Leuze electronic

the sensor people

SMART
SENSOR
BUSINESS

MA 258i

Fieldbus Gateway – EtherNet/IP

en 04-2017/01 50117132
We reserve the right to
make technical changes

Original operating instructions

ПРОМЭЛЕКТРОНИКА / sales@prom-elec.com

© 2017
Leuze electronic GmbH + Co. KG
In der Braike 1
D-73277 Owen / Germany
Phone: +49 7021 573-0
Fax: +49 7021 573-199
http://www.leuze.com
info@leuze.com

1 General information 5
1.1 Explanation of symbols 5
1.2 Declaration of Conformity 5
1.3 Description of functions 6
1.4 Definition of terms 7

2 Safety 8
2.1 Intended use 8
2.2 Foreseeable misuse 8
2.3 Competent persons 9
2.4 Disclaimer 9

3 Fast commissioning / operating principle 10
3.1 Mounting 10
3.2 Device arrangement and selection of the mounting location 10
3.3 Electrical connection 10
3.3.1 Connecting the Leuze device 11
3.3.2 Connecting the power supply and the bus cable 11
3.4 Starting the device 11
3.5 MA 258*i* on EtherNet/IP 12
3.5.1 Manually setting the IP address 13
3.5.2 Configure the participant 15
3.5.3 Transfer the data to the control (RSLogix 5000 specific) 18
3.5.4 Adapting the device parameters 18
3.5.5 Use explicit messaging services 22

4 Device description 23
4.1 General Information to the connector units 23
4.2 Characteristics of the connector units 23
4.3 Device construction 24
4.4 Operating modes 25
4.5 Fieldbus systems 26
4.5.1 EtherNet/IP 26

5 Specifications 29
5.1 General specifications 29
5.2 Dimensioned drawings 30
5.3 Type overview 31

6 Installation and mounting 32
6.1 Storage, transportation 32
6.2 Mounting 33
6.3 Device arrangement 34
6.3.1 Selecting a mounting location 34
6.4 Cleaning 34

7 Electrical connection 35
7.1 Safety notices for the electrical connection 35
7.2 Electrical connection 36
7.2.1 PWR IN – voltage supply / switching input/output 36
7.2.2 PWR OUT switching input/output 38
7.3 BUS IN 38
7.4 BUS OUT 40
7.5 Device interfaces 41
7.5.1 RS 232 device interface (accessible after opening the device, internal) 41
7.5.2 Service interface (internal) 42

8 Status displays and operational controls 43
8.1 LED status indicators 43
8.1.1 LED indicators on the circuit board 43
8.1.2 **LED indicators on the housing 44**
8.2 Internal interfaces and operational controls 45
8.2.1 Overview of operational controls of the 45
8.2.2 Connector X30 … connectors 47
8.2.3 RS 232 service interface – X33 47
8.2.4 S10 service switch 47
8.2.5 Rotary switch S4 for device selection 48

9 Configuration 49
9.1 Connecting the service interface 49
9.2 Reading out information in Service mode 49

10 Telegram 53
10.1 Structure of the fieldbus telegram 53
10.2 Description of the input bytes (status bytes) 54
10.2.1 Structure and meaning of the input bytes (status bytes) 54
10.2.2 Detailed description of the bits (input byte 0) 55
10.2.3 Detailed description of the bits (input byte 1) 57

10.3 Description of the output bytes (control bytes) 57
10.3.1 Structure and meaning of the output bytes (control bytes) 57
10.3.2 Detailed description of the bits (output byte 0). 58
10.3.3 Detailed description of the bits (output byte 1). 59
10.4 RESET function / deleting memory 60

11 Modes. 61

11.1 Functionality of the data exchange. 61
11.1.1 Reading slave data in Collective mode (gateway -> PLC) 62
11.1.2 Writing slave data in Collective mode (PLC -> gateway) 62
11.1.3 Command mode 65

12 Commissioning and configuration. 68

12.1 Measures to be performed prior to the initial commissioning. 68
12.2 Starting the device and setting the communication parameters 69
12.2.1 Manually setting the IP address 69
12.3 Configuration steps for a Rockwell control without EDS support. 71
12.3.1 Integrating the hardware into the PLC using the generic EtherNet module 71
12.3.2 Configure the config assembly 73
12.4 Configuration steps for a Rockwell control with EDS support 76
12.4.1 Integrating the hardware into the PLC and installing the EDS file 76
12.4.2 Setting the parameters on the MA 76
12.5 EDS file - general info 80
12.6 EDS file - detailed description. 81
12.6.1 Class 1 Identity object 81
12.6.2 Class 4 assembly object. 82
12.7 Setting the read parameters on the Leuze device 86
12.7.1 Specific feature for the use of hand-held scanners (bar code and 2D devices, combi devices with RFID) 87
12.7.2 Specific features in the operation of an RFM/RFI. 88

13 Diagnostics and troubleshooting 89

13.1 General causes of errors 89
13.2 Interface errors. 90

14 Type overview and accessories 91

14.1 Part number code 91
14.2 Type overview 91
14.3 Accessory connectors. 91
14.4 Accessory ready-made cables for voltage supply. 92

14.4.1 Contact assignment of PWR connection cable 92
14.4.2 Specifications of the cables for voltage supply 92
14.4.3 Order codes of the cables for voltage supply 93

14.5 Accessory ready-made cables for bus connection 93
14.5.1 General information 93
14.5.2 Contact assignments M12 EtherNet connection cables KB ET... 93
14.5.3 Technical data of the M12 EtherNet connection cables KB ET.... 94
14.5.4 Order code M12 EtherNet connection cables KB ET... 94

14.6 Accessory ready-made cables for connecting Leuze Ident devices 95
14.6.1 Order codes for the device connection cables 95
14.6.2 Contact assignment for the device connection cables 95

15 Maintenance 96

15.1 General maintenance information 96

15.2 Repairs, servicing 96

15.3 Disassembling, packing, disposing 96

16 Specifications for Leuze end devices 97

16.1 Standard setting, KONTURflex (S4 switch position 0) 97

16.2 Bar code reader BCL 8 (S4 switch position 1) 99

16.3 Bar code reader BCL 22 (S4 switch position 2) 100

16.4 Bar code reader BCL 300i, BCL 500i, BCL 600i (S4 switch position 4) 101

16.5 Bar code reader BCL 90, BCL 900i (S4 switch position 5) 102

16.6 LSIS 122, LSIS 222 (S4 switch position 6) 103

16.7 LSIS 4x2i, DCR 202i (S4 switch position 7) 104

16.8 Hand-held scanner (S4 switch position 8) 105

16.9 RFI, RFM, RFU RFID readers (S4 switch position 9) 106

16.10 BPS 8 bar code positioning system (S4 switch position A) 107

16.11 BPS 300i bar code positioning system, ODSL xx optical distance sensors with RS 232 interface (S4 switch position B) 108

16.12 Modular interfacing unit MA 3x (S4 switch position C) 110

16.13 Resetting the parameters (S4 switch position F) 111

17 Appendix 112

17.1 ASCII Table 112

1 General information

1.1 Explanation of symbols

The symbols used in this operating manual are explained below.

Attention!

This symbol precedes text messages which must strictly be observed. Failure to comply with this information results in injuries to persons or damage to the equipment.

Notice!

This symbol indicates text passages containing important information.

1.2 Declaration of Conformity

The MA 258*i* modular interfacing units have been designed and manufactured in accordance with applicable European directives and standards.

Notice!

The Declaration of Conformity for these devices can be requested from the manufacturer.

The manufacturer of the product, Leuze electronic GmbH + Co. KG in D-73277 Owen, possesses a certified quality assurance system in accordance with ISO 9001.

The MA 258*i* modular interfacing unit is "UL LISTED" in accordance with American and Canadian safety standards and fulfills the requirements of Underwriter Laboratories Inc. (UL).

1.3 Description of functions

The MA 258*i* modular interfacing unit is used to connect Leuze devices directly to the fieldbus.

Bar code reader:	BCL 8, 22, 300i, 500i, 600i, 90, 900i
2D-code reader:	LSIS 122, LSIS 222, LSIS 4x2i, DCR 200i
Hand-held scanner	ITxxxx, HFU/HFM
RFID read-write devices:	RFM 12, 32, 62 & RFI 32, RFU 100, RFU 200
Bar code positioning system:	BPS 8, BPS 300
Optical distance sensors:	ODSL 9, ODSL 30, ODSL 96B
Measuring light curtain:	KONTURflex to Quattro-RSX/M12
multiNet master connection box:	MA 3x
Additional RS 232 devices:	Scales, third-party devices

This is accomplished by transmitting the data from the DEV via an RS 232 (V.24) interface to the MA 258*i* where a module converts it into the EtherNet/IP format. The data format on the RS 232 interface corresponds to the Leuze standard data format (9600 bd, 8N1 and STX, data, CR, LF).

The integration of the EDS file in the hardware manager of the PLC is necessary to ensure the correct function of the MA 258*i*.

The corresponding Leuze devices are selected using a rotary code switch on the circuit board of the connector unit. Many additional RS 232 devices can be connected through a universal position.

1.4 Definition of terms

For better understanding of the explanations provided in this document, a definition of terms follows below:

- **Bit designation:**
  The 1st bit or byte begins with count number "0" and means bit/byte 2^0.
- **Data length:**
  Size of a valid, continuous data packet in bytes.
- **EDS file (electronic data sheet):**
  Description of the device for the control.
- **Consistent:**
  Data which belongs together with regard to content and which must not be separated is referred to as consistent data. When identifying objects, it must be ensured that the data is transmitted completely and in the correct order, otherwise the result is falsified.
- **Leuze device (DEV):**
  Leuze devices, e.g., bar code readers, RFID readers, VisionReader…
- **Online command:**
  These commands refer to the respective, connected ident device and may be different depending on the device. These commands are not interpreted by the MA 258*i*, but are instead transmitted transparently (see description of Ident device).
- **CR:**
  Cross reference.
- **Perspective of I/O data in the description:**
  Output data is data which is sent by the control to the MA. Input data is data which is sent by the MA to the control.
- **Toggle bits:**
  Status toggle bit
  Each change of state indicates that an action was performed, e.g., bit ND (new data): each change of state indicates that new received data was transmitted to the PLC.
  Control toggle bit
  An action is performed on each change of state, e.g., bit SDO: on each change of state, the registered data is sent by the PLC to the MA 258*i*.

2 Safety

This device was developed, manufactured and tested in line with the applicable safety standards. It corresponds to the state of the art.

2.1 Intended use

The MA 258*i* modular interfacing unit is used for connecting Leuze devices such as bar code or 2D-code readers, hand-held scanners, RFID read-write devices, etc. directly to the fieldbus.

CAUTION

Observe intended use!

- Only operate the device in accordance with its intended use. The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not complying with its intended use.
  Leuze electronic GmbH + Co. KG is not liable for damages caused by improper use.
- Read the technical description before commissioning the device. Knowledge of this technical description is an element of proper use.

NOTICE

Comply with conditions and regulations!

- Observe the locally applicable legal regulations and the rules of the employer's liability insurance association.

Attention

For UL applications, use is permitted exclusively in Class 2 circuits according to NEC (National Electric Code).

2.2 Foreseeable misuse

Any use other than that defined under "Intended use" or which goes beyond that use is considered improper use.

In particular, use of the device is not permitted in the following cases:

- Rooms with explosive atmospheres
- As stand-alone safety component in accordance with the machinery directive [1)]
- For medicinal purposes

1) Use as safety-related component within the safety function is possible, if the component combination is designed correspondingly by the machine manufacturer.

NOTICE
Do not modify or otherwise interfere with the device. Do not carry out modifications or otherwise interfere with the device. The device must not be tampered with and must not be changed in any way. The device must not be opened. There are no user-serviceable parts inside. Repairs must only be performed by Leuze electronic GmbH + Co. KG.

2.3 Competent persons

Connection, mounting, commissioning and adjustment of the device must only be carried out by competent persons.

Prerequisites for competent persons:

- They have a suitable technical education.
- They are familiar with the rules and regulations for occupational safety and safety at work.
- They are familiar with the technical description of the device.
- They have been instructed by the responsible person on the mounting and operation of the device.

Certified electricians

Electrical work must be carried out by a certified electrician.

Due to their technical training, knowledge and experience as well as their familiarity with relevant standards and regulations, certified electricians are able to perform work on electrical systems and independently detect possible dangers.

In Germany, certified electricians must fulfill the requirements of accident-prevention regulations BGV A3 (e.g. electrician foreman). In other countries, there are respective regulations that must be observed.

2.4 Disclaimer

Leuze electronic GmbH + Co. KG is not liable in the following cases:

- The device is not being used properly.
- Reasonably foreseeable misuse is not taken into account.
- Mounting and electrical connection are not properly performed.
- Changes (e.g., constructional) are made to the device.

3 Fast commissioning / operating principle

Notice!

*Below you will find a **short description for the initial commissioning** of the EtherNet/IP gateway MA 258i. Detailed explanations for the listed points can be found throughout the handbook.*

3.1 Mounting

The gateway mounting plate MA 258*i* can be mounted in two different ways:

- using four threaded holes (M6) or
- using two M8x6 screws on the two lateral grooves.

3.2 Device arrangement and selection of the mounting location

Ideally, the MA 258*i* should be mounted so that it is easily accessible near the Ident device in order to ensure good operability, e.g., for configuring the connected device.

Detailed information can be found in chapter 6.3.1.

3.3 Electrical connection

The devices from the MA 2xx*i* family feature four M12 connectors/sockets which are coded differently depending on the interface.

The voltage supply (**PWR IN**) as well as the switching inputs/outputs (**PWR OUT** or **PWR IN**) are connected there. The number and function of the switching inputs/outputs is dependent on the connected end device.

An internal RS 232 interface is used for connecting the respective Leuze device. Another internal RS 232 interface functions as a service interface for configuring the connected device via a serial null modem cable.

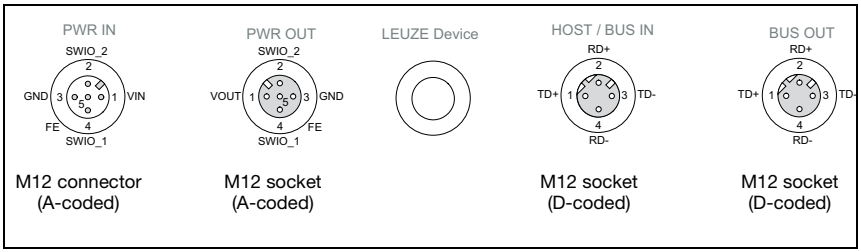


Figure 3.1: MA 258*i* connections

Detailed information can be found in chapter 7.

3.3.1 Connecting the Leuze device

- *To connect the Leuze device to the internal RS 232 device interface, open the housing of the MA 258**i** and lead the corresponding device cable (see chapter 14.6) through the middle threaded opening.*
- *Connect the cable to the internal device interface (**X30**, **X31** or **X32**,* see chapter 7.5.1*).*
- *Use rotary switch **S4** (see chapter 8.2.5) to select the connected device.*
- *Now screw the PG cable gland into the threaded opening to provide strain relief and ensure protection class IP 65.*

Attention!

Only then may the supply voltage be applied.
*Upon startup of the MA 258**i**, the device selection switch is queried and the gateway automatically sets itself to the Leuze device.*

Connecting functional earth FE

- *Ensure that the functional earth (FE) is connected correctly.*

Unimpaired operation is only guaranteed when the functional earth is connected properly. All electrical disturbances (EMC couplings) are discharged via the functional earth connection.

3.3.2 Connecting the power supply and the bus cable

- *Ideally, use the ready-made cables listed in chapter 14.4.3 to connect the gateway to the power supply via the **PWR IN** connection.*
- *The ready-made cables listed in chapter 14.5.4 are preferred for connecting the gateway to the fieldbus via the **HOST / BUS IN** connection.*
- *If applicable, use the **BUS OUT** connection if you would like to construct a network with linear topology.*

3.4 Starting the device

- *Apply the supply voltage +18 … 30VDC (+24VDC model); the MA 258**i** starts up. The MS LED displays that it is ready for operation.*

3.5 MA 258*i* on EtherNet/IP

Commissioning on the EtherNet/IP is performed according to the following scheme:

- Address assignment (automatically via DHCP, BootP or manually)
- Configuration of the participant depends on the control software version: either by using the generic EtherNet module or by installing the EDS file
- Transfer the data to the control
- Adapting the device parameters depends on the version of the control software: either by configuring the config assembly or by adapting the EDS file
- Use explicit messaging services

The MA 258*i* can be configured in the planning tool/control using the EDS file if the control supports this. PLC software RSLogix 5000 from Rockwell offers EDS support for EtherNet/IP from software version 20.00 and up. Without PLC support of the EDS integration, the settings are made via the "generic EtherNet module". In this case, the respective configuration must be entered and adapted manually for each device.

After all parameters have been set in the planning tool/control, the download to the MA 258*i* takes place. The set parameters are now stored on the MA 258*i*.

Afterwards, all MA 258*i* parameters should be stored via upload in the control. This aids in retaining the parameters during device exchanges, as they a re now also stored centrally in the control.

The EtherNet/IP baud rate is defined for the entire network in the planning tool/control.

Detailed information can be found in chapter 12.

3.5.1 Manually setting the IP address

To set the IP address manually, the DHCP operation via BootP or the Rockwell control must be deactivated.

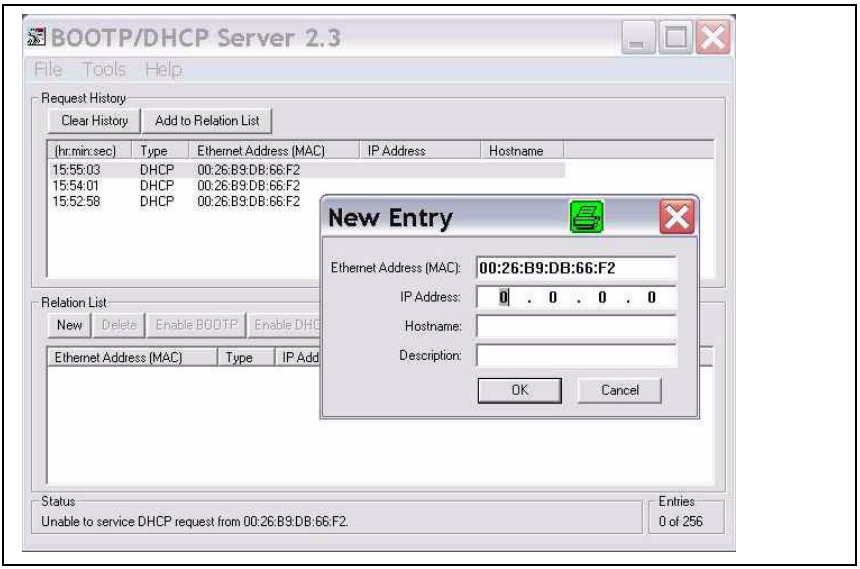


Figure 3.2: Manually setting the IP address

If your system does not include a DHCP server or if the IP addresses of the devices are to be set permanently, proceed as follows:

↳ *Have the network administrator specify the data for IP address, net mask and gateway address of the MA 258i.*

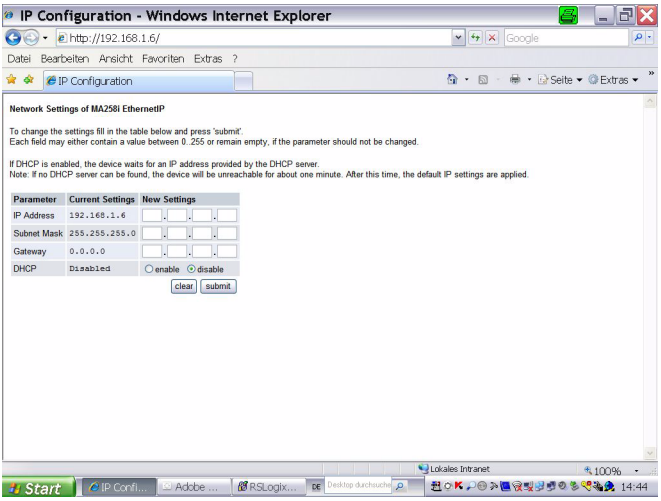


Figure 3.3: Making network settings

- *Select the connected device via the device selection switch.*
- *Apply the supply voltage +18 … 30VDC (+24VDC model); the MA 258i starts up.*
- *Now switch the service switch to "MA".*
- *Now start a web browser by entering the IP address into the navigation bar. You will be shown a page for the direct setting of the addresses.*

Note!

The service switch must be in switch position "MA" for the MA 258i to start in configuration mode.

- *Connect the serial RS 232 Sub-D interface of the MA 258i to the serial interface of your PC.*
- *Make the respective settings on the configuration page opened in the web browser.*

3.5.2 Configure the participant

Configuration with the generic EtherNet module

In the RSLogix 5000 configuration tool for EtherNet/IP, software version <20.00, a so-called "generic EtherNet module" is created for the MA 258*i* under the `Communication` path.

