migan MPB FI/SI

Large Displays Numeric LED with Ethernet TCP/IP / Profibus DP / Profinet / Serial Interface

Manual

Index

1 General

The product series “migan FI/SI“ is available with the following optionally interfaces:

- Ethernet TCP/IP
- Profibus DP
- Profinet
- Serial (RS232 / RS485)

This 7 segment displays are designed for professional use. Depending on the type of device they are suitable for indoor or outdoor use.

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

Change of the Controlling Protocol!

The displays use a new controlling protocol.

Due to the advanced possibilities, we recommend the use of this new option. By default, the displays are already set to this new universal protocol.

For compatibility reasons, however, the “old” controlling can be activated by software (MKS).
For details, refer to chapter “Protocol Classic”.

2 Technical Information

Display type:	7 segment LED
Character heights:	Indoor use: 60 / 100 / 150 / 200 / 250 mm
Character heights:	Outdoor use: 100 / 200 / 300 mm
Number of digits:	1...100
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:	On request: Ethernet TCP/IP, Profibus DP, Profinet, RS232, RS485
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

Details to the used interface can be found in the corresponding chapters.

2.1 Device Configuration

Itemnumber :_____

Type:
☐ for inside use ☐ for outside use

Character height:
☐ 60 mm ☐ 100 mm ☐ 150 mm ☐ 200 mm ☐ 250 mm ☐ 300 mm

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

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

View:
☐ single sided ☐ double sided ☐ ____ sided

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

Protection:
☐ IP40 ☐ IP54 ☐ IP65 ☐ IP _____

Operating temperature:
with type for inside use:
☐ 0...+50 °C (standard)

with type for outside use:
☐ -20...+50 °C (standard)
☐ -25...+50 °C (optional with heating)

special version:
☐ _____ °C

Housing dimensions: _____x_____x_____mm

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

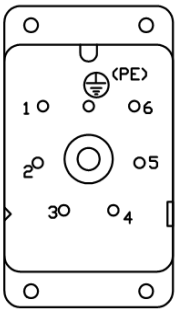
Interface:
☐ Ethernet TCP/IP ☐ Profibus DP ☐ 2x Profinet (integrated switch) ☐ RS485 ☐ RS232
☐ Digital Inputs
☐ Digital Outputs

Protocol (at delivery):
☐ Universal (standard)
☐ Classic

2.2 Pin Assignment Supply Power

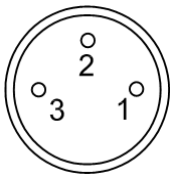
For definite pin assignment, please see the inside labelling of the mating plugs.

Supply Power 230 VAC



Pin	Assignment
1	L1
2	N
⏚ (PE)	PE

Supply Power 24 VDC (optional)



Pin	Assignment
1	GND
2	+24 VDC
3	PE

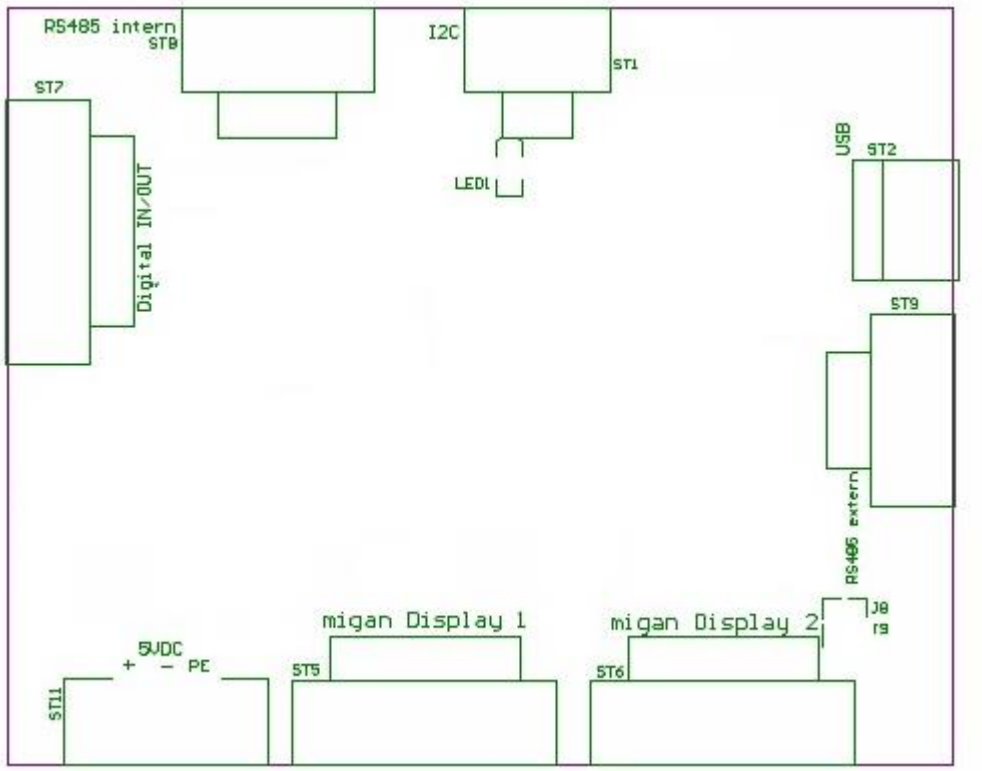
3 Device Types

This chapter describes configuration and operation of the different interfaces.

Basically, you need the protocols, which are described in chapter “Control Data“. Depending on the interface, there may be additional bytes. Please see respective chapter “Operation“ for details.

3.1 Devices with RS485 / 232

3.1.1 Interface Settings

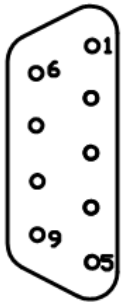


LED

LED	Function / Description	
LED 1 (green)	Power-up:	Blinks at a frequency of approx. 2,5 Hz
	Normal operation:	Blinks at a frequency of approx. 5 Hz
	Boot mode:	Blinks at a frequency of approx. 0,5 Hz
	Software upload:	Flickers during the upload
	Configuration:	
	Defective MKS:	Blinks with an Error Code: 1x

Interface Parameters will be seit bei software (MKS)

3.1.2 Pin Assignments RS485 / 232



Pin	RS232	RS485
1		
2	RxD	
3	TxD	Rx+ / Tx+
4		
5	GND	GND *
6		+5 VDC *
7		
8		Rx- / Tx-
9		

* If an external bus termination is needed, these pins can be used.

