migan ModbusRTU
Large Display Numeric LED with Modbus RTU Interface

User's Manual

migan ModbusRTU
Large Display Numeric LED with Modbus RTU Interface
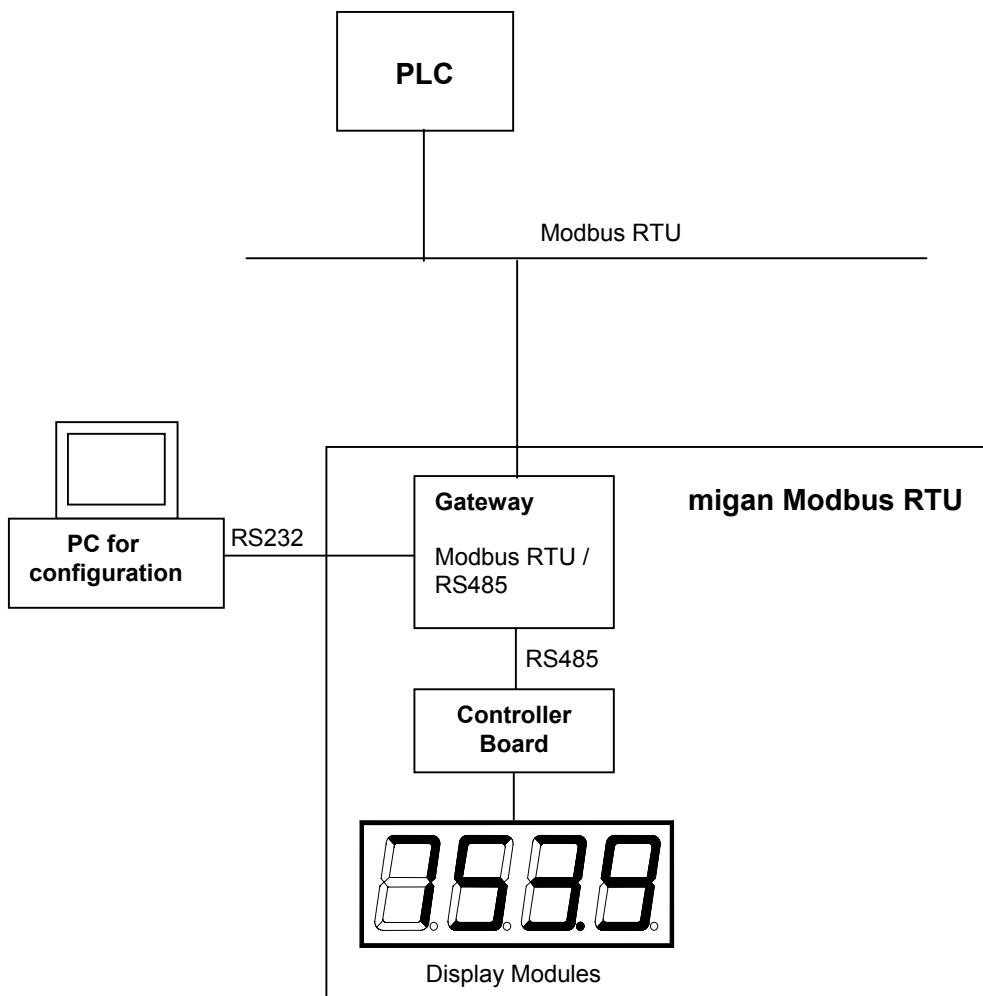
Index

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1 General

The large format numeric display can be used universally as a production display unit 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.

2 System Overview

The display is controlled with a ModbusRTU interface.