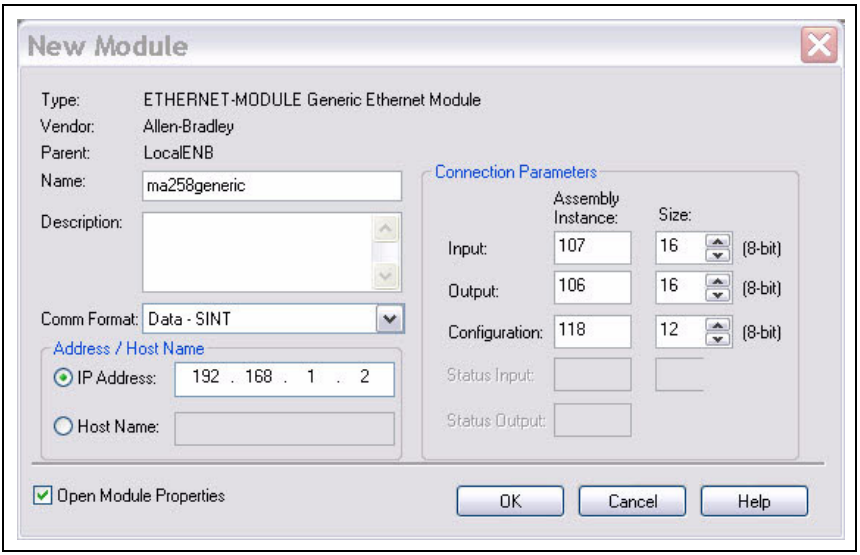


Figure 3.4: Generic module

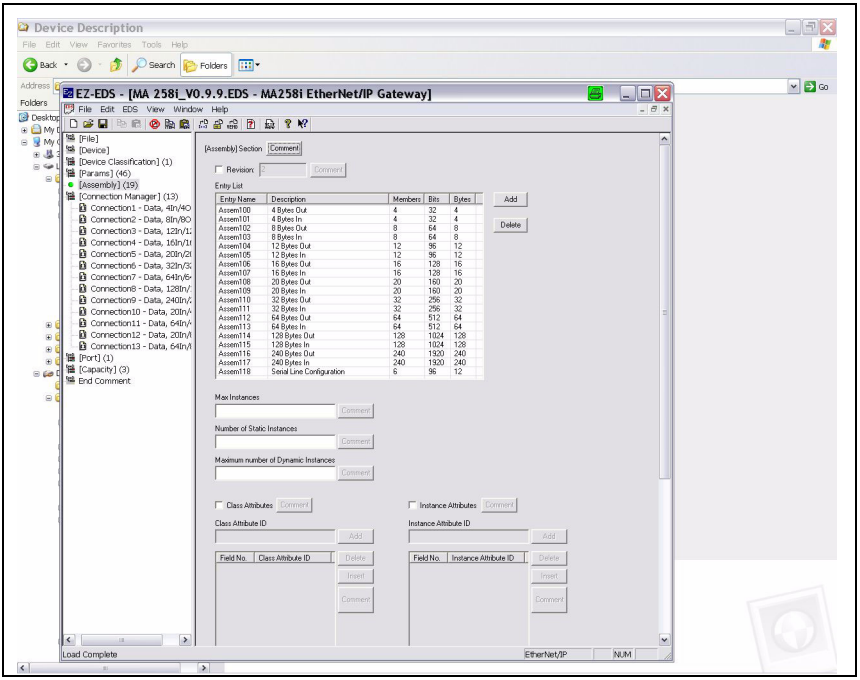


Figure 3.5: Assembly list

The input mask for the Generic module describes:

- The name of the participant (can be selected freely; e.g.MA 258*i*).
- The format of the I/O data (data - DINT = 32 bit or data - SINT = 8 bit).
- The IP address of the participant.
- The address and length of the input assembly (instance 106). *)
- The address and length of the output assembly (instance 107). *)
- Optional: The address and length of the configuration assembly (instance 118; 12 x 8 bit).

*) The possible data lengths are shown in figure 3.5. You can select the suitable byte number for your application here. Recommendations can be found in chapter "Specifications for Leuze end devices" on page 97.

Notice!

The available lengths (4, 8, 12, 16, 20, 32, 64, 128, 240 bytes) of the input/output data cannot be freely combined. The MA can only process ONE combination (connection). Please select the suitable combination for the data length and the connected device. Detailed information on this topic can be found in chapter 12.6.2.

Attention!

If the configuration assembly is addressed with instance 118 and length 12 in the input mask for the generic module, all MA 258i parameters with the value 0 are occupied in the first moment. All default parameters of the MA must be manually entered in the configuration assembly. Changing the individual default values is possible at any time.

For the exact description of the assemblies for input/output and configuration, please refer to chapter 12.6.2.

The query cycle of the input and output assemblies is subsequently defined in the `Module properties` -> `Connection` path in the `Request packet interval (RPI)` input field.

The participant is thereby defined in offline mode; the data must subsequently be transferred to the control.

Configuration of the participant using the EDS file

From RSLogix 5000 software version 20.00 and up, proceed as follows to create the MA 258*i* as an EtherNet participant in your system:

- *First, load the EDS file for the device via EDS wizard into the PLC database.*

Notice!

You can find the EDS file at **www.leuze.com.**

- *After loading, select the device via the device list and enter it into the HW manager via Drag&Drop.*
- *Open the input dialog for setting the address and additional parameters by double-clicking on the device symbol and make the desired entries here.*
- *Finally, transmit the values to the device via download.*

3.5.3 Transfer the data to the control (RSLogix 5000 specific)

- *Activate online mode.*
- *Select the EtherNet communication port.*
- *Select the processor onto which the project is to be transferred.*
- *Set the control to PROG.*
- *Start the download.*
- *Set the control to RUN.*

3.5.4 Adapting the device parameters

Configure the parameters via the config assembly

The MA 258*i* makes available a configuration assembly that allows the entire parameter set of the MA 258*i* to be saved in the control and, if necessary, to be called up.

The config assembly must include all parameters that affect the MA 258*i*. The config assembly is automatically written to the connected participants in cycles that the control manufacturer defines.
The config assembly is implemented in class 4, under instance 118. By default, all parameters are preset to the value 0 (zero).

Attention!
If the config assembly is not adapted, the MA 258i displays a corresponding behavior acc. to the parameters preset with 0.

- *Switch the control to offline mode.*
- *Double-click* `Controller tags` *to edit the configuration assembly.*

The configuration assembly can be recognized by the index "C" appended to the device name.
Parameter entry is performed as described in section "Setting MA parameters manually via the config assembly" on page 74.

Attention!
Activation of the config assembly as described above necessitates value entry in the corresponding parameter memory locations. When using the configuration assembly, the default parameters must also be entered in the corresponding memory locations (see also "Setting MA parameters manually via the config assembly" on page 74).

After all of the parameters relevant to the MA 258*i* are entered, the control is switched to "online" and the project is downloaded again.

Setting the parameters on the MA via the EDS file

After the EDS file has been integrated, the device must be created as a "module" to establish a connection. It is also helpful to assign an IP address to the MA beforehand, e.g. via the service interface.

- *To do this, double-click on the tree node EtherNet.*
- *In the new window, select the desired device from the database and carry out the respective configuration.*

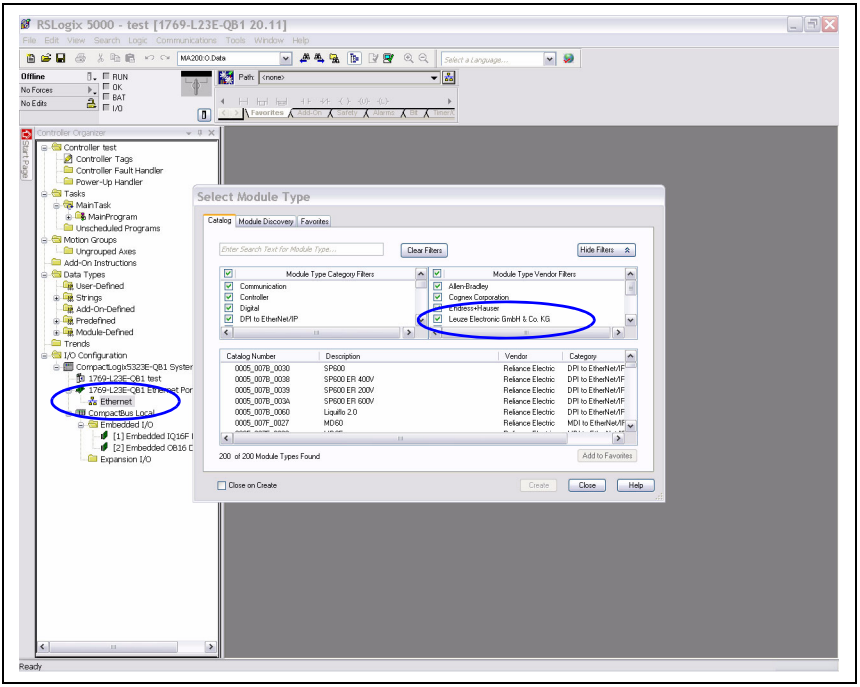


Figure 3.6: Creating a module

- *First set the IP address.*

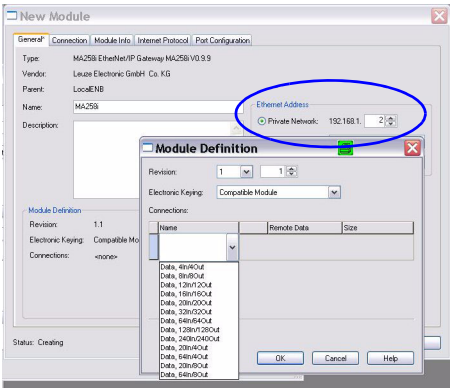


Figure 3.1: Setting the IP address of the MA

↳ *Then, via the Change button, select the input/output data length of the module from a list of possible combinations by clicking on Connection.*

Notice!

The available lengths (4, 8, 12, 16, 20, 32, 64, 128, 240 bytes) of the input/output data are stored here in "fixed" combinations. They cannot be freely combined. The MA can only process ONE combination (connection).
Please select the suitable combination for the data length and the connected device. For further information, see chapter 16 "Specifications for Leuze end devices".

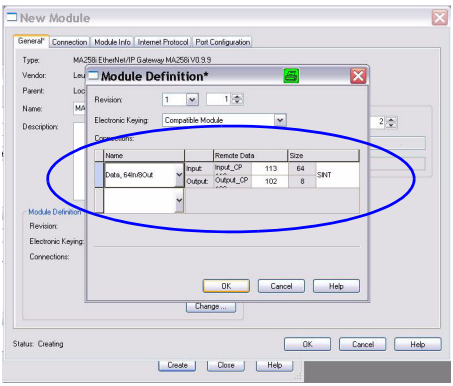


Figure 3.2: Select combination for the lengths of the input and output data

Notice!
Since the combination of Produced/Consumed data contains 2 bytes for the control and status bytes, the actual user data length is always 2 bytes smaller than specified in the selected combination.
E.g., when using the combination with 12 bytes In/12 bytes Out, there are effectively 10 bytes available for user data on the Leuze device after subtracting the 2 bytes for status and control bytes.

Recommendation

A combination with 4 bytes of output data length is sufficient for most output data.
A longer length is needed, for example, if a BCL bar code scanner is to be configured by means of PT-sequences, or an RFID transponder is to be described. In these cases, larger combinations are usually advisable.

↳ *Select the appropriate combination and transmit the settings to the device.*

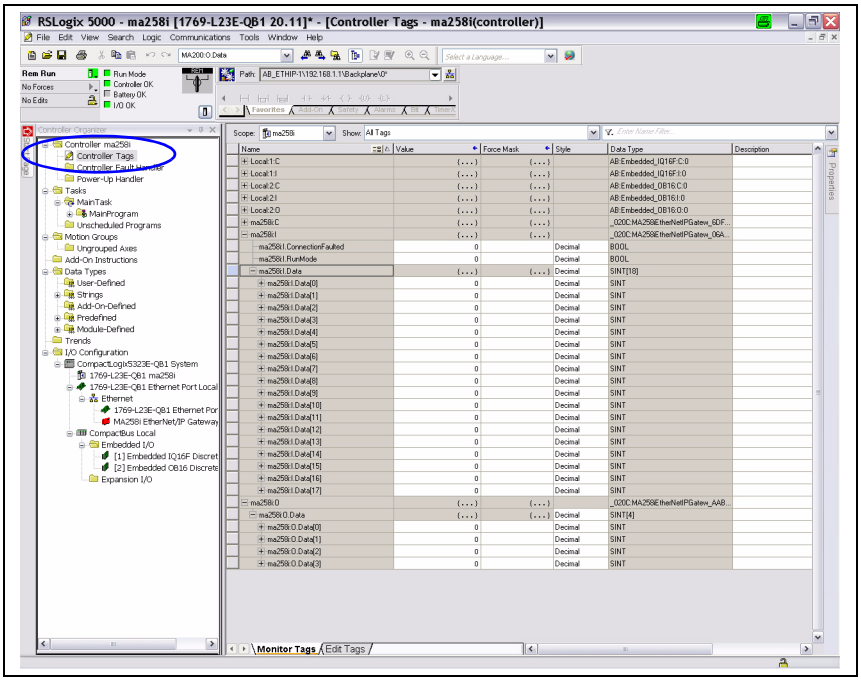


Figure 3.7: MA settings in the controller tags

3.5.5 Use explicit messaging services

Explicit messaging services (e.g., "get attributes …, set attribute …, and others) can be used to acyclically access all data of the MA 258*i*

Attention!

If parameters are changed via explicit messaging services while simultaneously activating a configuration assembly, the changed parameters must subsequently be entered in the configuration assembly.

4 Device description

4.1 General Information to the connector units

The modular interfacing unit of the MA 2xx*i* family is a versatile gateway for integrating Leuze RS 232 devices (e.g., BCL 22 bar code readers, RFID devices, RFM 32, …) into the respective fieldbus. The MA 2xx*i* gateways are intended for use in industrial environments with a high protection class. Various device versions are available for the conventional fieldbuses. With a stored parameter structure for the connectable RS 232 devices, commissioning could hardly be simpler.

4.2 Characteristics of the connector units

A special characteristic of the MA 258*i* device family are three function modes:

1. **Transparent mode**
   In this function mode, the MA 258*i* functions as a pure gateway with automatic communication from and to the PLC. Absolutely no special programming by the user is necessary for this purpose. The data is not buffered or stored temporarily, however. Instead, it is "passed on".
   The programmer must make certain to retrieve the data from the input memory of the PLC at the right time, as it is otherwise overwritten by new data.

2. **Collective mode**
   In this operating mode, data and telegram parts are temporarily stored in the memory (buffer) of the MA and sent to the RS 232 interface or to the PLC in a telegram by means of bit activation. In this mode, however, all communication control must be programmed on the PLC.
   This function mode is helpful, for example, for very long telegrams or when one or more codes with long code lengths are read.

3. **Command mode**
   With this special operating mode, it is possible to use the first bytes of the data range to transmit predefined commands to the connected device by means of bit activation. For this purpose, device-dependent commands (so-called online commands) are predefined via the device selection switch, see chapter 16 "Specifications for Leuze end devices".

4.3 Device construction

The MA 258*i* modular interfacing unit is used for interconnecting Leuze devices, such as the BCL 8, BCL 22, etc., directly to the fieldbus. This is accomplished by transmitting the data from the Leuze device via an RS 232 (V.24) interface to the MA 258*i* where a module converts it into the fieldbus format. The data format of the RS 232 interface corresponds to the standard Leuze data format.

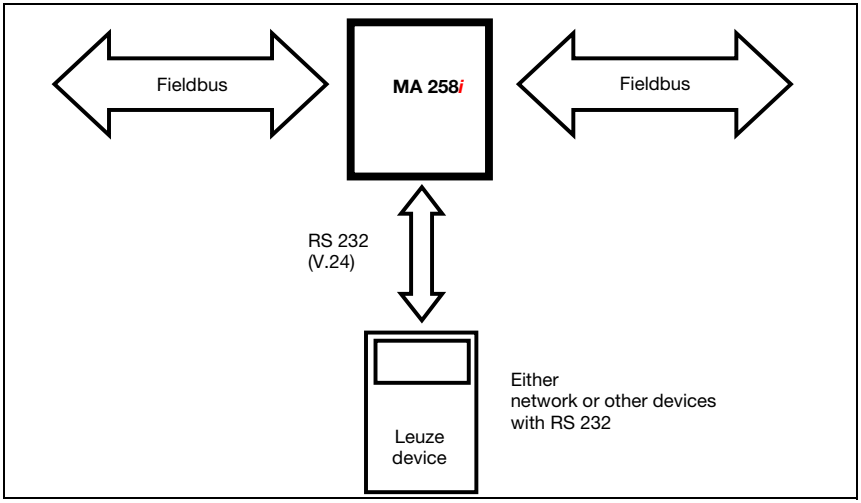


Figure 4.1: Connection of a Leuze device (BCL, RFI, RFM, …) to the fieldbus

The cable of the respective Leuze device is guided through cable bushings with PG cable glands into the MA 258*i* and connected there with the PCB connectors.

The MA 258*i* is intended as a gateway for any RS 232 devices, e.g., BCL 300i, hand-held scanners, scales or for coupling a multiNet network.

The RS 232 cables are internally connectable using JST plug connectors. The cable can be connected to the device using a stable PG cable gland which provide strain relief and protection against contamination.

With the help of adapter cables with Sub-D 9 or open cable end, other RS 232 devices can also be connected.

4.4 Operating modes

For fast commissioning, the MA 258*i* offers an additional operating mode, the "Service mode", in addition to the "Standard mode". In this operating mode, the Leuze device can, for example, be configured on the MA 258*i* and the network settings of the MA can be displayed. To do this, you need a PC/laptop with a suitable terminal program, as BCL-Config from Leuze or similar.

Service switch

Select between "operation" and "service" modes with the service switch. You have the following options:

Pos. RUN:

Operation
The Leuze device is connected to the fieldbus and communicates with the PLC.

Pos. DEV:

Service Leuze device
The connection between the Leuze device and the fieldbus is interrupted. With this switch position, you can communicate directly with the Leuze device at the fieldbus gateway via RS 232. You can send online commands via the service interface, configure the Leuze device using the corresponding BCL- BPS-, …-Config configuration software and have the read data of the Leuze device output.

Pos. MA:

Service fieldbus gateway
With this switch setting, your PC/terminal is connected with the fieldbus gateway.In doing so, the current setting values of the MA (e.g. address, RS 232 parameters) can be called up via a command.

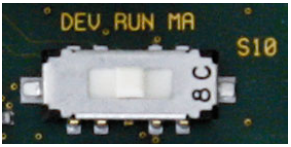


Figure 4.2: Service-switch switch positions

Notice!

If the service switch is on one of the service settings, the MS LED flashes on the front side of the device, see chapter 8.1.2 "LED indicators on the housing".

Furthermore, on the control, the SMA service bit of the status bytes signals that the MA is in service mode.

Service interface

The service interface can be accessed once the MA 258*i* housing cover has been removed and features a 9-pin Sub-D connector (male). A crossed RS 232 connection cable is required to make the RxD, TxD and GND connections.

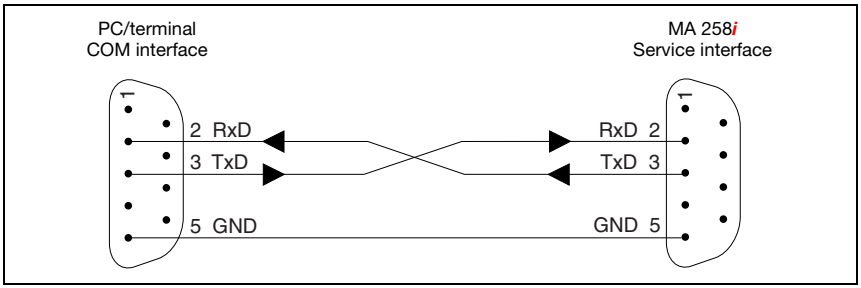


Figure 4.3: Connecting the service interface to a PC/terminal

Attention!

For the service PC to function, the RS 232 parameters must be the same as those of the MA. The Leuze standard setting of the interface is 9600 bd, 8N1 and STX, data, CR, LF.

4.5 Fieldbus systems

Various product variants of the MA 2xx*i* series are available for connecting to different fieldbus systems such as PROFIBUS DP, PROFINET-IO, DeviceNet and Ethernet or EtherCAT.

4.5.1 EtherNet/IP

The MA 258*i* is designed as an EtherNet/IP device (acc. to IEEE 802.3) with a standard baud rate of 10/100 Mbit. The functionality of the device is defined via parameter sets which are clustered in objects, classes and instances. These objects … are contained in an EDS file which, depending on the version of the control software, can be used to configure and integrate the MA into the system. PLC software RSLogix 5000 from Rockwell offers EDS support for EtherNet/IP from software version 20.00 and up. A fixed MAC ID is assigned to each MA 258*i* by the manufacturer; this ID cannot be changed.

The MA 258*i* automatically supports the transmission rates of 10 Mbit/s (10Base T) and 100 Mbit/s (10Base TX), as well as auto-negotiation and auto-crossover.

The MA 258*i* features multiple M12 connectors / sockets for the electrical connection of the supply voltage, the interface and the switching inputs and outputs. Additional information on the electrical connection can be found in chapter 7.

The MA 258*i* supports the following protocols and services:

- EtherNet/IP
- DHCP
- ARP
- PING

Further information on commissioning can be found in chapter 12.

EtherNet/IP – star topology

The MA 258*i* can be operated as a single device (standalone) in an EtherNet star topology with individual IP address. The setting is made via DHCP/ BootP.

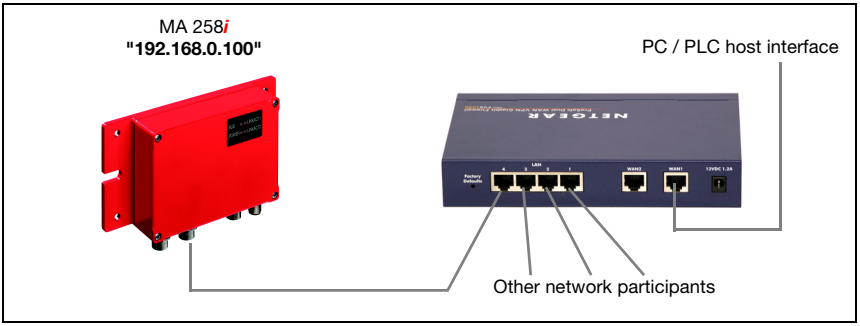


Figure 4.4: EtherNet/IP with star topology

EtherNet/IP – linear topology

The innovative further development of the MA 258*i* with integrated switch functionality offers the option of connecting multiple gateways of type MA 258*i* to one another without direct connection to a switch. In addition to the classic "star topology", a "linear topology" is thus also possible.