3.1.3 Operation

Start-Up Procedure:

- Segment test

After this, the display waits for valid user data.
If a valid frame is sent during the test routine, the test will complete and after that, data are displayed.

The controlling of the device happens with the protocols, that are described in chapter “Control Data“.

3.1.4 Controlling Example

For details see chapter “Control Data”.
The use of the protocol “universal” is required (standard, see chapter “General”).

Demands:

- Display with 3 digits and device address 1
- Show “1.23”
- Data type: unsigned CHAR
- Fixed checksum (standard)
- Response frame is activated per DIP switch (standard)

1. Send frame to the display

```
  01 06 00 30 80 00 7B 55
  \/ \/ \_________/ \/ \/
  |  |       |      |  |
  | LEN    O1…O4   "123"|
  |                     |
ADR                   CHK
```

2. Wait for response frame

```
  01 02 00 55
```

3.2 Devices with Ethernet TCP/IP

3.2.1 Configuration

The device is preset with the following network settings:

IP Address: 192.168.4.200
Net Mask: 255.255.255.0
Port: 10001

To change these parameters, proceed as follows:

Advice for Windows 7 users:
The Telnet client must be activated:
Start -> Control Panel -> Programs -> Turn Windows features on or off -> Telnet Client

- Switch the supply power for the display on and connect it to the network hub with an RJ45 cable (1:1 cable) or directly to a PC (crosslink cable).

- Start the “MS DOS entry prompt” at your Windows PC.
  With Windows 7 you must have extended rights:
  Start -> All Programs -> Accessories -> double-click at Command Promp -> Run as Administrator

- Enter the desired IP address for the device to the ARP table:
  ARP -S XXX.XXX.XXX.XXX xx-xx-xx-xx-xx-xx < CR>

  XXX.XXX.XXX.XXX : desired IP address
  xx-xx-xx-xx-xx-xx : Ethernet MAC address of the device (see label at the housing)

- Establish a Telnet connection to port 1:
  TELNET XXX.XXX.XXX.XXX 1 < CR>

  This connection will fail (disconnect within 3 seconds). However, the IP address is temporarily changed.
  Close the Telnet window after acknowledging the error message.

- Establish a Telnet connection to port 9999:
  TELNET XXX.XXX.XXX.XXX 9999 < CR>

  After the connection has been established, immediately press the enter key (within 5 seconds) in order to enter the setup mode.

- Enter “0” (Server).

- Enter the desired IP address and press the enter key.

- Repeatedly press the enter key until
  ”Netmask: Number of Bits for Host Part (…)“ appears.
  Enter here the number of free bits for the IP address,
  f.e. “8“ for the netmask 255.255.255.0
  (=11111111.11111111.11111111.00000000) or
  “11“ for the netmask 255.255.248.0
  (=11111111.11111111.11111000.00000000) and press the enter key.

- Repeatedly press the enter key until “Your choice?” appears.

- Press “9” to save all settings (-> the Telnet connection is interrupted).

Configuration of the Ethernet interface is now complete.
Now, the control frame can be transmitted to the display via the selected IP address (TCP/IP connection via port 10001).

3.2.2 Operation

After start-up, a segment test is performed.

Subsequently, after establishing a TCP/IP connection with adjusted IP address and port 10001, the device waits for valid user data.
The controlling of the device happens with the protocols, which are described in chapter “Control Data“.

3.2.3 Controlling Example

For details see chapter “Control Data”.
The use of the protocol “universal” is required (standard, see chapter “General”).

Demands:

- Display with 3 digits
- Show “1.23”
- Data type: unsigned CHAR

1. Send frame to the display

```
  01 06 00 30 80 00 7B 55
  \/ \/ \_________/ \/ \/
  |  |       |      |  |
  | LEN   O1…O4   "123"|
  |                    |
ADR                   CHK
```

2. Wait for response frame

```
  01 02 00 55
```

3.2.4 Recover Factory Settings

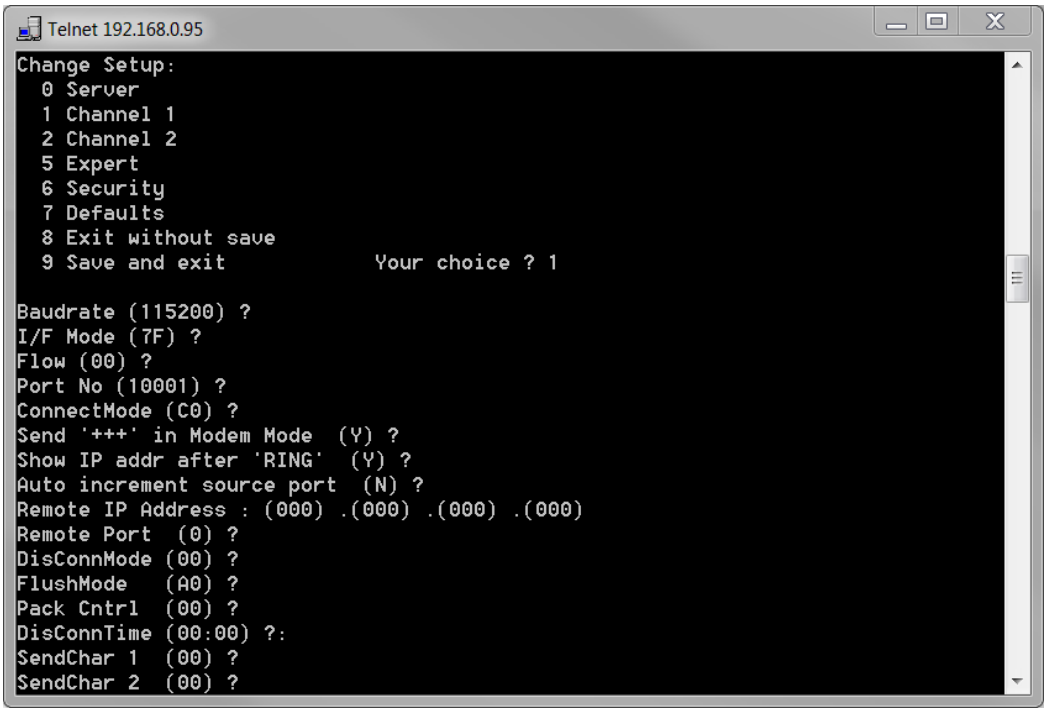
The display is already preset at delivery and can be adjusted with the settings, mentioned in chapter „Configuration“. Following instruction describes ho to reset factory settings, f.e. in case of an error.
The IP address will not be changed with the following operation. Please see chapter „Configuration“ if you want to do that.

