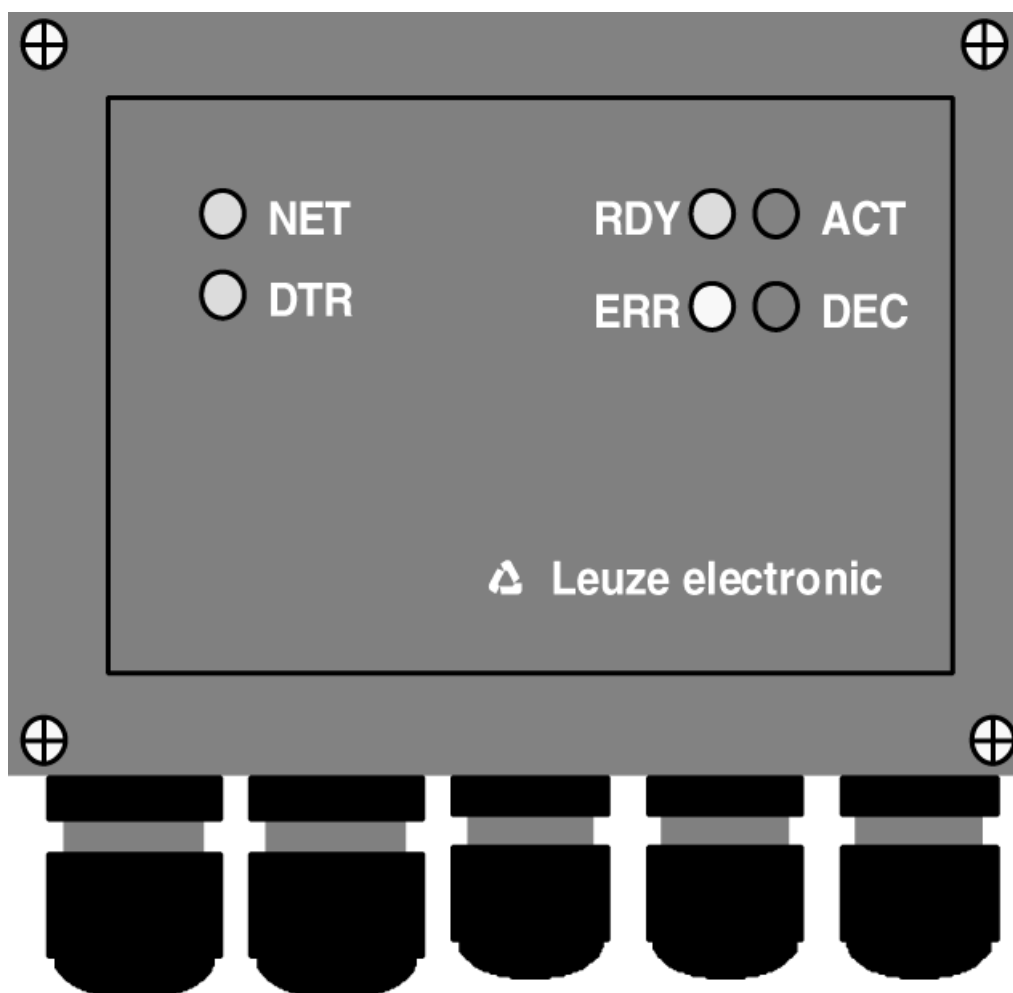


Coupling Unit MA 21 as Leuze multiNet plus Slave and as Protocol Converter

Technical Description



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1 General Information

1.1 Explanation of Symbols

The symbols used in this manual are explained below.



Attention!

This symbol appears in front of text which must be carefully observed. Failure to heed this information may lead to injuries to personnel or damage to the equipment.



Notice!

This symbol indicates text which contains important information.

1.2 Contact address

Leuze electronic GmbH + Co.

In der Braike 1, Postfach 1111

D- 73277 Owen/Teck

Phone: +49 (0) 7021/573 0

Fax: +49 (0) 7021/573 199

<http://www.leuze.de>

1.3 Technical Data

General Specifications

Manufacturer:	Leuze electronic
Model	MA 21, connection/interface converter for hand-held scanners and devices with RS 232 interface
Housing	Diecast aluminum
Dimensions	130 x 90 x 93 mm (H x W x D)
Weight	0.64 kg
Protection class	IP 54

Interface

Model (selectable)	RS 232, with galvanic isolation
	RS 422, with galvanic isolation
	RS 485, with galvanic isolation
	TTY, with galvanic isolation
Service interface	RS 232 internal, 9 pin Sub D plug

Power Supply

Operating voltage	18 ... 36 V DC
Power consumption	4VA max

Environmental Conditions

Operating temperature range	0 ... 50°C
Storage temperature range	-20 ... +60°C
Air moisture	max 90% relative humidity, non-condensing
Vibration	accord. IEC 68.2.6
Shock	accord. IEC 68.2.27
EMC	accord. IEC 801

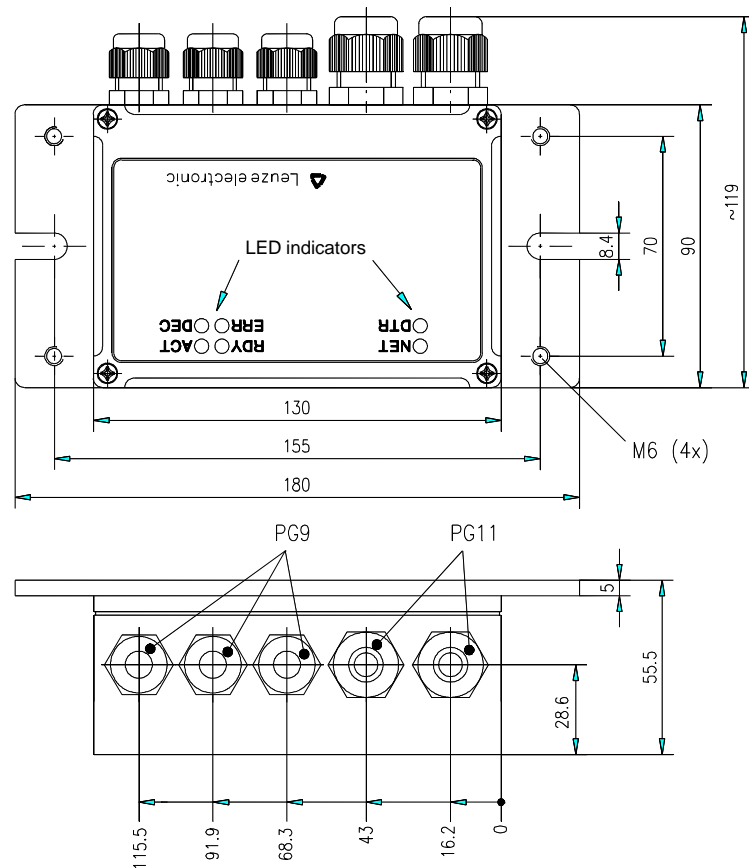


Figure 1.1: Dimensioned drawing MA 21

1.4 Function Characteristics of the MA 21

General Information The coupling unit MA 21 is used for connecting hand-held scanners or other devices with an RS 232 interface to the Leuze multiNet plus network or for directly connecting to a host computer with an RS232, RS422, RS485 or TTY interface.

The MA 21 is a variation of the MA 30. There are, for this reason, operation and display elements in the MA 21 which serve no function.

These operation and display elements will be indicated where appropriate throughout this manual.

Leuze multiNet plus

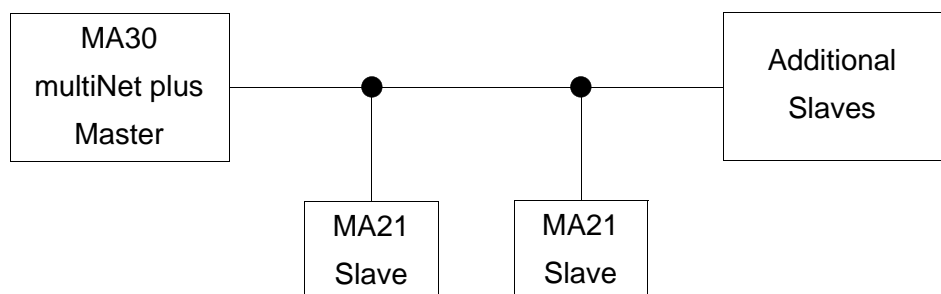


Figure 1.2: MA 21 as slave in the Leuze multiNet plus

Slaves in the multi-Net All Leuze bar code readers and decoders which are multiNet plus capable can be used as slaves, including the devices

- BCL 21 with MA2
- BCL 40/BCL 80 with or without MA 10
- RFI 40 with or without MA 10
- BCL 5/BCL 7 with decoder MDS 70
- BCL 5/BCL 7 with decoder DD55
- MA 21 with hand-held reader device
- MA 21 with external devices

Two-wire RS 485 The Leuze multiNet plus is optimised for fast transmission of scanner data to a primary host computer. Physically, the multiNet plus consists of a two-wire RS 485 interface through which the multiNet plus software protocol is controlled. This makes wiring the network easy and inexpensive since slaves are connected to each another in parallel.

