# migan

Large Format Numeric LED Display with InterBus Interface

# User Manual

microSYST Systemelectronic GmbH, Albert-Einstein-Straße 7, 92637 Weiden
Tel. +49 961 39166-0, Fax +49 961 39166-10, info@microsyst.de, www.microsyst.de

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Tel. +49 961 39166-0, Fax +49 961 39166-10, info@microsyst.de, www.microsyst.de

# 1 General

The large display numeric LED can be used universally for displaying production data, or as an information board.

The modular design allows for cost-effective models of various sizes, and with different character heights and numbers of digits.

Thus integration into existing equipment or systems is easy and simple.

### Display Functions

- Data transmission: InterBus
- Simple parameter setting and initial start-up
- Variable size thanks to modular display design.

**Important Note:**

The display provides two different types of transmission frames (selectable with DIP switches).

As of 11/09/2005 a new, simpler frame type is adjusted at the delivery by default (see chapter “Standard Transmission Frame“).

If the former transmission frame is still required (see chapter “Alternative Transmission Frame”, the internal DIP switches must be adjusted according to this (see chapter “InterBus-Interface”).



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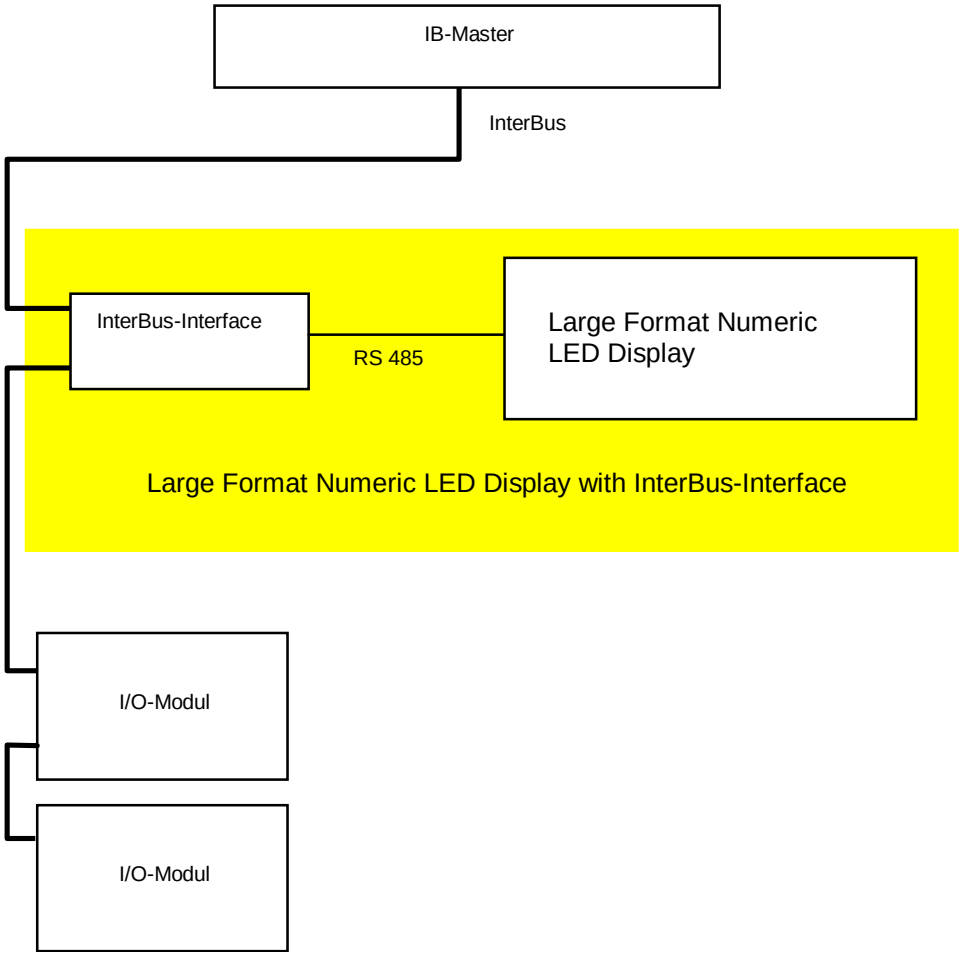
## 2 System Overview

Schematic diagram of the display unit at the interface.