- Establish a Telnet connection to port 9999:
  TELNET XXX.XXX.XXX.XXX 9999 < CR>

  After the connection has been established, immediately press the enter key (within 5 seconds) in order to enter the setup mode.

- Enter "7“ (Defaults)

- Enter "1“ (Channel 1) and do the following settings:



- Save settings with item "9" (Save and exit) and "Enter".

- Close the window of the MS DOS entry prompt

3.3 Devices with Profibus DP

Interface Data

ID Number:	$05D0_h$
GSD File:	MICR05D0.GSD
Cyclical User Data:	max. 200 bytes output, max 200 bytes input, max. 300 bytes output + input
Standard Configuration:	2x 0x3F (32 input-/output bytes)
Parameter Data:	Standard 7 Byte
User PRM:	none
Diagnosis:	Standard 6 Byte
External Diagnosis:	none
Transmission Speed:	9.6 kBaud / 19.2 kBaud / 93.75 kBaud / 187.5 kBaud / 500 kBaud / 1.5 MBaud / 3 MBaud, 6 MBaud, 12 MBaud
Protocol:	Profibus DP DIN19245, part 3

3.3.1 Configuration

The configuration of the Profibus interface normally happens using the GSD file. It is initially imported into the "Device Catalog" of the configuration software. Subsequently, the Profibus interface can be “dragged” into the bus system and then be configured.

With the configuration, the user can individually adapt data width within the data transfer. Data widths of 1 to 16 bytes maximum are possible.
By specifying these identifiers in any order, the desired total data width is set for both the input and the output data.

Data Identifier	Number of Bytes	Function / Description
0x10	1	Input data
0x11	2	Input data
:	:	:
0x1F	16	Input data
0x20	1	Output data
0x21	2	Output data
:	:	:
0x2F	16	Output data
0x30	1/1	Input / output data (1 byte each)
0x31	2/2	Input / output data (2 bytes each)
:	:	
0x3F	16/16	Input / output data (16 bytes each)

The maximum number of input and output bytes is 200 bytes each.
However a total number of 300 bytes (input + output) may not be exceeded.

⇨ Default configuration: 2x 0x3F = 32 input and 32 output bytes

Attention:

The configured output data width must be at least 2 bytes larger than the longest protocol to be sent (because of toggle and length byte).

The configured input data width must be at least 2 bytes larger than the longest used response frame (because of toggle and length byte).

DP Diagnosis Data

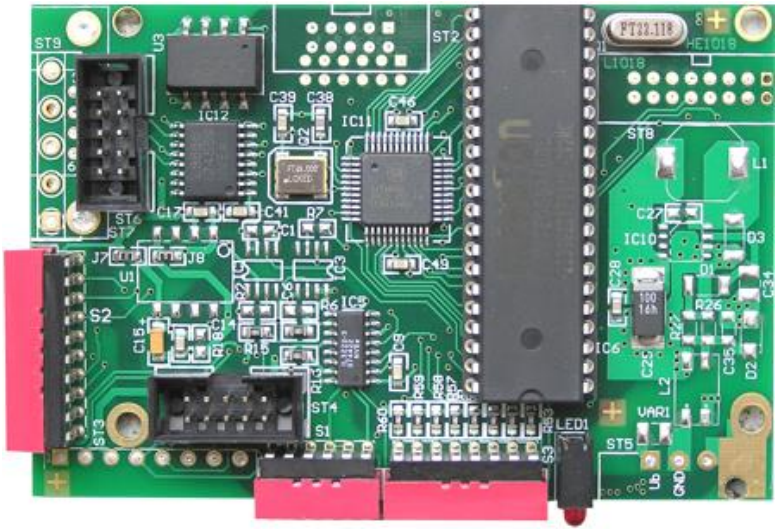
The device does not support any extended diagnosis data. Default diagnosis is utilised.

DP Parameter Data

The User_Prm_Data are not utilised by the interface. However, a test is run to determine whether or not User_Prm_Data are transferred by the Profibus master. If User_Prm_Data are transferred, Profibus initialisation is disabled and the slave must be reconfigured and parameterised.

Note:
Standard parametrisation is required and is normally installed by the utilised DP configurators.

3.3.2 Interface Settings



Profibus Address, internal Profibus Bus Termination (S2)

DIP Switch	Function	OFF	ON
1	DP address 2^0	0	1_D
2	DP address 2^1	0	2_D
3	DP address 2^2	0	4_D
4	DP address 2^3	0	8_D
5	DP address 2^4	0	16_D
6	DP address 2^5	0	32_D
7	DP address 2^6	0	64_D
8	reserved	√	-
9	Internal Profibus bus termination	not set	set
10			

Only DP addresses 0...126 are allowed

Factory setting: Address 3, no internal bus termination
=> DIP 1, 2 = ON, remaining switches = OFF

The bus termination has to be set at the beginning and at the end of the Profibus line (either internally or externally).

