

# migra SI

LED Information Display with Serial Interface

## User's Manual

# migra SI

LED Information Display with Serial Interface

## Table of Contents

<b>1 GENERAL</b>	<b>4</b>
1.1 Display Functions	4
<b>2 APPLICATIONS EXAMPLE</b>	<b>5</b>
<b>3 TECHNICAL DATA</b>	<b>6</b>
3.1 Device Configuration	7
3.2 Display Elements	8
3.3 Setting Options at the Control PCB	9
3.3.1 Configuration Switch Settings	9
3.3.2 Configuration Switch Setting Options	10
3.3.3 Test Routines	11
3.4 Online Frame Layout	12
3.4.1 General	12
3.4.2 Frame Layout	12
3.4.3 Clear Page	13
3.4.4 Clear Line	13
3.4.5 Print Text	14
3.4.6 Select Character Set	14
3.4.7 Set Attribute	15
3.4.8 Blink Synchronisation	15
3.4.9 Adjust Brightness	16
<b>4 CONNECTOR PIN ASSIGNMENTS</b>	<b>17</b>
<b>5 HOUSING DIMENSIONS</b>	<b>19</b>
<b>6 APPENDIX</b>	<b>20</b>
6.1 Standard Equipment	20
6.2 Optional Accessories	20
6.3 Order Numbers	20
6.4 Displayable Characters	21
6.5 Maintenance and Care	22

# migra SI

LED Information Display with Serial Interface

<b>6.6 Declaration of Conformity</b>	<b>23</b>
<b>6.7 Guarantee</b>	<b>24</b>
<b>6.8 Versions Overview</b>	<b>25</b>

# migra SI

LED Information Display with Serial Interface

## 1 General

The large format, graphics compatible display can be used universally for displaying production data, or as an information board.

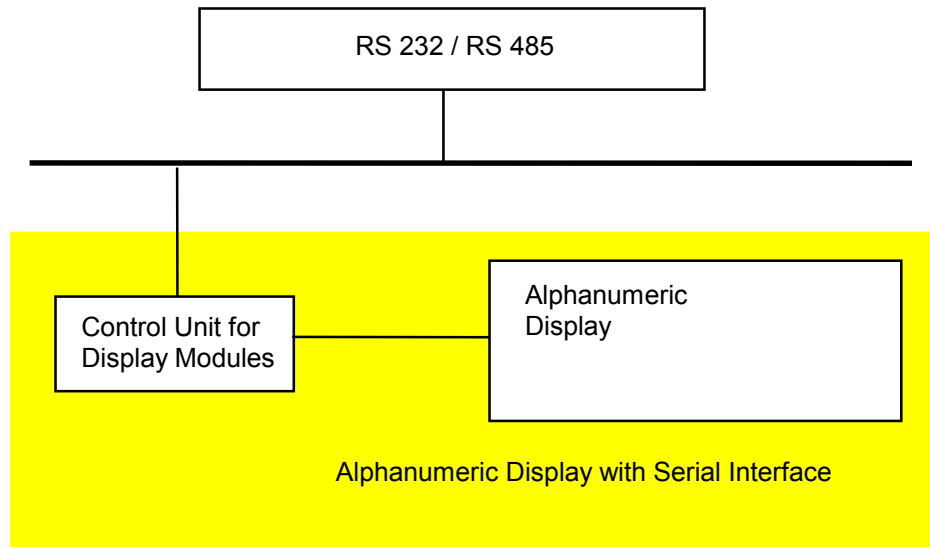
### 1.1 Display Functions

- Data transmission: RS 232 or RS 485 serial interface
- Configuration and control with included PC software
- Text displays (font styles: normal and bold)
- Stationary text, blinking text and inverse display
- Monitor display