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Tel. +49 961 39166-0, Fax +49 961 39166-10, info@microsyst.de, www.microsyst.de

# 3 Technical Data

## 3.1 Overall Specification

| | |
|---|---|
| Display type: | 7 segment SMD LED |
| Character heights: | Indoor use: 60 / 100 / 150 / 200 / 250 mm<br>Outdoor use: 100 / 200 / 300 mm |
| Number of digits: | Standard: 1...12<br>Alternative: 1…15 |
| Number of lines: | Standard 1 line, multiple lines on request |
| Display colour: | Standard red, other colours on request |
| Operating voltage: | 230 VAC / 50 Hz, 110 VAC / 60 Hz or 24 VDC ±20% |
| View: | Single sided to four sided |
| Interface: | Interbus |
| Displayable characters: | See corresponding chapter |
| Labelling: | On request |
| Housing: | Industrial version, powder coated aluminum |
| Housing colour: | RAL 7016 (anthracite) |
| Mounting: | Articulated arm, angle bracket, hanging on chain or mounting frame |
| Protection: | See chapter „Device Configuration“ |
| Operating temp.: | See chapter „Device Configuration“ |
| Storage temp.: | -25 ... +70 °C |

**Notes for the start-up**

- When putting on the power supply, the following sequence has to be observed:
  - Connect the power supply cable to the display.
  - Connect the power supply cable to the power supply.

- When disconnecting the power supply, the following sequence has to be observed:
  - Disconnect the power supply cable from the power supply.
  - Disconnect the power supply cable from the display.



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### 3.2 Device Configuration

***Type:***
☐ for inside use ☐ for outside use

***Character height:***
☐ 60 mm ☐ 75 mm ☐ 100 mm ☐ 120 mm ☐ 150 mm ☐ 180 mm
☐ 200 mm ☐ 250 mm

***Number of lines***: _____ ***Number of digits per line***: _____

***Display colour***:
☐ red ☐ green ☐ yellow ☐ white ☐ blue

***View***:
☐ single sided ☐ double sided ☐ four sided

***Operating voltage***:
☐ 230 VAC / 50 Hz ☐ 110 VAC / 60 Hz ☐ 24 VDC

***Protection***:
☐ IP40 ☐ IP54 ☐ IP65 ☐ IP _____

***Operating temperature***:
☐ 0 to +50 °C ☐ -25 to +50 °C ☐ _____ °C

***Housing dimensions***: _____x_____x_____mm

***Housing Material***:
☐ Aluminum profile ☐ Stainless steel ☐ Sheet metal

***Interface***: Interbus

***InterBus ID***: 03H (fixed)



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### 3.3 Device or System Start-Up

The large format numeric LED display performs internal memory and function tests while powering up.

The following data appear at the large format display:

- Baud rate
- Parity
- Data bits
- Stop bits
- - 1 2 3 4 5 ...
- Address.

**The displayed values are of no significance for the InterBus user.**
This setting influences control via the RS 485 serial interface (internal).



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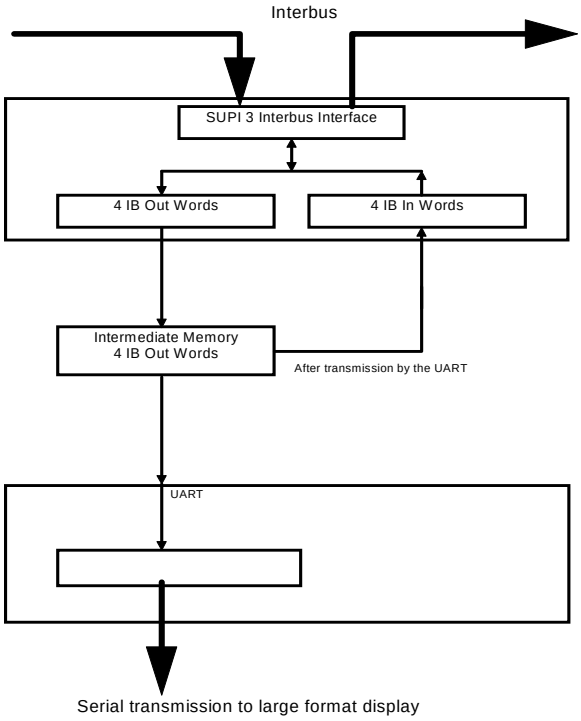
## 3.4 Control via the InterBus Interface

Data received by the InterBus („out“ words) are stored to intermediate memory, processed and transmitted to the large format display. After the frame has been transmitted, the frame data are mirrored via the InterBus as a response („in“ words).