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2.1 Device Configuration

Character Height:
☐ 60 mm   ☐ 100 mm   ☐ 150 mm   ☐ 200 mm   ☐ 250 mm

Number of Lines:

_____

Number of Digits per Line:
☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5   ☐ 6   ☐ 7   ☐ 8   ☐ 9   ☐ 10
☐ 11   ☐ 12   ☐ 13   ☐ 14   ☐ 15

Display Colour:
☐ red   ☐ green   ☐ yellow

Dimensional Display:
Line 1: _____   Line 5: _____
Line 2: _____   Line 6: _____
Line 3: _____   Line 7: _____
Line 4: _____   Line 8: _____

View:
☐ single sided   ☐ double sided   ☐ quadruple sided

Operating Voltage:
☐ 230 V / 50 Hz   ☐ 110 V / 60 Hz   ☐ 24 V DC

Protection:
☐ IP40   ☐ IP54   ☐ IP65

Temperature Range:
☐ 0 to + 50 °C   ☐ -25 to + 50 °C

Housing dimensions: _____x_____x_____mm

Housing Colour: RAL _____

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

*Device Address:*_____

3 Technical Information

3.1 Overall Specification

Display type:	7 segment LED
Character height:	60 mm (2.36''), 100 mm (3.94''), 150 mm (5.91''), 200 mm (7.87 ''), 250 mm (9.84'')
Digits:	2 to 15 digits
Display colour:	red, green, yellow
Character set:	see chapter "Displayable Characters"
View:	single, double or quadruple sided
Interface:	ModbusRTU
Operating voltage:	230 V / 50 Hz, 110 V / 60 Hz or 24 VDC
Power Consumption:	60 mm (2.36'') approx. 1.3 W per digit
	100 mm (3.94'') approx. 2.5 W per digit
	150 mm (5.91'') approx. 7.0 W per digit
	200 mm (7.87'') approx. 7.5 W per digit
	250 mm (9.84'') approx. 10.0 W per digit
Housing:	industrial version, powder coated aluminium
Housing dimensions:	see chapter "Device Configuration"
Mounting:	articulated arm, hanging mount bracket for wall mounting
Protection:	IP54 or IP65
Operating temp.:	0 to +50 °C (optional -25 to +50 °C)
Storage temperature:	-25 to + 70°C

3.2 Device Start-Up

Internal memory and function tests are performed at the large format display during power-up.

The following parameters appear:

- Baud rate
- Parity
- Internal Address

These parameters do **not** have a meaning for the user and serve merely for diagnostic purposes of the **internal** RS485 interface.

The ModbusRTU communication parameters are set via DIP-switches inside the housing (see below) and will **not** be displayed!

3.3 Display Control Via ModbusRTU

The display represents a ModbusRTU-Slave and is controlled by a ModbusRTU-Master (f.e. a PLC).

To change the display contents, the ModbusRTU-Master has to write to some Registers. Therefore the commands "Force Multiple Registers" (function code $16_d=10_H$) or "Read/Write Registers" (function code $23_d=17_H$) can be used.

Here we assume that "Registers" are counted beginning at "0". If your PLC starts counting at "1" you may have to increase the register-address by 1!

The following data has to be written **starting at register-address 0402_H:**

| Register		Contents
0402_H	HIGH	**P1** = decimal point byte 1 (for digits 1…5)
	LOW	**P2** = decimal point byte 2 (for digits 6…10)
0403_H	HIGH	**P3** = decimal point byte 3 (for digits 11…15)
	LOW	**D1** = ASCII-code for digit 1
0404_H	HIGH	**D2** = ASCII-code for digit 2
	LOW	**D3** = ASCII-code for digit 3
0405_H	HIGH	**D4** = ASCII-code for digit 4
	LOW	**D5** = ASCII-code for digit 5
0406_H	HIGH	**D6** = ASCII-code for digit 6
	LOW	**D7** = ASCII-code for digit 7
0407_H	HIGH	**D8** = ASCII-code for digit 8
	LOW	**D9** = ASCII-code for digit 9
0408_H	HIGH	**D10** = ASCII-code for digit 10
	LOW	**D11** = ASCII-code for digit 11
0409_H	HIGH	**D12** = ASCII-code for digit 12
	LOW	**D13** = ASCII-code for digit 13
$040A_H$	HIGH	**D14** = ASCII-code for digit 14
	LOW	**D15** = ASCII-code for digit 15