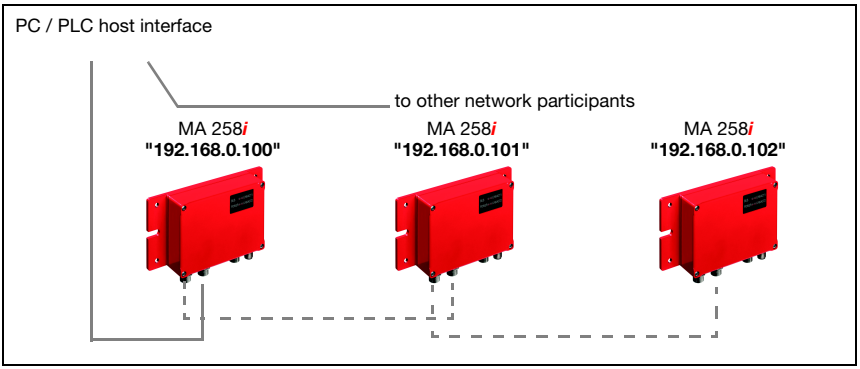


Figure 4.5: EtherNet/IP with linear topology

Each participant in this network requires its own unique IP address, which must be assigned to it via BootP or the control software. Alternatively, the DHCP procedure can be used.

The maximum length of a segment (connection from the hub to the last participant) is limited to 100 m.

Communication

The MA 258*i* gateway supports the CIP-based EtherNet/IP protocol and requires the setup of a GENERIC module or the EDS file (**E**lectronic **D**ata **S**heet), depending on the control software used, for communication.

Notice!

Rockwell RSLogix 5000 supports EDS integration for EIP from software version 20.00 and up.

The EDS file is available for download from the Leuze home page.

You can find the EDS file at **www.leuze.com.**

The EDS file is named "MA258i.eds"; the corresponding icon is named "MA258i.ico".

The EDS file includes all communication parameters of the participants as well as the available objects.

The input/output data is addressed according to the following fundamental scheme:

1. Device address (MAC ID)
   The participant is addressed with its MAC ID, which is unique in the network.
2. Object class identifier (class)
   Used as the basis for addressing the desired object class.
3. Object instance identifier (instance)
   Addressing of the object instance within the object class.
4. Attribute identifier (attribute)
   Addressing of the attribute within the object instance.
5. Service code (get, set, reset, start, stop and others...)
   The maintenance code ultimately describes the type of access to the data, e.g., reading or writing.

5 Specifications

5.1 General specifications

Electrical data		
Interface type 1		EtherNet/IP, integrated switch, BUS: 1x M12 socket (D-coded), 1x M12 socket (D-coded) PWR/IO: 1x M12 connector (A-coded), 1x M12 socket (A-coded)
	protocols	EtherNet/IP communication DHCP ARP PING
	baud rate	10/100 MBd
	vendor ID	524Dec / 20CH
	device type	12Dec / 0CH (communications adapter)
	position sensor type	Product type 04 (gateway)
Interface type 2		RS 232
	baud rate	300 bit/s … 115200 bit/s
Service interface		RS 232, 9-pin Sub-D connector, Leuze standard
	data format	data bit: 8, parity: none, even ODD; stop bit: 1
Switching input/output		1 switching input/1 switching output device-dependent voltage
Operating voltage		18 … 30 VDC (PELV, Class 2) [1]
Power consumption		Max. 5VA (without IDS, current consumption max. 300 mA)
Max stress on the connector (PWR IN/OUT)		3 A
Indicators		
LED LINK0 / ACT0	green	Connection possible
	yellow	Data transmission
LED LINK1 / ACT1	green	Connection possible
	yellow	Data transmission
LED NS	green	Device in service mode
	red	Network error
LED MS	green/flashing	Device ok/device in service mode
	red	Configuration error
Mechanical data		
Protection class		IP 65 (with screwed-on M12 and connected Leuze device)
Weight		700 g
Dimensions (HxWxD)		130 x 90 x 41 mm / with plate: 180 x 108 x 41 mm
Housing		Diecast aluminum
Connection		2 x M12: BUS IN / BUS OUT EtherNet/IP 1 connector: RS 232

	1 x M12: Power IN/GND and switching input/output 1 x M12: Power OUT/GND and switching input/output
Environmental data	
Operating temperature range	0°C … +55°C
Storage temperature range	-20°C … +60°C
Air humidity	Max. 90% rel. humidity, non-condensing
Vibration	IEC 60068-2-6, test FC
Shock	IEC 60068-2-27, test Ea
Electromagnetic compatibility	EN 61000-6-3:2007 (interference emissions for residential, commercial and light-industrial environments) EN 61000-6-2:2005 (interference rejection for industrial sectors)
Certifications	UL 60950-1, CSA C22.2 No. 60950-1 [1)]

1) For UL applications: only for use in "Class 2" circuits acc. to NEC.

5.2 Dimensioned drawings

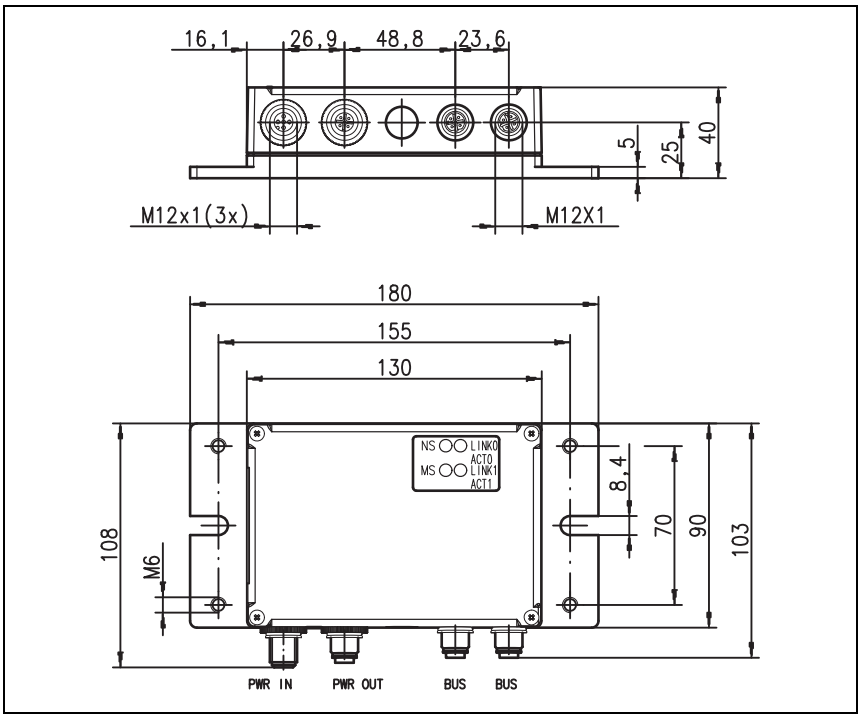


Figure 5.1: Dimensioned drawing MA 258*i*

5.3 Type overview

The following versions of the MA 2xx*i* gateway family are available for facilitating the integration of Leuze RS 232 devices in the various fieldbus types.

Fieldbus	Device type	Part no.
PROFIBUS DP V0	MA 204*i*	50112893
Ethernet TCP/IP	MA 208*i*	50112892
PROFINET-IO RT	MA 248*i*	50112891
DeviceNet	MA 255*i*	50114156
CANopen	MA 235*i*	50114154
EtherCAT	MA 238*i*	50114155
EtherNet/IP	MA 258*i*	50114157

Table 5.1: Type overview MA 2xx*i*

6 Installation and mounting

6.1 Storage, transportation

Attention!

When transporting or storing, package the device so that it is protected against collision and humidity. Optimal protection is achieved when using the original packaging. Heed the required environmental conditions specified in the technical data.

Unpacking

- *Check the packaging for any damage. If damage is found, notify the post office or shipping agent as well as the supplier.*
- *Check the delivery contents using your order and the delivery papers:*
  - Delivered quantity
  - Device type and model as indicated on the name plate
  - Brief manual

The name plate provides information as to what MA 2xx*i* type your device is. For specific information, please refer to the package insert or chapter 14.2.

Name plate of the connector unit

Figure 6.1: Device name plate MA 258*i*

Notice!

Please note that the shown name plate is for illustration purposes only; the contents do not correspond to the original.

- *Save the original packaging for later storage or shipping.*

If you have any questions concerning your shipment, please contact your supplier or your local Leuze electronic sales office.

- *Observe the applicable local regulations when disposing of the packaging materials.*

6.2 Mounting

The gateway mounting plate MA 258*i* can be mounted in two different ways:

- using four threaded holes (M6) or
- using two M8 screws on the two lateral grooves.

Fastening by means of four M6 or two M8 screws

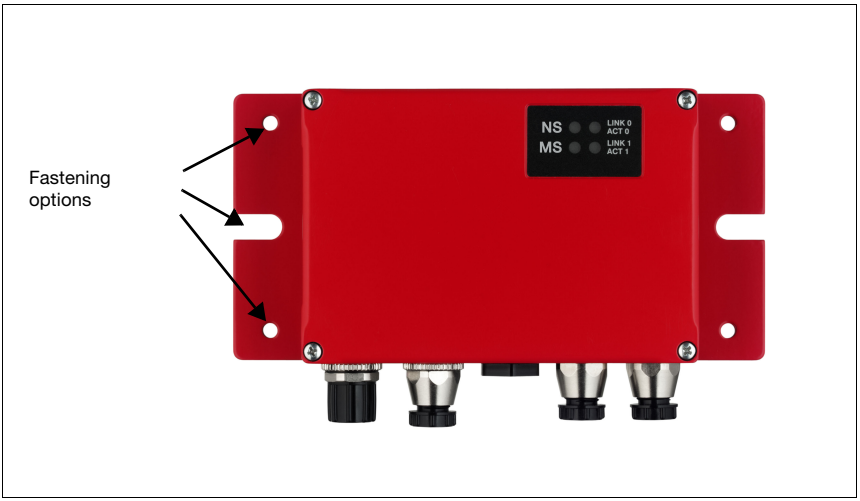


Figure 6.2: Fastening options

6.3 Device arrangement

Ideally, the MA 258*i* should be mounted so that it is easily accessible near the Ident device in order to ensure good operability, e.g., for configuring the connected device.

6.3.1 Selecting a mounting location

In order to select the right mounting location, several factors must be considered:

- The permissible cable lengths between the MA 258*i* and the host system depending on which interface is used.
- The housing cover should be easily accessible, so that the internal interfaces (device interface for connecting the Leuze device via PCB connectors, service interface) and other operational controls are easy to reach.
- Maintaining the required environmental conditions (temperature, humidity).
- Lowest possible chance of damage to the MA 258*i* by mechanical collision or jammed parts.

6.4 Cleaning

↳ *Clean the housing of the MA 258i with a soft cloth after mounting. Remove all packaging remains, e.g. carton fibers or Styrofoam balls.*

Attention!

Do not use aggressive cleaning agents such as thinner or acetone for cleaning the device.

7 Electrical connection

The fieldbus gateways MA 2xx*i* are connected using variously coded M12 connectors.

An RS 232 device interface allows the respective devices to be connected with system connectors. The device cables are equipped with a prefabricated PG cable gland.

Coding varies and the design is implemented as either socket or connector depending on the HOST (fieldbus) interface and function. For the exact design, refer to the corresponding description of the MA 2xx*i* device type.

Notice!

The corresponding mating connectors and ready-made cables are available as accessories for all cables. For further information, see chapter 14 "Type overview and accessories".

Figure 7.1: Location of the electrical connections

7.1 Safety notices for the electrical connection

Attention!

Before connecting the device please ensure that the supply voltage matches the value printed on the nameplate.
Connection of the device and cleaning must only be carried out by a qualified electrician.
Ensure that the functional earth (FE) is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly.
If faults cannot be corrected, the device should be removed from operation and protected against possible commissioning.

Attention!

For UL applications, use is only permitted in class 2 circuits in accordance with the NEC (National Electric Code).

The fieldbus gateways are designed in accordance with safety class III for supply by PELV (protective extra-low voltage with reliable disconnection).

Notice!

Protection class IP65 is achieved only if the connectors and caps are screwed into place!

7.2 Electrical connection

The MA 258*i* features two M12 connectors/sockets for voltage supply; each is A-coded.

The voltage supply (**PWR IN**) as well as the switching inputs/outputs (**PWR OUT** or **PWR IN**) are connected there. The number and function of the switching inputs/outputs is dependent on the connected end device. Two additional M12 sockets are used for connection to the fieldbus. Both of these connections are D-coded.

An internal RS 232 interface is used for connecting the respective Leuze device. Another internal RS 232 interface functions as a service interface for configuring the connected device via a serial null modem cable.

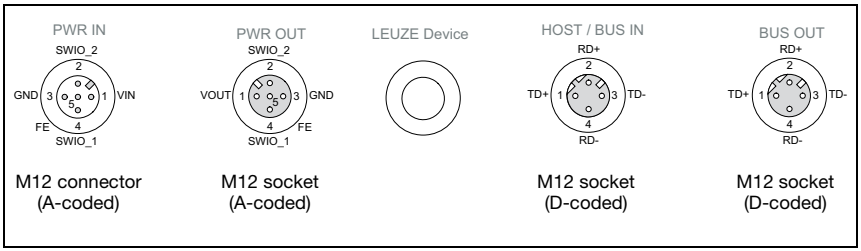


Figure 7.2: MA 258*i* connections

Described in detail in the following are the individual connections and pin assignments.

Attention!

Voltage supply and bus cable are coded in the same way. Please observe the printed connection designations

7.2.1 PWR IN – voltage supply / switching input/output

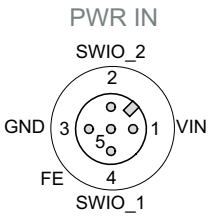
PWR IN (5-pin connector, A-coded)			
 M12 connector (A-coded)	**Pin**	**Name**	**Remark**
	1	VIN	Positive supply voltage +18 … +30VDC
	2	SWIO_2	Switching input/switching output 2
	3	GND	Negative supply voltage 0VDC
	4	SWIO_1	Switching input/switching output 1
	5	FE	Functional earth
	Thread	FE	Functional earth (housing)

Table 7.1: PWR IN pin assignment

Notice!

The designation and function of the SWIO depends on the connected device. Please observe the following table!

Device	PIN 2	PIN 4
BCL 22	SWOUT_1	SWIN_1
BCL 8	SW_0	SW_I
Hand-held scanner/BCL 90	n.c.	n.c.
RFM/RFU/RFI	SWOUT_1	SWIN_1
LSIS 122, LSIS 222, DCR 202i	SWOUT	SWIN
LSIS 4x2/BCL 300, BCL 500, BCL 600i	configurable IO 1 / SWIO 3 IO 2 / SWIO 4	configurable
KONTURflex	n.c.	n.c.
ODSL 9, ODSL 96B	Q1	n.c.
ODSL 30	Q1	active/reference (on SWIN_1, PWRIN)

Table 7.1: Device-specific function of the SWIOs

Supply voltage

Attention!

For UL applications, use is only permitted in class 2 circuits in accordance with the NEC (National Electric Code).

The fieldbus gateways are designed in accordance with safety class III for supply by PELV (protective extra-low voltage with reliable disconnection).

Connecting functional earth FE

Notice!

Ensure that the functional earth (FE) is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly. All electrical disturbances (EMC couplings) are discharged via the functional earth connection.

Switching input/output

The MA 258*i* is equipped with the **SWIO_1 and SWIO_2** switching inputs/outputs. This is located on the PWR IN M12 connector and on the PWR OUT M12 connector. The connection of the switching inputs/outputs from PWR IN to PWR OUT can be interrupted by means of a jumper. In this case, only the switching input and output on PWR IN are active.

The function of the switching inputs and outputs is dependent on the connected Leuze device. Detailed information on this topic can be found in the respective operating instructions.

7.2.2 PWR OUT switching input/output

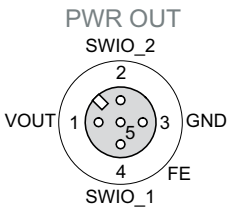
PWR OUT (5-pin socket, A-coded)			
 M12 socket (A-coded)	**Pin**	**Name**	**Remark**
	1	VOUT	Voltage supply for additional devices (VOUT identical to VIN at PWR IN)
	2	SWIO_2	Switching input/switching output 2
	3	GND	GND
	4	SWIO_1	Switching input/switching output 1
	5	FE	Functional earth
	Thread	FE	Functional earth (housing)

Table 7.2: PWR OUT pin assignment

Notice!

The maximum admissible current of the PWR OUT and IN connectors is maximum 3A. To be subtracted from this is the current consumption of both the MA and of the connected end device.

The function of the switching inputs and outputs is dependent on the connected Leuze device. Detailed information on this topic can be found in the respective operating instructions.

On delivery, the SWIO 1/2 are connected in parallel on PWR IN/OUT. This connection can be separated with a jumper.

7.3 BUS IN

The MA 258*i* provides an EtherNet/IP interface as a HOST interface.

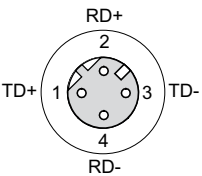
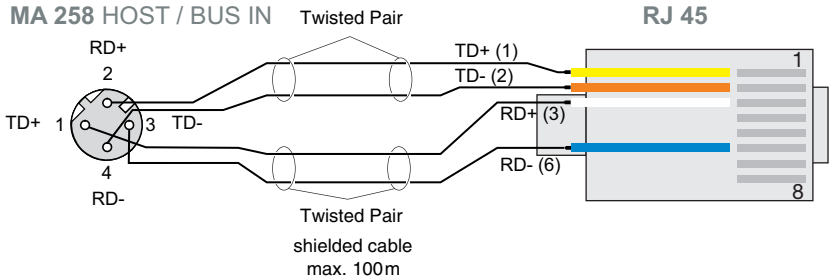
BUS IN (4-pin socket, D-coded)			
 M12 socket (D-coded)	**Pin**	**Name**	**Remark**
	1	TD+	Transmit Data +
	2	RD+	Receive Data +
	3	TD-	Transmit Data -
	4	RD-	Receive Data -
	Thread	FE	Functional earth (housing)

Table 7.3: EtherNet/IP BUS IN pin assignment

For the host connection of the MA 258i, the "KB ET - … - SA-RJ45" ready-made cables are preferred, see table 14.4 Bus connection cable for the MA 258i on page 94.

EtherNet/IP cable assignment



RJ45 - assignment and wire colors

Pin	Signal	Name	Wire color according to PROFINET	Wire color according to EIA T568B
1	TD+	Transmission Data +	yellow	white/orange
2	TD–	Transmission Data –	orange	orange
3	RD+	Receive Data +	white	white/green
6	RD–	Receive Data –	blue	green

Figure 7.3: HOST/BUS IN cable assignments on RJ-45 (shown here is the device connection)

Notice for connecting the EtherNet/IP interface!

Ensure adequate shielding. The entire connection cable must be shielded and earthed. The RD+/RD- and TD+/TD- wires must be stranded in pairs.
Use CAT 5 cable for the connection.

7.4 BUS OUT

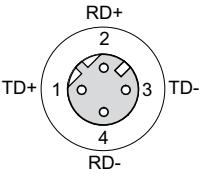
BUS OUT (4-pin socket, D-coded)			
BUS OUT  M12 socket (D-coded)	**Pin**	**Name**	**Remark**
	1	TD+	Transmit Data +
	2	RD+	Receive Data +
	3	TD-	Transmit Data -
	4	RD-	Receive Data -
	Thread	FE	Functional earth (housing)

Table 7.4: EtherNet/IP BUS OUT pin assignment

↳ *For the host connection of the MA 258i, the "KB ET - … - SSA" ready-made cables are preferred, see table 14.4 Bus connection cable for the MA 258i on page 94.*

Notice!

Ensure adequate shielding. For the devices and ready-made cables offered by Leuze electronic, the shield is on PIN 1.

If you use user-configurable cables, note the following:

Notice!

Ensure adequate shielding. The entire connection cable must be shielded and earthed. The signal lines must be stranded in pairs.
Use CAT 5 cable for the connection.

Notice!

*For the MA 258i as standalone device or as the last participant in a linear topology, termination on the BUS OUT socket is **not** mandatory!*

7.5 Device interfaces

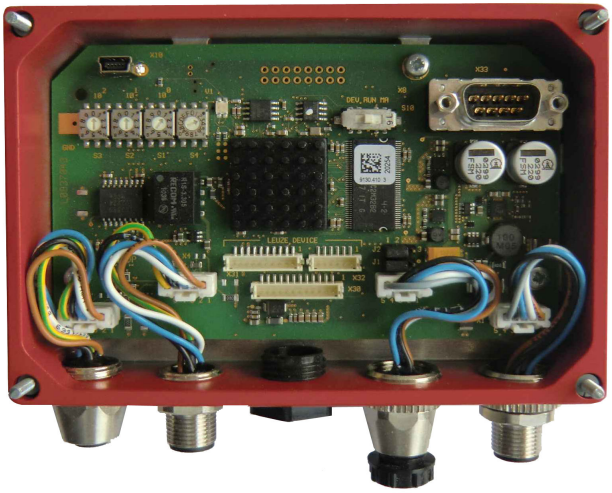


Figure 7.4: Open MA 258*i*

7.5.1 RS 232 device interface (accessible after opening the device, internal)

The device interface is prepared for the system plugs (PCB connectors) for Leuze devices RFI xx, RFM xx, BCL 22.

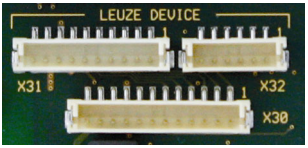


Figure 7.5: RS 232 device interface

The standard devices are connected with 6- or 10-pin connector piece to X31 or X32, respectively. For hand-held scanners, BCL 8 and BPS 8 with 5VDC supply (from the MA) on pin 9, the 12-pin X30 PCB connection is available as well.

By using an additional cable (cf. "Type overview and accessories" on page 91), the system connection can be established on M12 or 9-pin Sub-D, e.g., for hand-held scanners.