# migra SI

LED Information Display with Serial Interface

## 2 Applications Example



# migra SI

LED Information Display with Serial Interface

## 3 Technical Data

### General Specifications

Display type:	LED dot matrix
Pixel size:	2 mm (0.079")
Character Height:	26 mm (1.02")
Digits:	25 to 100
Lines:	4 to 24
Display colour:	Green
Operating voltage:	230 V / 50 Hz, 110 V / 60 Hz or 24 V DC $\pm$ 20%
View:	Single sided
Interface:	Serial bus compatible RS 485, RS 232
Protocol:	ASCII
Baud rate:	9.6 kBaud
Housing:	Industrial version, powder coated aluminium
Housing dimensions:	See chapters 3.1 and 5
Housing colour:	RAL 7016 (anthracite)
Mounting:	Articulated arm, angle bracket or screw-in eyelets for hanging with chain
Protection:	IP 54 or IP 65
Operating temperature:	0 to +50° C
Storage temperature:	-25 to +70° C

# migra SI

LED Information Display with Serial Interface

## 3.1 Device Configuration

Number of pixels (horizontal x vertical): \_\_\_\_\_ x \_\_\_\_\_

Display colour: green

View:

single sided       double sided

Operating voltage:

230 V / 50 Hz       110 V / 60 Hz       24 V DC

Protection:

IP 54       IP 65

Temperature range:

0 to +50° C       -25 to +50° C

Housing dimensions:

\_\_\_\_\_ x \_\_\_\_\_ mm  
\_\_\_\_\_ x \_\_\_\_\_ inches

Housing colour:

RAL \_\_\_\_\_

Housing material:

aluminium profile  
 stainless steel  
 sheet metal

Interface:

RS 232       RS 485

Default settings upon delivery:

Baud rate:

1.2 kBaud     2.4 kBaud     4.8 kBaud     9.6 kBaud

19.2 kBaud

Data bits: 8,    Stop bits: 1,    Parity: none

Device address: \_\_\_\_\_ decimal

# migra SI

LED Information Display with Serial Interface

## 3.2 Display Elements

Alphanumeric display modules with a dot matrix of 161 x 10 pixels per module and line are utilised. Pixel diameter is approximately 2 mm (0.079").

Display type:	LED dot matrix display
Pixel height:	2 mm (0.079")
Character Height:	26 mm (1.02")
Number of lines:	4 to 24
Number of places:	25 to 100
Resolution per module:	4 lines of 161 x 10 LED pixels each (smallest display unit)
Display colour:	Green
View:	Single sided
Display:	ASCII character set (see table included in the appendix)

# migra SI

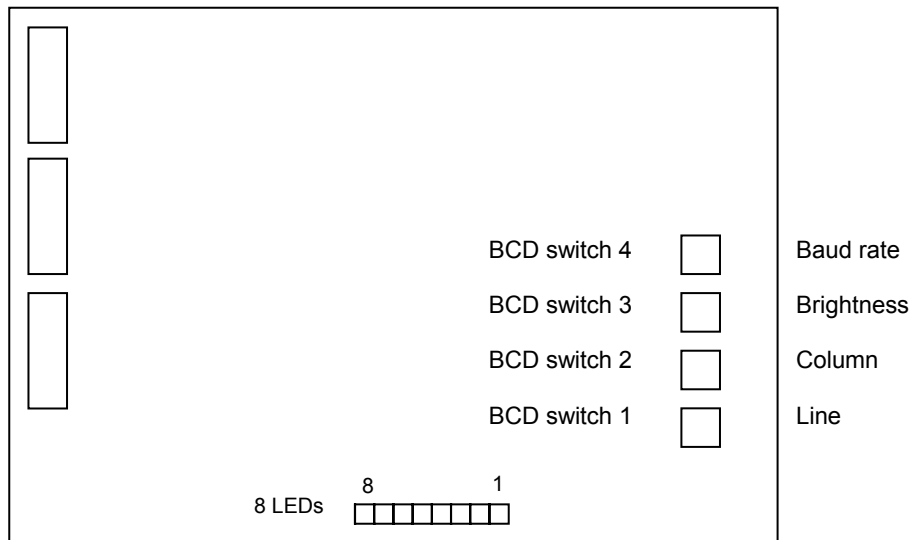
LED Information Display with Serial Interface

## 3.3 Setting Options at the Control PCB

### 3.3.1 Configuration Switch Settings

Rotary configuration switches can be used to adjust baud rate, brightness, and column and line starting positions.