Remarks:
- Up to 15 digits are possible!
- It is not necessary to initialize unused digits!
- Registers $402_H…40A_H$ correspond to the "output data area" $204_H…215_H$ of the used "HMS Anybus Communicator for Modbus RTU".
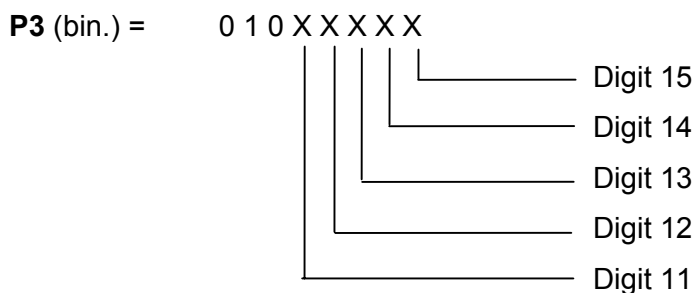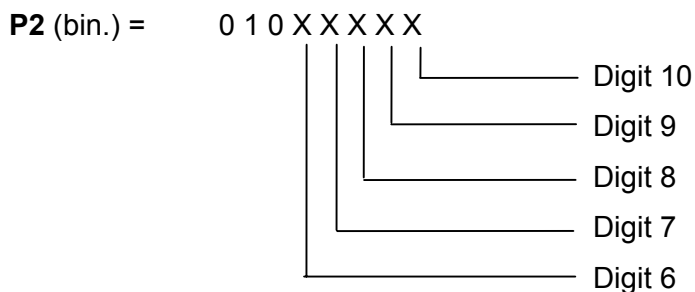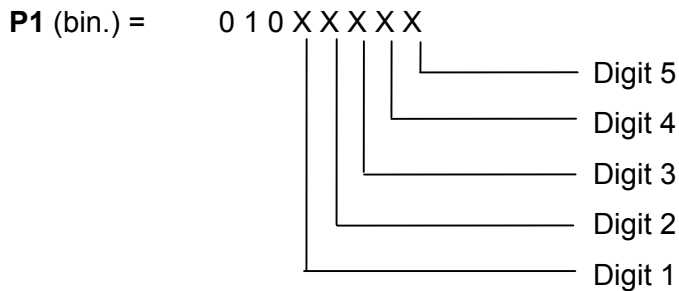
Display Data Positioning:
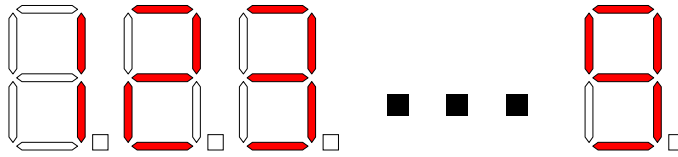
D1 is the 1st digit from the left side of the display.

…

Dn is the nth digit from the left side of the display (n=2…15).

Decimal Point Bytes:

If a decimal point needs to be set, the corresponding bit must be 1.

P1 (bin.) =   0 1 0 X X X X X

- Digit 5
- Digit 4
- Digit 3
- Digit 2
- Digit 1

P2 (bin.) =   0 1 0 X X X X X

- Digit 10
- Digit 9
- Digit 8
- Digit 7
- Digit 6

P3 (bin.) =   0 1 0 X X X X X

- Digit 15
- Digit 14
- Digit 13
- Digit 12
- Digit 11

So - if no decimal point needs to be set P1, P2 and P3 contain 40_H each!

Example for a ModbusRTU-Telegram="Request" (in hex):

01
17
04 02 00 08 04 02 00 08 10
55 5F 5F 31 32 33 34 35 36 37 38 39 30 31 32 33
FC F8

01 : ModbusRTU node address

17 : ModbusRTU function code for "Read/Write Registers"

04 02 00 08 04 02 00 08 10 : Read/Write 8 Registers starting at 0402_H

55 5F 5F 31 32 33 34 35 36 37 38 39 30 31 32 33 :
New Display Data =   - all points set except at digit 2 and 4
                              - display "12345…"

FC F8 = CRC16($FFFF_H$)-Checksum

Remark: The ModbusRTU communication normally is done automatically by the PLC! The user just has to set up the destination register addresses and the "data part" of the telegram (point bytes and digit data)!
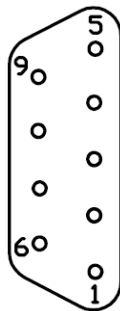
3.4 Connector Pin Assignments