Shielded, twisted pair conductors should be used for the multiNet. This allows a total network length of up to 1200 m.

The advantage of network operation lies in the transfer of read data from a single interface to the host computer. This minimises the wiring requirements of the bar code reader and reduces the number of communication processors/interface components.

If one wishes to operate the MA 21 directly from the host computer, it is possible to use the various interfaces (RS 232, RS 422, TTY or RS 485) as well as various protocols, such as 3964/RK512 (for further information, see Chapter 3.2).

Protocol Moreover, various data and frame formats can be set using the software setup (for further information, see Chapter 3.1), thereby ensuring that all commonly used protocols including 3964/RK512 can be used.


1.5 Addressing in the network


Addressing via ASCII address In order for the read data to be assigned to a station within the network, the individual bar code readers or devices must be addressed. In the multiNet plus, Leuze uses 2-byte ASCII addressing, which is sent in every data telegram. This address must be set at the stations by means of software or hardware (rotary switch).

The following rules apply here:

Master (MA 30):	Adr. 00
Slaves:	Adr. 01 to adr. 31 (sequentially numbered)

No address may occur more than once within the network. The numbering must be continuous, i.e. all address up to the last slave address must be occupied (=last subscriber in the network).

- 

Notice
When commissioning, make certain that the network addresses are correctly set.
- 

Notice
The logical sequence or the assigned addresses does/do not need to correspond to the physical arrangement of the read stations in the multiNet plus.

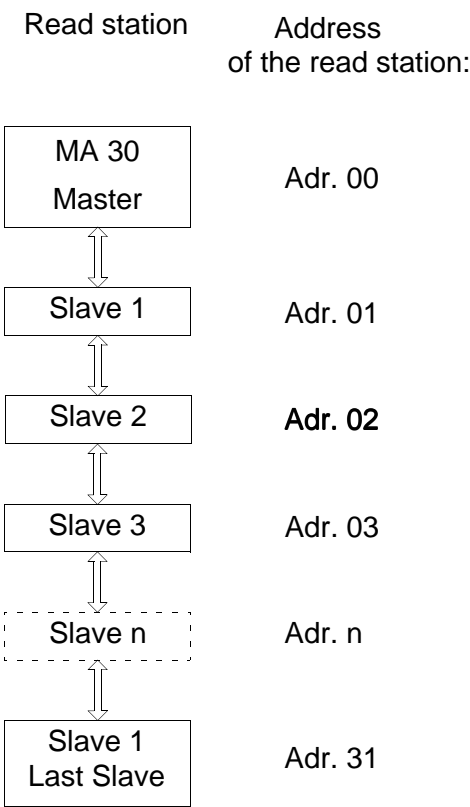


Figure 1.3: Assigning the network addresses

1.6 Control elements of the MA 21

MA 21 control elements

The control elements of the MA 21 are described below.

The illustration shows the MA 21 with the housing cover opened.

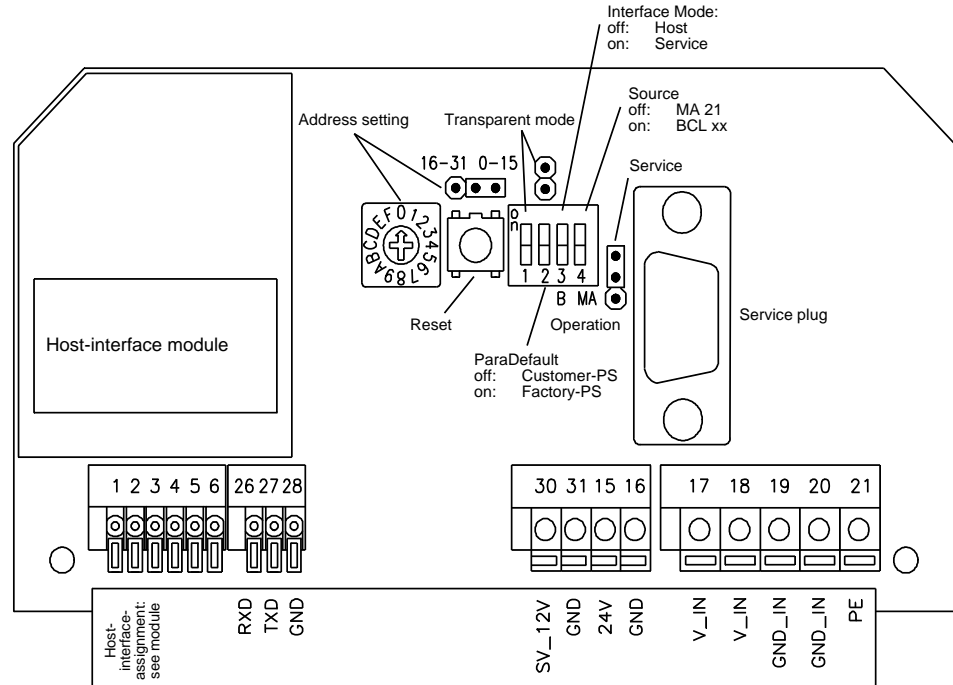



Figure 1.4: Front view: Control elements of the MA 21

Element	Function characteristics
Host-interface module	Insertable interface cards for host communication, select from RS 232, RS 485, RS 422 and TTY
Network address setting:	Set the device address with the rotary encoding switch or with the encoding jumper
Rotary switch:	Set to 0 if the MA 21 is to function as a gateway from the RS 232 to RS 485, RS 422 and TTY.
Jumper:	On 1 to F (15 positions), can be set for addressing in the multi-Net plus right: lower address range 0..15 left: higher address range 16..31
Ribbon band connection to the BCL xx	has no use in the MA 21
RESET button	press >0.2s and <4s: warm start press >4s: cold start
DIP switch 1 transparent mode switch	Off: Online commands which are sent via the host interface are interpreted and executed On: Online commands which are sent via the host interface are not interpreted

Element	Function characteristics
DIP switch setting 2 ParaDefault	Off: On a cold start, the customer parameter set is loaded On: On a cold start, the factory parameter set is loaded
DIP switch 3 interface mode	Off: Host interface active/monitoring of service interface On: Service interface active/host interface deactivated
DIP switch setting 4 Source	Should always be set to off in the MA 21.
Service/Operation jumper	Top: Service/Monitor (default setting)
Service plug	Sub D 9-pin. plug, RS 232 interface for service/setup operation 2=Rx, 3=Tx, 5=GND
Host interface	Terminals 1 ... 6: Host-computer connection terminals, pin assignment dependent on interface module
Client interface	Terminals 26 ... 28: Connection terminals for the external RS 232
External device voltage supply	Terminals 30 and 31: 8 - 12 V Terminals 15 and 16: 24 V
Operating voltage	Terminals 17..21: Connection terminals for operating voltage (18-36V DC) MA 21 and connected device. <div style="display: flex; align-items: center;">  <div> Attention! PE must be brought into contact on account of the interference suppression circuit! </div> </div>

Indicator LEDs Six LEDs are located on the rear of the device that indicate the operating status of the MA 21:

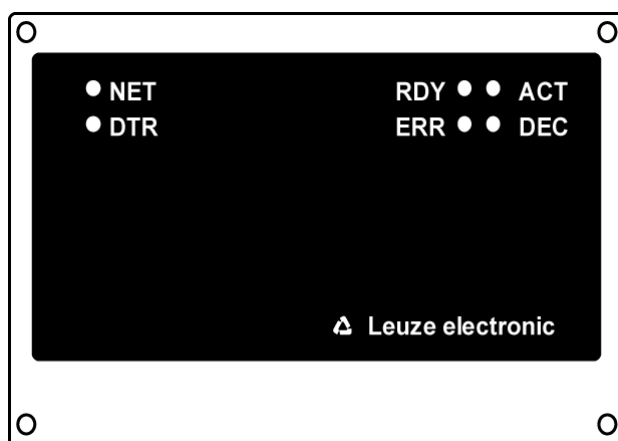


Figure 1.5: Rear view: LEDs on the MA 21

LED des.	Status	Description
RDY green	Ready	Flashing: • Setup menu is active • A reset or a new start is being performed Contin.: • Ready
ERR yellow	Error message (Error)	Flashing: • Special function is being executed • Setup menu is active Contin.: • Hardware error or serious software error • Reset is being started
ACT red	Indicates whether the MA 21 is in transparent mode.	Light off: • Online commands are interpreted and executed Contin.: • Online commands are not interpreted
DEC green	Serves no purpose in the MA 21	
NET green	Serves no purpose in the MA 21	
DTR green	Data transmission	Indicates data transmission to the host interface of the MA 21

1.7 Service mode

Service interface The service interface on the MA 21 is provided for commissioning the coupling unit. This interface can be reached upon removal of the MA 21 housing cover and contains a 9-pin SubD connector (male).