### 3.4.1 User Data – IB Output

The large format alphanumeric display utilises 4 IB output words. These are used for transmission of user data which are required for control of the large format display.

### 3.4.2 User Data – IB Input

The large format numeric display utilises 4 IB input words. These are used as a response to user data which have been transmitted to the large format display. After transmission of each frame, the IB data which have just been transferred to the large format LED display are mirrored in response to the „in“ words.



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Tel. +49 961 39166-0, Fax +49 961 39166-10, info@microsyst.de, www.microsyst.de

### 3.5 Standard Transmission Frame (IB-Output)

For activation of this frame type see chapter 4.1.

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 | Byte 8 |
|---|---|---|---|---|---|---|---|
| Char Digit 1/2 | Char Digit 3/4 | Char Digit 5/6 | Char Digit 7/8 | Char Digit 9/10 | Char Digit 11/12 | Option 1 | Option 2 |
| HIGH-Nibble / LOW-Nibble (see coding char) | | | | | | see coding option 1 | see coding option 2 |

| Coding Char | |
|---|---|
| **Char** | **Value** |
| '0' | 0 H |
| '1' | 1 H |
| '2' | 2 H |
| '3' | 3 H |
| '4' | 4 H |
| '5' | 5 H |
| '6' | 6 H |
| '7' | 7 H |
| '8' | 8 H |
| '9' | 9 H |
| '-' | A H |
| 'H' | B H |
| 'E' | C H |
| 'L' | D H |
| 'P' | E H |
| ' ' (Blank) | F H |

| Coding Option 1 | |
|---|---|
| Bit 0 | Point at digit 1 |
| Bit 1 | Point at digit 2 |
| Bit 2 | Point at digit 3 |
| Bit 3 | Point at digit 4 |
| Bit 4 | Point at digit 5 |
| Bit 5 | Point at digit 6 |
| Bit 6 | Point at digit 7 |
| Bit 7 | Point at digit 8 |

| Coding Option 2 | |
|---|---|
| Bit 0 | Point at digit 9 |
| Bit 1 | Point at digit 10 |
| Bit 2 | Point at digit 11 |
| Bit 3 | Point at digit 12 |
| Bit 4 | reserved (=0) |
| Bit 5 | reserved (=0) |
| Bit 6 | reserved (=0) |
| Bit 7 | Display activation 1 = ON, 0 = OFF |

#### 3.5.1 Example

The following chars shall be displayed at a 6-digit display:
"1234.56"

Frame (HEX-coded):
12 H 34 H 56 H 00 H 00 H 00 H 08 H 80 H



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### 3.6 Alternative Transmission Frame (IB-Output)

For activation of this frame type see chapter 4.1.

| Data byte 1 | Data byte 2 | Data byte 3 | Data byte 4 | Data byte 5 | Data byte 6 | Data byte 7 … n | Data byte n+1 |
|---|---|---|---|---|---|---|---|
| STX | ADRH | ADRL | PB1 | PB2 | PB3 | 1…15 chars (depending on number of digits) | ETX |
| 3C H | 30 H | 31 H | see coding of point bytes | | | ASCII code of the char, which shall be displayed | 3E H |

**Coding of Point Bytes (PB)**
As soon as the regarding bit has the value 0, the decimal point is shown at the relating display digit. Digit 1 is always the first digit of the device (located at the left side).