These switches are normally set at the factory, and should only be set by the user in exceptional cases.



LED 1:	No function
LEDs 2 – 5:	Image memory editing and character conversion
LED 6:	Interface interrupt
LED 7:	Communications error
LED 8:	An error has occurred during communication (LED can only be extinguished by means of reset).

# migra SI

LED Information Display with Serial Interface

## 3.3.2 Configuration Switch Setting Options

### S1: line address (0 to 5)

0 = 1<sup>st</sup> line displayed at the module

1 = 2<sup>nd</sup> line displayed at the module

.....

### S2: column address (0 to 3)

0 = 1<sup>st</sup> column displayed at the module

1 = 2<sup>nd</sup> column displayed at the module

.....

### S3: brightness (0 to 9)

0 = dark

.....

9 = bright

### S4: baud rate

BCD Switch Value	Baud Rate	Parity
0	1200	none
1	2400	none
2	4800	none
3	9600	none
4	19200	none
Other value	9600	none

# migra SI

LED Information Display with Serial Interface

### 3.3.3 Test Routines

In order to make sure that all pixels are being correctly illuminated, each module can be run through a test sequence which activates one pixel line or one pixel column, and then slowly shifts the display over the entire module.

With BCD switch 4 set to 8:

One pixel column is illuminated and is shifted over the entire module from right to left.

With BCD switch 4 set to 9:

One pixel line is illuminated and is shifted over the entire module from top to bottom.

The display unit must be reset after adjusting the rotary switches in order to activate the new settings (except for the brightness setting)!

# migra SI

LED Information Display with Serial Interface

## 3.4 Online Frame Layout

### 3.4.1 General

The display is controlled with the help of frames which are transmitted to the serial interface.

### 3.4.2 Frame Layout

Start Sequence	Command	Length	Content	EOT
----------------	---------	--------	---------	-----

Start sequence:	5 bytes long 01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>
Command:	1 byte long = command number 01 <sub>h</sub> : clear page = clear the screen 02 <sub>h</sub> : clear line = delete a line 03 <sub>h</sub> : no function 04 <sub>h</sub> : print text = display text 05 <sub>h</sub> : select character set (character set 1 or 2) 06 <sub>h</sub> : set attribute (normal, inverse or blinking) 07 <sub>h</sub> : blink synchronisation 08 <sub>h</sub> : adjust brightness (from 0 to 9)
Length:	2 bytes long (first the low, and then the high byte), length of the frame from the start sequence up to and including EOT
Content:	n bytes long depending upon the command
EOT:	1 byte long = end of telegram, value: 04 <sub>h</sub>

**Note:** The page number mentioned in the following chapters (01<sub>h</sub> or 02<sub>h</sub>) currently has not function, although it must be specified.

# migra SI

LED Information Display with Serial Interface

## 3.4.3 Clear Page

Format: start, command, length, content, EOT

Start:	01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>	-	Start sequence
Command:	01 <sub>h</sub>	-	Command
Length:	0A <sub>h</sub> , 00 <sub>h</sub>	-	Length from start up to and including EOT
Content:	01 <sub>h</sub> or 02 <sub>h</sub>	-	Page number (no function)
EOT:	04 <sub>h</sub>	-	End

This frame addresses all display units and the entire monitor is cleared, i.e. it goes dark.

