

# Bar Code Reader BCL 40 with Integrated Decoder Connector Unit MA 10

## Technical Description





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## 1 General Information

### 1.1 Explanation of Symbols

The symbols used in this operating manual are explained below.



**Attention!**

*Pay attention to passages marked with this symbol. Failure to heed this information can lead to injuries to personnel or damage to the equipment.*



**Attention Laser!**

*This symbol warns of possible danger through hazardous laser radiation.*



**Notice!**

*This symbol indicates text passages containing important information.*

### 1.2 Definition of Terms

**Activation**

Initiates a read process, e.g. by triggering the switched input.

**ASCII**

Standard character set (American Standard Code for Information Interchange) with 128 characters. Each character of the ASCII character set has been assigned a number from 0 to 127. This number is usually displayed in decimal format, but can also be displayed in hexadecimal or octal.

**Output format**

Determines the data format of the bar code information output from the decoder.

**autoConfig**

The function integrated into the bar code reader which automatically recognises the type and number of characters of the code to be read in.

**autoControl**

The function integrated into the bar code reader used to monitor the read quality.

**Bar code**

An arrangement of parallel bars and spaces which are arranged according to a standardised protocol such that they have a certain numeric or alphanumeric meaning.

**Deactivation**

End a read process, e.g. by using an online command.

**Decoder/Decoding system**

The microprocessor control unit which translates the scanned bar code information into a simple signal that can be processed further.

**Hex.**

Abbreviation for hexadecimal notation.

**Host**

External computer or programmable logic controller (PLC) which is connected to the bar code reader via a serial interface and is used to further process the decoded bar code information.

**Label**

Barcode label

**Read quality**

The read quality can be monitored using the autoControl function. The relationship of the number of successful reads to the total number of reads is determined and monitored.

**multiNet**

The network developed by Leuze for networking together several bar code readers.

**No Read**

Read failure; a read process was initiated but a label could not be decoded.

**Online command**

A command which is sent directly to the bar code reader from the host or a computer connected to the interface.

**Parameter set**

The data set which is permanently stored in the bar code reader and contains all of the device settings.

**PD**

Programming device

**Postfix**

Trailer of the data transfer protocol (frame protocol) between the bar code reader and the host.

**Prefix**

Header of the data transfer protocol (frame protocol) between the bar code reader and the host.

**Protocol**

Interface protocol of the serial interface.

**Frame protocol**

Transfer protocol for the data transfer between the bar code reader and the host.

**Raster scanner**

The sweep method of the scanner laser beam. It is used when the lines of the bar code can only be applied vertically with respect to the direction of travel, or when the code must be read while stationary.

**Reference code**

Complete or partial bar code information which can be compared to the read label, e.g. to select a path for packages.

**Scanner**

Bar code reader that optically scans the bar code with a laser beam.

**Switched output**

Connection for output of status or event messages, e.g. after a failed read.



**Switched input**

Bipolar input for connecting a sensor or switch used for initiating a read process or for acquiring a reference code.

**Interface module**

Electronic component in the connector unit MA 10 which carries out the electrical adjustment of the various serial interface types (e.g. RS 232, RS 422, etc.).

**PLC**

Programmable logic controller. A PLC usually can be used as a host.

**Bar code**

An arrangement of parallel bars and spaces which are arranged according to a standardised protocol such that they have a certain numeric or alphanumeric meaning.

**Teach-In**

Programming a reference code using an example bar code.

### 1.3 Declaration of Conformity

The bar code readers BCL 40 and the connector unit MA 10 have been developed and produced in accordance with the applicable European standards and directives.

**Notice!**

*The corresponding declaration of conformity can be requested from the manufacturer.*

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



## 2 Safety Notices

### 2.1 Safety Standards

The bar code readers BCL 40 and the connector unit MA 10 have been developed, produced and tested subject to the applicable safety standards. They correspond to the state of the art.

### 2.2 Intended Use

**Attention!**

*The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not corresponding to its intended use.*

Bar code readers of the type BCL 40 are conceived as stationary, high-speed scanners with integrated decoders for all current bar codes used for automatic object recognition.

The connector and interface unit MA 10 simplifies the connection of the bar code reader of type BCL 40 and adapts to various host interfaces. Connection to other bar code readers is not authorised.

In particular, unauthorised use includes:

- rooms with explosive atmospheres
- operation for medical purposes

**Fields of application**

The bar code readers BCL 40 with optional connector unit MA 10 are conceived particularly for the following fields of application:

- labelling and packaging machines
- automatic analysers
- space-critical bar code reading tasks
- storage and conveying technologies, in particular for object identification on fast-moving conveyor belts
- pharmaceutical industry

## **2.3 Working Safely**



### **Attention Laser Radiation!**

*The BCL 40 are laser devices of the Laser Protection Class 2.  
Do not look directly into the laser beam. Observe the applicable legal and local regulations for the operation of laser units.*



### **Attention!**

*Access to or changes on the device, except where expressly described in this operating manual, is not authorised.*

### **Safety Regulations**

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

### **Qualified Personnel**

Mounting, commissioning and maintenance of the device must only be carried out by qualified personnel.

Electrical work must be carried out by a certified electrician.

## 3 Description

### 3.1 The Bar Code Readers BCL 40

The bar code reader BCL 40 is a high-speed scanner with integrated decoder for all bar codes currently in use, e.g. 2/5 Interleaved, EAN, etc.

The many possible configurations of the device allow its adaptation to a multitude of reading tasks. Due to its compact size and short minimum reading distance, the BCL 40 can also be used in very compact spaces.

Together with the connector unit MA 10, it can easily be adapted for use with various interfaces, thus allowing additional processing by other systems. The MA 10 connector unit can also be used to network together several BCL 40 devices and to simplify electrical installation.