3.4.1 External Connections

9pol. Sub-D Female Connector "ModbusRTU"

Pin	Assignment
1	
2	RS-232 TxD
3	RS-232 RxD
4	
5	GND Bus
6	+5V Bus Out
7	RS-485 D0 (Rx/Tx-)
8	RS-485 D1 (Rx/Tx+)
9	

Remark: Depending on DIP5 of the ModbusRTU-interface (see below) **either** the RS232-pins **or** the RS485-pins may be used. The unused pins have to be left open. Do **not** use a standard RS232-cable where **all** pins are connected. Otherwise the ModbusRTU-interface may be destroyed!!!

9pol. Sub-D Male Connector "Configuration, RS232"
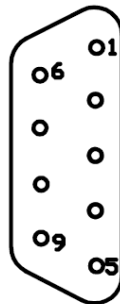
Pin	Assignment
1	
2	RxD
3	TxD
4	
5	GND
6	
7	
8	
9	

Remark: This connector should not be used by the customer! The configuration is already done by microSYST and must not be changed! Otherwise the correct function of the display can not be guaranteed!
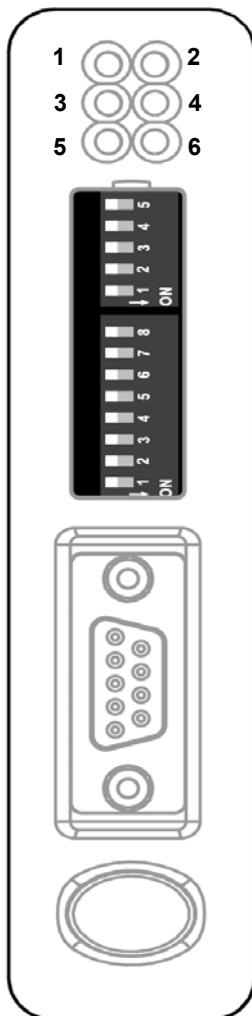
migan ModbusRTU
Large Display Numeric LED with Modbus RTU Interface

7pol. Mains Plug (230 VAC)
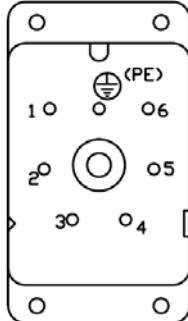
Pin	Assignment
1	L1
2	N
⏚ (PE)	PE

3.4.2 Internal LEDs and Switches

| LED	State	Description
1 - Bus Error	Off	Normal operation
	Red	Bus error; CRC mismatch >10%
2 - Bus Ready	Off	Not powered
	Green	Normal operation (bus ready)
	Red	Bus is off line (bus not ready)
3 – Processing	Off	Currently not processing query
	Green, flashing	Currently processing query
4 – HW Settings	Off	Normal operation
	Red	Not configured
5 - Subnet Status	Off	Power off
	Green, flashing	Initializing and not running
	Green	Running
	Red	Stopped or subnet error, or timeout
6 - Device Status	Off	Power off
	Alternating Red/Green	Invalid or missing configuration
	Green	Initializing
	Green, flashing	Configuration OK

migan ModbusRTU
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ModbusRTU
Node Address
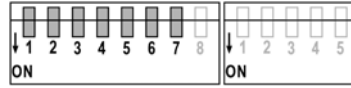
Node Address	DIP1	DIP2	DIP3	DIP4	DIP5	DIP6	DIP7
(reserved)	OFF	OFF	OFF	OFF	OFF	OFF	OFF
* 1	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	ON	OFF
…	…	…	…	…	…	…	…
126	ON	ON	ON	ON	ON	ON	OFF
127	ON	ON	ON	ON	ON	ON	ON