7.5.2 Service interface (internal)

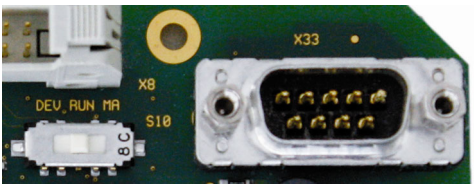


Figure 7.6: RS 232 service switch and service interface

Following activation, this interface enables access via the RS 232 to the connected Leuze device and the MA for configuration using the 9-pin Sub-D. The connection between the fieldbus interface and the device interface is switched off during access. The fieldbus itself is, however, not interrupted as a result.

The service interface can be accessed once the MA 258*i* housing cover has been removed and features a 9-pin Sub-D connector (male). A crossed RS 232 connection cable is required to make the RxD, TxD and GND connections. A hardware handshake via RTS, CTS is not supported at the service interface.

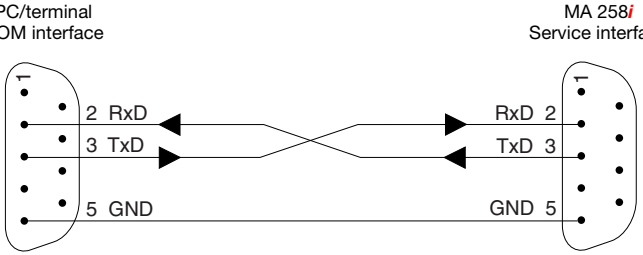


Figure 7.7: Connecting the service interface to a PC/terminal

Attention!

For the service PC to function, the RS 232 parameters must be the same as those of the MA. The Leuze standard setting of the interface is 9600Bd, 8N1 and STX, data, CR, LF.

Notice!

To configure the devices connected to the external interface, e.g., BCL 8 (JST plug connector "X30"), a cable specially configured for this purpose is necessary. The service switch must be in the "DEV" or "MA" position (Service Leuze device/MA).

8 Status displays and operational controls

Figure 8.1: LED indicators on the MA 258*i*

8.1 LED status indicators

8.1.1 LED indicators on the circuit board

LED (Status)

	off	**Device OFF** - no operating voltage or device defect
	continuous green light	**Device ok** - readiness for operation
	continuous orange light	**Device error / firmware available**
	flashing green-orange	**Device in boot mode** - no firmware

8.1.2 LED indicators on the housing

LED MS

MS	**off**	**Device OFF** - no operating voltage for details, see chapter 15 "Diagnostics and troubleshooting"
MS	**continuous green light**	**Device ok** - self test successfully finished - device monitoring active
MS	**flashing green**	**Device ok, device in service mode**
MS	**flashing red**	**Configuration error** - baud rate or address incorrect

LED NS

NS	**flashing green**	**Device ok, device in service mode**
NS	**continuous red light**	**Network error**

LINK 0/ ACT 0 LED

LINK 0 ACT 0	**continuous green light**	**LINK 0** - connection exists
LINK 0 ACT 0	**flashing yellow**	**ACT 0** - data exchange

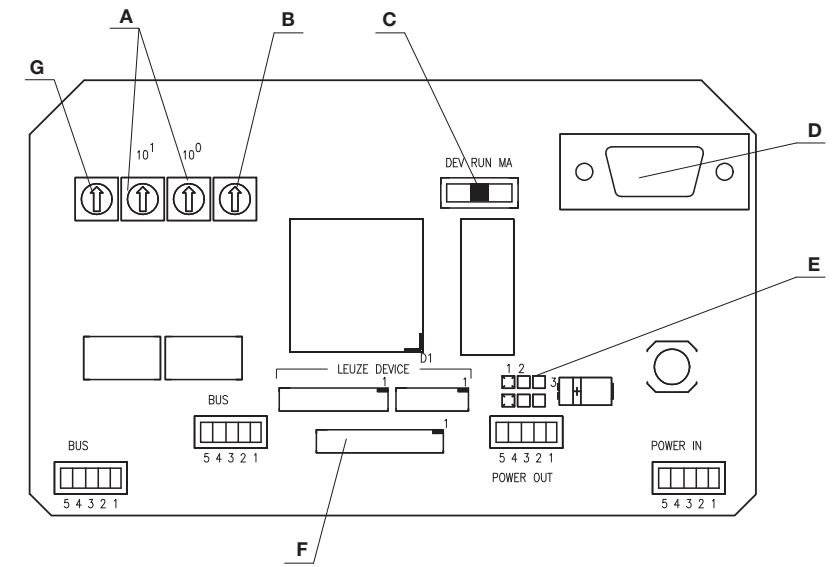
LINK 1/ ACT 1 LED

LINK 1 ACT 1	**continuous green light**	**LINK 1** - connection exists
LINK 1 ACT 1	**flashing yellow**	**ACT 1** - data exchange

8.2 Internal interfaces and operational controls

8.2.1 Overview of operational controls of the

The operational controls of the MA 258*i* are described in the following. The figure shows the MA 258*i* with opened housing cover.



= Standard settings

A MA 258*i*: not equipped
B Rotary switch S4 for device selection
C Service switch
D RS 232 Sub-D service interface
E Jumper for bridging, separating switching input/output PWR IN/OUT
F 3 JST plug connectors: connection of the Leuze devices
G MA 258*i*: without function/not equipped

Figure 8.2: Front view: operational controls of the MA 258*i*

Circuit board element desig.	Function
X1 Operating voltage	PWR IN M12 connector for operating voltage (18 … 30VDC) MA 258*i* and connected Leuze device xx
X2 Output voltage	PWR OUT M12 connector for other devices (MA, BCL, sensor, …) VOUT = VIN max. 3A
X4 HOST interface	BUS IN HOST interface for connecting to the fieldbus
X5 HOST interface	BUS OUT Second BUS interface for creating a network with other participants in a linear topology
X30 Leuze device	JST plug connector with 12 pins Connection of the Leuze devices with 5V / 1A (BCL 8, BPS 8 and hand-held scanner)
X31 Leuze device	JST plug connector with 10 pins Connection of the Leuze devices (BCL, RFI, RFM,…) Pin VINBCL with standard setting = V+ (18 - 30V)
X32 Leuze device	JST plug connector with 6 pins Connection of the Leuze devices (BCL, RFI, RFM,…) Pin VINBCL with standard setting = V+ (18 - 30V)
X33 RS 232 service interface	9-pin SUB-D connector RS 232 interface for service/setup operation. Enables the connection of a PC via serial null modem cable for configuring the Leuze device and the MA 258*i*
S4 Rotary switch	Rotary switch (0 … F) for device selection Standard setting = 0
S10 DIP switch	Service switch Switch between service Leuze device (DEV), service fieldbus gateway (MA) and operation (RUN). Standard setting = operation.
J1, J2 Jumper	Bridging, separating switching input/output (interruption of connection between the two PWR M12 connectors of the SWIO 1/ SWIO 2)

8.2.2 Connector X30 … connectors

PCB connectors **X30 … X32** are available in the MA 258*i* for connecting the respective Leuze devices via RS 232.

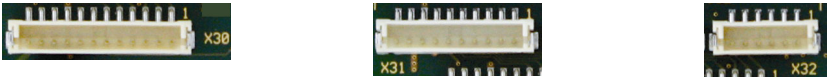


Figure 8.3: Connections for Leuze devices

Attention!

Several Leuze devices may not be connected to the MA 258i simultaneously, as only one RS 232 interface can be operated.

8.2.3 RS 232 service interface – X33

The **X33** RS 232 interface facilitates the configuration of the Leuze device and the MA 258*i* via PC, which is connected by means of a serial null modem cable.

X33 pin assignment – service connector

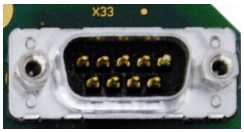
SERVICE (9-pin SUB-D connector)			
	**Pin**	**Name**	**Remark**
	2	RXD	Receive Data
	3	TXD	Transmit Data
	5	GND	Functional earth

Table 8.1: SERVICE pin assignment

8.2.4 S10 service switch

The **S10** DIP switch can be used to select between the "operation" and "service" modes, i.e. you switch between the following options here:

- Operation (RUN) = default setting
- Service Leuze device (DEV) and
- Service fieldbus gateway (MA)

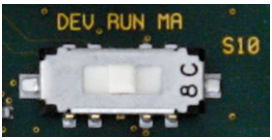


Figure 8.4: DIP switch service - operation

For further information on the corresponding options, see chapter 4.4 "Operating modes".

8.2.5 Rotary switch S4 for device selection

The **S4** rotary switch is used to select the Leuze end device.

Figure 8.5: Rotary switch for device selection

The following switch positions are assigned to the Leuze devices:

Leuze device	Switch position
Standard setting Other RS 232 devices such as KONTURflex QUATTRO	0
BCL 8	1
BCL 22	2
n.c.	3
BCL 300i, BCL 500i, BCL 600i	4
BCL 90, BCL 900i	5
LSIS 122, LSIS 222	6

Leuze device	Switch position
LSIS 4x2i, DCR 202i	7
Hand scanner	8
RFID (RFI xx, RFM xx, RFU xx)	9
BPS 8	A
ODS 9, ODSL 30, ODSL 96B, BPS 300i	B
MA 3x	C
Reset to factory setting	F

The gateway is set via the switch position on the Leuze device. If the switch position is changed, the device must be restarted, since the switch position is only queried after switching off completely and then restarting the device.

Notice!

In switch position "0", a distance of >20ms must be maintained between two telegrams so they can be distinguished from one another.

The parameters of the Leuze end devices are described in chapter 16.

9 Configuration

The MA 258*i* can be configured using the EDS file via the device manager of the control. In case the PLC does not (yet) offer this service (RSLogix 5000 supports it from version 20.00 and up), a generic module and the manual config assembly must be employed.

The connected device is normally configured via the service interface of the MA with the help of a suitable configuration program.

The respective configuration programs – e.g. for bar code readers the BCL-Config, for RFID devices the RF-Config etc. – and the associated documentation is provided on the Leuze home page **www.leuze.com** in the respective Download area.

Notice!

In order to display the help texts, a PDF viewer program (not included in the delivery contents) must also be installed. For important information on configuring and on the configurable functions, please refer to the description of the respective device.

9.1 Connecting the service interface

The RS 232 service interface is connected after opening the device cover of the MA 258*i* via the 9-pin Sub-D and a cross-wired null modem cable (RxD/TXD/GND). For connection, see chapter "Service interface (internal)" on page 42.

The service interface is activated with the help of the service switch and establishes a direct connection to the connected device with the "DEV" (Leuze device) or "MA" (gateway) setting.

9.2 Reading out information in Service mode

- *After starting up in the "RUN" switch position, set the service switch of the MA to the "MA" position.*
- *Now start one of the following terminal programs: e.g., BCL, RF, BPS Config.*

Alternatively, you can also use the Windows tool "Hyperterminal".

- *Start the program.*
- *Select the correct COM port (e.g., COM1) and set the interface as follows:*

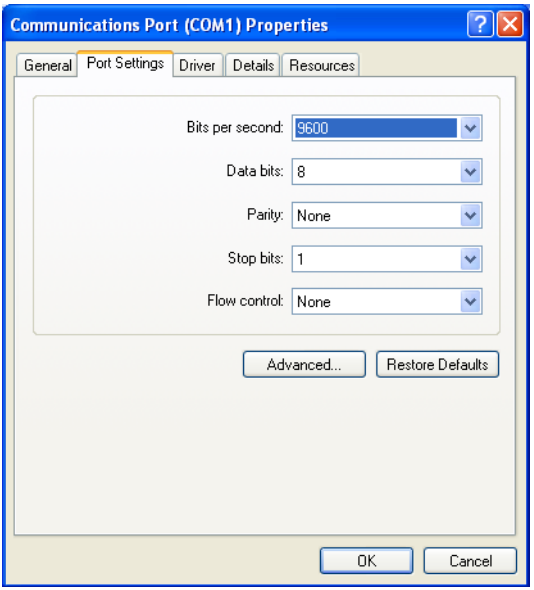


Figure 9.1: COM port settings

Notice!

Observe that STX, data, CR, LF framing must be set on the PC terminal program so that communication is possible with the connected Leuze device.

Commands

You can now call up information on the MA 258*i* by sending the following commands.

v	General service information.
s	Enable memory mode for the last frames.
l	The memory mode shows the last RX and TX frames for ASCII and fieldbus.

Table 9.1: Available commands

Information

Version	Version information.
Firmware date	Firmware date.

Table 9.2: General firmware information

Selected scanner	Currently selected Leuze device (selected via switch S4).
Gateway mode	Transparent or Collective mode.
Ring buffer fill level	Current fill level of the ring memory in Collective mode (ASCII->Fieldbus). 1024 bytes max.
Received ASCII Frames	Number of received ASCII frames.
ASCII Framing Error (GW)	Number of received framing errors.
Number of Received CTB's	Number of CTB commands.
Number of Received SFB's	Number of SFB commands.
Command-Buffer fill level	Current fill level of the ring memory in Command mode (fieldbus->ASCII). 1024 bytes max.
Number of received transparent frames	Number of received fieldbus frames without CTB/SFB.
Number of send fieldbus frames	Number of frames sent via the fieldbus.
Number of invalid commands	Number of invalid commands.
Number of ASCII stack send errors	Number of frames that the ASCII memory could not send.
Number of good ASCII send frames	Number of frames that the ASCII memory sent successfully.

Table 9.3: General gateway information

ND	Current status of ND bit.
W-Ack	Current status of W-Ack bit.
R-Ack	Current status R-Ack bit.
Data loss	Current status of data loss bit.
Ring buffer overflow	Current status of ring buffer overflow bit.
Ring buffer overflow (internal)	Current status of ring buffer overflow bit (internal status).
Ring buffer CTB/SFB (internal)	Current status of CTB and SFB bits.
DEX	Current status of DEX bit.
BLR	Current status of BLR bit.

Table 9.4: Current states of the status and control bits

ASCII-Start-Byte	Currently configured start byte (dependent on switch position S4).
ASCII-End-Byte1	Currently configured stop byte 1 (dependent on switch position S4).
ASCII-End-Byte2	Currently configured stop byte 2 (dependent on switch position S4).
ASCII framing	Character length, parity, stop bit(s).
ASCII baud rate	Currently configured baud rate (dependent on switch position S4).
ASCII warm start status	Indicates whether the ASCII memory has detected and accepted a valid configuration.

Table 9.5: ASCII configuration

EIS input data length	Length of the data received (consumed data, default 4 bytes).
EIS output data length	Length of the data supplied (produced data, default 18 bytes).
IP address	Displays the set IP address.

Gateway address	Displays the set gateway address.
Network mask	Displays the set network mask.
DHCP	DHCP mode (ENABLED/DISABLED).

Table 9.6: Communication parameters MA 258*i*

10 Telegram

10.1 Structure of the fieldbus telegram

All operations are performed by control and status bits. Two bytes of control information and two bytes of status information are available for this purpose. The control bits are a part of the output module and the status bits are a part of the input bytes. The data starts with the third byte.

If the actual data length is longer than the data length configured in the gateway, only part of the data is transmitted; the remaining data is lost. In this case, the DL (data loss) bit is set.

The following telegram structure is used between **PLC -> fieldbus gateway**:

7	6	5	4	3	2	1	0	
ND	Address 4	Address 3	Address 2	Address 1	Address 0	Broadcast	Command mode	Control byte 0
				CTB	SFB		R-ACK	Control byte 1

Data byte / parameter byte 0	Data
Data byte / parameter byte 1	
…	

This telegram structure is used between **fieldbus gateway -> PLC**:

7	6	5	4	3	2	1	0	
ND	BO	DL	BLR	DEX	SMA		W-ACK	Status byte 0
DLC7	DLC6	DLC5	DLC4	DLC3	DLC2	DLC1	DLC0	Status byte 1

Data byte / parameter byte 0	Data
Data byte / parameter byte 1	
…	

Only the data part with the corresponding frame (e.g., STX, CR & LF) is then transmitted between the fieldbus gateway and the Leuze end device. The two control bytes are processed by the fieldbus gateway.

The corresponding control and status bits and their meaning are specified in section 10.2 and section 10.3.

Further information on the broadcast control bytes and address bits 0 … 4 can be found in chapter "Modular interfacing unit MA 3x (S4 switch position C)" on page 110.

10.2 Description of the input bytes (status bytes)

10.2.1 Structure and meaning of the input bytes (status bytes)

7	6	5	4	3	2	1	0	
ND	BO	DL	BLR	DEX	SMA		W-ACK	Status byte 0
DLC7	DLC6	DLC5	DLC4	DLC3	DLC2	DLC1	DLC0	Status byte 1

Data byte / parameter byte 0	Data
Data byte / parameter byte 1	
…	

Table 10.1: Structure of the input bytes (status bytes)

Bits of the input byte (status byte) 0

Bit no.	Designation	Meaning
0	W-ACK	Write-Acknowledge (write confirmation when using buffer)
2	SMA	Service mode active(service mode activated)
3	DEX	Data exist (data in transmit buffer)
4	BLR	Next block ready (new block ready)
5	DL	Data loss
6	BO	Buffer overflow
7	ND	New data only in Transparent mode

Bits of the input byte (status byte) 1

Bit no.	Designation	Meaning
0 … 7	DLC0 … DLC7	**D**ata **L**ength **C**ode (length of the following user data)

Notice!

T-bit means toggle bit, i.e. this bit changes its state on each event ("0" → "1" or "1" → "0").

10.2.2 Detailed description of the bits (input byte 0)

Bit 0: Write-Acknowledge: W-ACK

This bit is only relevant for writing slave data in blocks, see chapter 11.1.2 (buffer data on RS 232). It toggles when data from the PLC are sent to the MA with CTB or SFB.

Input data	Description	Addr.	Data type	Value range	Default
W-ACK	**W**rite-**Ack**nowledge (write confirmation) Write handshake Indicates that the data was successfully sent by the PLC to the gateway. Write-Acknowledge is indicated via this bit. The W-ACK bit is toggled by the fieldbus gateway whenever a transmit command has been successfully executed. This applies both for the transmission of data to the transmit buffer with the CTB command and for sending the transmit buffer contents with the SFB command.	0.0	Bit	0->1: Successfully written 1->0: Successfully written	0

Bit 2: Service mode active: SMA

Input data	Description	Addr.	Data type	Value range	Default
SMA	**S**ervice **m**ode **a**ctive (SMA) The SMA bit is set if the service switch is set to "MA" or "DEV", i.e. if the device is in either fieldbus gateway or Leuze device service mode. This is also indicated by a flashing PWR LED on the front side of the device. Upon changing to the normal operating mode "RUN", the bit is reset.	0.2	Bit	0: Device in operating mode 1: Device in service mode	0h

Bit 3: Data exist: DEX

This bit is only relevant for reading slave data in Collective mode relevant, see chapter 11.1.1.

Input data	Description	Addr.	Data type	Value range	Default
DEX	**D**ata **e**xist (data in transmit buffer) Indicates that further data is stored in the transmit buffer which is ready for transmission to the control. This flag bit is always set to high ("1") by the fieldbus gateway as long as data is in the buffer.	0.3	Bit	0: No data in the transmit buffer 1: Further data in the transmit buffer	0h

Bit 4: Next block ready to transmit: BLR

This bit is only relevant for reading slave data in Collective mode relevant, see chapter 11.1.1.

Input data	Description	Addr.	Data type	Value range	Default
BLR	Next **bl**ock **r**eady to transmit (new block ready) The Block Ready toggle bit changes its state whenever the fieldbus gateway has removed received data from the receive buffer and registered it in the corresponding receive-data bytes. This signals to the master that the quantity of data indicated in the DLC bits to be present in the input data bytes originated in the data buffer and is current.	0.4	Bit	0->1: Data transmitted 1->0: Data transmitted	0

Bit 5: Data loss: DL

This bit is important for monitoring data transmission in Transparent and Collective mode.

Input data	Description	Addr.	Data type	Value range	Default
DL	**D**ata **l**oss (Data transmission monitoring) This bit is set until the device is reset (bit pattern see chapter 10.4 "RESET function / deleting memory") in case gateway data was not able to be sent to the PLC and was lost. Furthermore, this bit is set in case the configured data frame, e.g. 8 bit, should be smaller than the data to be transmitted to the PLC, e.g. bar code with 20 digits. In this case, the first 8 digits are transmitted to the PLC, the rest are truncated and are lost. In this process, the Data loss bit is also set.	0.6	Bit	0->1: Data loss	0

Bit 6: Buffer overflow: BO

Input data	Description	Addr.	Data type	Value range	Default
BO	Buffer overflow (buffer overflow) This flag bit is set to high ("1") when the buffer overflows. The bit is automatically reset when the buffer again has memory space available. While the BO bit is set, the RTS signal of the serial interface is deactivated. The memory size of the gateway for the data of both the PLC and the Leuze end device is 1 kByte.	0.6	Bit	0->1: Buffer overflow 1->0: Buffer o.k.	0

Bit 7: New data: ND

This bit is only relevant in Transparent mode.