On demand, the BCL 40 can be equipped with an integrated heater. This variant is used primarily in low-temperature and outdoor applications. The optional heater is constructed such that no heat transfer occurs between the separately mounted technical unit and the scanner housing. In addition, the front cover of the device is heated, preventing the formation of condensation which would affect the reading function. The reading curves differ with respect to the standard type in the construction of the front cover, which is modified by heating filaments.

### 3.2 Features of the BCL 40

#### 3.2.1 Performance features

- Compact device dimensions (W x H x D) 90 x 120 x 43mm
- Reading height of 70 mm at a distance of 10mm
- Maximum reading distance up to 700mm (depending on type of optics)
- Raster or line scanner (R1 = raster, S = single line) max. 1200scans/s
- A switched input for triggering a read process using sensors
- Automatic monitoring of the read quality with the 'autoControl' function
- Automatic recognition of the bar code type using 'autoConfig'
- All device parameters can be set by software
- Heavy-duty housing of protection class IP 65 with corresponding cable
- RS 232 or RS 485 interface to host
- Extensive formatting possibilities for data output
- Reference code (comparison code)

### 3.2.2 Added features with MA 10

- Device status display with 4 LEDs
- RS 485 interface with electrical isolation for networking several devices
- Alternative interface RS 232, RS 422 or TTY using a selectable interface module with electrical isolation for directly connecting to the host
- Two hardware switched outputs for status signals
- Additional switched input for the definition of reference code 1
- Simple electrical connection via double terminal clamps, i.e. both the power supply and the interface circuits can easily be connected in series.
- Heavy-duty housing of protection class IP 65
- 2 parameter sets can be stored locally in the MA 10 (current parameter set, customer-specific parameter set)
- Built-in RS 232 service interface for fast commissioning or troubleshooting on site using a PC or programming device
- Switch for the autoConfig function

### 3.2.3 Modular Concept

#### ***BCL 40 "Stand alone"***

The bar code reader BCL 40 can be operated as an individual 'stand alone' (①) device. Electrical connection of the power supply, interface and switched input are centrally made via a 15 pin SubD socket.

For connection, it is best to use the 15 conductor connection cable from Leuze. The requirements for protection class IP 65 are fulfilled when using this cable only (see chapter 5 "Accessories / Order Designation").

#### ***BCL 40 with MA 10***

When using several BCL 40 units or under rough environment conditions, the installation of one connector unit MA 10 for each BCL 40 unit is recommended.

Electrical connection, commissioning, and service can be comfortably carried out in a short period of time.

The BCL 40 and MA 10 can be mounted directly together (②) or arranged separately next to each other. When mounted separately (③), the two units are connected by a cable. Protection class IP 65 is maintained when the sealed accessory cable is used (see chapter 5 "Accessories / Order Designation").

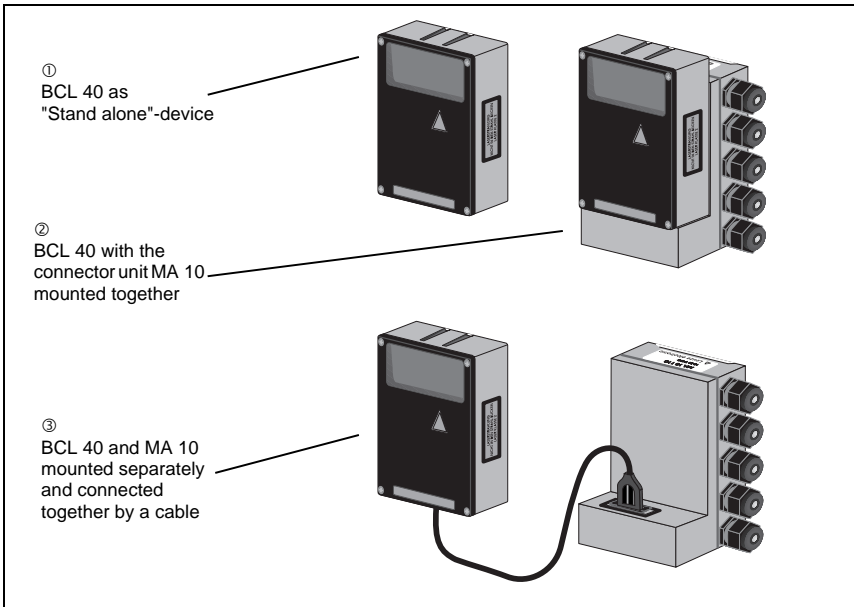


Figure 3.1: Possible combinations of the BCL 40 / MA 10

### **Networking**

Up to 31 BCL 40 bar code readers can be networked together using the connector unit MA 10 (with interface module RS 485). The devices are interconnected by connecting the individual RS 485 interfaces in parallel.

### **multiNet plus**

In the Leuze multiNet plus, the individual network devices sequentially transfer their data to the network master MA 30 when requested ("polling").

The master station can also be fitted with an BCL 40, making it a complete scanner station which also controls the network.

Each network device declared as a slave maintains a device address which is set in the respective MA 10 with a coding switch. If the reader unit is exchanged (BCL), the device address and all settings in the MA 10 are maintained.

The master then transmits the data of all network devices via its host interface to a primary PLC control system or a computer, i.e. it "collects" the scanner data in the network and transmits them to an interface on the host computer. This reduces interface costs (CPs) and time programming the software.

The MA 30/31 are suitable for use as network master devices.