LEDs

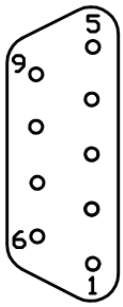
LED	Status	Meaning
red	ON	no Profibus DP connection or RAM error (if green LED OFF)
	OFF	Profibus DP connection established
green	OFF	Controller is not running (hardware error)
	ON	Controller is running
	temporary OF (blinking)	UART communication (frame has been sent or received)

Default Settings S1, S3

The DIP switches are preset and must not be changed!

DIP Switch	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
S1	OFF	ON	ON	ON	ON	ON	-	-
S3	OFF	OFF	ON	ON	OFF	OFF	OFF	ON

3.3.3 Pin Assignment Profibus DP



Pin	Assignment
1	
2	
3	Rx+ / Tx+ (B strand)
4	RTS
5	GND, electrically isolated
6	5V, electrically isolated
7	
8	Rx- / Tx- (A strand)
9	

3.3.4 Operation

Start-Up Procedure:

As long as no Profibus connection is established, "----" is shown.

After starting the Profibus connection, the minus signs (----) disappear and the display waits for valid data.

DP Output Data

Control frames from the user must be entered into the DP output data.

DP Output Data					
Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**...**	**Byte n**
Toggle byte	Length byte	Frame bytes according chapter "Control Data" (resp. "Protocol Classic – Previous Version")			

In order to transmit a frame to the MIGAN, the bytes – described in chapter "Control Data" - must be entered at the Profibus side as output bytes 3 through n. After the length byte (= number of bytes of control data) has been entered, the toggle byte must be changed in order to start transmission.

Before you send the next frame, the MIGAN must get enough time for processing the current command!

It is strongly recommended to wait for the response frame of the MIGAN (see chapter "Response Frame").

DP Input Data

The user gets MIGAN response frames in the DP input data:

DP Input Data					
Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**...**	**Byte n**
Toggle byte	Length byte	Response bytes according chapter "Response Frame"			

Each time a frame has been received from the MIGAN, it is entered as input bytes 3 through n, and the frame length is entered as byte 2 (= length byte).
The length byte reflects the number of following bytes.
The toggle byte is also increased by 1.

3.3.5 Controlling Example

For details see chapter “Control Data”.
The use of the protocol “universal” is required (standard, see chapter “General”).

Demands:

- Display with 3 digits
- Show “1.23”
- Data type: unsigned CHAR

1. Start of Profibus DP communication (here with 16 I/O bytes)

```
Output: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Input : 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

2. Enter control data and length byte

```
Output: 00 08 01 06 00 30 80 00 7B 55 00 00 00 00 00 00
           \/ \/ \/ \_________/ \/ \/
           |  |  |       |      |  |
  length byte | LEN    O1…O4  „123“|
              ADR                 CHK
             (fixed)
```

3. Change toggle byte => Send control frame

```
Output: 01 08 01 06 00 30 80 00 7B 55 00 00 00 00 00 00
        \/
        |
   changed toggle byte
```

4. Wait for response frame