Input data	Description	Addr.	Data type	Value range	Default
ND	**N**ew **d**ata (new data) This bit is toggled on each data set that is sent from the gateway to the PLC. This can be used to differentiate between multiple, identical data sets that are sent to the PLC.	0.7	Bit	0->1; 1->0: On each status change for new data	0

10.2.3 Detailed description of the bits (input byte 1)

Bit 0 … 7: Data length code: DLC0 … DLC7

Input data	Description	Addr.	Data type	Value range	Default
DLC0 … DLC7	**D**ata **l**ength **c**ode (number of user data in bytes) Stored in these bits is the number of user data bytes transmitted to the PLC which follow.	1.0 … 1.7	Bit	1_h (00001_b) … FF_h (00255_b)	0h (00000b)

10.3 Description of the output bytes (control bytes)

10.3.1 Structure and meaning of the output bytes (control bytes)

7	6	5	4	3	2	1	0	
ND	Address 4	Address 3	Address 2	Address 1	Address 0	Broadcast	Command mode	Control byte 0
				CTB	SFB		R-ACK	Control byte 1

Data byte 1	Data
Data byte 2	
…	

Table 10.2: Structure of the output bytes (control bytes)

Bits of the output byte (control byte) 0

Bit no.	Designation	Meaning
0	Command mode	Command mode
1	Broadcast	Broadcast (only relevant with a connected MA 3x)
2 … 6	Address 0 .. 4	Address bits 0 .. 4 (only relevant with a connected MA 3x)
7	ND	New data

Bits of the output byte (control byte) 1

Bit no.	Designation	Meaning
0	R-ACK	**R**ead-**Ack**nowledge
2	SFB	**S**end data **f**rom transmit **b**uffer
3	CTB	**C**opy to **t**ransmit-**b**uffer

10.3.2 Detailed description of the bits (output byte 0)

Bit 0: Command mode: Command mode

Output data	Description	Addr.	Data type	Value range	Default
Command mode	Command mode This bit is used to activate Command mode. In Command mode, no data is sent by the PLC to the Leuze end device via the gateway. In Command mode, various bits that execute corresponding commands depending on the selected Leuze device can be set in the data- or parameter field. For further information, see chapter 11.1.3 "Command mode".	0.0	Bit	0: Default, transparent data transmission 1: Command mode	0

The following two control bits ("Bit 1: Broadcast: Broadcast" on page 58 and "Bits 2 … 6: address bits 0 .. 4: address 0 .. 4" on page 58) are only relevant with a connected MA 3x. With other devices, these fields are ignored.

Bit 1: Broadcast: Broadcast

Output data	Description	Addr.	Data type	Value range	Default
Broadcast	Broadcast A broadcast only functions with a multiNet network connected via the MA 3x. If this bit is activated, the gateway automatically adds the broadcast command "00B" before the data. This is directed at all participants in the multiNet.	0.1	Bit	0: No broadcast 1: Broadcast	0

Bits 2 … 6: address bits 0 .. 4: address 0 .. 4

Output data	Description	Addr.	Data type	Value range	Default
Address 0..4	Address bits 0 .. 4 As with the broadcast command, individual devices in the multiNet can also be addressed via the MA 3x . In this case, the corresponding address of the device precedes the data field telegram.	0.2 … 0.6	Bit	00000: Addr. 0 00001: Addr. 1 00010: Addr. 2 00011: Addr. 3 …	0

Bit 7: New data: ND

Output data	Description	Addr.	Data type	Value range	Default
ND	**N**ew **d**ata This bit is needed if several identical pieces of data are to be sent in sequence.	0.7	Bit	0->1; 1->0: On each status change for new data	0

10.3.3 Detailed description of the bits (output byte 1)

Bit 0: Read-Acknowledge: R-ACK

This bit is only relevant for writing slave data in blocks (Collective mode), see chapter 11.1.2.

Output data	Description	Addr.	Data type	Value range	Default
R-ACK	**R**ead-**Ack**nowledge (read confirmation) Toggle bit: Indicates to the fieldbus gateway that the "old" data has been processed and that new data can be received. At the end of a read cycle, this bit must be toggled in order to be able to receive the next data set. This toggle bit is switched by the master after valid received data has been read out of the input bytes and the next datablock can be requested. If the gateway detects a signal change in the R-ACK bit, the next bytes are automatically written from the receive buffer to the input data words and the BLR bit toggled. Further toggling erases the memory (to 00h).	1.0	Bit	0->1 or 1->0: Successfully written & ready for the next transmission	0

Bit 2: Send data from buffer: SFB

This bit is only relevant for writing slave data in blocks (Collective mode), see chapter 11.1.2.

Output data	Description	Addr.	Data type	Value range	Default
SFB	**S**end **d**ata from **b**uffer (send data from the gateway transmit buffer to the RS 232) Toggle bit: changing this bit causes all data which was copied to the transmit buffer of the fieldbus gateway via the CTB bit to be transmitted to the RS 232 interface or the connected Leuze device.	1.2	Bit	0->1: Data to RS 232 1->0: Data to RS 232	0

ПРОМЭЛЕКТРОНИКА / sales@prom-elec.com

Bit 3: Copy to transmit buffer: CTB

This bit is only relevant for writing slave data in blocks (Collective mode), see chapter 11.1.2.

Output data	Description	Addr.	Data type	Value range	Default
CTB	**C**opy to **t**ransmit **b**uffer (transmission data to transmit buffer) Toggle bit: Changing this bit writes the data from the PLC to the transmit buffer of the fieldbus gateway. This is used, for example, for long command strings which must be transmitted to the connected ident device. The CTB toggle bit is switched whenever transmit data is not to be sent directly via the serial interface, but instead transferred to the transmit buffer.	1.3	Bit	0->1: Data in buffer 1->0: Data in buffer	0

Notice!

The state change of the CTB bit signals the MA that the data is going into the buffer; therefore, it's essential to observe the order!
When the CTB is not used, the telegram (which fits in one cycle) is transmitted directly to the RS 232 interface. Please make sure it is complete!

10.4 RESET function / deleting memory

For many applications, it is helpful to be able to reset the MA buffer (in Collective mode) or status bits.

The following bit pattern can be transmitted from the PLC for this purpose (if >20 ms is pending):

Control byte 0:	10101010 (AAh)
Control byte 1:	10101010 (AAh)
OUT data byte 0/parameter byte 0:	AAh
OUT data byte 1/parameter byte 1:	AAh

This sets the memory or status/control bits to 00h.

Please observe that the data image may need to be updated by toggling in Collective mode.

11 Modes

11.1 Functionality of the data exchange

The fieldbus gateway has two different modes that can be selected via the PLC:

- **Transparent mode (standard setting)**
  In Transparent mode, all data is sent 1:1 and directly by the serial end device to the PLC. It is not necessary to use status and control bits here. However, only data bytes possible for **one** transmission cycle are transmitted - all others are lost.
  The distance between two successive telegrams (without frame) must be more than 20 ms, since there is otherwise no clear separation between them.
  ASCII characters are typically expected as data content; under certain circumstances, the MA therefore detects different control characters as invalid characters in the data range and truncates them. At 00_h in the data range, the MA cuts the telegram off because unnecessary bytes are also filled with 00_h.
- **Collective mode**
  In Collective mode, the data of the serial end device is stored temporarily in the fieldbus gateway by toggling the CTB bit and is not sent to the PLC in blocks until prompted to do so by the PLC.
  On the PLC, a status bit (DEX) then signals that new data is ready for retrieval. This data is then read out from the fieldbus gateway in blocks (toggle bit).
  In order to distinguish between the individual telegrams on the PLC, in Collective mode the serial frame is sent to the PLC in addition to the data.

  The size of the buffer is 1 kByte.

Notice!

In Collective mode, the CTB and SFB bits are needed for communication handling via the buffer. Telegrams that can also be completely transmitted in one cycle in Collective mode (including data frame) go directly through. If PLC data is provided and transferred without a state change of the CTB bit, it goes directly to the RS 232 interface with the set telegram data length. Incomplete (incl. data frame) or faulty telegrams can cause error messages in the connected device!

Combination with the Command mode is possible.

Data exchange in blocks must be programmed on the PLC.

11.1.1 Reading slave data in Collective mode (gateway -> PLC)

If the Leuze device transmits data to the fieldbus gateway, the data is stored temporarily in a buffer. The PLC is signaled via the "DEX" bit that data is ready for retrieval in the memory. Data is not automatically transmitted.

If no further user data is present in the MA 258*i* ("DEX" bit = "0"), the "R-ACK" bit must be toggled once as read confirmation to release data transmission for the next read cycle.

If the buffer still contains more data ("DEX bit = 1), the next remaining user data present in the buffer is transmitted by toggling the "R-ACK" control bit. This process is to be repeated until the "DEX" bit returns to "0"; all data has then been removed from the buffer. "R-ACK" must be toggled here again once more as a terminating read confirmation in order to release data transmission for the next read cycle.

Used status and control bits:

- DLC
- BLR
- DEX
- R-ACK

11.1.2 Writing slave data in Collective mode (PLC -> gateway)

Writing in blocks

The data sent by the master to the slave is first collected in a "transmit buffer" by setting the "CTB" bit (**C**opy to **t**ransmit **b**uffer). Please observe that data provided is transmitted directly by toggling the bit.

The data is then sent in the order received from the buffer to the connected Leuze device via the serial interface with the command: "SFB" (**S**end data **f**rom transmit **b**uffer). Please don't forget the suitable data frame!

Afterward, the buffer is again empty and can be written with new data.

Notice!

With this function, it is possible to temporarily store longer data strings in the gateway independent of how many bytes the used fieldbus can transmit at once. With this function, longer PT sequences or RFID write sequences, for example, can be transmitted, since the connected devices can, in this way, receive their commands (e.g., PT or W) in a continuous string. The respective frame (STX CR LF) is needed to differentiate between the individual telegrams.

Used status and control bits:

- CTB
- SFB
- W-ACK

If PLC data is provided and transferred without a state change of the CTB bit, it goes directly to the RS 232 interface with the set telegram data length. Incomplete (incl. data frame) or faulty telegrams can cause error messages in the connected device!

Examples for the activation of a Leuze device

In the data part (starting at byte 2) of the telegram to the gateway, a "+" (ASCII) is sent for activation.

This means that the hex value "2B" (corresponds to a "+") is to be entered in control or output byte 2. To deactivate the reading gate, a "2D" (hex) must be used instead (corresponds to a "-" ASCII).

7	6	5	4	3	2	1	0	
ND	Address 4	Address 3	Address 2	Address 1	Address 0	Broadcast	Command mode	Control byte 0
				CTB	SFB		R-ACK	Control byte 1

Data byte 1	Data
Data byte 2	
…	

7	6	5	4	3	2	1	0	
0	0	0	0	0	0	0	0	Output byte 0
0	0	0	0	0	0	0	0	Output byte 1
0	0	0	0	0	0	B	2	Output byte 2
0	0	0	0	0	0	0	0	Output byte 3

Collective mode sequence diagram

Send long online commands to the DEV, read RS 232 answer from DEV

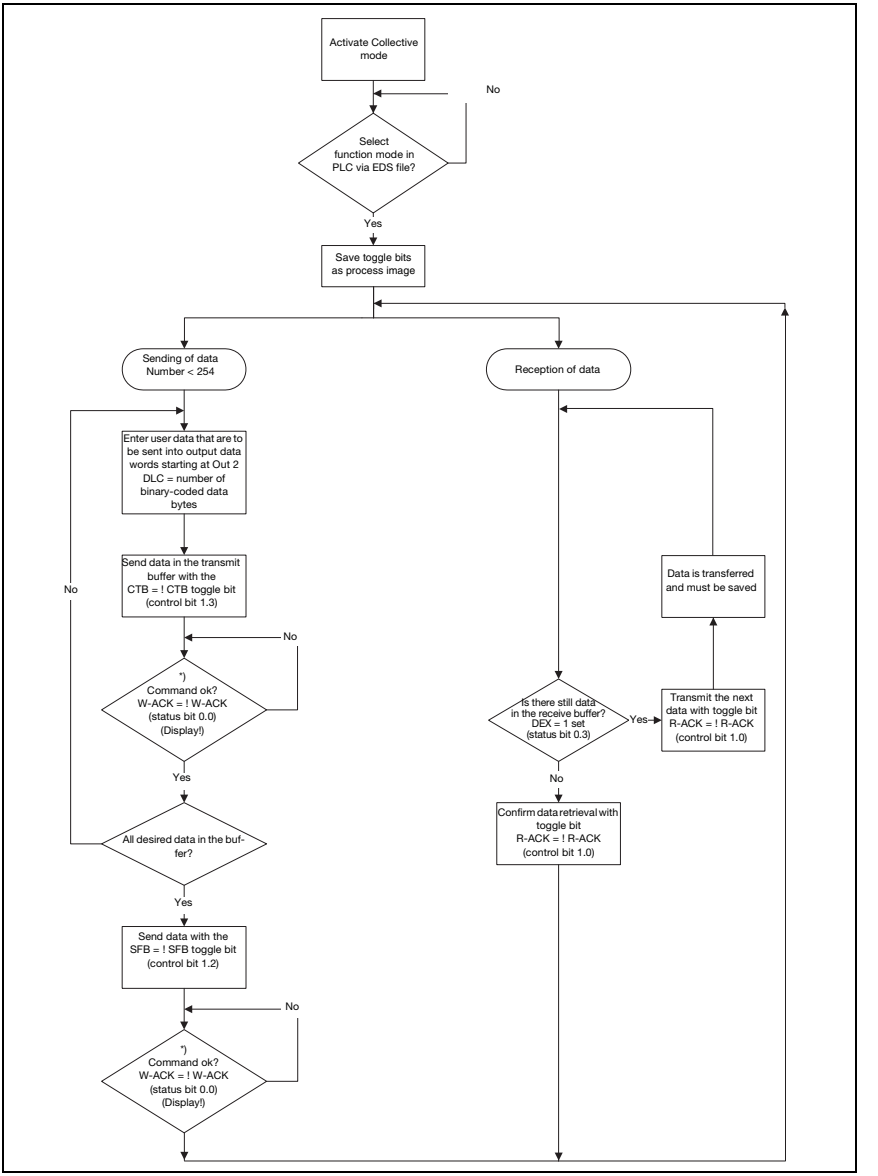


Figure 11.1: Data transmission scheme with long online commands

11.1.3 Command mode

One specific feature is the so-called Command mode, which is defined via the output control byte 0 (bit 0) ... and enables the control of the connected device per bit.

If the command mode is activated (command mode = 1), no data is sent by the PLC to the Leuze end device via the gateway. The data from the MA to the PLC is transmitted in the selected operating mode (Transparent/Collective).

With the Command mode, it is possible to set various device-specific bits in the data- or parameter field that execute the corresponding serial commands (e.g., v, +, -, etc.). If, for example, the version of the Leuze end device is to be queried, the corresponding bit is to be set so that a "v" is sent to the Leuze device with the <STX> v <CR> <LF> frame.

The Leuze end device also answers the gateway with data (e.g. bar code content, NoRead, device version, etc.) in response to most commands. The answer is immediately passed on to the PLC by the gateway.

Notice!

The parameters available for the individual Leuze devices are listed in chapter 16.
Command mode cannot be used with hand-held scanners.

Examples for the activation of a Leuze device

In Command mode, control or output byte 0.0 is to be set for activating the Command mode. Only the corresponding bit (control or output byte 2.1) then needs to be set for activating and deactivating the reading gate.

7	6	5	4	3	2	1	0	
0	0	0	0	0	0	0	1	Output byte 0
0	0	0	0	0	0	0	0	Output byte 1
0	0	0	0	0	0	1	0	Output byte 2
0	0	0	0	0	0	0	0	Output byte 3

Command mode sequence diagram

Set control byte 0, bit 0.0 to 1

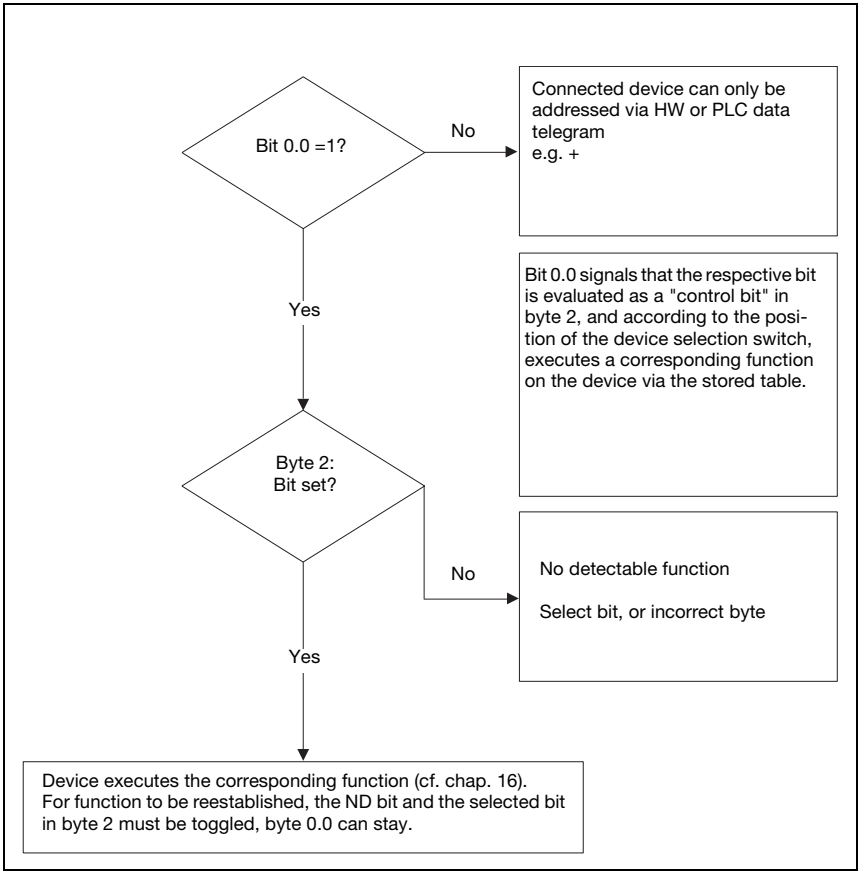


Figure 11.2: Execution of command after activation of the Command mode

Triggering the ident devices and reading the data

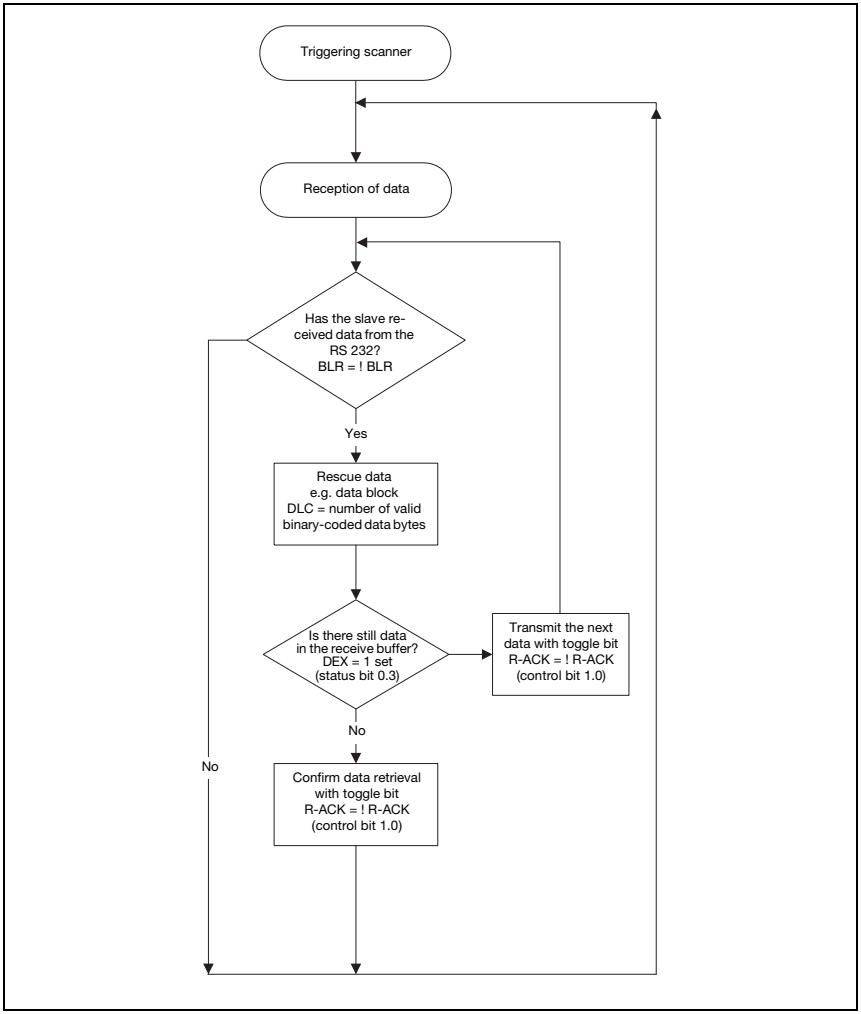


Figure 11.3: Activating DEV and reading data

Notice!

Further information on fieldbus telegram structure can be found in chapter 10.1. A specification of all usable commands can be found in chapter "Specifications for Leuze end devices" on page 97.

12 Commissioning and configuration

12.1 Measures to be performed prior to the initial commissioning

- *Before commissioning, familiarize yourself with the operation and configuration of the MA 258i.*
- ***Before connecting the supply voltage**, recheck all connections and ensure that they have been properly made.*

The Leuze device must be connected to the internal RS 232 device interface.

Connecting the Leuze device

- *Open the housing of the MA 258i and lead the corresponding device cable (see chapter 14.6) through the middle threaded opening.*
- *Connect the cable to the internal device interface (X30, X31 or X32,* see chapter 7.5.1*).*
- *Use rotary switch S4 (see chapter 8.2.5) to select the connected device.*
- *Now screw the PG cable gland into the threaded opening to provide strain relief and ensure protection class IP 65.*
- *Finally, close the housing of the MA 258i.*

Attention!

Only then may the supply voltage be applied.
Upon startup of the MA 258i, the device selection switch is queried and the gateway automatically sets itself to the Leuze device.

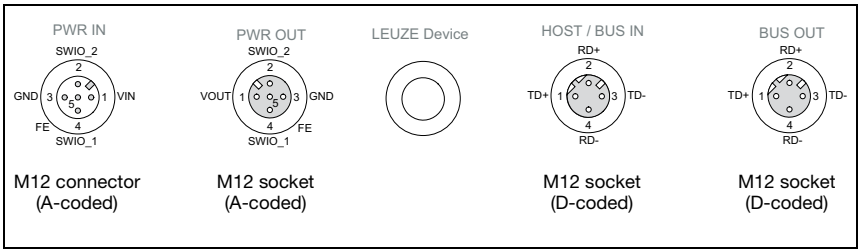


Figure 12.1: Connections of the MA 258i seen from below, device on mounting plate

- *Check the applied voltage. It must be in the range between +18V … 30VDC.*

Connecting functional earth FE

- *Ensure that the functional earth (FE) is connected correctly.*

Unimpaired operation is only guaranteed when the functional earth is connected properly. All electrical disturbances (EMC couplings) are discharged via the functional earth connection.