## 3.4.4 Clear Line

Format: start, command, length, content, EOT

Start:	01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>	-	Start sequence
Command:	02 <sub>h</sub>	-	Command
Length:	0B <sub>h</sub> , 00 <sub>h</sub>	-	Length from start up to and including EOT
Content:	01 <sub>h</sub> or 02 <sub>h</sub> 01 <sub>h</sub> through 18 <sub>h</sub>	-	Page number (no function)
EOT:	04 <sub>h</sub>	-	Line: 1 through 24
		-	End

This frame deletes an entire line, i.e. the line goes dark.

# migra SI

LED Information Display with Serial Interface

## 3.4.5 Print Text

Format: start, command, length, content, EOT

Start:	01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>	- Start sequence
Command:	04 <sub>h</sub>	- Command
Length:	0D <sub>h</sub> - 77 <sub>h</sub> , 00 <sub>h</sub>	- Length from start to EOT, i.e. possible range of 13 to 119
Content	1 <sub>h</sub> or 02 <sub>h</sub>	- Page number (no function)
	01 <sub>h</sub> through 18 <sub>h</sub>	- Line: 1 through 24
	01 <sub>h</sub> through 6B <sub>h</sub>	- Place number: 1 through 107 (with reference to character set 1)
	20 <sub>h</sub> through FF <sub>h</sub>	- Text (ASCII codes)
EOT:	04 <sub>h</sub>	- End

The text is displayed using the current attribute and the current character set.

## 3.4.6 Select Character Set

Format: start, command, length, content, EOT

Start:	01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>	- Start sequence
Command:	05 <sub>h</sub>	- Command
Length:	0B <sub>h</sub> , 00 <sub>h</sub>	- Length from start to EOT
Content:	01 <sub>h</sub> or 02 <sub>h</sub>	- Page number (no function)
	01 <sub>h</sub> or 02 <sub>h</sub>	- Character set 1 (normal) or 2 (bold)
EOT:	04 <sub>h</sub>	- End

The character set selected with this frame remains active until another character set is selected with the same frame.

# migra SI

LED Information Display with Serial Interface

## 3.4.7 Set Attribute

Format: start, command, length, content, EOT

Start:	01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>	- Start sequence
Command:	06 <sub>h</sub>	- Command
Length:	0C <sub>h</sub> , 00 <sub>h</sub>	- Length from start to EOT
Content:	01 <sub>h</sub> or 02 <sub>h</sub>	- Page number (no function)
	01 <sub>h</sub> or 02 <sub>h</sub>	- Text attribute: 01 <sub>h</sub> : normal
		02 <sub>h</sub> : inverse (only allowed for character set 1)
	00 <sub>h</sub> through FF <sub>h</sub>	- Blink attribute: 0: no blinking
		1 to 254: remaining blink time (100 = 1 min.)
		255: continuous blinking
EOT:	04 <sub>h</sub>	- End

The current attribute remains active until another attribute is selected with this frame.

The text which is read out after execution of this frame is displayed using the current attribute.

## 3.4.8 Blink Synchronisation

Format: start, command, length, content, EOT

Start:	01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>	- Start sequence
Command:	07 <sub>h</sub>	- Command
Length:	09 <sub>h</sub> , 00 <sub>h</sub>	- Length from start to EOT
Content:	none	- No content
EOT:	04 <sub>h</sub>	- End

All modules are addressed by this frame, and their synchronisation counters are simultaneously reset in order to allow for synchronised blinking.