```
Input: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  ▼
Input: 01 04 01 02 00 55 00 00 00 00 00 00 00 00 00 00
       \/ \/ \_________/
       |  |       |
       |  |    response frame
       | length
  toggle  byte
   byte
```

3.4 Devices with Profinet

Interface Data

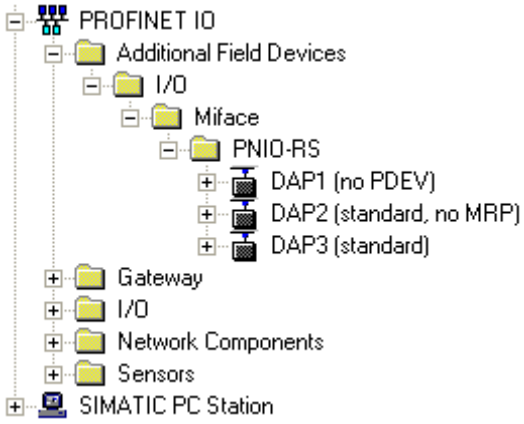
Interface:	2 x Profinet IO (with integrated switch)
Baud rate:	100 Mbit/s
Standards:	IEC 61158 / 61784 Profinet IO device RT (conformance class B) Profinet IO device IRT (conformance class C)
Features:	- Base: Siemens ERTEC200 - Real-time classes 1, 2 and 3 - RTA, LLDP, SNMP, MIB-II, LLDP-MIB - MRP (media redundancy) - DCP - Fast Startup - Send clock = 0.25, 0.5, 1, 2, 4 ms - Clock divider = 1…512 (RT), 1…16 (IRT) - Output data width = 0…250 bytes - Input data width = 0…250 bytes - Vendor-/Device-ID = $01CF_h$ / 0001_h

3.4.1 Configuration of the Profinet Controller

The Profinet controller must be configured properly in order to communicate with the Profinet device.

The following descriptions refer to the "HW Config" tool from Siemens and are intended to represent the principle. This works of course with the tools of other manufacturers.

First, the GSDML file (“GSDML-V2.2-microSYST-01CF-MifacePNIO-....xml“) has to be added to the “device catalogue“ of the configuration tool (menu item “Options/Install GSD File...“). Then, the interface is shown in the catalogue view as follows:



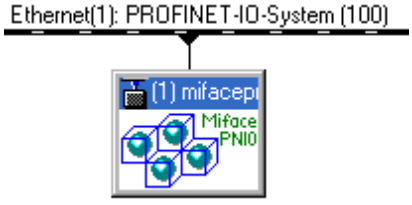
Now you can choose between 3 different “Device Access Points“:

- DAP1 (no PDEV),
  if your Profinet controller does not know a “physical device“
  (usually only with older Profinet controllers)

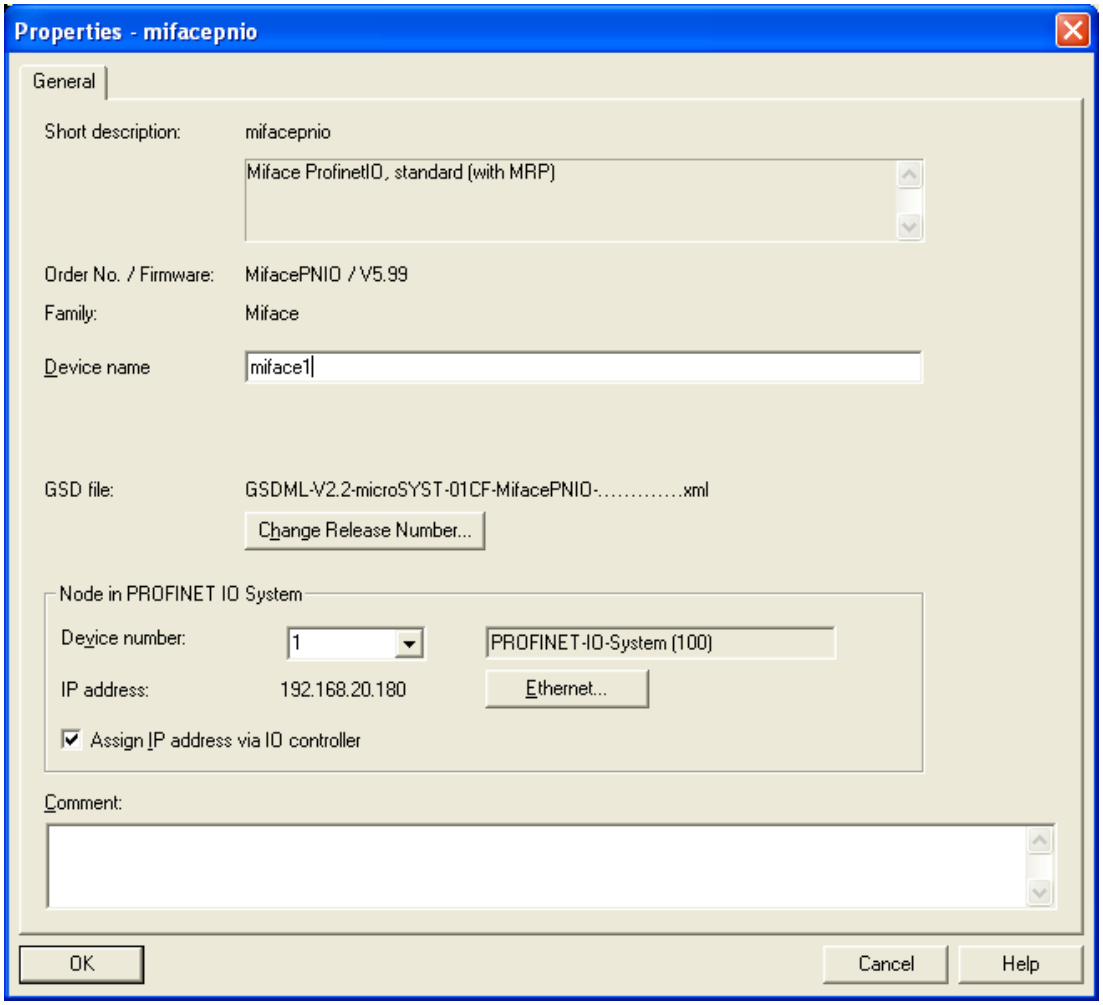
- DAP2 (standard, no MRP),
  if the MRP ability of the interface shall not be activated.

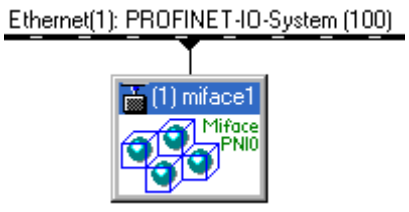
- **DAP3 (standard)**,
  if the MRP ability of the interface shall be activated.

”Drag“ the needed “DAP“ to your Profinet system:



Consider a meaningful name for the device and rename the interface (here “**miface1**”) accordingly:



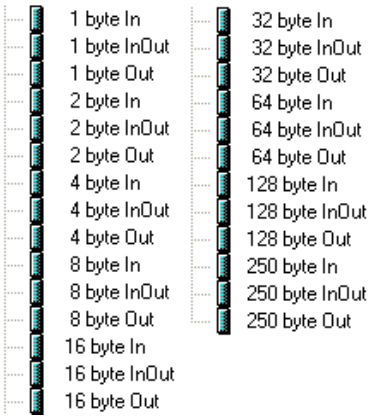


In the next step the I/O data width of the cyclic Profinet communication must be defined.

The **output data width** must be at least 2 bytes higher than the largest protocol, that shall be sent (because of toggle and length byte).

The **input data width** must be at least 2 bytes higher than the largest protocol (response frame) that shall be received; because of toggle and length byte.

There are Profinet IO modules with a data width of 1…250 bytes available:



Example: 40 bytes output, 16 bytes Input

Slot	Module	Order number	I Address	Q address
0	*miface1*	*MifacePNIO*		
X1	*Interface*			
X1 P1	*Port 1*			
X1 P2	*Port 2*			
1	32 byte Out			0...31
2	8 byte Out			32...39
3	16 byte In		0...15	

Do not forget to define the I/O-addresses according to your needs!

We recommend to use for setting “Slot X1 / IO Cycle / Update time” not less than 8 ms to avoid unnecessary network load)!

After finishing the Profinet configuration, it must still be loaded into the Profinet controller:

-  „Station/Save and Compile“
-  „PLC/Download...“

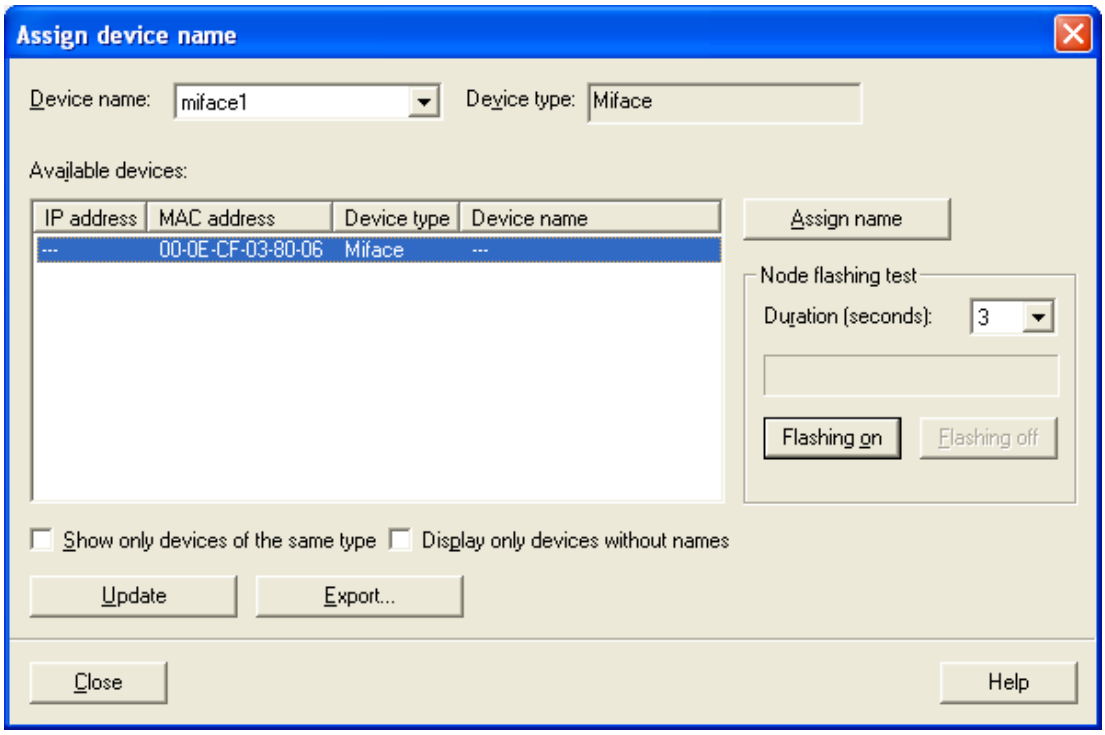
3.4.2 Profinet Device: Assign Name

The Profinet device must be assigned (one time) the device name, which also was chosen in the Profinet controller configuration ("**miface1**" in the example above).