Connection This can be used to connect a PC or terminal via the serial RS 232/V.24 interface to the MA 21 for parameterisation purposes. The connection is made using a crossed RS 232 connection cable that establishes the RxD, TxD and GND connections. The hardware handshake at the service interface is via RTS. A CTS handshake is not supported.

RS 232 connection cable

PC / terminal
COM interface

MA 21
service interface

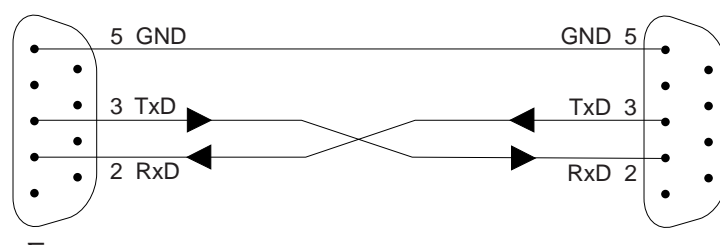


Figure 1.6: Connecting the service interface to a PC / terminal

DIP switch setting In order to activate the service mode, DIP switch 3 must be set to the "ON"

position. The switch must always be set to this position when commands are to be sent from a PC via the service interface to the MA 21. If the switch is set to "OFF", data can be passively monitored, but they cannot be sent to the network.

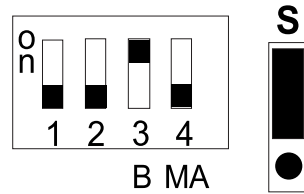


Figure 1.7: Setting the DIP switch and the jumper in the service network



Attention!

Upon activation of the service mode, the connection to the host computer is interrupted, i.e. serial communication with the network occurs exclusively via the service interface.

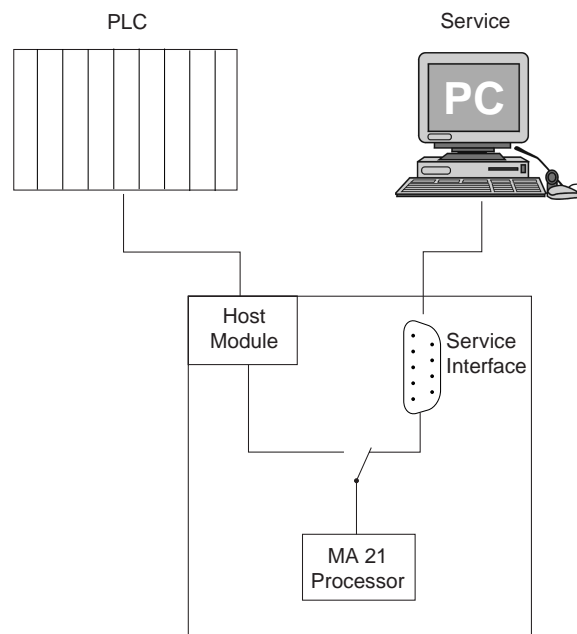


Figure 1.8: Host/Service changeover

TERM 3.0 Software



Notice!

The network can also be parameterised via the host interface. When commissioning, however, parameterisation via a PC/terminal is considerably more convenient, in particular when performed using the TERM 3.0 user-interface software from Leuze electronic, which was developed for this purpose.

Data format of the service interface

When DIP switch 3 is set to "Service", the service interface always functions with the fixed data format

- 9600 baud
- 8 data bits
- 1 stop bit
- no parity
- no handshake

This setting is automatically set when in Term 3.0 under **Serial Port 1/2** the option **Default Settings** is selected.

ASCII address



Attention!

Please note that in order to communicate in the network, the option **Frame Format/Address Mode/ASCII Address** must be activated and the correct address must be chosen.

Structure of the data frame

The data frame on the service interface is structured as follows:

	Prefix 1	Adr. HI	Adr. LO	Data	Terminator 1	Terminator 2
ASCII	STX	0	1	CODE	CR	LF
HEX	02h	30h	31h	43h 4Fh 44h 45h	0Dh	0Ah



Notice!

The data content "CODE" is only an example, included here are the real user data of the frame. Address 01 corresponds to slave 1 in the network.

Parameterisation can also be performed offline using TERM 3. With this PC-program tool, parameters can be entered in a mask from a user interface. This mask can be stored as a file and transferred to the MA 21 if necessary.

Exiting service mode

As soon as DIP switch 3 is switched back to "Host", the host interface is reactivated.

Data monitoring

In this setting, data which are being sent from the MA 21 to the host computer can be monitored on the service interface via the RS 232 (data monitoring). For this purpose, your PC or terminal must be set to the host protocol, as the host interface is only passively coupled and no protocol conversion takes place.

Together with the TERM 3.0 "Data Monitor program", you are equipped with a powerful diagnosis tool.

For further information on the Term 3, refer to the Term 3 short description.

2 Connection

2.1 Connect the host interface

Connection terminals: 1-6

Interface module pin assignment



Attention!
The pin assingment of the connection terminals is dependent on the interface module which is plugged in. Leuze offers four modules which can be used with the serial interfaces RS 232, RS 422, TTY or RS 485. The terminal designations are printed on the module.

Which interface module is plugged in can be determined from the MA 21 type designation:

MA 21 interface types

Model designation/ order designation	Interface module of the host interface
MA 21 100	RS 485
MA 21 110	RS 232
MA 21 120	TTY
MA 21 130	RS 422

For Multinet, see Chapter 2.2

2.1.1 RS 232 interface

RS 232

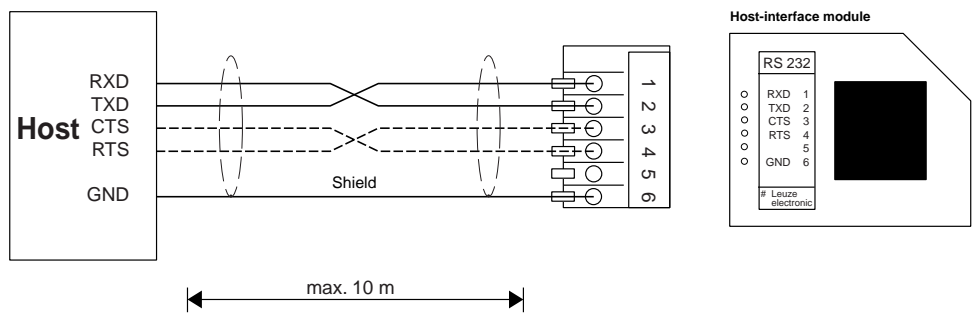


Figure 2.1: Connecting the MA 21 to an RS 232 host computer



Notice!
The wiring for RTS and CTS must only be connected if RTS/CTS hardware handshake is used.

2.1.2 TTY interface:

TTY active a) MA 21 active/host passive:

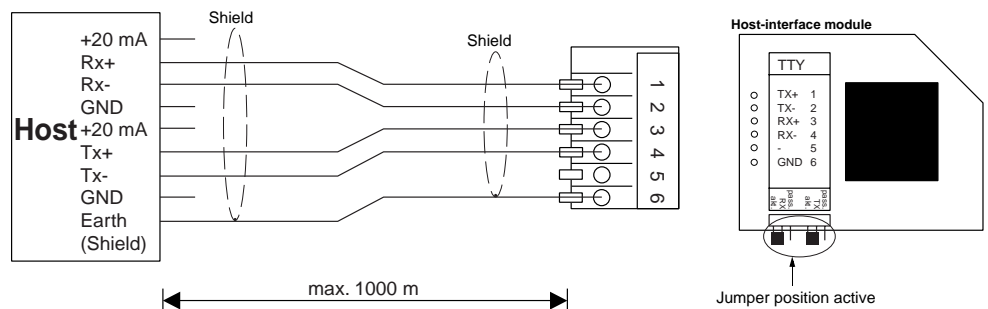


Figure 2.2: Active connection of the MA 21 to a TTY host computer

TTY passive MA 21 passive/host active

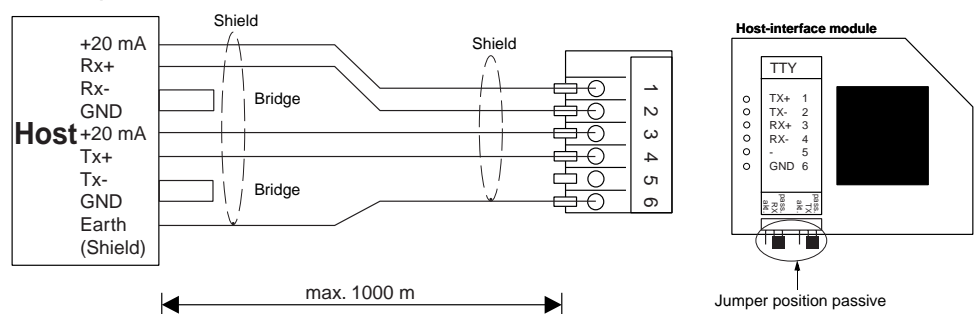


Figure 2.3: Passive connection of the MA 21 to a TTY host computer



Information on connecting the TTY interface:

- The active subscriber is the subscriber which supplies the current (20mA).
- Switching between active/passive on the host interface card is carried out using two jumper pairs, independent for transmit (Tx) and for receive (Rx).
- The jumpers for active/passive switching must always be changed in pairs (upper and lower jumpers in the same position). The current source and GND are, in this way, internally switched at the MA 21 host-interface module.
- Mixed operation (transmit active/receive passive or vice versa) is possible.
- When switching from active to passive operation or the reverse, the wiring of the connection cable (pin order) changes.

2.1.3 RS 422 interface:

RS 422

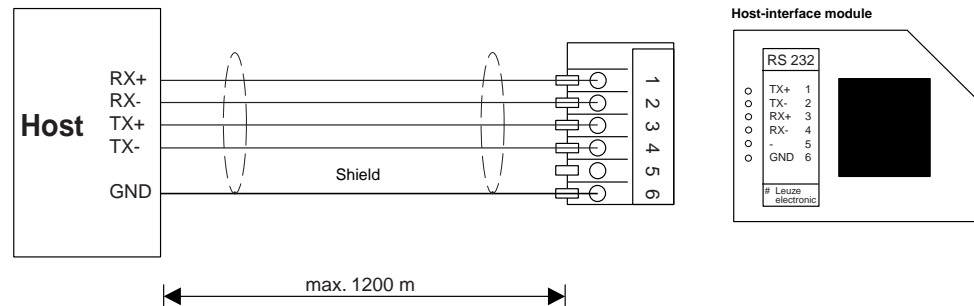


Figure 2.4: Connecting the MA 21 to an RS 422 host computer

2.2 Connecting the multiNet plus interface

Connection terminals: 1-6 RS485

RS 485

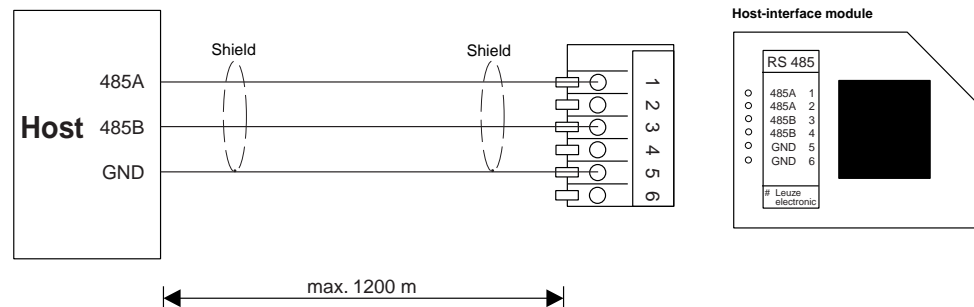


Figure 2.5: Connecting the MA 21 to an RS 485 host computer

multiNet plus interface

The multiNet plus interface establishes the connection between the subscribers. Make certain that the RS 485 interface module is plugged in. The two-wire RS 485 with galvanic decoupling connects one slave to the next in parallel.

Recommended network cable:

- Twisted pair, twin cable
- Cross sectional area: min. 0.2mm²
- Shielded
- Copper resistance <100 Ω/km
e.g. LiYCY 2x0.2mm²

The slaves must be equipped with an RS 485 multiNet plus interface, i.e.

- **DD55** (standard RS 485)
- **MDS 70** with **IM 40** (single-head) or **IM 47** (double-head decoder)
- **BCL 40/80** with **MA 10 100** or **MA 30**
- **BCL41** with **MA 3**
- **BCL21** with **MA 2** or **MA 4**

can be connected to the network.

**Wiring the
multiNet plus**

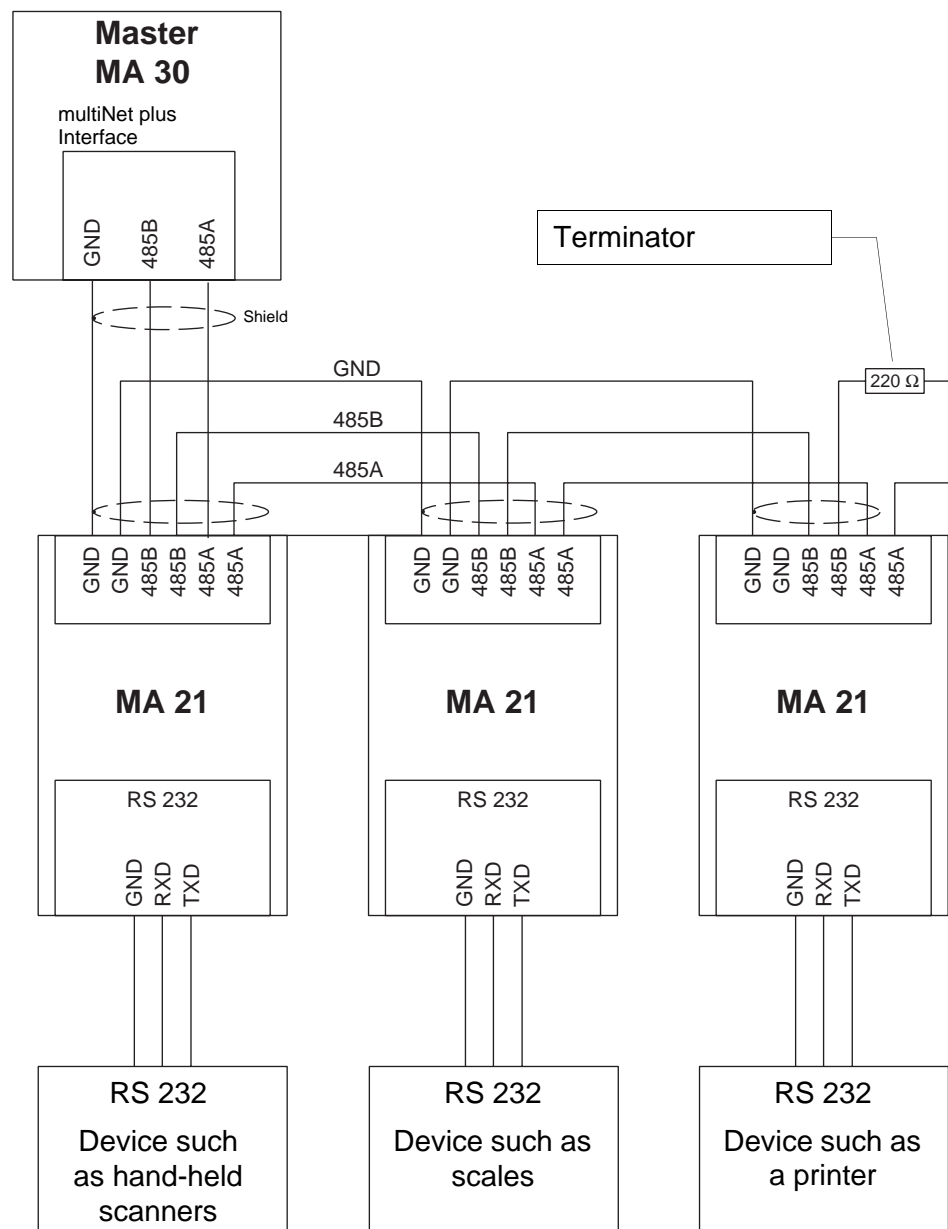


Figure 2.6: Wiring the multiNet plus



Information on connecting the multiNet plus interface:

- The wires RS 485 A, 485 B and GND are looped through the network; with MA 30, MA 21, MA 10 and MDS 70 the terminals are doubled for this purpose.
- The shielding is to be connected at the slaves to GND.
- The maximum wire length in the network is 1200m.
- The (physically) last slave in the network should be provided with a terminator of 220Ω between 485 A and 485 B. This prevents reflections and improves interference immunity.
- Wires 485 A and 485 B must not under any circumstances be reversed; the multiNet is otherwise not functional.