* = Factory-Setting

ModbusRTU
Baudrate
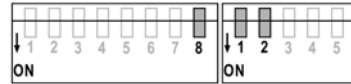
Baudrate	DIP8	DIP1	DIP2
(reserved)	OFF	OFF	OFF
1200 baud	OFF	OFF	ON
2400 baud	OFF	ON	OFF
4800 baud	OFF	ON	ON
9600 baud	ON	OFF	OFF
* 19200 baud	ON	OFF	ON
38400 baud	ON	ON	OFF
57600 baud	ON	ON	ON

* = Factory-Setting

ModbusRTU
Parity & Stop Bits
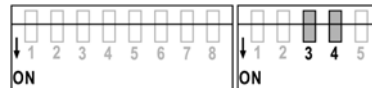
Parity	DIP3	DIP4
(reserved)	OFF	OFF
* No parity, 2 stop bits	OFF	ON
Even parity, 1 stop bit	ON	OFF
Odd parity, 1 stop bit	ON	ON

* = Factory-Setting

ModbusRTU
Physical Interface
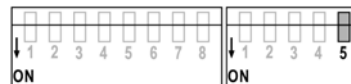
Interface Type	DIP5
RS232	ON
* RS485	OFF

* = Factory-Setting

migan ModbusRTU
Large Display Numeric LED with Modbus RTU Interface

Important note:

To change the setting of the DIP-switches obey the following order:
- disconnect the power supply
- open the housing
- open the dip switch protection cap (carefully - using a little srew driver)
- set the dip switches as desired
- close the dip switch protection cap
- close the housing
- reconnect the power supply

While the housing is open power may only be applied by qualified personnel and nothing has to be touched inside the housing at this time! Otherwise electrical shock and danger to life may happen! Please be careful!

4 Appendix

4.1 Displayable Characters

The data bytes are ASCII-coded.

Lower ☟	Higher ☞	0000 0	0001 1	0010 2	0011 3	0100 4	0101 5	0110 6	0111 7
0000	0			"Blank"	0		P		P
0001	1				1	A	q	A	q
0010	2				2	b	r	b	r
0011	3				3	c	S	c	S
0100	4				4	d	E	d	E
0101	5				5	E	u	E	u
0110	6				6	F		F	
0111	7				7	G		G	
1000	8			[	8	H		H	
1001	9			]	9	I	y	I	y
1010	A					J		J	
1011	B								
1100	C					L		L	
1101	D			—					
1110	E					n		n	
1111	F					o	_	o	

4.2 Maintenance and Care

Observe the following instructions in order to assure best possible perform-ance of the display:

- Make sure that the housing can be opened for adjustment and mainte-nance even after the display has been installed. Allow for adequate clear-ance at the back, front and top of the display unit in order to allow for suf-ficient 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 mal-functioning or destruction of the device. Under certain circumstances elec-trical 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 Information".

- 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.

4.3 Declaration of Conformity

microSYST Systemelectronic GmbH, Zur Centralwerkstätte 10,
92637 Weiden, Germany

does hereby declare that the product described in this user's manual,

"migan"

to which this declaration makes due reference,
is in compliance with the following standards or normative documents:

Interference emission: generic standard EN 50081 - 2, issued July 1993
Product standard: EN 55011; group 1/2; class A, issued March 1991
Limit values identical to EN 55022

Interference immunity: generic standard EN 50082 - 2, issued March 1995
Basic specification per table

In accordance with regulations specified by guideline 89/336/ EWG (and
EMVG).

Weiden, 22 November 1999   microSYST Systemelectronic GmbH

4.4 Guarantee

The display is guaranteed for the duration specified in the "General Terms and Conditions" regarding manufactured products and services rendered for the electrical industry period against defects which existed at the time the device was delivered to the buyer.

The device is subject to technical change without notice. Errors and omissions are excepted. No claims can be honoured for the shipment of a new product. The buyer is required to make notification of defects within 2 weeks after identification of such. Non-observance of notification requirements is equated with acceptance of the defect.

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 all required and/or useful information regarding defects at no charge, as well as to the affected devices, 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" regarding manufactured products and services rendered for the electrical industry apply as well.

4.5 Versions Overview

Version	Date	Remark, Description
1.00	29.11.07	Kreuzer: Document created
1.01	20.12.07	Nickl: Revised

Certified per **DIN EN ISO 9001:2000**.