For this, connect the device to the Profinet network and connect its power supply.

Start the tool for setting the device name:

- Mark(click) the concerned device in the bus overview
- Select the menu item “PLC/Ethernet/Assign Device Name...“
- Mark (click) the line with the corresponding device (see MAC-address)
- Click “Assign name“
- Close window



Tip: If you want to find the device of the marked line, you can click on „Flashing on“. LED 1 (green) of the corresponding interface starts to blink then.

3.4.3 Interface Settings

LED	Status	Meaning
green	On	Normal state
	Blinking	Normal state with DCP signalling
	Off	Hardware error
red	On	No Profinet connection
	Off	Cyclic Profinet communication runs

The DIP switches are preset at delivery and must not be changed!

Default Settings:

DIP Switch	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
S1	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
S2 (*1)	ON	OFF	OFF	OFF	OFF	OFF	-	-
S2 (*2)	OFF	ON	ON	ON	ON	ON	-	-

*1: The interface ist mounted to the migan controller board.
*2: The interface is connected with the migan controller board via RS485.

3.4.4 Operation

Start-Up:

The connection between the Profinet controller and the Profinet device is established automatically (this can last up to 10 seconds).
The red LED of the interface goes out, as soon as the Profinet connection is established.
To let this happen, the PN controller must be correctly configured and the PN device must have the matching name.

The communication between Profinet controller and the display (Profinet device) happens within cyclic data traffic.

Profinet Output Data

The user must enter control frames into the Profinet output data.

Profinet Output Data					
Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**...**	**Byte n**
Toggle byte	Length byte	Frame bytes according chapter “Control Data” (resp. “Protocol Classic – Previous Version”)			

In order to transmit a frame to the MIGAN, the frame bytes – described in chapter “Control Data” - must be entered at the Profinet side as output bytes 3 through n. After the length byte (= number of bytes of control data) has been entered, the toggle byte must be changed in order to start transmission.

Before you send the next frame, the MIGAN must get enough time for processing the current command!

It is strongly recommended to wait for the response frame of the MIGAN (see chapter „Response Frame“).

Profinet Input Data

Profinet Input Data					
Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**...**	**Byte n**
Toggle byte	Length byte	Response bytes according chapter “Response Frame”			

Each time a frame has been received from the MIGAN, it is entered as input bytes 3 through n, and the frame length is entered as byte 2 (= length byte). The value of the length byte corresponds with the number of bytes of the response frame.
The toggle byte is also increased by 1.

Thus only the toggle byte needs to be monitored at the Profinet controller side. As soon as it changes, data of the received frame can be read out and next frame can be sent.

3.4.5 Controlling Example

For details see chapter “Control Data”.
The use of the protocol “universal” is required (standard, see chapter “General”).

- Display with 3 digits
- Show “1.23”
- Data type: unsigned CHAR

1. Start of Profinet communication (here with 16 I/O bytes)