# migra SI

LED Information Display with Serial Interface

## 3.4.9 Adjust Brightness

Format: start, command, length, content, EOT

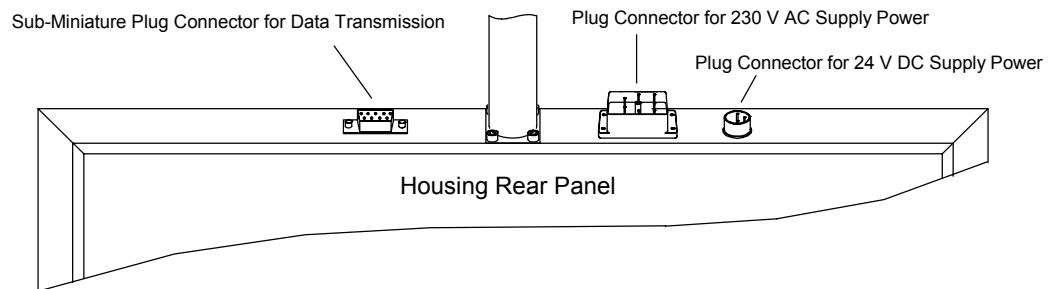
Start:	01 <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub> , FF <sub>h</sub>	-	Start sequence
Command:	08 <sub>h</sub>	-	Command
Length:	0A <sub>h</sub> (must be adhered to), 00 <sub>h</sub>	-	Length from start to EOT
Content:	01 <sub>h</sub> or 02 <sub>h</sub> 00 <sub>h</sub> through 09 <sub>h</sub>	-	Page number (no function)
		-	Brightness in 10 steps: 0 = dark 9 = bright
EOT:	04 <sub>h</sub>	-	End

Brightness for the entire display board can be adjusted in ten steps with this frame, i.e. all modules are addressed.

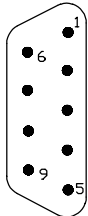
# migra SI

LED Information Display with Serial Interface

## 4 Connector Pin Assignments



### 9-Pin Sub-Miniature Plug Connector (interface)



PIN	RS 232	RS 485
1	n.c.	n.c.
2	RxD (input)	n.c.
3	TxD (output)	Rx+ / Tx+
4	n.c.	n.c.
5	GND	GND *
6	n.c.	+5 VDC *
7	n.c.	n.c.
8	n.c.	Rx- / Tx-
9	n.c.	n.c.

\* only used for bus termination, if needed.

The unit is equipped with either one RS 232 or one RS 485 interface.

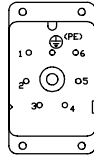
Example: Wire to control the migra SI via RS 232 with the enclosed Software

PC		migra SI
Pin 2 (RxD)	-----	Pin 3 (TxD)
Pin 3 (TxD)	-----	Pin 2 (RxD)
Pin 4 (DTR)	---	
	]	
Pin 6 (DSR)	---	
Pin 5 (GND)	-----	Pin 5 (GND)
Pin 7 (RTS)	---	
	]	
Pin 8 (CTS)	---	

# migra SI

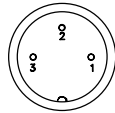
LED Information Display with Serial Interface

## 7-Pin Mains Plug (230 V AC)



PIN	Function
1	L1
2	N
(PE)	PE

## 3-Pin Round Plug (24 V DC, optional)

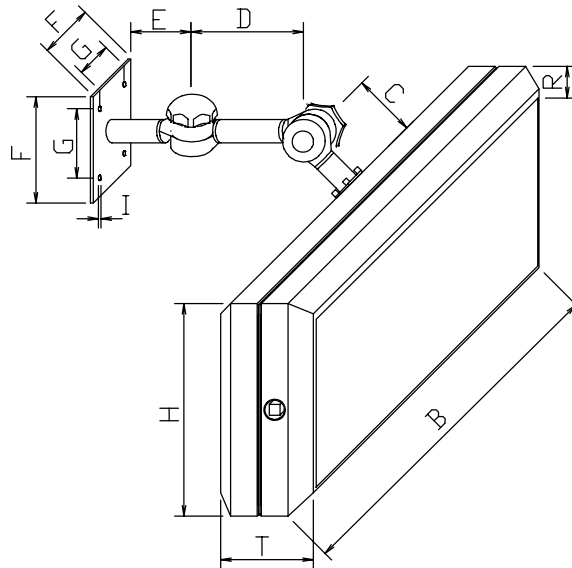


PIN	Function
1	GND
2	+ 24 V DC
3	PE

# migra SI

LED Information Display with Serial Interface

## 5 Housing Dimensions



Dimension	Measurement	Dimension	Measurement
T	87 mm (3.43")	E	74 mm (2.91")
R	21 mm (0.83")	F	100 mm (3.94")
C	60 mm (2.36")	G	70 mm (2.76")
D	110 mm (4.33")	I	7 mm (0.28")