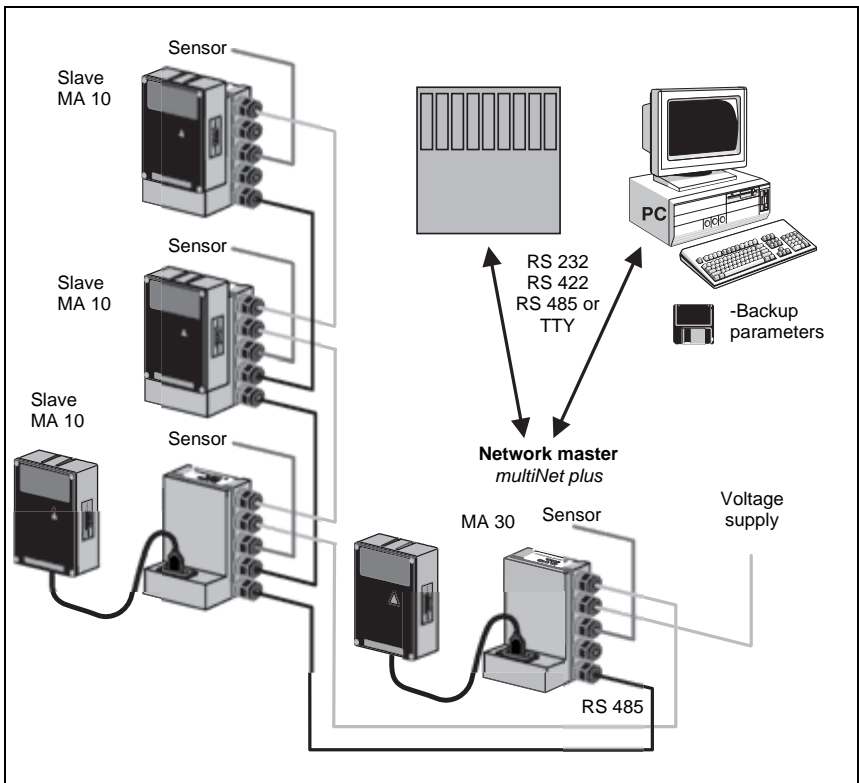


Figure 3.2: Networking possibilities using the multiNet plus

### **Two-wire RS 485**

The Leuze MultiNet plus is optimised for fast transmission of scanner data to a primary host computer. The multiNet plus physically consists of a two-wire RS 485 interface through which the multiNet plus software protocol is controlled. Thus network connection is very simple and inexpensive: the network connection is simply passed through to the next slave.

### **Interface modules**

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

Connection of the network to the primary computer is made via the host interface of the MA 30 which can be equipped with 4 different physical interface modules. Modules for RS 232, RS 422, TTY and RS 485 are available.

### 3.3 Construction

#### 3.3.1 BCL 40/device construction

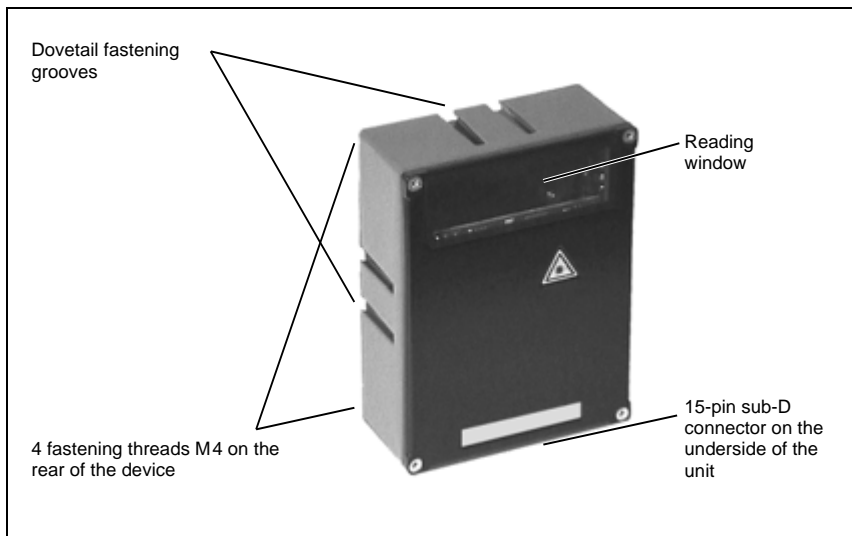


Figure 3.3: BCL 40/device construction



### 3.3.2 Device construction MA 10

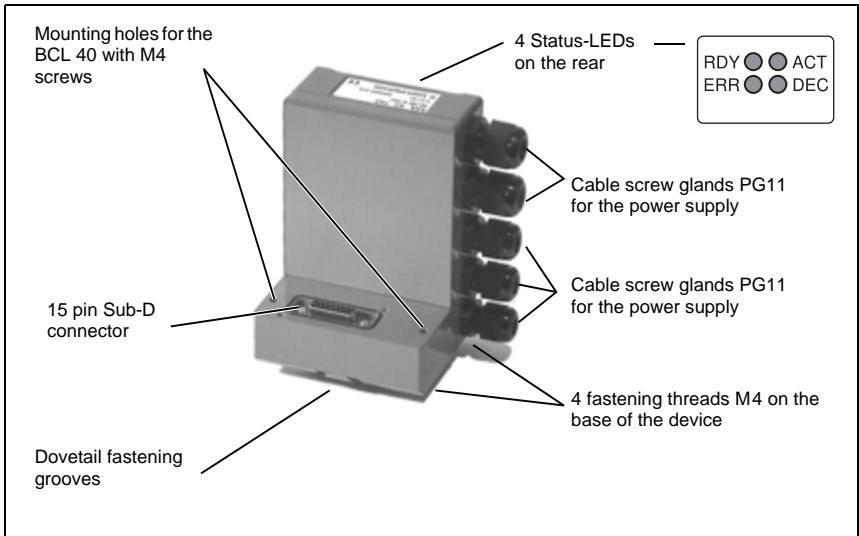


Figure 3.4: Connector unit MA 10

#### **Device variations MA 10**

The MA 10 is available in four models:

- MA 10 100 with host interface module RS 485
- MA 10 110 with host interface module RS 232
- MA 10 120 with host interface module TTY
- MA 10 130 with host interface module RS 422

All modules are galvanically isolated, i.e. they are EMC interference protected and immune to differences in voltage potentials across long cable lengths.