```
Output: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Input : 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

2. Enter control data and length byte

```
Output: 00 08 01 06 00 30 80 00 7B 55 00 00 00 00 00 00
           \/ \/ \/ \_________/ \/ \/
           |  |  |       |      |  |
  length byte | LEN    O1…O4  „123“|
              ADR                 CHK
             (fixed)
```

3. Change toggle byte => Send control frame

```
Output: 01 08 01 06 00 30 80 00 7B 55 00 00 00 00 00 00
        \/
        |
   changed toggle byte
```

4. Wait for response frame

```
Input: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  ▼
Input: 01 04 01 02 00 55 00 00 00 00 00 00 00 00 00 00
       \/ \/ \_________/
       |  |       |
       |  |    response frame
       | length
  toggle  byte
   byte
```

4 Control Data

Following chapters descrive the current controlling with the protocol “universal” (see also chapter “General”).

Devices with Profibus or Profinet interface need two more bytes; see corresponding chapters “Operation”.

4.1 Display Output

ADR	LEN	O1
Device address	Number of following bytes (from O1 to CHK)	Options
1_D ... 99_D (= 01_H ... 63_H) Apart from displays with RS485/232, address 1_D is used here.	06_H ... n	Bit 7: report software version* Bit 6: 0 = Statically display the last received data (standard) 1 = Display “----“, if no new data is received within 5 s. Bits 5...4: <u>Brightness</u> 00 = 100% 01 = 80% 10 = 60% 11 = 40% Bit 3 = Digital output 4 Bit 2 = Digital output 3 Bit 1 = Digital output 2 Bit 0 = Digital output 1 Output will be set, if corresponding bit = 1

* at communication with response frame

O2
Output format
Bits 7...4: Physical number of digits (bit coded) 0001...1111 = 1...15 digits 0000 = ASCII representation with up to 40 digits Bit 3: Mode 0 = LSB first: Data byte D1 = least significant byte 1 = MSB first: Data byte D1 = most significant byte Bits 2...0: Data type* — max. number of digits 000 = unsigned CHAR (0...255) — 3 001 = unsigned INT (0...65535) — 5 010 = unsigned LONG (0...4294967296) — 10 011 = signed CHAR (-128...127) — 4 100 = signed INT (-32768...32767) — 6 101 = signed LONG (-2147483648... 2147483647) — 11 110 = ASCII representation — 40 111 = reserved * at value representation: right-aligned display at ASCII representation: left-aligned display

O3	O4
Decimal points / colons	Decimal points / colons, blinking
Bit 7 = Point for digit 1 Bit 6 = Point for digit 2 Bit 5 = Point for digit 3 Bit 4 = Point for digit 4 Bit 3 = Point for digit 5 Bit 2 = Point for digit 6 Bit 1 = Point for digit 7 Bit 0 = Point for digit 8	Bit 7 = Point for digit 9 Bit 6 = Point for digit 10 Bit 5 = Point for digit 11 Bit 4 = Point for digit 12 Bit 3 = Point for digit 13 Bit 2 = Point for digit 14 Bit 1 = Point for digit 15 Bit 0 = Display blinks

A point is set, if corresponding bit = 1

Depending on the display module (ordering option), only a decimal point or only a colon can be shown.

D1…Dn	CHK
Data bytes (value- or ASCII representation)	Checksum
Value representation: CHAR value: 1 byte INT value: 2 bytes LONG value: 4 bytes ASCII representation (max. 80 bytes): 1 byte per character, max. 40 digits, Bit 7 = 1: digit blinks The decimal point or colon (ordering option) has character code $2C_H$ or $2E_H$ and is always set at the previous digit.	standard: 55_H (fixed value) **or** LOW byte of the sum of all previous bytes (ADR...Dn)

Controlling devices with multiple display areas (e.g. 2 lines):
The partition from O2…Dn is used repeatedly according to the number of display areas (see example 3).
Please attend to the maximum total frame length of 150 bytes.

Example 1:
Display with 4 digits, device address 1, unsigned INT (LSB first), brightness = 60%, display value = 1.23

```
01 07 20 41 40 00 7B 00 55
```

Example 2:
Display with 4 digits, device address 1, ASCII representation, brightness = 60%, display value = 12.34

```
01 0A 20 46 00 00 31 32 2E 33 34 55
```

Example 3:
Display with 2 lines and 4 digits per line, device address 1, unsigned INT (LSB first), display value for line 1 = 1.23,
display value for line 2 = 5.67

```
01 0C 00 41 40 00 7B 00 41 40 00 37 02 55
         \_____________/\_____________/
            Line 1         Line 2
           (O2...D2)      (O2...D2)
```

4.2 Response Frame

Digital inputs are optionally available (depending on display type).

ADR	LEN	I1	CHK
Device address	Length	Digital Input	Checksum
1_D ... 99_D (= 01_H ... 63_H)	02_H	Bit 7 = Event digital input 4 Bit 6 = Event digital input 3 Bit 5 = Event digital input 2 Bit 4 = Event digital input 1 Bit 3 = Status digital input 4 Bit 2 = Status digital input 3 Bit 1 = Status digital input 2 Bit 0 = Status digital input 1	standard: 55_H (fixed value) **or** LOW byte of the sum of all previous bytes (ADR + LEN + I1)

Event of a digital input = 1, if it has been set at least once since the last query (f.e. with a button). The event is deleted after every query.

Status of a digital input = 1, if it's set at the moment.

Example

Device address = 1, digital input 3 is set

```
01 02 04 55
```

5 Appendix

5.1 Displayable Characters

The data bytes are ASCII coded.

Lower / Higher	0	1	2	3	4	5	6	7
0			"Blank"	0		P		p
1				1	A	q	A	q
2				2	b	r	b	r
3				3	c	S	c	S
4				4	d	t	d	t
5				5	E	u	E	u
6				6	F		F	
7				7	G		G	
8			[	8	H		H	
9			]	9	I	y	I	y
A					J		J	
B								
C			. / : *		L		L	
D			–					
E			. / : *		n		n	
F					o	_	o	

* Depending on the display module (ordering option), only the decimal point or only the colon can be shown.

5.2 Protocol “Classic” (Previous Version)

Basically, we recommend the current controlling which is described in the chapter “Control Data”.

For compatibility reasons with already delivered devices, the previous protocol and inteface properties are still integrated and can be activated by software (MKS).

Devices with Profibus or Profinet interface need two more bytes; see corresponding chapters “Operation”.