2.3 Connecting the voltage supply

Connection terminals: 17-21

Voltage supply Connection terminals for the MA 21 voltage supply

Input voltage:	18..36V DC	
Power consumption:	4 VA max., MA 21 without BCL	
Terminals 17, 18:	V_IN	(pos. operating voltage)
Terminals 19, 20:	GND_IN	(reference voltage, ground)
Terminal 21:	PE	(protective earth; earth)



Notice!

The terminals for V_IN and GND_IN are doubled to ease wiring. This allows the supply voltage to be wired in parallel from one read station to the next.

2.4 Connecting an external device

2.4.4 Connecting the RS232 client interface

Connection terminals: 26-28,

RS 232 Connection terminals for the RS232 interface of an external device such as a hand-held scanner

Terminal 26:	RXD
Terminal 27:	TXD
Terminal 28:	GND

2.4.5 Connecting the voltage supply

Connection terminals: 15, 16, 30, 31

Voltage supply Various voltages are offered: 8 - 12V variable and 24V fixed.

Terminal 15:	24V
Terminal 16:	GND
Terminal 17:	8 - 12V adjustable
Terminal 18:	GND

The 24V client voltage supply is potential-free relative to the MA 21 voltage supply as well as to the client interface.

3 Commissioning

3.1 Operating the MA 21 as a multiNet plus slave

Initialising the network

- Set the valid address for the slave at the address selection switch. For further information, see Chapter 1.3.
- The last slave address must be set on the MA 30 address switch.
- Set the "Operation" operating mode on the slaves.
- Switch on the voltage supply.

Acknowledgements at the terminal window:		Meaning:
i>	00 M	M = master
i>	01 s	s = slave
i>	02 s	
i>	•	
i>	•	
i>	•	
i>	n s	n = last slave address (max 31)

If, after the initialisation phase (approx. 30 s), not all slaves are ready or if a time out (Adr.+T) is output, refer to Chapter "Troubleshooting".

The connected slaves can now be addressed and parameterised from the master as though they were individual devices.

With one difference:

Addressing a slave

In the network, each data telegram must contain an ASCII address which specifies the slave for which the data are intended (see Chapter 1.5 Service Mode: Structure of the Data Frame)

When operating the terminal program, make certain that you have selected the address of the slave with which you would like to communicate in the menu Frame Format/Address Mode/ASCII Address. The following key combinations can also be used to simplify the address setting as of version 5.22:

- Ctrl + → = increase address or
 Ctrl + ← = reduce address.

3.2 Operating the MA 21 as a protocol converter

Host interface Prior to the initial commissioning of the host interface, this must be set in the parameters of the host computer/PLC.

To do this, use the service interface of the MA 21 and switch to "Service Network" (see Chapter 1.5 Service Mode).

Calling up master setup An appropriate terminal program such as Term 3 can be used to call up the MA 21 online setup. To do this, type in an "e" to switch to the MA 21 master setup in which all settings for network operation can be made. The following menu appears:

```
00          Load Parameter Set
00
00          Setup
00  -----
00  1:      Language
00  2:      MA21 Setup
```

Language Use "1: Language" to select from the English (default setting) and German languages.

Use "2: MA21 Setup" to switch to the setup menu.

```
00          MA21 Setup
00  -----
00  1:      Serial Host Interface
00  2:      Serial Client Interface
00  3:      General Information
```

Setting the host protocol Select "Serial Host Interface":

```
00          Serial Host Interface
00  -----
00  1:      General Settings
00  2:      Protocol Frame
00  3:      3964 / RK 512 Protocol
```

Under "General Settings" you will find:

```

00          General Settings
00  -----
00  1:    Data Format      [8-no-1]
00  2:    Baud Rate       [9600 baud]
00  3:    Protocol        [frame protocol]
00  4:    Handshake Mode [no handshake]

```

Under "Protocol", select from:

```

00          Protocol
00  -----
00  1:    No Protocol
00  2: *   Protocol Frame
00  3:    Protocol Frame with Acknowledge
00  4:    3964 / RK 512 Protocol
00  5:    multiNet Plus Slave

```

The default setting here is frame protocol, as indicated by the asterisk (*).

This frame protocol is specified in detail in the corresponding menu:

Use ESC to return to the serial host interface menu and select there item 2:
Frame Protocol

```

00          Protocol Frame
00  -----
00  1:    Prefix 1        [02H]
00  2:    Prefix 2        [00H]
00  3:    Postfix 1       [0DH]
00  4:    Postfix 2       [0AH]
00  5:    Address Format [ASCII address]
00  6:    BCC Mode       [no BCC]

```

Block Check Character Here, you set the frame characters you are using (prefix, postfix). The address must be set in the network to "ASCII Address" or "Binary Address".

"BCC Mode" specifies whether or not a so-called "Block Check Character" is to be transmitted as XOR-checksum via a data telegram (default setting: no BCC).

3964/RK512 If you have activated "3964/RK512" as the protocol, you must set and/or check the appropriate parameters in the "3964/RK 512 Protocol" menu. The default values for 3964 without reaction telegram are preset here.

3.3 Setting and operating the client interface

In order to operate a hand-held scanner or other external device, connect the interface as well as the voltage supply to the MA 21 as described in Chapter 2.4.

Prior to the initial commissioning of the host interface, this must be set in the parameters of the connected RS232 device.

As described in the previous chapter, use the service interface of the MA 21 and switch to "Service Network" (see Chapter. 1.5 Service Mode).

An appropriate terminal program can be used to call up the MA 21 online setup. To do this, type in an "e" to switch to the MA 21 master setup in which all settings for network operation can be made. The following menu appears:

```

00          Load Parameter Set
00
00          Setup
00  -----
00  1:      Language
00  2:      MA21 Setup

```

Language Use "1: Language" to select from the English (default setting) and German languages.

Use "2: MA21 Setup" to switch to the setup menu.

```

00          MA21 Setup
00  -----
00  1:      Serial Host Interface
00  2:      Serial Client Interface
00  3:      General Information

```

Setting the client protocol

Select "Client Host Interface":

```

00          Serial Client Interface
00  -----
00  1:      General Settings
00  2:      Protocol Frame

```

Under "General Settings" you will find:

```

00          General Settings
00  -----
00  1:      Data Format      [7-same-1]
00  2:      Baud Rate       [9600 baud]
00  3:      Protocol        [frame protocol]
00  4:      Handshake Mode  [no handshake]

```

Under "Protocol", select from:

```
00          Protocol
00  -----
00  1:      No Protocol
00  2: *    Protocol Frame
00  3:      Protocol Frame with Acknowledge
```

The default setting here is frame protocol, as indicated by the asterisk (*).

This frame protocol is specified in more detail in the corresponding menu:

Use ESC to return to the serial host interface menu and select there item 2:
"Frame Protocol"

```
00          Protocol Frame
00  -----
00  1:      Prefix 1      [00H]
00  2:      Prefix 2      [00H]
00  3:      Postfix 1     [0DH]
00  4:      Postfix 2     [0AH]
00  5:      Address Format [ASCII address]
00  6:      BCC Mode      [no BCC]
```

3.4 Setting the general parameters

General parameters

In addition to the settings for the host interface which are made during the initial commissioning, the MA 21 master setup also offers a "General Information" menu which needs to be changed only in special cases:

```

00          General Information
00  -----
00  1:      Start Character          ['s']
00  2:      Error Character          ['&']
00  3:      Warning Character        ['@']

```

The start, error and warning characters are ASCII characters which the MA 21 transmits directly to the serial host interface or via the MA 30 to the host computer when the corresponding event occurs. A different ASCII character may be selected here.

Saving the setup



Attention!

After editing the setup, do not forget to exit the setup with "ESC, x" and save the changed values in the MA 21 with "3: Save and Exit"; the previous values will otherwise be retained.

After saving, wait until the MA 21 displays the start character ("00s"); only then has the initialisation with the new values been completed.

3.5 Managing the parameter sets in the MA 21

Parameter sets

The MA 21 is capable of managing three parameter-set types.

A "parameter set" is a memory area in the EEPROM which contains all settings (parameters) of a read station, such as code type, position number, etc, in numerical form. The TERM 3.0 terminal software facilitates menu-driven online and offline parameter changes. For information on operating the Term3 software, please refer to the appropriate operating instructions. For handling by means of software, the parameter sets are numbered from "0" to "2".

1. Current parameter set ("0"):

Parameter set which can be changed via online or offline setup and contains the current settings of the MA 21.

