82 mm W 550x H 200 x D 82 mm W 316 x H 124 x D 82 mm W 526 x H 176 x D 82 mm |
| (with plug terminal) | **Version A / B** 57 mm /100 mm display | W … x H … x **D 104 mm** |
| **Assembly cut-out** | **Version A** 57 mm display 100 mm display | $330.0^{-0.5}$ x $138.0^{-0.5}$ mm (WxH) $544.0^{-0.5}$ x $194.0^{-0.5}$ mm (WxH) |
| | **Version B** 57 mm display 100 mm display | $310.0^{-0.5}$ x $118.0^{-0.5}$ mm (WxH) $520.0^{-0.5}$ x $170.0^{-0.5}$ mm (WxH) |
| | **Weight** 57 mm display 100 mm display | approx. 3.0 kg approx. 5.0 kg |
| | **Connection 57/100 mm display** | 4-way adaptable screw terminal for voltage supply for line diameter by 2.5 $mm^2$ 9-way adaptable screw terminal for voltage supply for line diameter by 1.5 $mm^2$ |
| **Display** | Display Digit height Segment colour Number of digits Field of application | 7-segment-LED 57 mm, 100 mm, optional higher red or green 3 to 8 digits indoor/outdoor |
| **Interface serial** | Protocoll Baudrates Interfaces Line length RS232 Line length RS485 Bus users Termination | Parametrisable ASCII - protocoll 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 RS232 / RS485 parameterisable max. 3 m max. 1000 m max. 32 activatable via connection terminal |
| **Interface BCD** | HIGH / LOW | $\geq 4{,}5$ V / $\leq 2{,}4$ V |
| **Interface SPS** | HIGH / LOW | $\geq 4{,}5$ V / $\leq 4{,}0$ V |

**Power supply**

Supply voltage
(galvanic insulated)

Multi voltage power supply unit 100-240 VAC nominal voltage
+/-10%, 50/60 Hz
18-36 VDC

**Memory**
Data life

Parameter storage EEPROM
> 20 years

**Ambient conditions**

Working temperature
Storing temperature
Climatic density

0…60 °C
-20…80 °C
Rel. humidity ≤ 75 % on years average without dew

**EMV**
**CE-sign**

DIN 61326
conformity to 89/336/EWG

**Safety regulation**

DIN 61010

## 10. Error elimination

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

10.1. Questions and answers

**I.      After switching on, the unit constantly shows: segment test – Pb xx – U x.x**

> ➢ Send a valid command to the unit.

> ➢ Check the setting of the unit address.

**II.     The unit does not respond to commands via the serial interface.**

> ➢ Check the connection (interface cable) between the control device and the unit.

> ➢ Check the settings for baudrate and interface.

> ➢ Check the setting of the unit address.

**III.    The unit does not respond to data via the BCD input.**

> ➢ The unit is not being contacted via the "Select signal" to receive the data.

> ➢ No decade has been selected via the address.

> ➢ The signals are inadequate.

**IV.    The unit's display is dark.**

> ➢ Check the auxiliary voltage of the unit.

> ➢ Change to programming mode by pressing the [**P**] key. If a change is possible, the unit will permanently receive blanks.

> ➢ The unit has a defect that can only be remedied by the manufacture.

## 11. Appendix „A" BCD

Appendix A lists the various character sets of the **MG-XB** with BCD input. By selecting a different character set, the presentable symbols can be adapted to the particular requirements. The character sets are designed in such a way that the display spectrum is as broad as possible.

| Decimal-value | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HEX-value | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| BCD-value | 0000 | 0001 | 0010 | 0011 | 0100 | 0101 | 0110 | 0111 | 1000 | 1001 | 1010 | 1011 | 1100 | 1101 | 1110 | 1111 |
| Character set 0 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | U | F | o | - | E | |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | r | o | o | - | E | |
| 2 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | H | L | P | - | E | |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | H | L | F | - | E | |
| 4 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ‾ | - | _ | o | C | |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ‾ | - | _ | o | F | |
| 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | P | F | U | L | |
| 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | , | - | ' | _ | F | |
| 8 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | n | F | u | t | o | |
| 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | b | C | d | E | F |

In the character sets 0...8, the 15th symbol is always a blank.

Examples:
...Character set 0
... °F, OFF
Character set 1 — Error, °
Character set 2 — HELP
Character set 3 — HILFE, OFF
Character set 4 — °C, ‾(heat), –(soll), _(cool)
Character set 5 — °F, ‾(heat), –(soll), _(cool)
Character set 6 — A(mpere), FULL, OFF, PA(scal), P1 (for pos.1)
Character set 7 — OFF, function control: rotating segments

Segments:
Character set 8 — OFF, on, On, out, no
Character set 9 — Display of the HEX characters

Kommentar [dw3]: DW 11-03-04 V1.04 Die Character set – Nummern müssen nach Tabelle angepaßt werden

# Appendix B

## 12. Appendix B hexa-decimal

The following table shows the ASCII symbols in decimal form, as are needed parameterising the unit.

| Decade 2 u. 3 | Decade 1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | | | |
| 00 | NUL | SOH | STX | ETX | EOT | ENQ | ACK | BEL | BS | HT |
| 01 | LF | VT | FF | CR | SO | SI | DLE | DC1 | DC2 | DC3 |
| 02 | DC4 | NAK | SYN | ETB | CAN | EM | SUB | ESC | FS | GS |
| 03 | RS | US | SPACE | ! | " | # | $ | % | & | ' |
| 04 | ( | ) | * | + | , | - | . | / | 0 | 1 |
| 05 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; |
| 06 | < | = | > | ? | @ | A | B | C | D | E |
| 07 | F | G | H | I | J | K | L | M | N | O |
| 08 | P | Q | R | S | T | U | V | W | X | Y |
| 09 | Z | [ | \ | ] | ^ | _ | ´ | a | b | c |
| 10 | d | e | f | g | h | i | j | k | l | m |
| 11 | n | o | p | q | r | s | t | u | v | w |
| 12 | y | z | { | \| | } | ~ | DEL | | | |

## 13. Notes