Display Output

STX	ADRH*	ADRL*
Start of transmission	Device address HIGH, ASCII coded	Device address LOW, ASCII coded
$3C_H$ (or 02_H)	30_H ... 39_H	30_H ... 39_H

P1	P2	P3
Point byte 1	Point byte 2	Point byte 3
Bits 7...5 = 010 Bit 4 = Point for digit 1 Bit 3 = Point for digit 2 Bit 2 = Point for digit 3 Bit 1 = Point for digit 4 Bit 0 = Point for digit 5	Bits 7...5 = 010 Bit 4 = Point for digit 6 Bit 3 = Point for digit 7 Bit 2 = Point for digit 8 Bit 1 = Point for digit 9 Bit 0 = Point for digit 10	Bits 7...5 = 010 Bit 4 = Point for digit 11 Bit 3 = Point for digit 12 Bit 2 = Point for digit 13 Bit 1 = Point for digit 14 Bit 0 = Point for digit 15
To display a point, the corresponding bit must be set.		

D1...Dn	ETX
Data bytes	End of transmission
One byte per character to be displayed; ASCII coded Bit 7 = 1: Digit blinks = 0: Digits is shown statically The decimal point has character code $2C_H$ or $2E_H$ and is set at the former digit each. Writing direction is from the left to the right.	$3E_H$ if STX = $3C_H$ (03_H if STX = 02_H)

*ADRH, ADRL:
Those bytes specify HIGH and LOW byte of the adjusted device address. Apart from displays with RS485/232, address 1 is always used here -> ADRH = 30_H, ADRL = 31_H

Example 1
Device address 23, display “1.23“, decimal point is controlled via the point bytes
3C 32 33 50 40 40 31 32 33 3E

Example 2
Device address 23, display “1.23“, decimal point as ASCII character via the data bytes
3C 32 33 40 40 40 31 2E 32 33 3E

Digital Outputs, Brightness

Digital outputs are optionally available (depending on display type).
The display content is not changed after this frame.

STX	ADRH	ADRL
Start of transmission	Device address HIGH, ASCII coded	Device address LOW, ASCII coded
$3C_H$ (or 02_H)	30_H ... 39_H	30_H ... 39_H

O1	O2	O3	ETX
Digital outputs	Brightness	reserved	End of transmission
Bits 7...4 = 0110 Bit 3 = Digital output 4 Bit 2 = Digital output 3 Bit 1 = Digital output 2 Bit 0 = Digital output 1 Output will be set, if corresponding bit = 1	Bits 7...4 = 0110 Bit 3: report software version* Bit 2 = 0 Bits 1, 0: Brightness 00 = 100% 01 = 80% 10 = 60% 11 = 40%	60_H	$3E_H$ if STX = $3C_H$ (03_H if STX = 02_H)

* at communication with response frame

Example
Device address = 1, set digital output 2, brightness = 80 %

```
3C 30 31 62 61 60 3E
```

Response Frame

The response frame can be activated with a DIP switch.
Digital inputs are optionally available (depending on display type).

STX	ADRH	ADRL
Start of transmission	Device address HIGH, ASCII coded	Device address LOW, ASCII coded
$3C_H$ (or 02_H) = STX from the control protocol	30_H ... 39_H	30_H ... 39_H

►

I1	I2	I3	ETX
Status of digital inputs	**Events** of digital inputs	reserved	End of transmission
Bits 7...4 = 0100 Bit 3 = Digital input 4 Bit 2 = Digital input 3 Bit 1 = Digital input 2 Bit 0 = Digital input 1	Bits 7...4 = 0100 Bit 3 = Digital input 4 Bit 2 = Digital input 3 Bit 1 = Digital input 2 Bit 0 = Digital input 1	40_H	$3E_H$ (oder 03_H) = ETX from the control protocol

Status of a digital input = 1, if it's set at the moment.

Event of a digital input = 1, if it has been set at least once since the last query (f.e. with a button). The event is deleted after every query.

Example
Device address = 1, digital input 4 was set at least once since last query

```
3C 30 31 40 48 40 3E
```

5.3 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 unauthorized persons.

5.4 Declaration of Conformity

EU-Konformitätserklärung

EU Declaration of Conformity

Produktbezeichnung: migan
Product name:

Typenreihe: migan FI
Type code: migan SI

Hersteller: microSYST Systemelectronic GmbH
Manufacturer: Am Gewerbepark 11
92670 Windischeschenbach

Das bezeichnete Produkt stimmt mit der folgenden Europäischen Richtlinie überein: *We herewith confirm that the above mentioned product meets the requirements of the following standard:*		**Die Übereinstimmung des bezeichneten Produktes mit den Vorschriften der angewandten Richtlinie(n) wird nachgewiesen durch die Einhaltung folgender Normen / Vorschriften:** *The conformity of the product described above with the provisions of the applied Directive(s) is demonstrated by compliance with the following standards / regulations:*
Richtlinien / *Directives*		**Europäische Norm /** *Standard*
EMV Richtlinie *EMC Directive*	**2014/30/EU**	EN61000-6-2:2005
		EN61000-6-4:2007 +A1:2011
Niederspannungs-Richtlinie *Low Voltage Directive*	**2014/35/EU**	EN60950-1:2006 +A11:2009 +A1:2010 +A12:2011 +A2:2013
RoHS Richtlinie *RoHS Directive*	**2011/65/EU**	EN50581:2012

Windischeschenbach, 16.11.2017

Manuel Raß

Geschäftsführer / *General Manager*

5.5 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.

5.6 Versions Overview

Version	Date	Comments
1.00	03.12.12	Dokument created
1.10	21.03.13	Additional display option: “----“, if no new data is received within 5s (valid from HE1037).
1.20	18.07.13	Standard: Universal protocol, factory settings of the interfaces
1.30	17.10.13	Logo
1.40	22.01.14	migan 2 -> migan
1.50	23.04.14	Decimal point or colon possible
1.60	08.05.14	Default settings of the Profinet interface changed
1.70	27.06.14	Operating voltage
1.80	11.11.14	Device configuration: View
1.90	17.09.15	Description of LSB, MSB
2.00	17.11.15	Info to additional bytes with Profibus and Profinet devices
2.10	27.04.16	Declaration of conformity
3.00	15.11.16	migan2 ➔ migan MPB
3.10	13.11.17	Change of address and title MPB
3.20	28.11.18	Change of titles, change page 33 and 34

Certified per **DIN EN ISO 9001**.