On delivery, the SWIO 1/2 are connected in parallel on PWR IN/OUT. This connection can be separated with a jumper.

12.2 Starting the device and setting the communication parameters

As a first step, you need to start the device and set the communication parameters of the MA 258*i*. With the communication parameters, you determine how data is exchanged between the MA and host system, monitor PCs etc.

The communication parameters are independent of the topology in which the MA 258*i* is operated (see "EtherNet topologies" on page 34).

On delivery, the automatic address assignment via DHCP server is defined as the standard setting of the MA 258*i*.

12.2.1 Manually setting the IP address

To set the IP address manually, the DHCP operation via BootP or the Rockwell control must be deactivated.

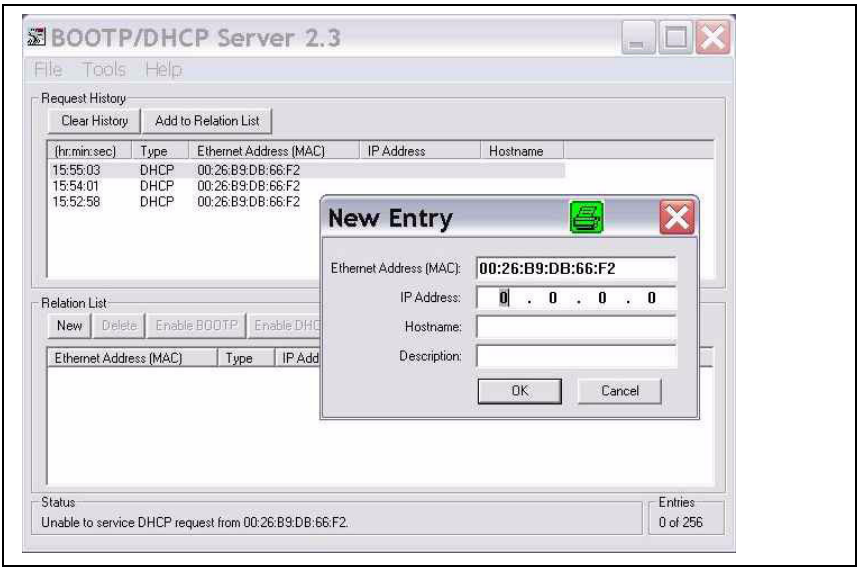


Figure 12.2: Manually setting the IP address

If your system does not include a DHCP server or if the IP addresses of the devices are to be set permanently, proceed as follows:

↳ *Have the network administrator specify the data for IP address, net mask and gateway address of the MA 258i.*

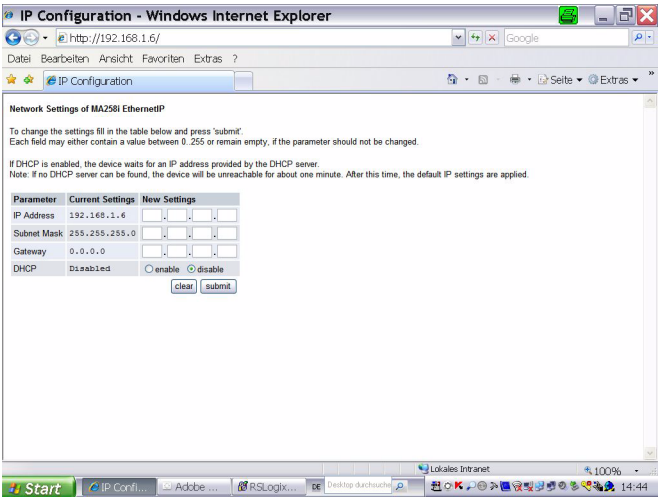


Figure 12.3: Making network settings

- *Select the connected device via the device selection switch.*
- *Apply the supply voltage +18 … 30VDC (typ. +24VDC); the MA 258i starts up.*
- *Now switch the service switch to "MA".*
- *Now start a web browser by entering the IP address into the navigation bar. You will be shown a page for the direct setting of the addresses.*

Notice!

The service switch must be in switch position "MA" for the MA 208i to start in configuration mode.

- *Connect the serial RS 232 Sub-D interface of the MA 258i to the serial interface of your computer.*
- *Make the respective settings on the configuration page opened in the web browser.*

12.3 Configuration steps for a Rockwell control without EDS support

12.3.1 Integrating the hardware into the PLC using the generic EtherNet module

In the RSLogix 5000 configuration tool for EtherNet/IP, software version <20.00, a so-called "generic EtherNet module" is created for the MA 258*i* under the `Communication` path.

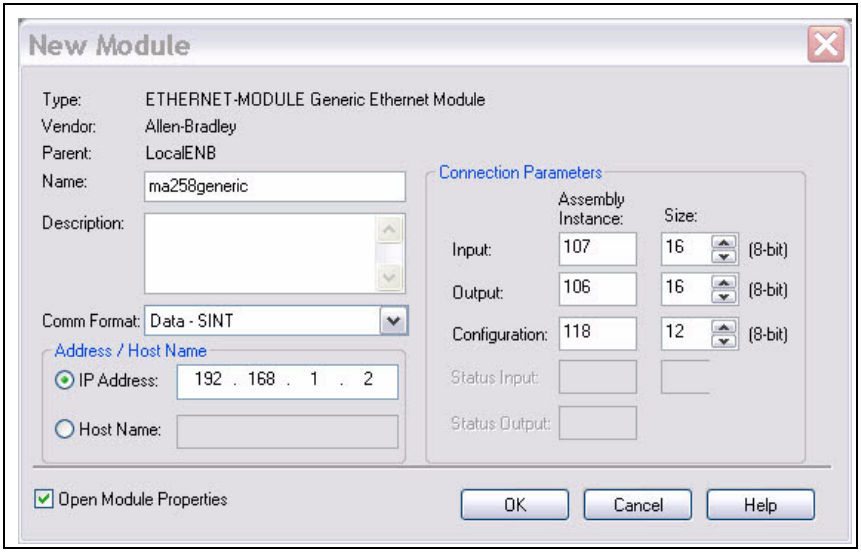


Figure 12.4: Generic module

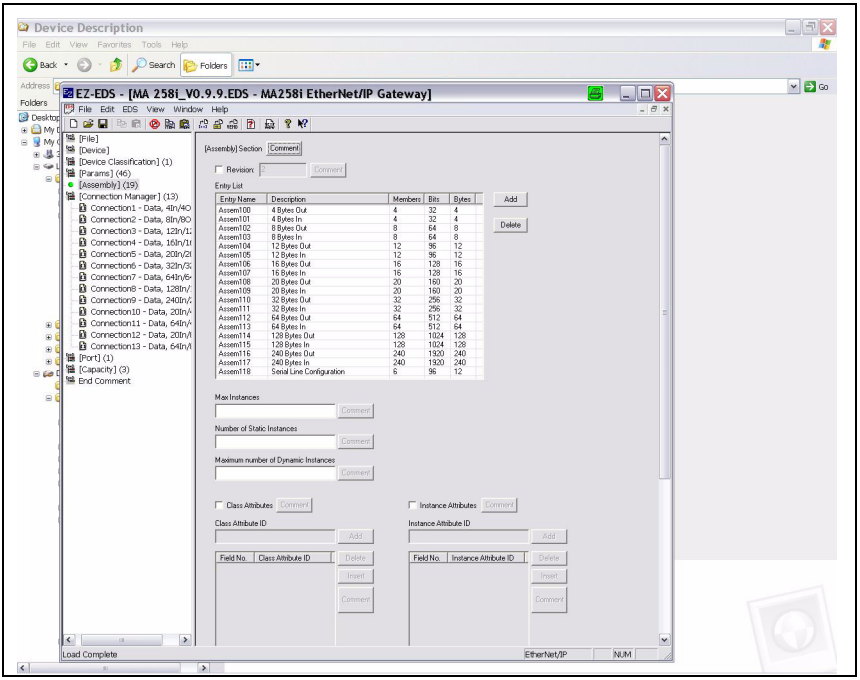


Figure 12.5: Assembly list

The input mask for the generic module describes:

- The name of the participant (can be selected freely; e.g.MA 258*i*).
- The format of the I/O data (data - DINT = 32 bit or data - SINT = 8 bit).
- The IP address of the participant.
- The address and length of the input assembly (instance 107). *)
- The address and length of the output assembly (instance 106). *)
- Optional: The address and length of the configuration assembly (instance 118; 12 x 8 bit).

*) The possible data lengths are shown in figure 12.5. You can select the suitable byte number for your application here. Recommendations can be found in chapter "Specifications for Leuze end devices" on page 97.

Notice!

The available lengths (4, 8, 12, 16, 20, 32, 64, 128, 240 bytes) of the input/output data cannot be freely combined. The MA can only process ONE combination (connection). Please select the suitable combination for the data length and the connected device. Detailed information on this topic can be found in chapter 12.6.2.

Attention!

If the configuration assembly is addressed with instance 118 and length 12 in the input mask for the generic module, all MA 258i parameters with the value 0 are occupied in the first moment. All default parameters of the MA must be manually entered in the configuration assembly. Changing the individual default values is possible at any time.

For the exact description of the assemblies for input/output and configuration, please refer to chapter 12.6.2.

The query cycle of the input and output assemblies is subsequently defined in the `Module properties` -> `Connection` path in the `Request packet interval (RPI)` input field.

The participant is thereby defined in offline mode; the data must subsequently be transferred to the control.

12.3.2 Configure the config assembly

The MA 258i makes available a configuration assembly that allows the entire parameter set of the MA 258i to be saved in the control and, if necessary, to be called up.

The config assembly must include all parameters that affect the MA 258i. The config assembly is automatically written to the connected participants in cycles that the control manufacturer defines.

The config assembly is implemented in class 4, under instance 118. By default, all parameters are preset to the value 0 (zero).

Attention!

If the config assembly is not adapted, the MA 258i displays a corresponding behavior acc. to the parameters preset with 0.

- *Switch the control to offline mode.*
- *Double-click `Controller tags` to edit the configuration assembly.*

The configuration assembly can be recognized by the index "C" appended to the device name.

Parameter entry is performed as described in section "Setting MA parameters manually via the config assembly" on page 74.

Attention!

Activation of the config assembly as described above necessitates value entry in the corresponding parameter memory locations. When using the configuration assembly, the default parameters must also be entered in the corresponding memory locations (see also "Setting MA parameters manually via the config assembly" on page 74).

After all of the parameters relevant to the MA 258*i* are entered, the control is switched to "online" and the project is downloaded again.

Setting MA parameters manually via the config assembly

Notice!

If the device was integrated into an older-version control without EDS support using the generic module, the following option exists to change parameters of the MA:

After setting up the device with the generic module, the MA appears in the RSlogix software in the file structure on the left among the *Controller tags*.

- *Display the reserved control area (MA200.C in this case) by double-clicking on the MA entry.*
- *Now enter the parameters manually into bytes 00-11.*
  Subsequent adaptations may be made by changing the respective position.

Please find a detailed description of the Leuze-specific assembly in chapter 12.6.2.

Byte 00+01:	DataMode (collective/transparent mode)
Byte 02+03:	Serial line mode (rotary / EDS)
Byte 04+05:	Baud rate (9600Bd)
Byte 06+07:	Data bits (7/8 data bits)
Byte 08+09:	Parity (N/E/O)
Byte 10+11:	Stop bits (1/2)

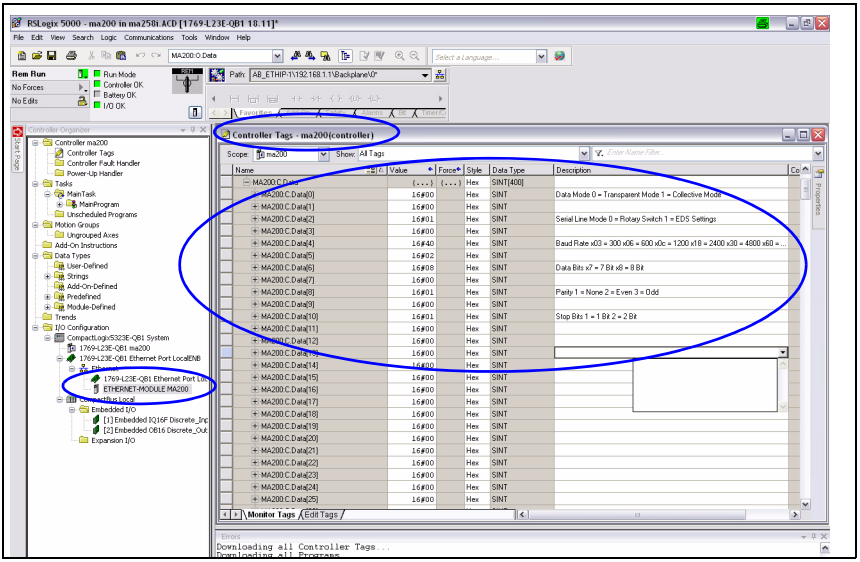


Figure 12.6: Entering the byte parameters

↳ *Transfer the settings made to the device via EtherNet module -> Properties via Reset module.*

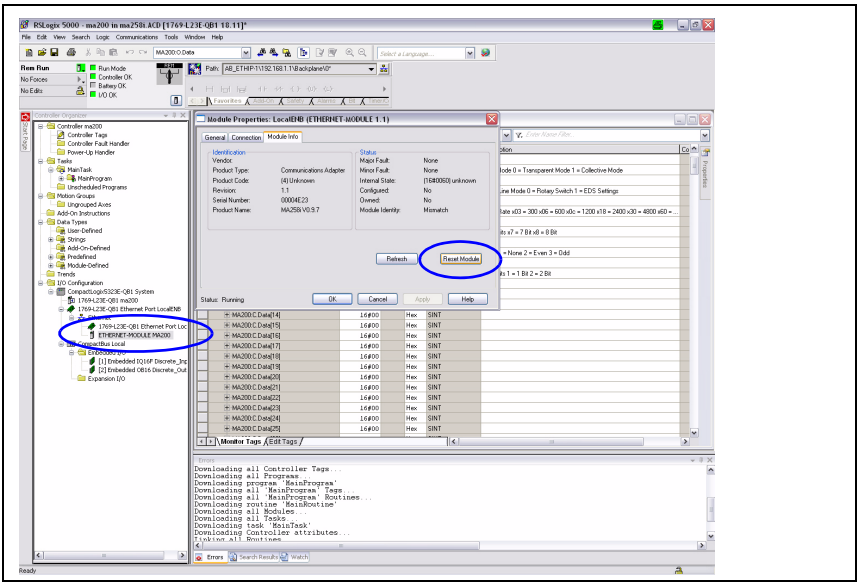


Figure 12.7: Transferring manual MA settings to the device

12.4 Configuration steps for a Rockwell control with EDS support

The following steps are necessary for commissioning with a Rockwell control:

- Creation of the EtherNet participants in PLC software RSLogix 5000 from Version 20.00 and up (with EDS support)
- Installation of the EDS file using the EDS wizard.
- Setting the parameters on the MA via the module.

12.4.1 Integrating the hardware into the PLC and installing the EDS file

To integrate the device and to establish a connection between the PLC and the device MA 258*i*, proceed as follows:

↳ *First, load the EDS file for the device via EDS wizard into the PLC database.*

Notice!

You can find the EDS file at **www.leuze.com.**

↳ *After loading, select the device via the device list and enter it into the HW manager via Drag&Drop.*

↳ *Open the input dialog for setting the address and additional parameters by double-clicking on the device symbol and make the desired entries here.*

↳ *Finally, transmit the values to the device via download.*

12.4.2 Setting the parameters on the MA

After the EDS file has been integrated, the device must be created as a "module" to establish a connection. It is also helpful to assign an IP address to the MA beforehand, e.g. via the service interface.

↳ *To do this, double-click on the tree node EtherNet.*

↳ *In the new window, select the desired device from the database and carry out the respective configuration.*

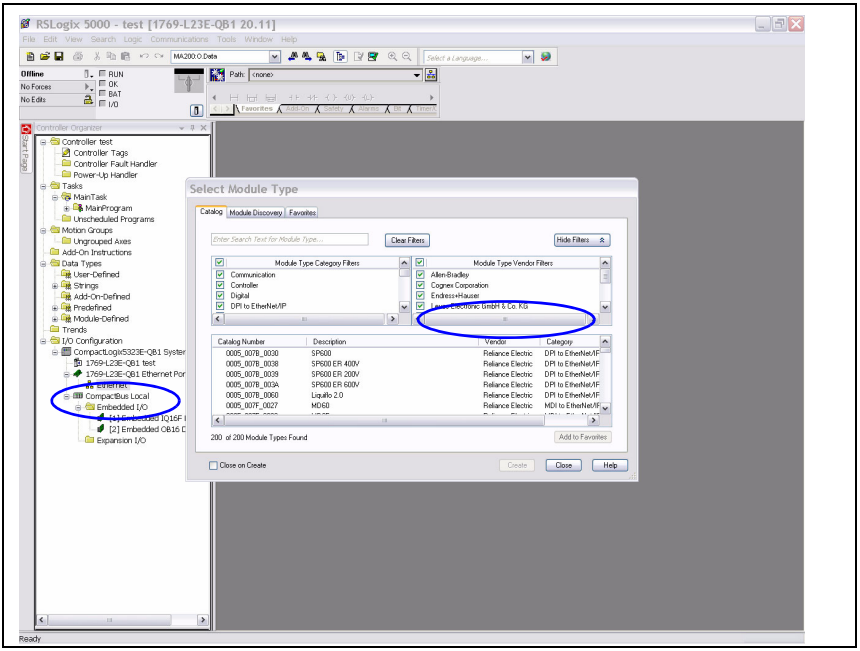


Figure 12.8: Creating a module

↳ *First set the IP address.*

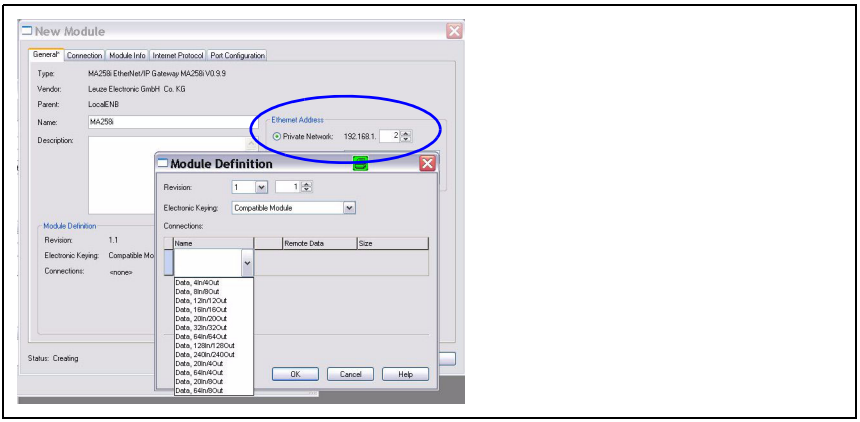


Figure 12.9: Setting the IP address of the MA

Attention!

The IN/OUT combinations can only be selected from the list!

↳ *Then, via the Change button, select the input/output data length of the module from a list of possible combinations by clicking on Connection.*

Notice!

The available lengths (4, 8, 12, 16, 20, 32, 64, 128, 240 bytes) of the input/output data are stored here in "fixed" combinations. They cannot be freely combined. The MA can only process ONE combination (connection).
Please select the suitable combination for the data length and the connected device. For further information, see chapter 16 "Specifications for Leuze end devices".

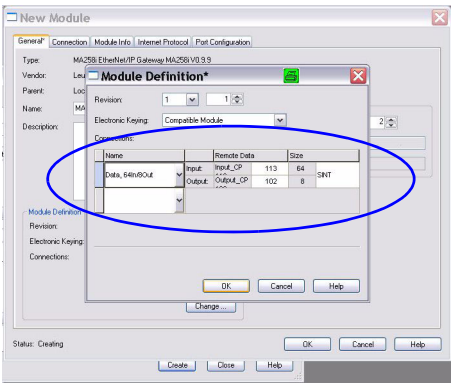


Figure 12.10: Select combination for the lengths of the input and output data

Notice!

Since the combination of Produced/Consumed data contains 2 bytes for the control and status bytes, the actual user data length is always 2 bytes smaller than specified in the selected combination.
E.g., when using the combination with 12 bytes In/12 bytes Out, there are effectively 10 bytes available for user data on the Leuze device after subtracting the 2 bytes for status and control bytes.

Recommendation

A combination with 4 bytes of output data length is sufficient for most output data.
A longer length is needed, for example, if a BCL bar code scanner is to be configured by means of PT-sequences, or an RFID transponder is to be described. In these cases, larger combinations are usually advisable.