#### **Notice!**

*Only the type MA 10 100 can be used as a multiNet slave unit.*

## 4 Specifications

### 4.1 Technical Data BCL 40 Standard Version

#### Optical Data

|                       |  |
|-----------------------|--|
| Light source          | Laser diode 650nm  |
| Scanning rate         | BCL with N, M, F optics: 1200scans/s<br>BCL with L optics: 900scans/s  |
| Resolution            | 0.1mm ... 1.2mm<br>module width  |
| Beam deflection       | by means of rotating polygon mirror wheel  |
| Reading distance      | 0 ... 700mm (depending on type of optics: N, M, F, L), see chapter 4.5.4 "Reading curves BCL 40 standard version"  |
| Reading field opening | 70mm at a distance of approx. 10mm (see chapter 4.5.4 "Reading curves BCL 40 standard version")  |
| Grid (R1)             | 8 lines  |
| Grid field            | specified is the area from the first to the last laser beam as a function of distance to the scanner<br>22mm at 100mm scanner distance<br>33mm at 200mm scanner distance<br>45mm at 300mm scanner distance<br>65mm at 500mm scanner distance<br>95mm at 800mm scanner distance |
| Single line (S)       | 1 line   |
| Optical window        | glass with scratch-resistant Indium coating  |
| Laser safety class    | 2  |
| Code types            | 2/5 Interleaved; Code 39; Code 128; EAN 8; 13; EAN 128; UPC; Codabar; Add-On for EAN / UPC   |
| Software features     | selectable output format, autoConfig, autoControl, reference code comparison, multiple read, real time decoding, adjustment mode, diagnosis, reading gate control, control of switching inputs and switching outputs, etc.   |

#### Electrical data

|                |  |
|----------------|--|
| Interface type | can be switched between RS 232 and RS 485, additional service interface (RS 232)<br>TTY / RS 422 optional with MA 10 |
| Baud rate      | 110 ... 57600Bd (host interface only)  |
| Data formats   | data bits: 7, 8, 9<br>parity: None, Even, Odd<br>Stop bit: 1, 2  |
| Protocols      | with/without frame protocol<br>ACK/NAK, 3964 (R) RK 512, RTS/CTS<br>X ON / X OFF, multiNet plus                      |
| Ports          | 1 switching input  |
| LED green      | device ready (Power On)  |

|   |   |
|---|---|
| Switching input                         | 12 ... 36VDC/AC voltage, selectable galvanic isolation or supplied operating voltage, max. insulation voltage: 250V (with galvanic isolation) |
| Operating voltage                       | 18 ... 36V  |
| Power consumption                       | 5VA max.  |
| <b>Mechanical data</b>                  |   |
| Protection class                        | IP 65   |
| Weight                                  | approx. 430g  |
| Dimensions (WxHxD)                      | 120 x 90 x 43mm   |
| Housing                                 | diecast aluminium   |
| <b>Environmental data</b>               |   |
| Ambient temperature (operation/storage) | 0°C ... +40°C / -20°C ... +60°C   |
| Air humidity                            | max. 90% rel. humidity, non-condensing  |
| Vibration                               | IEC 68.2.6  |
| Shock                                   | IEC 68.2.27   |
| EMC                                     | IEC 801   |

Table 4.1: General Specifications BCL 40 Standard Version

## 4.2 Technical Data BCL 40 with Heating

The following table is limited to the data which are different than those specified for the standard model.

|   |   |
|---|---|
| <b>Optical Data</b>                     |   |
| Light source                            | Laser diode 660nm   |
| Resolution                              | 0.25mm ... 1.0mm module width   |
| Reading distance                        | 0 ... 630mm (depending on type of optics: M, F, L)<br>see chapter 4.5.5 "Reading curves BCL 40 with heating"                                  |
| Reading field opening                   | Depending on the distance, the reading curve is typically approx. 20 ... 70mm narrower see chapter 4.5.5 "Reading curves BCL 40 with heating" |
| <b>Electrical data</b>                  |   |
| Operating voltage                       | 24VDC $\pm$ 2V  |
| Power consumption                       | 10W max.  |
| <b>Mechanical data</b>                  |   |
| Weight                                  | approx. 500g  |
| Dimensions (WxHxD)                      | 120 x 90 x 52mm   |
| <b>Environmental data</b>               |   |
| Ambient temperature (operation/storage) | -40°C ... +30°C/-20°C ... +60°C   |

Table 4.2: General Specifications BCL 40 with Heater

4.3      **Technical Data MA 10**

**Mechanical data**

|                    |                   |
|--------------------|-------------------|
| Housing            | Diecast aluminium |
| Dimensions (WxHxD) | 130 x 90 x 78mm   |
| Weight             | approx. 740g      |
| Protection class   | IP 65             |

**Interfaces**

|                   |  |
|-------------------|--|
| Type (optional)   | RS 232, with galvanic isolation<br>RS 422, with galvanic isolation<br>RS 485, with galvanic isolation<br>TTY, with galvanic isolation<br>RS 232 internal, 9 pin Sub D plug, male |
| Service interface |  |

**Inputs/outputs**

|                    |  |
|--------------------|--|
| 2 switched inputs  | galvanically isolated,with supply voltage terminal for sensors 12 ... 36VDC/AC, insulation voltage 500V  |
| 2 switched outputs | can be operated galvanically isolated or not isolated<br>switching voltage 5 ... 48V DC, max. load 500mA |

**Power supply**

|                   |              |
|-------------------|--------------|
| Operating voltage | 18 ... 36VDC |
| Power consumption | 2VA max.     |

**Environmental data**

|  |  |
|--|--|
| Ambient temperature<br>(operation/storage) | 0°C ... +50°C/-20°C ... +60°C          |
| Air humidity                               | max. 90% rel. humidity, non-condensing |
| Vibration                                  | IEC 68.2.6                             |
| Shock                                      | IEC 68.2.27                            |
| EMC  | IEC 801                                |