2. Customer-specific parameter set ("1"):

The parameter set stored in the MA 21 which can be created as a copy a valid, current parameter set in order to save customer-specific settings. As a result, the customer-specific data are not lost following a hardware reset.

3. Factory parameter set ("2"):

Leuze standard parameter set which cannot be changed.
 The settings correspond to those set on delivery.
 The MA 21 can be reset to factory settings by means of a hardware RESET (see Chapter 3.6.2).

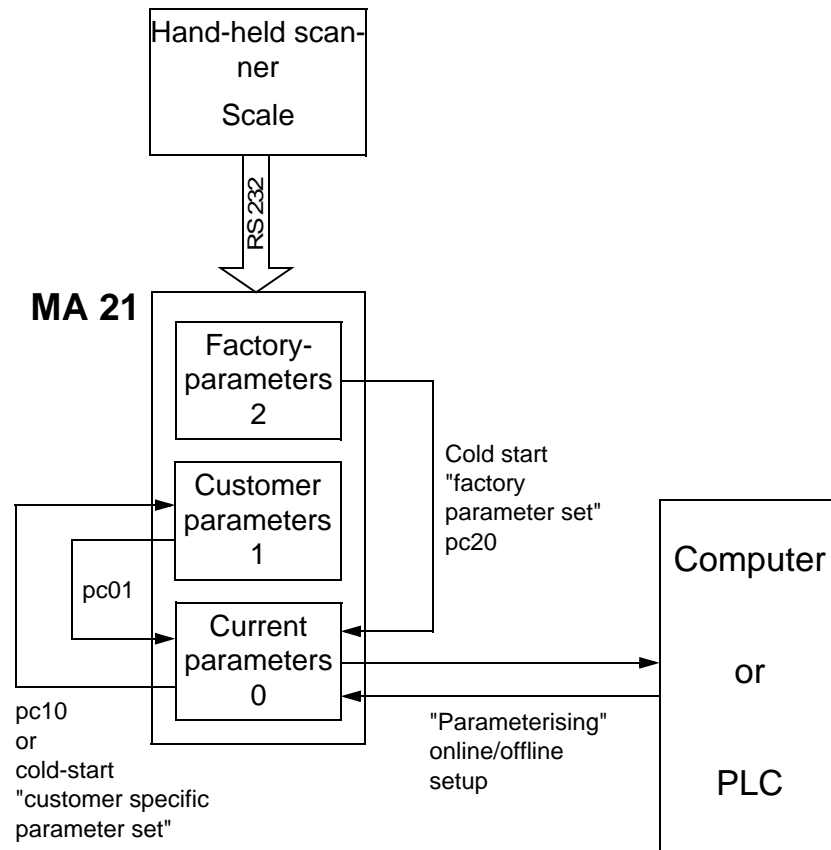


Figure 3.1: Managing the parameter sets in the MA 21

The parameter sets remain retained after the operating voltage has been switched off. When switched back on, the device is started with the current parameter set. If this is not valid, the customer-specific parameter set is loaded.

"parameter copy" command

With the online command **"parameter copy"**, short **"pc"**, you can copy a parameter set setting as a "backup" into the customer-specific parameter set. The read station can be reset to this state at any time by means of a hardware RESET (see Chapter 3.6.2).

Commands for handling parameter sets by means of software:

- pc01:** Copies the current parameter set into the customer-specific parameter set
- pc10:** Copies the customer-specific parameter set into the current parameter set (same as hardware RESET with customer-specific parameters)
- pc20:** Copies the default parameter set into the current parameter set (same as hardware RESET with factory parameters)

MA 21 factory parameters **An overview of the most important factory parameters in the MA 21 master setup:**

00		MA21 Setup	
00		-----	
00	1:	Serial Host Interface	
00	2:	Serial Client Interface	
00	3:	General Information	

00	1:	Serial Host Interface	
00		-----	
00	1:	General Settings	
00	1:	Data Format	[8-NO-1]
00	2:	Baud Rate	[9600 baud]
00	3:	Protocol	[frame protocol]
00	4:	Handshake Mode	[no handshake]
00	2:	Protocol Frame	
00		-----	
00	1:	Prefix 1	[02H]
00	2:	Prefix 2	[00H]
00	3:	Postfix 1	[0DH]
00	4:	Postfix 2	[0AH]
00	5:	Address Format	[ASCII address]
00	6:	BCC Mode	[no BCC]

00	3:	3964 / RK 512 Protocol	
00		-----	
00	1:	Transmit BCC to 3964	[no]
00	2:	Transmit with High Priority	[no]
00	3:	ZVZ Character Delay Time	[220]
00	4:	NAK No Acknowledgement	[550]
00	5:	Number of Transmission Retries	[5]
00	6:	RK512 Protocol	[no]
00	7:	Number of Reception Data Blocks	[10]
00	8:	Start Address in the DB	[0]
00	9:	Address Offset for Slave	[64]
00	A:	Reaction Telegram in RK512	[no]

```

00  2:    Serial Client Interface
00  -----

00  1:    General Settings
00  1:    Data Format      [7-EVEN-1]
00  2:    Baud Rate       [9600 baud]
00  3:    Protocol        [frame protocol]
00  4:    Handshake Mode   [no handshake]

00  2:    Protocol Frame
00  -----

00  1:    Prefix 1        [00H]
00  2:    Prefix 2        [00H]
00  3:    Postfix 1       [0DH]
00  4:    Postfix 2       [0AH]
00  5:    Address Format [ASCII address]
00  6:    BCC Mode        [no BCC]

00  3:    General Information
00  -----

00  1:    Start Character['s']
00  2:    Error Character['&']
00  3:    Warning Character['@']

```

3.6 Performing a RESET

3.6.1 Software RESET ("warm start"):

Software reset Should the MA 21 not respond even with applied operating voltage and the RDY LED no longer illuminates, you should first perform a software RESET. To do this, press the RESET button on the MA 21 for longer than 0.2 and less than 4.0 s.

The operating software is restarted and the device reinitialised with the current parameters. Following the initialisation, the MA21 reports with "S" and the LED RDY must illuminate.

If you have performed the warm start and the MA 21 still fails to respond, an error may have been made in the setup settings for the "current parameter set" of the MA 21. A hardware RESET (see 3.6.2) resets the parameter set of BCLxx and MA 21 to a defined state in which the devices will again be operational.

3.6.2 Hardware RESET ("cold start"):

Hardware RESET During a cold start, you can reset the MA 21 to either the factory settings (factory parameter set) or to your customer-specific parameter set. Which parameter set is loaded is dependent on the position of DIP switch 2. To perform a cold start, press the RESET button for longer than 4s.



Attention!

During the cold start, the current parameter set is overwritten by either your customer-specific parameter set or the Leuze factory parameter 0set, i.e. any settings made to the current parameter set are lost. A hardware RESET should, therefore, only be performed when the software can no longer be started or when you consciously want to reset the BCLxx and MA 21.

Customer-specific parameter set:



Factory parameter set:



Figure 3.2: Loadable parameter sets on cold start

4 Appendix

4.1 Troubleshooting

Troubleshooting If problems occur during the commissioning of the MA 2, refer to the following table. Typical errors and their possible causes are described here as well as tips for correcting the errors.

No.	Error description	Possible cause(s)	Remedy
Error when switching on			
1	No LED lights up, 0	Operating voltage reversed or not correctly connected	Check/correct connection
2	LED RDY flashes for longer than 30 s after device switched on	"Power ON" function test could not be successfully executed	Check the network wiring, switch operating voltage off and on again
3	In network operation, network master (Adr. "00") does not report to host	No communication between host and master: 1) False interface type plugged in 2) Interface incorrectly connected 3) The set data format between host and MA 21 does not agree 4) DIP switch 3 on "Service"	1) Change interface module 2) Correct as shown in connection diagram 3) Check data format, change in master setup 4) Set DIP switch 3 to "Host"
4	Master reports with "00S", the connected slaves do not	1) Last slave address not set on master MA 21 2) DIP switch 4 on "BCL"	1) Use the rotary switch or master setup to set the last slave address 2) Set DIP switch 4 to "MA 21"
5	Master reports with "00S", the connected slaves all report with time out (e.g. 01T, 02T, 03T etc.)	1) Interruption or reverse connection of the multi-Net plus interface (RS 485) 2) The slaves have not recognised the protocol type "multiNet" and are operating with a different data format	1) Check/measure connections, A and B wires must not be reversed 2) Check and, if necessary, correct settings for the host protocol of the slaves at the service interface Data format: multiNet mode Baud rate: 57600 Protocol: multiNet plus slave
Other errors when switching on			