↳ *Select the appropriate combination and transmit the settings to the device.*

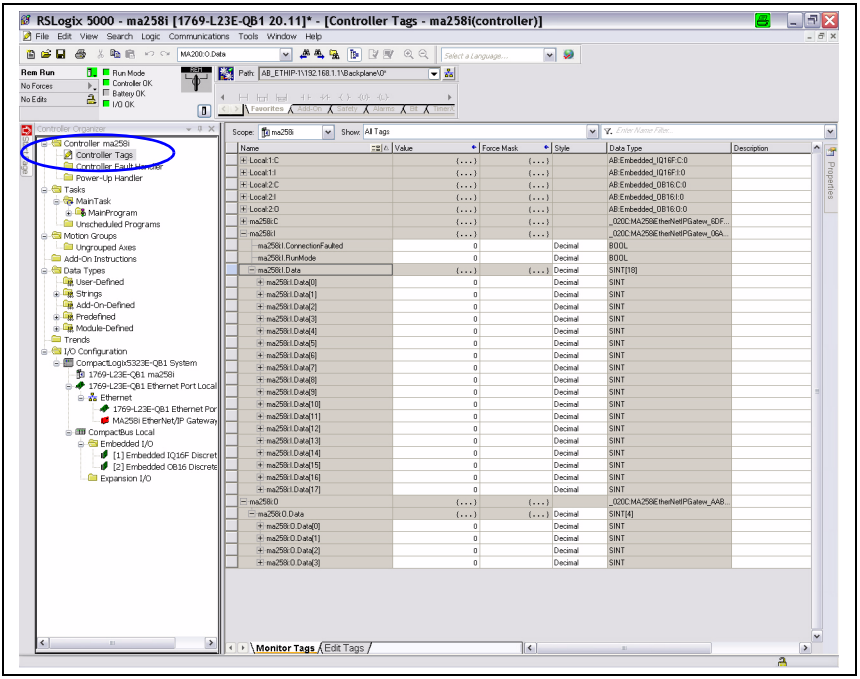


Figure 12.11: MA settings in the controller tags

Variable configuration of the communication data width

The communication of the MA 2xx*i* with the fieldbus system can be configured with a variable data width; the upper limit is restricted by the fieldbus. For EtherNet/IP, a value between 4 and 480 bytes (240 bytes each for input and output data) can be set.

The small data lengths (< 28 bytes) are particularly of interest for use with bar code scanners (BCL). The larger data lengths are, on the other hand, relevant for 2D-code scanners (hand-held scanners, LSIS) and RFID.

Notice!

The representation of the (Rockwell) control is usually set to double word (DINT, 4 bytes). Please observe that in this representation, the byte sequence can vary in contrast to the read code. We thus recommend creating the settings using SINT.

After all parameters have been set in the planning tool/control, the download to the MA 258*i* takes place. The set parameters are now stored on the MA 258*i*.

Afterwards, all MA 258*i* parameters should be stored via upload in the control. This aids in retaining the parameters during device exchanges, as they a re now also stored centrally in the control.

Each time a connection is established between the control and the MA 258*i*, these parameters are now transmitted again to the MA 258*i*. Note that this function must be supported by the control.

The EtherNet baud rate is defined for the entire network in the planning tool/control. The baud rate is set on the MA 258*i* via the S3 baud rate selector switch.

Only if the baud rates are the same is communication with the MA 258*i* possible.

12.5 EDS file - general info

The EDS file contains all identification and communication parameters of the device, as well as the available objects. PLC software RSLogix 5000 from Rockwell offers EDS support for EtherNet/IP from software version 20.00 and up.

The MA 258*i* is uniquely classified via a class 1 identity object (component of the MA258i.eds file) for the EtherNet master.

The identity object contains, among other things, a manufacturer-specific vendor ID, as well as an ID that describes the principle function of the participant.

The MA 258*i* has the following identity object (class 1):

Vendor ID: 524 $_{dec}$./ 20C_H

Device type: 12 $_{dec}$ / 0C_H (labels the MA 258*i* as "communications adapter")

Position sensor type: product type 04 (specifies the MA 258*i* as "gateway")

The types of communication access to the data of the MA 258*i* described by the ODVA:

- Polling
- Cyclic
- Combinations of polling and cyclic

are supported by the MA 258*i*.

Communication access via **change of state** is not implemented and must not be activated in the network configuration.

If accepting the objects without change, all parameters are set to default values. The default settings are shown in the objects described in detail in the "Default" column.

Notice!

In the following tables, all attributes marked in the "Access" column with "Get" in the individual objects are to be understood as inputs of the MA (control).
Attributes marked in the "Access" column with "Set" represent outputs or parameters.

12.6 EDS file - detailed description

12.6.1 Class 1 Identity object

Object class 1 = 01_H

Services:

- Get Attribute Single
- Reset type 0x05

Path			Designation	Size in bit	Data type	Default (dec)	Min (dec)	Max (dec)	Access
Cl.	Inst.	Attr.							
1	1	1	Vendor-Id	16	UINT	524	-	-	Get
		2	Device type	16	UINT	12	-		Get
		3	Product Code	16	UINT	04	-		Get
		4	Revision (Major, minor)	16	Struct{ USINT major, USINT minor};	Major = 1, Minor = 1	Major = 1, Minor = 1	Major = 127, Minor = 999	Get
		5	Status	16	WORD	See CIP specification (5-2.2.1.5 status)			Get
		6	Serial number	32	UDINT	Manufacturer specific			Get
		7	Product name	(max. 32) x 8	SHORT_STRING	"MA 258i"			Get

In the network configuration (e.g., RSNetWorx, "generic module"), it is possible to specify when entering the individual participants which attributes of the scanner are to be monitored from the identity object.

12.6.1.1 Vendor ID

The Vendor ID assigned by ODVA for Leuze electronic GmbH + Co. KG is 524_D.

12.6.1.2 Device type

The MA 258*i* is defined by Leuze electronic as a "communications adapter". According to ODVA, the MA 258*i* is assigned number $12_D = 0C_H$.

12.6.1.3 Product Code

The product code is an ID assigned by Leuze electronic that has no further impact on other objects.

12.6.1.4 Revision

Version number of the identity object.

12.6.1.5 Status

The device status is displayed in the status byte, the first part of the telegram.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ext. device state				reserved	configured	reserved	owned
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
reserved							

12.6.1.6 Serial number

For use in EtherNet, the serial number receives a serial number converted according to CIP. CIP describes a special format for the serial number. After conversion to a CIP code, the serial number is, as before, unique, but no longer corresponds in its resolution to the serial number on the name plate.

12.6.1.7 Product name

This attribute contains a short designation of the product. Devices with the same product code may have different "product names".

12.6.2 Class 4 assembly object

Object class 4=04_H

Services:

- Get Attribute Single
- Set Attribute Single

Cl.	Inst.	Attr.	Designation	Size in bit	Data type	Default (dec)	Min (dec)	Max (dec)	Access
4	**100**	**3**	Produced data size	32	SINT	4 bytes	-	-	SET
	101		Consumed data size	32	SINT	4 bytes	-	-	GET
	102		Produced data size	64	SINT	8 bytes	-	-	SET
	103		Consumed data size	64	SINT	8 bytes	-	-	GET
	104		Produced data size	96	SINT	12 bytes	-	-	SET
	105		Consumed data size	96	SINT	12 bytes	-	-	GET
	106		Produced data size	128	SINT	16 bytes	-	-	SET
	107		Consumed data size	128	SINT	16 bytes	-	-	GET
	108		Produced data size	160	SINT	20 bytes	-	-	SET
	109		Consumed data size	160	SINT	20 bytes	-	-	GET
	110		Produced data size	256	SINT	32 bytes	-	-	SET
	111		Consumed data size	256	SINT	32 bytes	-	-	GET
	112		Produced data size	512	SINT	64 bytes	-	-	SET
	113		Consumed data size	512	SINT	64 bytes	-	-	GET
	114		Produced data size	1024	SINT	128 bytes	-	-	SET
	115		Consumed data size	1024	SINT	128 bytes	-	-	GET
	116		Produced data size	1920	SINT	240 bytes	-	-	SET
	117		Consumed data size	1920	SINT	240 bytes	-	-	GET

PLC software RSLogix 5000 from Rockwell provides EDS support for EtherNet/IP from software version 20.00 and up only. For older versions without support for the EDS integration, the respective device can only be created via the "generic module" in the PLC. When doing so, the values of the input and output data lengths must be manually entered according to the following table.

The following overview shows the combinations of input and output data lengths (Produced/ Consumed data size) available:

Combination	Description	Input data	Output data
Data, 4 In/4 Out	Data content with max. 2 bytes	4	4
Data, 8 In/8 Out	Data content with max. 6 bytes	8	8
Data, 12 In/12 Out	Data content with max. 10 bytes	12	12
Data, 16 In/16 Out	Data content with max. 14 bytes	16	16
Data, 20 In/20 Out	Data content with max. 18 bytes	20	20
Data, 32 In/32 Out	Data content with max. 30 bytes	32	32
Data, 64 In/64 Out	Data content with max. 62 bytes	64	64
Data, 128 In/128 Out	Data content with max. 126 bytes	128	128
Data, 240 In/240 Out	Data content with max. 238 bytes	240	240
Data, 20 In/4 Out	Data content with max. 18 /2 bytes	20	4
Data, 64 In/4 Out	Data content with max. 62 /2 bytes	64	4
Data, 20 In/8 Out	Data content with max. 18 /6 bytes	20	8
Data, 64 In/8 Out	Data content with max. 62 /6 bytes	64	8

Table 12.1: Overview of all possible combinations of input and output data lengths

12.6.2.1 Configuration instance

In addition, all values of the configuration (including changes) must be entered manually as hex/bin values into the "ControlerTags" *.C of the respective device, see "Setting MA parameters manually via the config assembly" on page 74.

Cl.	Inst.	Attr.	Designation	Size in bit	Data type	Default (dec)	Min (dec)	Max (dec)	Access
4	118	3	Data Mode	8	BYTE	0	0	1	Set
			Serial line mode	8	BYTE	0 see below	0	1	Set
			Baud Rate	8	BYTE	96 see below	3	1152	Set
			Data Bits	8	BYTE	8 see below	7	8	Set
			Parity	8	BYTE	1 see below	1	3	Set
			Stop Bits	8	BYTE	1 see below	1	2	Set

Instance 118, attribute 3

Input assembly length 12 byte

Leuze-specific assembly

Byte 00+01: Data mode
Byte 02+03: Serial line mode
Byte 04+05: Baud rate
Byte 06+07: Data bits
Byte 08+09: Parity
Byte 10+11: Stop bits

Data Mode

Parameter value:

0_d 0000_h = Transparent mode (default)
1_d 0100_h = Collective mode
Byte 0+1: 0000_h , LowByte first

Serial line mode

Parameter value:

0_d 0000_h= Use rotary switch (default)
1_d 0100_h= Use EDS settings
Byte 2+3: 0000_h , LowByte first

RS 232 Baud Rate

Parameter value:

3_d	0300_h =	300
6_d	0600_h =	600
12_d	$0C00_h$ =	1200
24_d	1800_h =	2400
48_d	3000_h =	4800
96_d	6000_h =	9600 (default)
192_d	$C000_h$ =	19200
384_d	8010_h =	38400
576_d	4020_h=	57600
1152_d	8040_h =	115200

Byte 4+5: 6000_h , LowByte first

RS 232 Data Bits

Parameter value:

7_d 0700_h = 7 bits
8_d 0800_h= 8 bits (default)
Byte 6+7: 0800_h , LowByte first

RS 232 parity

Parameter value:

1_d 0100_h= None (default)
2_d 0200_h= Even
3_d 0300_h= Odd
Byte 8+9: 0100_h , LowByte first

RS 232 Stop Bits

Parameter value:

1_d 0100_h= 1 bit (default)
2_d 0200_h= 2 bit
Byte 10+11: 0100_h , LowByte first

12.7 Setting the read parameters on the Leuze device

Commissioning the Leuze device

To commission a read station, you must prepare the Leuze device on the MA 258*i* for its reading task. Communication with the Leuze device occurs via the service interface.

Notice!

For further information on connecting and using the service interface, see chapter 9 "Configuration".

↳ *To do this, connect the Leuze device to the MA 258i.*

Depending on the Leuze device, this occurs either via a connection cable (accessory no.: KB 031-1000) or directly on the MA 258*i*. The service connector and corresponding switches can be accessed with the housing cover open.

↳ *Select the "DEV" service switch position.*

Connect the service interface; call up the terminal program

↳ *Connect your PC to the service connector via the RS 232 cable.*

↳ *On the PC, call up a terminal program (e.g., BCL-Config) and check whether the interface (COM 1 or COM 2) to which you have connected the MA 258i is set to the following Leuze standard setting: 9600 baud, 8 data bits, no parity, 1 stop bit and STX, data, CR, LF.*

You can download the config. tool from **www.leuze.com** for BCL, RFID, etc.

In order to communicate with the connected Leuze device, the **STX, data, CR, LF** framing must be set on the PC terminal program, as the Leuze device is preconfigured ex works for this frame character.

STX (02h):	Prefix 1
CR (0Dh):	Postfix 1
LF (0Ah):	Postfix 2

Operation

↳ *Switch the MA 258i to switch position "RUN" (operation).*

The Leuze device is now connected to the fieldbus. Activation of the Leuze device can now occur via the switching input on the MA 258*i*, via the process data word Out bit 1 (bit 0.2) or by transmitting a "+" command to the Leuze device (see chapter 16 "Specifications for Leuze end devices"). For further information on the fieldbus transmission protocol, see chapter 10 "Telegram".

Reading out information in service mode

↳ *Set the service switch of the gateway to switch position "MA" (gateway).*

↳ *Send a "v" command to call up all service information of the MA 258i.*

An overview of the available commands and information can be found in chapter "Reading out information in Service mode" on page 49.

12.7.1 Specific feature for the use of hand-held scanners (bar code and 2D devices, combi devices with RFID)

Notice!

For a description of device configuration and the required codes, please see the corresponding documentation at ***www.leuze.com.***

12.7.1.1 Cable-connected hand-held scanners on the MA 258i

All hand-held scanners and mobile combi devices available in the Leuze electronic product line can be used with the corresponding connection cable.

When using the MA 258*i*, the voltage supply of the hand-held scanner (5V/at 1A) can be connected to the interface by means of a cable via the 9-pin Sub-D connector (voltage on PIN 9). The corresponding cable is to be selected for the respective hand-held scanner and ordered separately. The 9-pin Sub-D cable (KB JST-HS-300, part no. 50113397) is connected to this cable, which is connected to the MA 258*i*. This cable must also be ordered separately.

In this example, triggering occurs by means of a trigger button on the hand-held scanner.

12.7.1.2 Wireless hand-held scanners on the MA 258i

All wireless hand-held scanners and mobile combi devices available in the Leuze electronic product line can be used with the corresponding connection cable via the base station.

A 230VAC connection (socket) is usually necessary for the charging station. Here, a data connection of the charging station is established with the MA 258*i*. The corresponding cable is to be selected for the respective hand-held scanner and ordered separately. Connect this cable to the 9-pin Sub-D cable (KB JST-HS-300, part no. 50113397), which is connected to the MA 258*i*. This cable must also be ordered separately.

In this example, triggering occurs by means of a trigger button on the hand-held scanner.

The following codes for configuring the devices are necessary for these devices as well.

12.7.2 Specific features in the operation of an RFM/RFI

When using the MA 258*i* in connection with an RFID device, we recommend a data width of at least 24 bytes to be able to transmit information to or from the reader in a telegram.

Shown here is a sample telegram for a write command in combination with an RFID device.

Notice!

Also note that all characters which are sent to a transponder are hex-encoded ASCII characters. Each of these (hexadecimal) characters is, in turn, to be handled as an individual ASCII character and converted to hexadecimal format for transmission via the fieldbus.

Example:

7	6	5	4	3	2	1	0	
00	00	00	00	00	00	00	00	Control byte 0
00	00	00	00	00	00	00	00	Control byte 1
34	35	31	31	30	35	30	57	Data
00	00	34	37	33	37	35	36	

HEX	57	30	35	30	31	31	35	34	36	35	37	33	37	34
CHAR	W	0	5	0	1	1	5	4	6	5	7	3	7	4
Plain text	T			e			s			t				

13 Diagnostics and troubleshooting

If problems should occur during commissioning of the MA 258*i* you can refer to the following table. Typical errors and their possible causes are described here as well as tips for their elimination.

13.1 General causes of errors

Error	Possible error causes	Measures
Data loss (DL bit)	Data telegram longer than the bus telegram in bus cycle/memory size.	Increase in bus telegram length. Toggle out data earlier.
Data in the RS 232 instead of in the buffer	Incorrect order.	Correct order: Provide data, toggle CTB.
PWR status LED on the circuit board		
Off	No supply voltage connected to the device.	Check supply voltage.
	Hardware error.	Send the device to customer service.
Green/orange, flashing	Device in boot mode.	No valid firmware, send device to customer service.
Continuous orange light	Device error.	Send the device to customer service.
	Firmware update failed.	
MS LED on the housing (see figure 8.1 on page 43)		
Off	No supply voltage connected to the device.	Check supply voltage.
Red, flashing	Incorrect baud rate / address.	Check switch settings: Check baud rate or address.
NS LED on the housing (see figure 8.1 on page 43)		
Red continuous light	Network error.	Check wiring.
LINK /ACT LEDs on the housing (see figure 8.1 on page 43)		
Off	No connection.	Check wiring/IP address.

Table 13.1: General causes of errors

13.2 Interface errors

Error	Possible error causes	Measures
No communication via EtherNet/IP interface	Incorrect wiring.	Check wiring.
	Different protocol settings.	Check protocol settings.
	Protocol not released.	Activate TCP/ IP or UDP.
Sporadic errors at the EtherNet/IP interface	Incorrect wiring.	Check wiring. In particular, check wire shielding. Check the cable used.
	Effects due to EMC.	Check shielding (shield covering in place up to the clamping point). Check grounding concept and connection to functional earth (FE). Avoid EMC coupling caused by power cables laid parallel to device lines.
	Overall network expansion exceeded.	Check max. network expansion as a function of the max. cable lengths.

Figure 13.1: Interface error

Notice!

*Please use **chapter 13 as a master copy** should servicing be required.*
Cross the items in the "Measures" column which you have already examined, fill out the following address field and fax the pages together with your service contract to the fax number listed below.

Customer data (please complete)

Device type:	
Company:	
Contact partner / department:	
Phone (direct):	
Fax:	
Street / No:	
ZIP code/City:	
Country:	

Leuze Service fax number:

+49 7021 573 - 199

14 Type overview and accessories

14.1 Part number code

MA 2xx i

	i =	Integrated fieldbus technology
Interface	04	PROFIBUS DP
	08	Ethernet TCP/IP
	35	CANopen
	38	EtherCAT
	48	PROFINET RT
	55	DeviceNet
	58	EtherNet/IP
	MA	Modular interfacing unit

14.2 Type overview

Type designation	Description	Description
MA 204*i*	PROFIBUS gateway	50112893
MA 208*i*	Ethernet TCP/IP gateway	50112892
MA 235*i*	CANopen gateway	50114154
MA 238*i*	EtherCAT gateway	50114155
MA 248*i*	PROFINET-IO RT gateway	50112891
MA 255*i*	DeviceNet gateway	50114156
MA 258*i*	EtherNet/IP gateway	50114157

Table 14.1: Type overview MA 2xx*i*

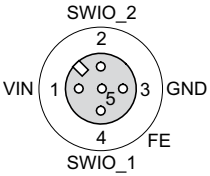
14.3 Accessory connectors

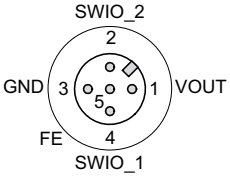
Type designation	Description	Description
KD 095-5A	M12 socket for voltage supply	50020501
KS 095-4A	M12 connector for SW IN/OUT	50040155
D-ET1	RJ45 connector for user-configuration	50108991
S-M12A-ET	Connector, axial, M12 connector, D-coded, terminals	50112155

Table 14.2: Connectors for the MA 258*i*

14.4 Accessory ready-made cables for voltage supply

14.4.1 Contact assignment of PWR connection cable

PWR IN (5-pin socket, A-coded)			
PWR IN  M12 socket (A-coded)	**Pin**	**Name**	**Core color**
	1	VIN	**brown**
	2	SWIO_2	**white**
	3	GND	**blue**
	4	SWIO_1	**black**
	5	FE	**gray**
	Thread	FE	**bare**

PWR OUT (5-pin connector, A-coded)			
PWR OUT  M12 connector (A-coded)	**Pin**	**Name**	**Core color**
	1	VOUT	**brown**
	2	SWIO_2	**white**
	3	GND	**blue**
	4	SWIO_1	**black**
	5	FE	**gray**
	Thread	FE	**bare**

14.4.2 Specifications of the cables for voltage supply

Operating temperature range	in rest state:	-30°C … +70°C
	in motion:	5°C … +70°C
Material	sheathing:	PVC
Bending radius	> 50mm	

14.4.3 Order codes of the cables for voltage supply

Type designation	Description	Part no.
K-D M12A-5P-5m-PVC	M12 socket for PWR, axial plug outlet, open cable end, cable length 5m	50104557
K-D M12A-5P-10m-PVC	M12 socket for PWR, axial plug outlet, open cable end, cable length 10m	50104559

Table 14.3: PWR cables for the MA 258*i*

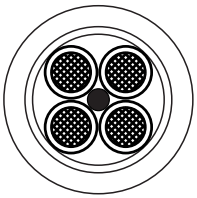
14.5 Accessory ready-made cables for bus connection

14.5.1 General information

- Cable KB ET… for connecting to Industrial EtherNet via M12 connector
- Standard cable available in lengths from 2 … 30m
- Special cables on request

14.5.2 Contact assignments M12 EtherNet connection cables KB ET…

M12 EtherNet connection cable (4-pin connector, D-coded, on both sides)			
Ethernet RD+ 2 TD− 3 1 TD+ 4 SH RD− M12 connector (D-coded)	**Pin**	**Name**	**Core color**
	1	TD+	**yellow**
	2	RD+	**white**
	3	TD-	**orange**
	4	RD-	**blue**
	SH (thread)	FE	**bare**



Core color

WH
YE
BU
OG

Conductor class: VDE 0295, EN 60228, IEC 60228 (class 5)

Figure 14.1: Cable structure of Industrial EtherNet connection cable

14.5.3 Technical data of the M12 EtherNet connection cables KB ET...

Operating temperature range in rest state: -50°C … +80°C
in motion: -25°C … +80°C
in motion: -25°C … +60°C (when used with drag chains)

Material cable sheath: PUR (green), wire insulation: PE foam, free of halogens, silicone and PVC

Bending radius > 65 mm, suitable for drag chains
Bending cycles > 10^6, perm. acceleration < 5 m/s^2

14.5.4 Order code M12 EtherNet connection cables KB ET...

Type designation	Description	Part no.
M12 connector for BUS IN, axial connector, open cable end		
KB ET - 1000 - SA	Cable length 1 m	50106738
KB ET - 2000 - SA	Cable length 2 m	50106739
KB ET - 5000 - SA	Cable length 5 m	50106740
KB ET - 10000 - SA	Cable length 10 m	50106741
M12 connector for BUS IN to RJ-45 connector		
KB ET - 1000 - SA-RJ45	Cable length 1 m	50109879
KB ET - 2000 - SA-RJ45	Cable length 2 m	50109880
KB ET - 5000 - SA-RJ45	Cable length 5 m	50109881
KB ET - 10000 - SA-RJ45	Cable length 10 m	50109882
M12 connector + M12 connector for BUS OUT to BUS IN		
KB ET - 1000 - SSA	Cable length 1 m	50106898
KB ET - 2000 - SSA	Cable length 2 m	50106899
KB ET - 5000 - SSA	Cable length 5 m	50106900
KB ET - 10000 - SSA	Cable length 10 m	50106901

Table 14.4: Bus connection cable for the MA 258*i*

14.6 Accessory ready-made cables for connecting Leuze Ident devices

14.6.1 Order codes for the device connection cables

Type designation	Description	Part no.
KB JST-3000	MA 31, BCL 90, IMRFU-1(RFU), cable length 3m	50115044
KB JST-HS-300	Hand-held scanner, cable length 0.3m	50113397
KB JST-M12A-5P-3000	BPS 8, BCL 8, cable length 3m	50113467
KB JST-M12A-8P-Y-3000	LSIS 4x2i, cable length 3m	50113468
KB JST-M12A-8P-3000	LSIS 122, LSIS 222, cable length 3m	50111225
K-D M12A-5P-5m-PVC	Voltage supply, cable length 5m	50104557
K-D M12A-5P-10m-PVC	Voltage supply, cable length 10m	50104559
K-DS M12A-MA-5P-3m-S-PUR	ODS 96B with RS 232	50115049
K-DS M12A-MA-8P-3m-S-PUR	ODSL 30/D 232-M12	50115050
K-DS M12A-MA-5P-3m-1S-PUR	Konturflex Quattro RSX	50116791
KB 500-3000-Y	BCL 500i, cable length 3m	50110240
KB 301-3000-MA200	BCL 300i, cable length 3m	50120463

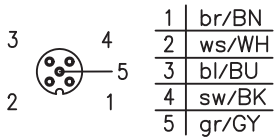
Table 14.5: Device connection cables for the MA 258*i*

Notice!