Dimension	Measurement
B	min. 620 mm (24.41")
H	min. 238 mm (9.37")

# migra SI

LED Information Display with Serial Interface

## 6 Appendix

### 6.1 Standard Equipment

- Display unit with current software and hardware versions
- Hollow square key
- User's manual
- Mating plug for power supply
- Mating plug for interface

### 6.2 Optional Accessories

- Hollow square key
- User's manual (A4 format)

### 6.3 Order Numbers

Designation	Order Number
Hollow square key	G4-041
User's manual (German, A4 format)	X-M31-9AXX5X-005
User's manual (English, A4 format)	X-M32-9AXX5X-005

# migra SI

LED Information Display with Serial Interface

## 6.4 Displayable Characters

Data bytes are ASCII coded.

Higher Lower	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	X	X		0	@	P	`	p	X	X	X	X	X	X	X	X
xxxx0001	X	X	!	1	A	Q	a	q	ü	X	X	X	X	X	ß	X
xxxx0010	X	X	"	2	B	R	b	r	X	X	X	X	X	X	X	X
xxxx0011	X	X	#	3	C	S	c	s	X	X	X	X	X	X	X	X
xxxx0100	X	X	\$	4	D	T	d	t	ä	ö	X	X	X	X	X	X
xxxx0101	X	X	%	5	E	U	e	u	X	X	X	X	X	X	X	X
xxxx0110	X	X	&	6	F	V	f	v	X	X	X	X	X	X	X	X
xxxx0111	X	X	'	7	G	W	g	w	X	X	X	X	X	X	X	X
xxxx1000	X	X	(	8	H	X	h	x	X	X	X	X	X	X	X	X
xxxx1001	X	X	)	9	I	Y	i	y	X	Ö	X	X	X	X	X	X
xxxx1010	X	X	*	:	J	Z	j	z	X	Ü	X	X	X	X	X	X
xxxx1011	X	X	+	;	K	[	k	{	X	X	X	X	X	X	X	X
xxxx1100	X	X	,	<	L	\	l		X	X	X	X	X	X	X	X
xxxx1101	X	X	-	=	M	]	m	}	X	X	X	X	X	X	X	X
xxxx1110	X	X	.	>	N	^	n	~	Ä	X	X	X	X	X	X	X
xxxx1111	X	X	/	?	O	_	o	■	X	X	X	X	X	X	X	X

**X** means not available

# migra SI

LED Information Display with Serial Interface

## 6.5 Maintenance and Care

Observe the following instructions in order to assure best possible performance of the display:

- 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 assure 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, in particular regarding temperature and atmospheric humidity 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.
- All instructions and stipulations included in this owner's manual must be adhered to.

# migra SI

LED Information Display with Serial Interface

## 6.6 Declaration of Conformity

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

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

**“migra SI”**,

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 directive 89/336/ EWG  
(and EMVG).

Weiden, 7 March 2001

microSYST Systemelectronic GmbH

# migra SI

LED Information Display with Serial Interface

## 6.7 Guarantee

The display is guaranteed for the duration of the legally specified 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 also 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 specified 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.

# migra SI

LED Information Display with Serial Interface

## 6.8 Versions Overview

Ver.	Date	Comments
1.20	7/17/2002	Kreuzer: English version
1.30	10/2/2002	Kreuzer: Housing dimensions changed
1.50	11/20/2002	Kreuzer: Pin assignment RS232 changed
1.60	12/11/2002	Kreuzer: Pin assignment RS485 changed, new logo
1.70	1/23/2003	Kreuzer: New designation Rx/Tx (+/-)
1.80	4/24/2003	Kreuzer: Pixel dimension is 2 mm