| PB1 | Point Position |
|---|---|
| Bit 0 | Digit 5 |
| Bit 1 | Digit 4 |
| Bit 2 | Digit 3 |
| Bit 3 | Digit 2 |
| Bit 4 | Digit 1 |
| Bit 5 | State: 0 |
| Bit 6 | State: 1 |
| Bit 7 | State: 0 |

| PB2 | Point Position |
|---|---|
| Bit 0 | Digit 10 |
| Bit 1 | Digit 9 |
| Bit 2 | Digit 8 |
| Bit 3 | Digit 7 |
| Bit 4 | Digit 6 |
| Bit 5 | State: 0 |
| Bit 6 | State: 1 |
| Bit 7 | State: 0 |

| PB3 | Point Position |
|---|---|
| Bit 0 | Digit 15 |
| Bit 1 | Digit 14 |
| Bit 2 | Digit 13 |
| Bit 3 | Digit 12 |
| Bit 4 | Digit 11 |
| Bit 5 | State: 0 |
| Bit 6 | State: 1 |
| Bit 7 | State: 0 |

The point bytes must be sent, even if no decimal point shall be shown. In this case, the point bytes PB1 to PB3 have the value $40_H$ (because of the static values of the bits 5 to 6).



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Tel. +49 961 39166-0, Fax +49 961 39166-10, info@microsyst.de, www.microsyst.de

### 3.6.1 Interbus Frame for controlling the Display

| **Byte 1** | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 | Byte 8 |
|---|---|---|---|---|---|---|---|
| **Toggle byte** | Data byte 1 | Data byte 2 | Data byte 3 | Data byte 4 | Data byte 5 | Data byte 6 | Data byte 7 |

**Toggle byte**
The interface at the large format display is driven with the first byte of output data (toggle byte TB).
The toggle byte is saved to intermediate memory immediately after the InterBus interface has been initialised (first of all it must be „0“), and is then always compared with the respectively current content of the first byte of output data. As soon as it’s value is changed, subsequent output data are evaluated and interface data are transmitted to the large format display if appropriate. The only evaluation criterion is a change of content – the actual content itself is irrelevant.

The following must be observed in order to transmit a frame to the large format display:

- The frame at the large format LED display is subdivided into blocks of 7 bytes each, which are transmitted one after the other.
- The InterBus interface accepts output data transmitted by the IB master (7 bytes) as soon as the toggle byte has been changed. As soon as transmission of the 7 bytes of frame data to the large format display is concluded, the output data transmitted by the IB master are mirrored to the input data at the IB master (8 bytes).
- The next block cannot be transmitted until input and output data are identical (the comparison of the toggle byte is sufficiently).
- If the last block of the protocol requires less than 7 bytes, the unused bytes must be set to 00h (they are not sent).


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### 3.6.2 Example

**Display the numbers “123456”**

Transmission of block 1

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| toggle byte | STX<br>3C H | ADRH<br>30 H | ADRL<br>31 H | point byte1<br>40 H | point byte2<br>40 H | point byte3<br>40 H | display data<br>31 H |

First change bytes 2 through 8, then change byte 1!

Do not begin with transmission of block 2 until response has been received (8 bytes of output data are mirrored to the input data)!

Transmission of block 2

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| Toggle byte | display data<br>32 H | display data<br>33 H | display data<br>34 H | display data<br>35 H | display data<br>36 H | ETX<br>3E H | not used<br>00 H |

First change bytes 2 through 8, then change byte 1!

## 3.7 Response Frame (IB Input – 8 Bytes)

Once the display has been updated, these bytes are identical to the IB output bytes. The IB input bytes needn’t be evaluated by the Interbus Master (PLC).



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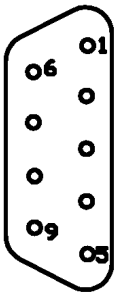
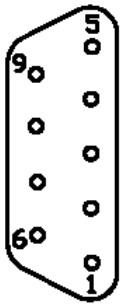
# 4 Connector Pin Assignments

### IB-IN (Interbus IN, 9-Pin Sub-D Plug Connector)




| Pin | Assignment |
|---|---|
| 1 | DO |
| 2 | DI |
| 3 | COM |
| 4 | n.c. |
| 5 | n.c. |
| 6 | /DO (inverted) |
| 7 | /DI (inverted) |
| 8 | n.c. |
| 9 | n.c. |

### IB-OUT (Interbus OUT, 9-Pin Sub-D Socket Connector)




| Pin | Assignment |
|---|---|
| 1 | DO |
| 2 | DI |
| 3 | COM |
| 4 | n.c. |
| 5 | Termination* (+5 VDC) |
| 6 | /DO (inverted) |
| 7 | /DI (inverted) |
| 8 | n.c. |
| 9 | Termination* (RBST) |

**Termination*:**
If a further device is connected, pin 5 must be bridged to pin 9.
If no further device is connected, pin 5 is not bridged to pin 9.