Table 4.3:      General Specifications MA 10

#### 4.4 Dimensioned drawings

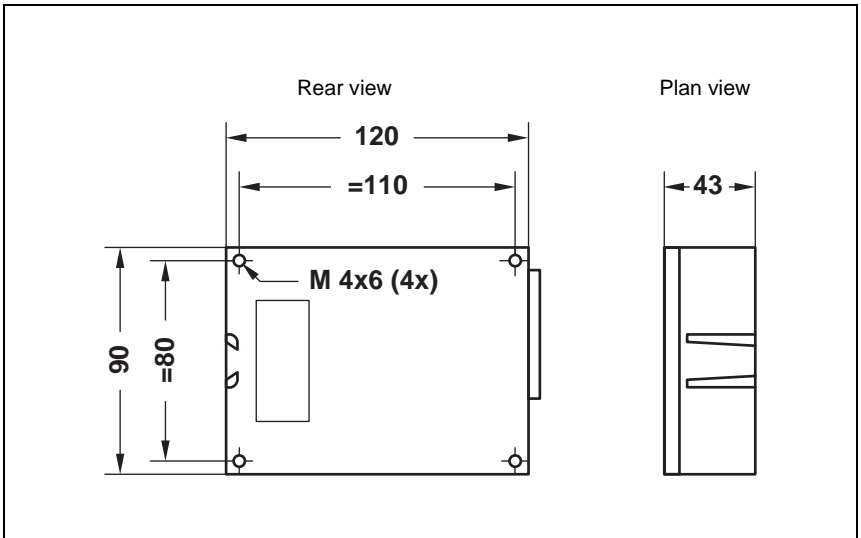


Figure 4.1: Dimensioned drawing BCL 40

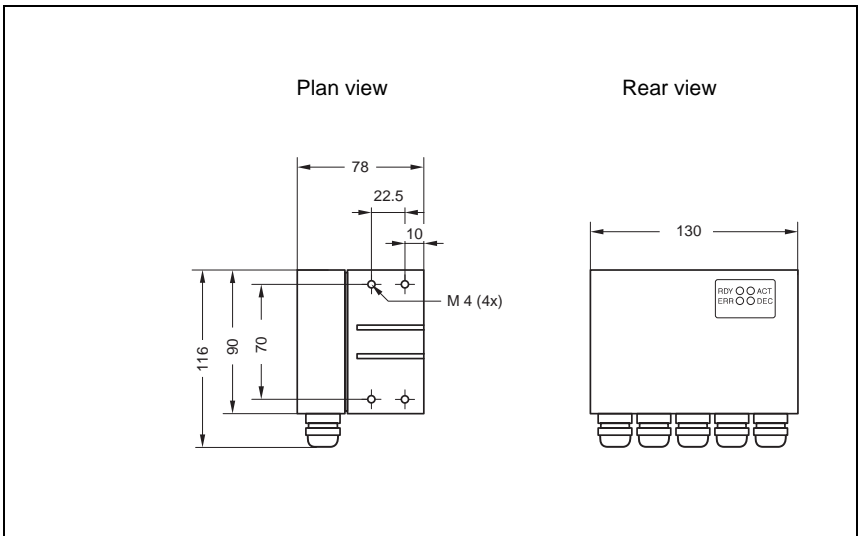


Figure 4.2: Dimensioned drawing MA 10

## 4.5 Optical Data

The range at which the bar code can be read by the BCL 40 (the so-called reading field) depends not only on the quality of the printed bar code but also on its dimensions and the incident angle of the scanner beam.

Therefore, above all, the module of a bar code is decisive for the size of the reading field.

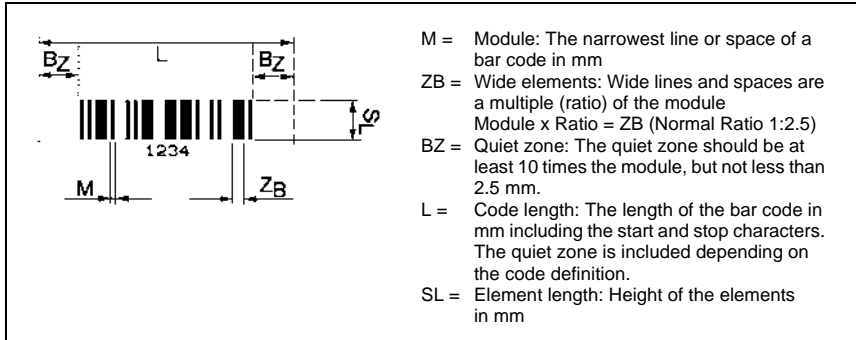


Figure 4.3: The most important characteristics of a bar code



### **Notice!**

*A rule of thumb: The smaller the module of the bar code is, the smaller the maximum reading distance and reading field width will be.*

➡ Therefore, when selecting a mounting location and/or the bar code label, take into account the different reading characteristics of the scanner with various bar code modules.

For different reading tasks, the BCL 40 is available in various versions, both as a raster scanner and as a single line scanner. The device specifications are given in the following table and accompanying graphic.

#### 4.5.1 Type overview

| Model           | Range (mm)  | Module/ resolution (mm) | Scanning rate (scan/s) | Scanner type (Sweep principle) | Part No.  |
|-----------------|-------------|-------------------------|------------------------|--------------------------------|-----------|
| BCL 40 R1 N 100 | 20 ...80    | 0.1 ... 0.5             | 1200                   | Raster                         | 500 29678 |
| BCL 40 S N 100  |             |                         |                        | Single line                    | 500 29679 |
| BCL 40 R1 M 100 | 0 ... 250   | 0.2 ... 1.0             | 1200                   | Raster                         | 500 26111 |
| BCL 40 S M 100  |             |                         |                        | Single line                    | 500 28920 |
| BCL 40 R1 F 100 | 50 ...500   | 0.3 ... 1.0             | 1200                   | Raster                         | 500 28168 |
| BCL 40 S F 100  |             |                         |                        | Single line                    | 500 28921 |
| BCL 40 R1 L 100 | 250 ... 700 | 0.5 ... 1.2             | 900                    | Raster                         | 500 28427 |
| BCL 40 S L 100  |             |                         |                        | Single line                    | 500 28922 |

Table 4.4: Type overview

#### 4.5.2 Sweep principle

##### **Raster (R1)**

8 parallel lines scan the label.