The BCL 22 devices with JST connector, RFM xx and RFI xx can be connected directly with the injection molded device cable.

14.6.2 Contact assignment for the device connection cables

K-D M12A-5P-5000/10000 connection cable (5-pin with injection molded connector), open cable end



Pin	Core color
1	brown
2	white
3	blue
4	black
5	gray

KB JST 3000 (RS 232 connection cable, JST pin strip 10-pin, open cable end)

Signal	Core color	JST 10-pin
TxD 232	red	5
RxD 232	brown	4
GND	orange	9
FE	shield	10

15 Maintenance

15.1 General maintenance information

The MA 258*i* does not require any maintenance by the operator.

15.2 Repairs, servicing

Repairs to the device must only be carried out by the manufacturer.

↳ *Contact your Leuze distributor or service organization should repairs be required. The addresses can be found on the inside of the cover and on the back.*

Notice!

When sending devices to Leuze electronic for repair, please provide an accurate description of the error.

15.3 Disassembling, packing, disposing

Repacking

For later reuse, the device is to be packed so that it is protected.

Notice!

Electrical scrap is a special waste product! Observe the locally applicable regulations regarding disposal of the product.

16 Specifications for Leuze end devices

Serial interface and Command mode

The corresponding Leuze end device can be selected while configuring the fieldbus gateway (see chapter 9 "Configuration").

The exact specifications for the individual Leuze end devices can be found in the following sections and in the device description.

The corresponding serial command is sent to the Leuze end device in Command mode. To send the corresponding command to the RS 232 device after activating the Command mode in byte 0 (control bit 0.0), set the corresponding bit in byte 2.

The Leuze end device also responds to most commands by sending data, such as the bar code contents, NoRead, device version, etc., back to the gateway. The answer is not evaluated by the gateway, but is instead passed on to the PLC.

For the BPS 8, BPS 300i and hand-held scanners, a number of specific features are to be noted.

16.1 Standard setting, KONTURflex (S4 switch position 0)

This switch position can be used with almost all devices, since a data frame is transmitted along with it if necessary. A 00h in the data range of the control is interpreted as the end of a telegram/invalid, however.

The distance between two successive telegrams (without frame) must be more than 20ms in this switch position, since there is otherwise no clear separation between them. If necessary, the settings have to be adjusted on the device.

Leuze measuring sensors with RS 232 interface (such as a KONTURflex Quattro RS) do not necessarily use a telegram frame, which is why these are also operated in switch position 0.

Specifications for the serial interface

Default parameter	Standard
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<Data>
Data Mode	transparent

Notice!

The data frame is specified via the switch position.Only the data mode and the baud rate can also be set via the "Configuration assembly"/ EDS file.
In the factory setting, the S4 switch position is 0. Resetting the settings to these is possible in S4 switch position F. The procedure for doing this is described in chapter 16.13.

KONTURflex specifications

Settings on the MA 258*i*

- EtherNet address is freely selectable
- Device selection switch at position "0"

EtherNet settings

- Produced/Consumed data settings:
  Dependent on number of beams used, but at least "20 bytes In/4 bytes Out"
- User parameters:
  "Transparent mode", "Use ESD settings", baud rate 38400, "4 data bits", "No parity", "2 stop bits"

KONTURflex settings

First, the following settings are to be performed on the device using KONTURFlex-Soft:

- Either "Autosend (fast)" or "Autosend with data in Modbus format"
- Repeat time "31.5 ms"
- Autosend baud rate "38.4 KB"
- 2 stop bits, no parity

16.2 Bar code reader BCL 8 (S4 switch position 1)

Specifications for the serial interface

Default parameter	BCL 8
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	v
1	Activation / deactivation reading gate	+ / -
2	Reference-code 1 teach-in	RT1
3	Reference-code 2 teach-in	RT2
4	Automatic configuration of reading task activation / deactivation	CA+ / CA-
5	Switching output 1 activation	OA1
6		
7	Switching output 1 deactivation	OD1
8	System standby	SOS
9	System active	SON
10	Query reflector polling	AR?
11	Output version of the boot kernel with check sum	VB
12	Output version of the decoder program with check sum	VK
13	Reset parameters to default values	PC20
14	Device restart	H

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the bar code that is to be read.

  With an 18-digit bar code (+ 2 bytes of status bytes), for example, it is advisable to use the "20 bytes In/4 bytes Out" combination.

16.3 Bar code reader BCL 22 (S4 switch position 2)

Specifications for the serial interface

Default parameter	BCL 22
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	v
1	Activation / deactivation reading gate	+ / -
2	Reference-code 1 teach-in	RT1
3	Reference-code 2 teach-in	RT2
4	Automatic configuration of reading task activation / deactivation	CA+ / CA-
5	Switching output 1 activation	OA1
6	Switching output 2 activation	OA2
7	Switching output 1 deactivation	OD1
8	Switching output 2 deactivation	OD2
9		
10		
11	Output version of the boot kernel with check sum	VB
12	Output version of the decoder program with check sum	VK
13	Reset parameters to default values	PC20
14	Device restart	H
15		

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the bar code that is to be read.

  With an 18-digit bar code (+ 2 bytes of status bytes), for example, it is advisable to use the "20 bytes In/4 bytes Out" combination.

16.4 Bar code reader BCL 300i, BCL 500i, BCL 600i (S4 switch position 4)

Specifications for the serial interface

Default parameter	BCL 300i, BCL 500i, BCL 600i
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	v
1	Activation / deactivation reading gate	+ / -
2	Reference code teach-in activation / deactivation	RT+ / RT-
3		
4	Autom. configuration of reading task activation / deact.	CA+ / CA-
5	Switching output 1 activation	OA1
6	Switching output 2 activation	OA2
7	Switching output 1 deactivation	OD1
8	Switching output 2 deactivation	OD2
9		
10		
11		
12		
13	Parameter - difference to default parameter set	PD20
14	Reset parameters to default values	PC20
15	Device restart	H

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the bar code that is to be read.

  With an 18-digit bar code (+ 2 bytes of status bytes), for example, it is advisable to use the "20 bytes In/4 bytes Out" combination.

16.5 Bar code reader BCL 90, BCL 900i (S4 switch position 5)

Specifications for the serial interface

Default parameter	BCL 90, BCL 900i
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	v
1	Activation / deactivation reading gate	+ / -
2	Configuration mode	11
3	Alignment mode	12
4	Read operation	13
5		
6		
7		
8		
9		
10		
11		
12		
13		
14	Reset parameters to default values	PC20
15	Device restart	H

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the bar code that is to be read.

  With an 18-digit bar code (+ 2 bytes of status bytes), for example, it is advisable to use the "20 bytes In/4 bytes Out" combination.

16.6 LSIS 122, LSIS 222 (S4 switch position 6)

Specifications for the serial interface

Default parameter	LSIS 122, LSIS 222
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	i
1	Activation/Deactivation of reading gate: 12h/14h (**LSIS 122 only**)	<DC2> / <DC4>
2	Activation of reading gate (**LSIS 222 only**)	<SYN>T<CR>
3	Deactivation of reading gate (**LSIS 222 only**)	<SYN>U<CR>
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the 2D code that is to be read.

  With an 18-digit bar code (+ 2 bytes of status bytes), for example, it is advisable to use the "20 bytes In/4 bytes Out" combination.

16.7 LSIS 4x2i, DCR 202i (S4 switch position 7)

Specifications for the serial interface

Default parameter	LSIS 4x2i, DCR 202i
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	v
1	Image acquisition trigger	+
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the 2D code that is to be read.

  With an 18-digit bar code (+ 2 bytes of status bytes), for example, it is advisable to use the "20 bytes In/4 bytes Out" combination.

16.8 Hand-held scanner (S4 switch position 8)

Specifications for the serial interface

Default parameter	Hand-held scanner
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<Data> <CR> <LF>

Notice!

Command mode cannot be used with hand-held scanners.

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the bar code that is to be read.

  With an 12-digit bar code (+ 2 bytes of status bytes), for example, it is advisable to use the "20 bytes In/4 bytes Out" combination.

16.9 RFI, RFM, RFU RFID readers (S4 switch position 9)

Specifications for the serial interface

Default parameter	RFM 12,RFM 32 and RFM 62 RFI 32 RFU (via IMRFU)
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	v [1)]
1	Activation / deactivation reading gate	+ / -
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14	Reset parameters to default values	R [1)]
15	Device restart	H

1) Not for IMRFU/RFU

Recommended settings

- Produced/Consumed data settings:
  dependent on the number of digits of the RFID code that is to be read.

  For the reading of a 16-digit serial number (+ 2 bytes of status bytes), for example, it is advisable to use the "64 bytes In/8 bytes Out" combination.

The RFID devices expect the telegrams / data in HEX format.

16.10 BPS 8 bar code positioning system (S4 switch position A)

Specifications for the serial interface

Default parameter	BPS 8
Baud rate	57600
Data mode	8N1
Handshake	no
Protocol	binary protocol without acknowledgment
Frame	<Data>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (HEX)	
		byte 1	byte 2
0	Request diagnostic info	01	01
1	Request marker info	02	02
2	Request SLEEP mode	04	04
3	Request position info	08	08
4	Request individual measurement	10	10
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Recommended settings

- Produced/Consumed data settings:
  "20 bytes In/4 bytes Out"

  In this switch position, the MA automatically sends a position request to the BPS 8 every 10ms until another command comes via the control. Automatic request only restarts when a new position request is sent by the PLC or when the MA is restarted.

16.11 BPS 300i bar code positioning system, ODSL xx optical distance sensors with RS 232 interface (S4 switch position B)

Notice!

In this switch position, 6-byte data (fixed) is always expected by the device. This is why a quick telegram sequence can be transmitted reliably even without a data frame.

BPS 300i

Specifications for the serial interface

Default parameter	BPS 300i
Baud rate	38400
Data mode	8N1
Handshake	no
Protocol	binary protocol without acknowledgment
Frame	<Data>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Transmit individual position value = single shot	C0F131
1	Cyclically transmit position values	C0F232
2	Stop cyclical transmission	C0F333
3	Laser diode on	C0F434
4	Laser diode off	C0F535
5	Transmit single speed value	C0F636
6	Cyclically transmit speed values	C0F737
7	Transmit single position and speed value	C0F838
8	Cyclically transmit position and speed values	C0F939
9	Transmit marker information	C0FA3A
10	Not used / reserved	
11	Transmit diagnostic information	C0FC3C
12	Activate standby	C0FD3D
13		
14		
15		

Recommended settings

- Produced/Consumed data settings:
  "20 bytes In/8 bytes Out"

ODSL 9, ODSL 30 and ODSL 96B

Notice!

The default settings of the ODS serial interface have to be adjusted! Further information on configuration of the interface can be found in the technical description of the corresponding device.

Specifications for the serial interface

Default parameter	ODSL xx
Baud rate	38400
Data mode	8N1
Handshake	no
Protocol	ASCII transmission, 5-digit measurement value
Frame	<Data>

Specifications for Command mode

Command mode cannot be used with the ODSL 9, ODSL 30 and ODSL 96B.

The ODSL 9/96B is to be operated in the "Precision" measure mode. The mode is set through the display menu via `Application` -> `Measure mode` -> `Precision`. You can find more details on this in the technical description.

16.12 Modular interfacing unit MA 3x (S4 switch position C)

Specifications for the serial interface

Default parameter	MA 3x
Baud rate	9600
Data mode	8N1
Handshake	no
Protocol	framing protocol without acknowledgment
Frame	<STX> <Data> <CR> <LF>

Specifications for Command mode

To activate the Command mode, bit 0 must be set to 1 in control byte 0.

For further information, see chapter 11.1.3 "Command mode", figure 11.2.

Control bit	Meaning	Corresponds to serial command (ASCII)
0	Version query	v
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14	Reset parameters to default values	PC20
15	Device restart	H

Recommended settings

- Produced data/Consumed data:
  dependent on the number of digits of the code that is to be read.

  With an 18-digit bar code (+ 2 bytes of status bytes + 2 bytes of slave address), for example, it is advisable to use the "64 bytes In/4 bytes Out" combination.

Notice!

In this switch position, the address of the multiNet slave is also transmitted in the first two bytes of the data range!

16.13 Resetting the parameters (S4 switch position F)

To reset all parameters of the MA that can be configured with software (such as baud rate, IP address, dependent on type) to the factory settings, do the following:

- *Set device switch S4 to F in a voltage free state.*
- *Switch the voltage on and wait until it is ready for operation.*
- *If necessary, switch the voltage off to prepare for commissioning.*
- *Set service switch S10 to the "RUN" position.*

17 Appendix

17.1 ASCII Table

HEX	DEC	CTRL	ABB	DESIGNATION	MEANING
00	0	^@	NUL	NULL	Zero
01	1	^A	SOH	START OF HEADING	Start of heading
02	2	^B	STX	START OF TEXT	Start of text characters
03	3	^C	ETX	END OF TEXT	Last character of text
04	4	^D	EOT	END OF TRANSMISSION	End of transmission
05	5	^E	ENQ	ENQUIRY	Request to transmit data
06	6	^F	ACK	ACKNOWLEDGE	Positive acknowledgment
07	7	^G	BEL	BELL	Bell signal
08	8	^H	BS	BACKSPACE	Backspace
09	9	^I	HT	HORIZONTAL TABULATOR	Horizontal tabulator
0A	10	^J	LF	LINE FEED	Line feed
0B	11	^K	VT	VERTICAL TABULATOR	Vertical tabulator
0C	12	^L	FF	FORM FEED	Form feed
0D	13	^M	CR	CARRIAGE RETURN	Carriage return
0E	14	^N	SO	SHIFT OUT	Shift out
0F	15	^O	SI	SHIFT IN	Shift in
10	16	^P	DLE	DATA LINK ESCAPE	Data link escape
11	17	^Q	DC1	DEVICE CONTROL 1 (X-ON)	Device control character 1
12	18	^R	DC2	DEVICE CONTROL 2 (TAPE)	Device control character 2
13	19	^S	DC3	DEVICE CONTROL 3 (X-OFF)	Device control character 3
14	20	^T	DC4	DEVICE CONTROL 4	Device control character 4
15	21	^U	NAK	NEGATIVE (/Tape) ACKNOWLEDGE	Negative acknowledge
16	22	^V	SYN	SYNCHRONOUS IDLE	Synchronization
17	23	^W	ETB	END OF TRANSMISSION BLOCK	End of data transmission block
18	24	^X	CAN	CANCEL	Invalid
19	25	^Y	EM	END OF MEDIUM	End of medium
1A	26	^Z	SUB	SUBSTITUTE	Substitution
1B	27	^[	ESC	ESCAPE	Escape
1C	28	^\	FS	FILE SEPARATOR	File separator
1D	29	^]	GS	GROUP SEPARATOR	Group separator
1E	30	^^	RS	RECORD SEPARATOR	Record separator
1F	31	^_	US	UNIT SEPARATOR	Unit separator
20	32		SP	SPACE	Space
21	33		!	EXCLAMATION POINT	Exclamation point
22	34		"	QUOTATION MARK	Quotation mark
23	35		#	NUMBER SIGN	Number sign
24	36		$	DOLLAR SIGN	Dollar sign
25	37		%	PERCENT SIGN	Percent sign
26	38		&	AMPERSAND	Ampersand
27	39		'	APOSTROPHE	Apostrophe
28	40		(	OPENING PARENTHESIS	Opening parenthesis

HEX	DEC	CTRL	ABB	DESIGNATION	MEANING
29	41		)	CLOSING PARENTHESIS	Closing parenthesis
2A	42		*	ASTERISK	Asterisk
2B	43		+	PLUS	Plus sign
2C	44		,	COMMA	Comma
2D	45		-	HYPHEN (MINUS)	Hyphen (minus)
2E	46		.	PERIOD (DECIMAL)	Period (decimal)
2F	47		/	SLANT	Slant
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	Colon
3B	59		;	SEMICOLON	Semicolon
3C	60		<	LESS THAN	Less than
3D	61		=	EQUALS	Equals
3E	62		>	GREATER THAN	Greater than
3F	63		?	QUESTION MARK	Question mark
40	64		@	COMMERCIAL AT	Commercial AT
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		

HEX	DEC	CTRL	ABB	DESIGNATION	MEANING
59	89		Y		
5A	90		Z		
5B	91		[	OPENING BRACKET	Opening bracket
5C	92		\	REVERSE SLANT	Reverse slant
5D	93		]	CLOSING BRACKET	Closing bracket
5E	94		^	CIRCUMFLEX	Circumflex
5F	95		_	UNDERSCORE	Underscore
60	96		‘	GRAVE ACCENT	Grave accent
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	Opening brace
7C	124		|	VERTICAL LINE	Vertical line
7D	125		}	CLOSING BRACE	Closing brace
7E	126		~	TILDE	Tilde
7F	127		DEL	DELETE (RUBOUT)	Delete

A

Accessories 91
Bus connection cables 93
Cables for Leuze ident devices 95
Connector 91
Voltage supply cables 92
ASCII Table 112

C

Causes of errors
General 89
Interface 90
Collective mode 23
Command mode 23, 65
Commissioning 68
Configuration 49, 68
Configuration assembly 18, 73, 84
Connecting the Leuze device 11
PCB connectors X30 ... X32 47
Connections
PWR IN 36
PWR OUT switching input/output 38
Control bytes 57

D

Declaration of Conformity 5
Definition of terms 7
Description of functions 6
Device description 23
Device interface RS 232 41
Diagnosis 89
Dimensioned drawings 30
Disassembling 96
Disposing 96

E

Electrical connection 10
Connecting the Leuze device 11
Power supply and bus cable 11
Safety notices 35
Ethernet connection cable 93

F

Fast commissioning 10
Fieldbus systems 26

G

Generic module 16, 72

I

Input byte 0
Buffer overflow 56
Data exist 55
Data loss 56
New data 57
Next block ready to transmit 56
Service mode active 55
Write-Acknowledge 55
Input byte 1
Data length code 57
Interface
EtherNet/IP 41

L

LED status indicators 43
Leuze device
2D-code reader
DCR 202i 104
LSIS 122 103
LSIS 222 103
LSIS 4x2i 104
Bar code positioning system (BPS)
BPS 300i 108
BPS 8 107
Bar code reader (BCL)
BCL 22 100
BCL 300i 101
BCL 500i 101
BCL 600i 101
BCL 8 99
BCL 90 102
BCL 900i 102
Hand-held scanner 105
Optical distance sensor (ODSL) 108
RFID read-write devices (RFM/RFI ...)
RFM 12, 32 and 62 106
Setting the read parameters 86
Specific feature for hand-held scanners 87
Specifications for Command mode 97
Specifications for the serial interface . . . 97

M
Maintenance 96
Mounting
Device arrangement, selecting a mounting location 10, 34
Mounting the device 10, 33

O
Operating modes
Operation 25
Service fieldbus gateway 25
Service Leuze device 25
Output byte 0
Address bits 0 .. 4 58
Broadcast 58
Command mode 58
New data 58
Output byte 1
Copy to transmit buffer 60
Read-Acknowledge 59
Send data from buffer 59

P
Packing 96

Q
Quality assurance 5

R
Reading slave data 62
Repair 96

S
Service interface 42, 47
Service mode
Commands 50
Information 50
Service switch 47
Servicing 96
Specifications 29
Electrical data 29
Environmental data 30
Indicators 29
Mechanical data 29
Starting the device 11, 69
Status bytes 54
Structure of the fieldbus telegram 53
Symbols 5

T
Telegram structure
Input bytes 54
Output bytes 57
Transparent mode 23
Troubleshooting 89
Type overview 31, 91

W
Writing slave data 62