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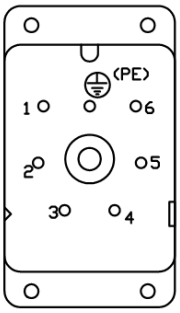
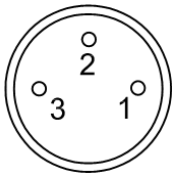
### Power Connector 230 VAC




| Pin | Assignment |
|---|---|
| 1 | L1 |
| 2 | N |
| ⏚ (PE) | PE |

### Power Connector 24 VDC (optional)




| Pin | Assignment |
|---|---|
| 1 | GND |
| 2 | +24 VDC |
| 3 | PE |



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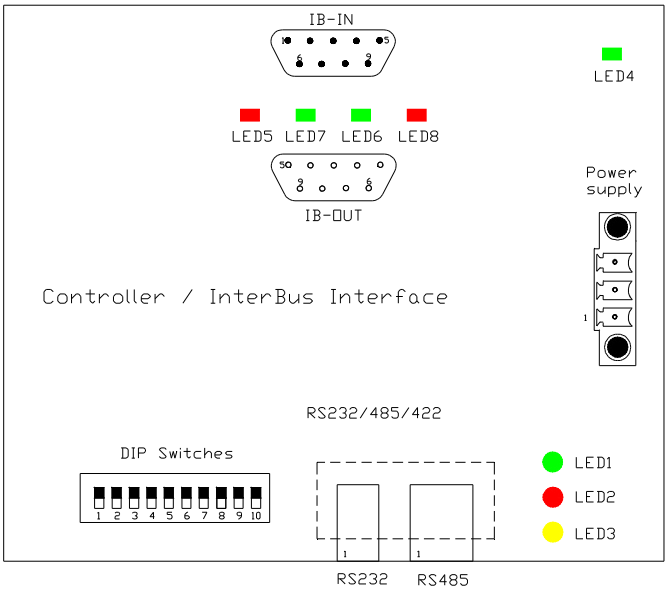
## 4.1 InterBus-Interface




### LEDs

| LED | Description | Status | Meaning |
|---|---|---|---|
| 1 (green) | RUN | blinks at approx 2 Hz | CPU-activity |
| 2 (red) | ERROR/UART | On | UART-communication |
| 3 (yellow) | BUS | On | cyclic IB-data transmission |
| 4 (green) | SUPI 3-Watchdog | On | normal operation after RESET |
| 5 (red) | ER | On | Error at the IB-module |
| 6 (green) | BA | On<br>Off | bus activity<br>no bus activity since at least 630 ms (Watchdog expired) |
| 7 (green) | CC | On | cable connection of the incoming bus OK and no Interbus-RESET |
| 8 (red) | RD | On | Interbus-RESET or continuing IB-Interface disengaged |



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### DIP Switches

| DIP | Setting |
|---|---|
| 1 | ON |
| 2 | ON |
| 3 | OFF |
| 4 | ON |
| 5 | ON |
| 6* | ON: Standard Frame<br>OFF: Alternative Frame |
| 7 | ON |
| 8 | ON |
| 9 | not connected |
| 10 | not connected |

*DIP6 specifies, which frame type is used for the controlling (see chapters 3.5 and 3.6). The remaining switches are set by default and must not be changed.



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# 5 Appendix

## 5.1 Maintenance and Care

Please observe the following instructions.

- Make sure that the housing can be opened for adjustment and maintenance even after the display has been installed. Allow for adequate clearance at the back, front and top of the display unit in order to follow for sufficient ventilation (if vent slots are included).
- Display quality is impaired by direct illumination with bright light sources and/or direct sunlight.
- The display must be switched off before cleaning.
- Protect the display from excessive humidity, extreme vibration, direct sunlight and extreme temperatures. Non-observance may lead to malfunctioning or destruction of the device. Under certain circumstances electrical shock, fire and explosion may occur as well. Information concerning allowable ambient conditions, including recommended temperature ranges, can be found in the chapter entitled „Technical Data“.
- The display may not be placed into service if the device and/or the power cable are known to be damaged.
- Do not attempt to repair the device yourself. The guarantee is rendered null and void if the device is tampered with by unauthorised persons.