Areas of use:

- when the bar code is printed in the conveying direction ("picket fence arrangement")
- when reading through plastic sheeting or from reflecting surfaces
- when reading stationary objects

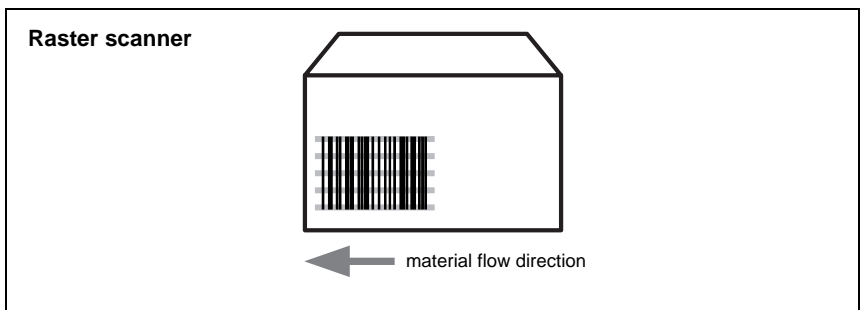


Figure 4.4: Sweep principle of the raster scanner



##### **Notice!**

*The scanning rate is distributed over 8 lines per scan, i.e. the scanning rate per raster line is 1/8 the total scanning rate.*

### **Single line (S)**

1 line scans the label.

Areas of use:

- when the bar code is printed in the conveying direction ("ladder arrangement")
- with bar codes having very short bar lengths

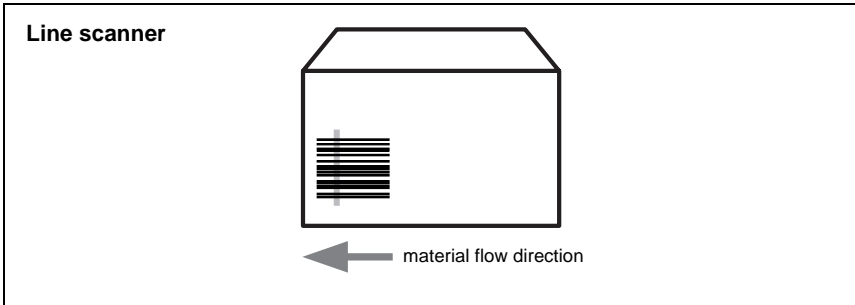


Figure 4.5: Sweep principle for the line scanner

## **4.5.3 Optics variants**

The BCL 40 is available with four different types of optics (N, M, F, L) that differ in range and resolution (see chapter 4.5.1 "Type overview").

### **Optic N:**

Zero to very short scanning ranges for very small modules.

### **Optic M:**

Zero to short scanning ranges for small to middle-sized modules.

### **Optic F:**

Zero to short scanning ranges for small to middle-sized modules.

### **Optic L:**

Middle to large scanning ranges with middle to large sized modules.

The following graphic displays the scanning curves of the various BCL models.



### **Notice!**

Please note that the actual scanning curves can vary due to factors such as label material, print quality, reading angle, print contrast, etc.