No.	Error description	Possible cause(s)	Remedy
6	Master and slaves report with "Adr.+S", but MA 21 with time out (e.g. 03T)	1) MA 21 is not correctly connected or is being operated with an incorrect data format 2) MA 21 is switched to "Service"	1) Check connection of the MA 21r.3, check host protocol (see above) 2) Switch MA 21 to "Operation"
Errors during operation			
7	LED DTR flimmers, however no data arrive at the host computer	1) Incorrect protocol set on the host interface of the MA 21 2) DIP switch 3 on "Service"	1) Set the protocol on the MA 21 to the values of the host computer 2) Set DIP switch 3 to "Host"
8	LEDs RDY and ERR flash at the same frequency	The MA 21 is in setup mode. No reading tasks can be performed while in this mode.	Exit setup and, if necessary, save. The MA21 returns to operating mode.
9	LED RDY does not light up	The MA 21 operating software is not being properly processed	Perform a software reset

4.2 ASCII-Table

HEX	DEC	CTRL	ABV	Designation	GERMAN
00	0	^@	NUL	NULL	Null
01	1	^A	SOH	START OF HEADING	Kopfzeilenbeginn
02	2	^B	STX	START OF TEXT	Textanfangszeichen
03	3	^C	ETX	END OF TEXT	Textendezeichen
04	4	^D	EOT	END OF TRANSMISSION	Ende der Übertragung
05	5	^E	ENQ	ENQUIRY	Aufforderung zur Datenübertragung
06	6	^F	ACK	ACKNOWLEDGE	Positive Rückmeldung
07	7	^G	BEL	BELL	Klingelzeichen
08	8	^H	BS	BACKSPACE	Rückwärtsschritt
09	9	^I	HT	HORIZONTAL TABULATOR	HORIZONTAL TABULATOR
0A	10	^J	LF	LINE FEED	Zeilenvorschub
0B	11	^K	VT	VERTICAL TABULATOR	Vertikal Tabulator
0C	12	^L	FF	FORM FEED	Seitenvorschub
0D	13	^M	CR	CARRIAGE RETURN	Wagenrücklauf
0E	14	^N	SO	SHIFT OUT	Dauerumschaltungszeichen
0F	15	^O	SI	SHIFT IN	Rückschaltungszeichen
10	16	^P	DLE	DATA LINK ESCAPE	Datenübertragungsumschaltung
11	17	^Q	DC1	DEVICE CONTROL 1 (X-ON)	Geräteststeuerzeichen 1
12	18	^R	DC2	DEVICE CONTROL 2 (TAPE)	Geräteststeuerzeichen 2
13	19	^S	DC3	DEVICE CONTROL 3 (X-OFF)	Geräteststeuerzeichen 3
14	20	^T	DC4	DEVICE CONTROL 4	Geräteststeuerzeichen 4
15	21	^U	NAK	NEGATIVE (/Tape) ACKNOWLEDGE	Negative Rückmeldung
16	22	^V	SYN	SYNCHRONOUS IDLE	Synchronisierung
17	23	^W	ETB	END OF TRANSMISSION BLOCK	Ende des Datenübertragungsblocks
18	24	^X	CAN	CANCEL	Ungültig
19	25	^Y	EM	END OF MEDIUM	Ende der Aufzeichnung
1A	26	^Z	SUB	SUBSTITUTE	Substitution
1B	27	^[	ESC	ESCAPE	Umschaltung
1C	28	^\	FS	FILE SEPARATOR	Hauptgruppentrennzeichen
1D	29	^]	GS	GROUP SEPARATOR	Gruppentrennzeichen
1E	30	^^	RS	RECORD SEPARATOR	Untergruppentrennzeichen
1F	31	^_	US	UNIT SEPARATOR	Teilgruppentrennzeichen
20	32		SP	SPACE	Leerzeichen
21	33		!	EXCLAMATION POINT	Ausrufungszeichen
22	34		"	QUOTATION MARK	Anführungszeichen
23	35		#	NUMBER SIGN	Nummerzeichen
24	36		\$	DOLLAR SIGN	Dollarzeichen
25	37		%	PERCENT SIGN	Prozentzeichen
26	38		&	AMPERSAND	Kommerzielles UND-Zeichen
27	39		'	APOSTROPHE	Apostroph
28	40		(	OPENING PARENTHESIS	runde Klammer (offen)
29	41		)	CLOSING PARENTHESIS	runde Klammer (geschlossen)
2A	42		*	ASTERISK	Stern
2B	43		+	PLUS	Pluszeichen
2C	44		,	COMMA	Komma
2D	45		-	HYPHEN (MINUS)	Bindestrich (Minuszeichen)
2E	46		.	PERIOD (DECIMAL)	Punkt
2F	47		/	SLANT	Schrägstrich (rechts)
30	48		0		
31	49		1		
32	50		2		
33	51		3		
34	52		4		
35	53		5		
36	54		6		
37	55		7		
38	56		8		
39	57		9		
3A	58		:	COLON	Doppelpunkt
3B	59		;	SEMI-COLON	Semikolen
3C	60		<	LESS THEN	Kleiner als
3D	61		=	EQUALS	Gleichheitszeichen
3E	62		>	GREATER THEN	Größer als
3F	63		?	QUESTION MARK	Fragezeichen

HEX	DEC	CTRL	ABV	Designation	GERMAN
40	64		@	COMMERCIAL AT	Kommerzielles a-Zeichen
41	65		a		
42	66		b		
43	67		c		
44	68		D		
45	69		e		
46	70		F		
47	71		G		
48	72		H		
49	73		I		
4A	74		J		
4B	75		K		
4C	76		L		
4D	77		M		
4E	78		N		
4F	79		O		
50	80		P		
51	81		Q		
52	82		R		
53	83		S		
54	84		T		
55	85		U		
56	86		V		
57	87		W		
58	88		X		
59	89		Y		
5A	90		Z		
5B	91		[	OPENING BRACKET	eckige Klammer (offen)
5C	92		\	REVERSE SLANT	Schrägstrich (links)
5D	93		]	CLOSING BRACKET	eckige Klammer (geschlossen)
5E	94		^	CIRCUMFLEX	Zirkumflex
5F	95		*	UNDERSCORE	Unterstrich
60	96			GRAVE ACCENT	Gravis
61	97		a		
62	98		b		
63	99		c		
64	100		D		
65	101		e		
66	102		F		
67	103		G		
68	104		H		
69	105		I		
6A	106		J		
6B	107		K		
6C	108		L		
6D	109		M		
6E	110		N		
6F	111		O		
70	112		P		
71	113		Q		
72	114		R		
73	115		S		
74	116		T		
75	117		U		
76	118		V		
77	119		W		
78	120		X		
79	121		Y		
7A	122		Z		
7B	123		{	OPENING BRACE	geschweifte Klammer (offen)
7C	124		|	VERTICAL LINE	Vertikalstrich
7D	125		}	CLOSING BRACE	geschweifte Klammer (geschlossen)
7E	126		~	TILDE	TILDE
7F	127		DEL	DELETE (RUBOUT)	Löschen



Leuze electronic GmbH + Co.
Postfach 11 11, D-73277 Owen/Teck
Tel. (07021) 57 30, Fax (07021) 57 31 99
E-mail: info@leuze.de
<http://www.leuze.de>

Sales and Service

A
Ing. Franz Schmachtl KG
Postfach 362
A-4021 Linz/Donau
Tel. Int. + 43 (0) 732/7646-0
Fax Int. + 43 (0) 732/765036

Zweigbüros:
Kolpingstraße 15
A-1232 Wien
Tel. Int. + 43 (0) 1/6162180
Fax Int. + 43 (0) 1/616218099

Theodor-Körner-Straße 54
A-8010 Graz
Tel. Int. + 43 (0) 316/672185
Fax Int. + 43 (0) 316/672439

Arzlerstr. 42 b, A-6020 Innsbruck
Tel. Int. + 43 (0) 512/265060
Fax Int. + 43 (0) 512/266151

ARG
Neumann SA.
Calle 55 N° 6043 (ex Buenos Aires 945)
1653 Villa Ballester
Provincia Buenos Aires, Argentina
Tel. Int. + 54 11 (0) 4/768-3449
Fax Int. + 54 11 (0) 4/767-2388

AUS
Leuze Australasia Pty. Ltd.
48 Skarratt Street
AUS-Silverwater NSW 21 28
Sydney, Australia
Tel. Int. + 61 (0) 2/97483788
Fax Int. + 61 (0) 2/97483817
E-mail: 100241.3435@compuserve.com

B
Leuze electronic nv/sa
Steenweg Buda 50
B-1830 Machelen
Tel. Int. + 32 (0) 2/2531600
Fax Int. + 32 (0) 2/2531536
E-mail: leuze.info@leuze.be