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## 5.2 Declaration of Conformity

# EG-Konformitätserklärung
## Declaration of EC-Conformity

**Produktbezeichnung:** **migan Interbus**
Product name:

**Produktbeschreibung:** Numerische LED-Großanzeige mit InterBus-Interface /
Product description: Large Format Numeric LED Display with InterBus Interface

**Hersteller:** microSYST Systemelectronic GmbH
Manufacturer: Albert-Einstein-Straße 7
92637 Weiden

| **Das bezeichnete Produkt stimmt mit der folgenden Europäischen Richtlinie überein:**<br>We herewith confirm that the above mentioned product meets the requirements of the following standard: | | **Die Übereinstimmung des bezeichneten Produktes mit den Vorschriften der Richtlinie wird nachgewiesen durch die vollständige Einhaltung folgender Normen:**<br>The correspondence of the above mentioned product with these requirements is proved by the fact that these products meet with the following single standards: |
|---|---|---|
| **Nummer** | **Bezeichnung** | **Europäische Norm** |
| **2004/108/EG** | **Elektromagnetische Verträglichkeit (EMV)** | EN61000-6-2:2006 |
| | | EN61000-6-4:2007 |

Weiden, den 27.03.2013

ppa. H. Kilian

Harald Kilian

**Leiter operatives Geschäft** / COO
**Prokurist** / Authorized Signatory



microSYST Systemelectronic GmbH, Albert-Einstein-Straße 7, 92637 Weiden
Tel. +49 961 39166-0, Fax +49 961 39166-10, info@microsyst.de, www.microsyst.de

## 5.3 Warranty / Liability

For the product, liability is assumed for defects, which existed at the delivery date according to our General Terms and Conditions.

Technically changes as well as errors are excepted. A claim for delivery of a new product does not exist. The buyer has to check the received product immediately and indicate evident defects at the latest 24 hours after detection. Non-observance of notification requirements is equated with acceptance of the defect. Not immediately visible defects have to be indicated immediately after their perception too.

Generally, defects and their symptoms must be described as accurately as possible in order to allow for reproducibility and elimination. The buyer must provide for access to the relevant device and all required and/or useful information at no charge and must make all of the required data and machine time available free of charge.

The guarantee does not cover defects, which result from non-observance of the prescribed conditions of use, or from improper handling.

If the device has been placed at the disposal of the buyer for test purposes and has been purchased subsequent to such testing, both parties agree that the product is to be considered “used” and that it has been purchased “as is”. No guarantee claims may be made in such cases.

The General Terms and Conditions of microSYST Systemelectronic GmbH in current version apply as well.



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## 5.4 Versions Overview

| Ver. | Date | Remark, Description |
|---|---|---|
| 1.00 | 07/10/00 | |
| 1.01 | 06/20/01 | |
| 2.00 | 10/04/01 | New InterBus-Interface (HE194-M01); Kreuzer |
| 2.10 | 12/12/01 | Kreuzer: Character height changed |
| 2.20 | 12/19/01 | Kreuzer: Housing dimensions changed |
| 2.30 | 02/06/02 | Kreuzer: Device configuration IB-ID |
| 2.40 | 06/11/02 | Kreuzer: Example changed |
| 2.50 | 12/17/02 | Kreuzer: New logo |
| 2.60 | 10/20/03 | Kreuzer: Notes for the start-up |
| 3.00 | 11/9/05 | Kreuzer: Additional frame type (selectable via DIP switch) |
| 3.10 | 1/28/11 | Description migan AW added |
| 3.20 | 3/27/13 | Company address, declaration of conformity, warranty |
| 3.30 | 10/17/13 | Logo |
| 3.40 | 01/20/15 | SMD LEDs |

Certified per **DIN EN ISO 9001.**



microSYST Systemelectronic GmbH, Albert-Einstein-Straße 7, 92637 Weiden
Tel. +49 961 39166-0, Fax +49 961 39166-10, info@microsyst.de, www.microsyst.de