BR
Leuze electronic Ltda.
Av. Jurua, 150-AlphaVile
BR-06455-010 Barueri-S. P.
Tel. Int. + 55 (0) 11/72956134
Fax Int. + 55 (0) 11/72956177
E-mail: leuze@leuze.com.br

CH
Leuze electronic AG
Ruchstuckstrasse 25
CH-8306 Brüttisellen
Tel. Int. + 41 (0) 1/8340204
Fax Int. + 41 (0) 1/8332626

CZ + SK
Schmachtl CZ Spol. SR. O.
Videňská 185
25242 Vestec-Praha
Tel. Int. + 420 (0) 2/44 910701
Fax Int. + 420 (0) 2/44 910700
E-mail: schmachtl@mbx.vol.cz

CO
Componentes Electronicas Ltda.
P.O. Box 478, CO-Medellin
Tel. Int. + 57 (0) 4/ 3511049
Telex 66922
Fax Int. + 57 (0) 4/3511019

DK
Desim Elektronik APS
Tuasingvej
DK-9500 Hobro
Tel. Int. + 45/ 98510066
Fax Int. + 45/ 98512220

D
Leuze electronic GmbH + Co.
Geschäftsstelle Dresden
Niedersedlitzer Straße 60
01257 Dresden
Telefon (0351) 2809319/20
Telefax (0351) 2809321
E-mail: vgd@leuze.de

Lindner electronic GmbH
Schulenburg Landstraße 128
30165 Hannover
Telefon (0511) 966057-0
Telefax (0511) 96 6057-57
E-mail: lindner@leuze.de

W+M planttechnik
Dipl.-Ing. Wörtler GmbH + Co.
Tannenbergsstraße 62
42103 Wuppertal
Telefon (0202) 37112-0
Telefax (0202) 318495
E-mail: wmlan@rga-net.de

Leuze electronic GmbH + Co.
Geschäftsstelle Frankfurt
Moselstraße 50
63452 Hanau
Telefon (06181) 9177-0
Telefax (06181) 917715
E-mail: vgf@leuze.de

Leuze electronic GmbH + Co.
Geschäftsstelle Owen
In der Braike 1
73277 Owen/Teck
Telefon (07021) 9850-910
Telefax (07021) 9850-911
E-mail: vgo@leuze.de

Leuze electronic GmbH + Co.
Geschäftsstelle München
Ehrenbreitsteiner Straße 44
80993 München
Telefon (089) 14365-200
Telefax (089) 14365-220
E-mail: vgm@leuze.de

E
Leuze electronic S.A.
Gran Via de Las Cortes
Catalanes, Nr. 641, Atico 4
E-08010 Barcelona
Tel. Int. + 34 9 3/3023080
Fax Int. + 34 93/3176520
E-mail: leuze@chi.es

F
Leuze electronic sarl.
Z.I. Nord Torcy, B.P. 62-BAT 4
F-77202 Marne la Vallée Cedex 1
Tel. Int. + 33 (0) 1/60051220
Fax Int. + 33 (0) 1/60050365
E-mail: leuze@club-internet.fr

FIN
SKS-teknika Oy
P.O. Box 122
FIN-01721 Vantaa
Tel. Int. + 358 (0) 9/852661
Fax Int. + 358 (0) 9/8526820

GB
Leuze Mayser electronic Ltd.
Alington Road, Eynesbury,
GB-St. Neots, Cambs., PE19 2RD
Tel. Int. + 44 (0) 1 480/408500
Fax Int. + 44 (0) 1 480/403808

GR
U.T.E. Co ABEE
16, Mavromichali Street
GR-18538 Piraeus
Tel. Int. + 30 (0) 1/4290710,
4290685, 4290991
Fax Int. + 30 (0) 1/4290770

H
Kvalix Automatika Kft.
Postfach 83
H-1327 Budapest
Tel. Int. + 36 (0) 1/3794708
Fax Int. + 36 (0) 1/3698488
E-mail: info@kvalix.hu
<http://www.kvalix.hu>

HK
Electrical Systems Ltd.
14/F Tai Po Commercial Centre
152 Kwong Fuk Road
Tai Po N.T. Hongkong
Tel. Int. + 852/26566323
Fax Int. + 852/26516808

I
IVO Leuze Vogtle Malanca s.r.l.
Via Soperga 54, I-20127 Milano
Tel. Int. + 39 02/2840493
Fax Int. + 39 02/26110640
E-mail: ivoleuze@tin.it

IL
Galoz electronics Ltd.
P.O. Box 35
IL-40850 Rosh Ha'ayin
Tel. Int. + 972 (0) 3/9023456
Fax Int. + 972 (0) 3/9021990

IND
Global Tech Corp.
403, White House
1482 Sadashir Peth, Tilak Road
Pune 411030, India
Tel. Int. + 91 (0) 212/470085
Fax Int. + 91 (0) 212/4470086

J
SSR Engineering Co., Ltd.
2-18-3 Shimomoguro
Meguro-Ku. Tokyo
Tel. Int. + 81 (0) 3/34936613
Fax Int. + 81 (0) 3/34904073

KOR
Useong Electrade Co.
3325, Gadong, Chungang,
Circulation Complex
No 1258, Guro-Bondong, Gurogu
Seoul, Korea
Tel. Int. + 82 (0) 2/6867314/5
Fax Int. + 82 (0) 2/6867316

MAL
Ingermark (M) SDN.BHD
No. 29 Jalan KPK 1/8
Kawasan Perindustrian Kundang
MAL-48020 Rawang,
Selangor Darul Ehsan
Tel. Int. + 60 (0) 3/6042788
Fax Int. + 60 (0) 3/6042188

N
Elteco A/S
Postboks 96
N-3901 Porsgrunn
Tel. Int. + 47 (0) 35/573800
Fax Int. + 47 (0) 35/573849

NL
Leuze electronic B.V.
Postbus 1276
NL-3430 BG Nieuwegein
Tel. Int. + 31 (0) 30/6066300
Fax Int. + 31 (0) 30/6060970
E-mail: info@leuze.nl
<http://www.leuze.nl>

P
LA2P, Lda.
Rua Almirante Sousa Dias, Loja D
Nova Oeiras, P-2780 Oeiras
Tel. Int. + 351 (0) 1/4422608/58
Fax Int. + 351 (0) 1/4422808

PL
Rotiw Sp.z.o.o.
Ul. Roździeńskiego 188 B
PL-40203 Katowice
Tel. Int. + 48 (0) 32/596031
Fax Int. + 48 (0) 32/7572734

RCH
Imp. Tec. Vignola S.A.I.C.
Plaza Justicia, Sub El Peral 25
Casilla 93-V
RCH-Valparaiso
Tel. Int. + 56 (0) 32/257073,
256521, Telex 33 0404
Fax Int. + 56 (0) 32/258571

ROC
Great Cofue Technology Co., Ltd.
4F-8, 39, Sec. 4, Chung Hsin Road
San-Chung City
Taipei Hsien, Taiwan, R. O. C.
Tel. Int. + 886 (0) 2/29838077
Fax Int. + 886 (0) 2/29853373

RP
JMTI Industrial Corporation
No. 5, Saturn Street
Bricktown, Moonwalk
Paranaque, Metro Manila, Philippines
Tel. Int. + 63 (0) 2/8446326
Fax Int. + 63 (0) 2/8932202

RSA
Countapulse Controls (PTY.) Ltd.
P.O.Box 40393,
RSA-Cleveland 2022
Tel. Int. + 27 (0) 11/6157556-8
Fax Int. + 27 (0) 11/6157513

S
Leuze electronic AB
Headoffice
Box 4025
181 04 Lidingö
Tel. + 46 (0) 8/7315190
Fax + 46 (0) 8/7315105

SGP
Pepperl + Fuchs Pte. Ltd.
P + F Building
18, Ayer Rajah Crescent, N. 06-03
SGP-Singapore 139942
Tel. Int. + 65/7799091
Fax Int. + 65/8731637

SLO
Tipteh d.o.o.
Cesta v Gorice 40
SLO-1111 Ljubljana
Tel. Int. + 386 (0) 61/2005150
Fax Int. + 386 (0) 61/2005151

TR
Arslan Elektronik A. S.
Lülecihendere Cod. Nr. 47
Tophane Karaköy
TR-Istanbul
Tel. Int. + 90 (0) 2/12/2434627
Fax Int. + 90 (0) 2/12/2518385

USA + CDN + MEX
Leuze Lumiflex Inc.
300 Roundhill Drive, Unit 4
USA-Rockaway, NJ 07866
Tel. Int. + 1 (0) 973/ 5860100
Fax Int. + 1 (0) 973/586 1590
E-mail: info@leuze-lumiflex.com
<http://www.leuze-lumiflex.com>