#### 4.5.4 Reading curves BCL 40 standard version

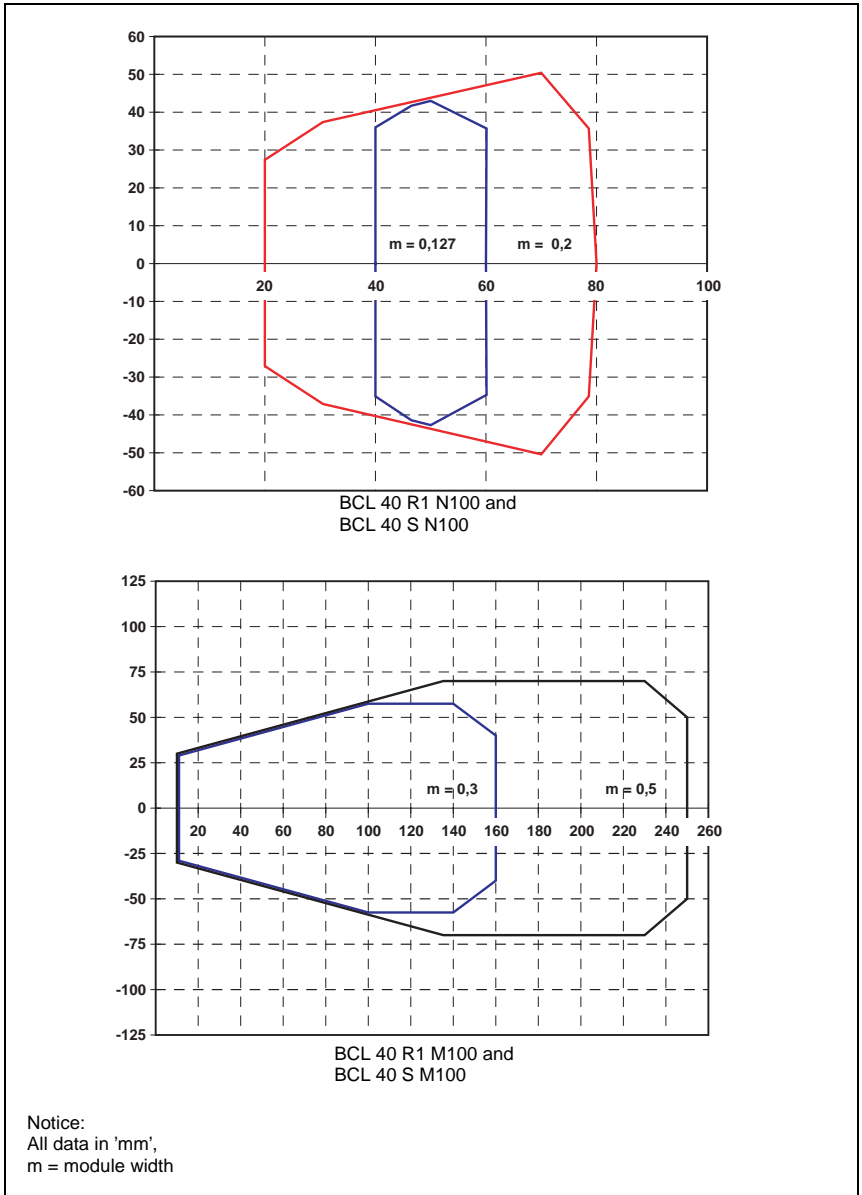


Figure 4.6: Reading curves BCL 40 standard version, optic variants N and M

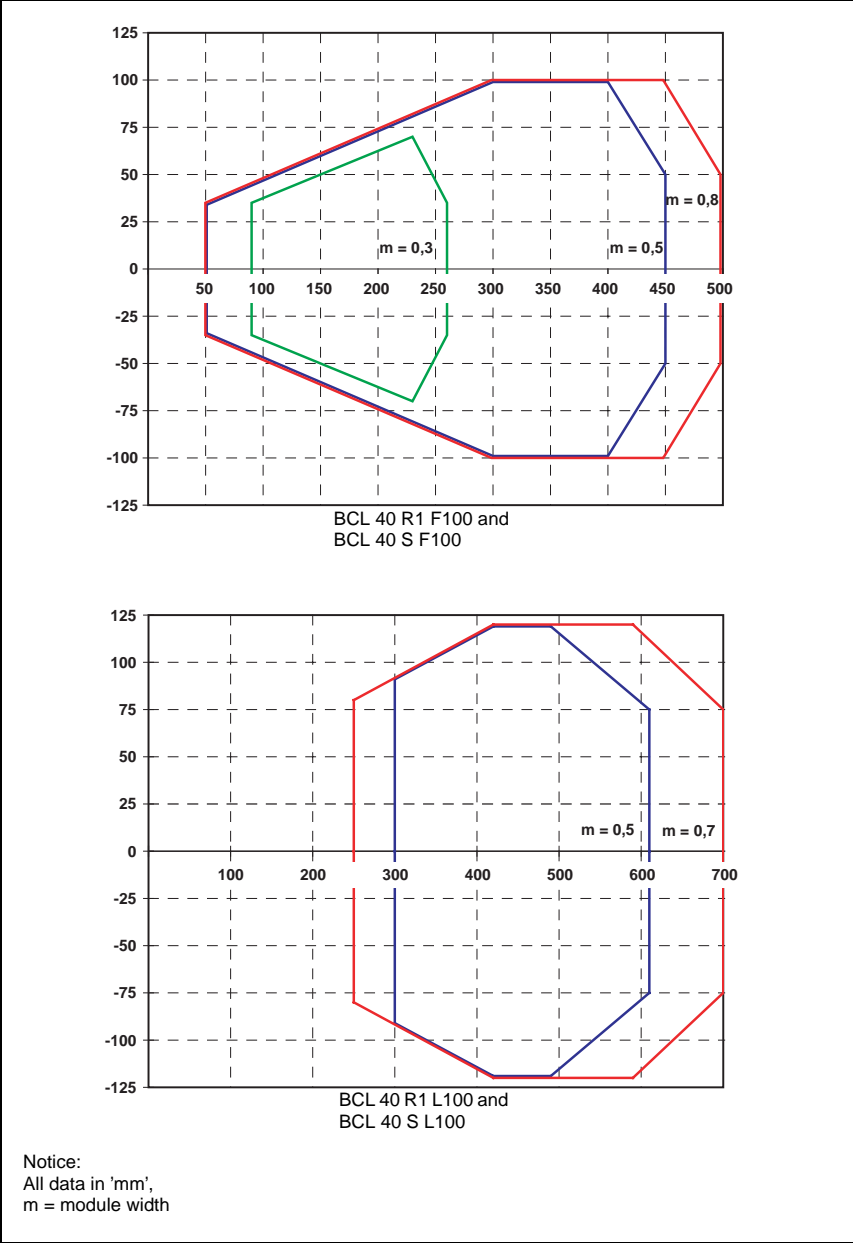


Figure 4.7: Reading curves BCL 40 standard version, optic variants F and L

#### 4.5.5 Reading curves BCL 40 with heating

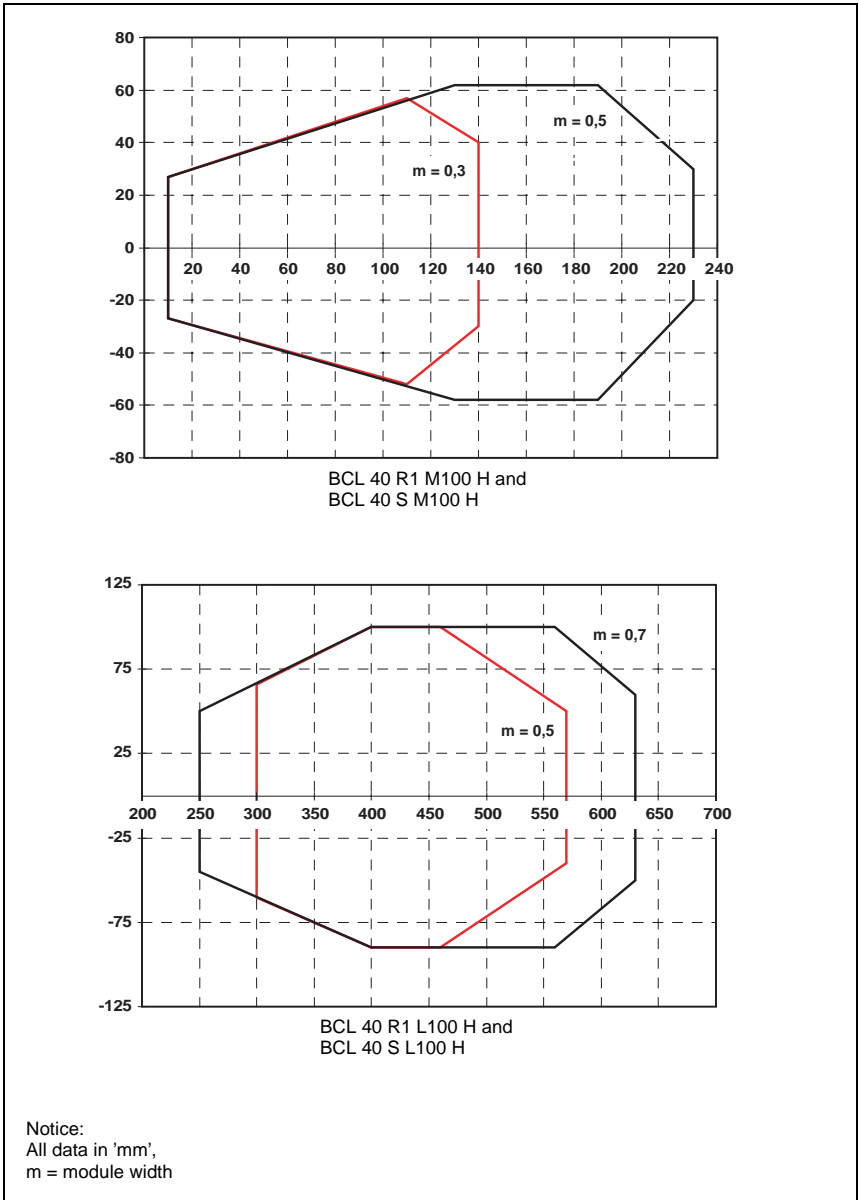


Figure 4.8: Reading curves BCL 40 with heating, optic variants M and L

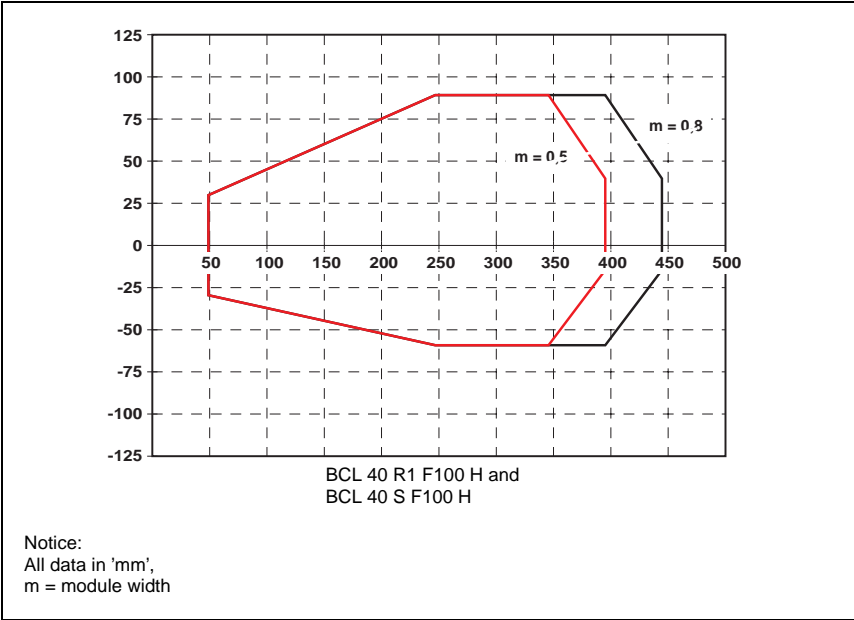


Figure 4.9: Reading curves BCL 40 with heating, optic variant F

## 5 Accessories / Order Designation

### 5.1 Accessories



**Notice!**

*Products from Leuze electronic GmbH & Co. can be ordered from any of the sales and service offices listed on the back page of this operating manual.*

#### 5.1.1 Bar code reader BCL 40

| Symbol          | Order No. | Short Description            |
|-----------------|-----------|------------------------------|
| BCL 40 R1 N 100 | 500 29678 | Raster scanner with N optics |
| BCL 40 S N 100  | 500 29679 | Line scanner with N optics   |
| BCL 40 R1 M 100 | 500 26111 | Raster scanner with M optics |
| BCL 40 S M 100  | 500 28920 | Line scanner with M optics   |
| BCL 40 R1 F 100 | 500 28168 | Raster scanner with F optics |
| BCL 40 S F 100  | 500 28921 | Line scanner with F optics   |
| BCL 40 R1 L 100 | 500 28427 | Raster scanner with L optics |
| BCL 40 S L 100  | 500 28922 | Line scanner with L optics   |

Table 5.1: Accessories/Order Designation BCL 40

#### 5.1.2 Connector and interface unit MA 10

| Symbol    | Order No. | Short Description  |
|-----------|-----------|--|
| MA 10 100 | 500 26110 | standard model,<br>multiNet Slave with host interface RS 485         |
| MA 10 110 | 500 26109 | standard,<br>with host interface RS 232                              |
| MA 10 120 | 500 27186 | standard,<br>active and passive operation with<br>host interface TTY |
| MA 10 130 | 500 27187 | standard, with host interface RS 422                                 |

Table 5.2: Accessories/Order Designation MA 10



**Notice!**

*All MA 10 units are supplied with an additional RS 232 service interface (9 pin Sub D).*

**5.1.3 Mounting accessories**

A wide range of mounting accessories are available for mounting the BCL 40 and MA 10.

***Mounting device BT 56***

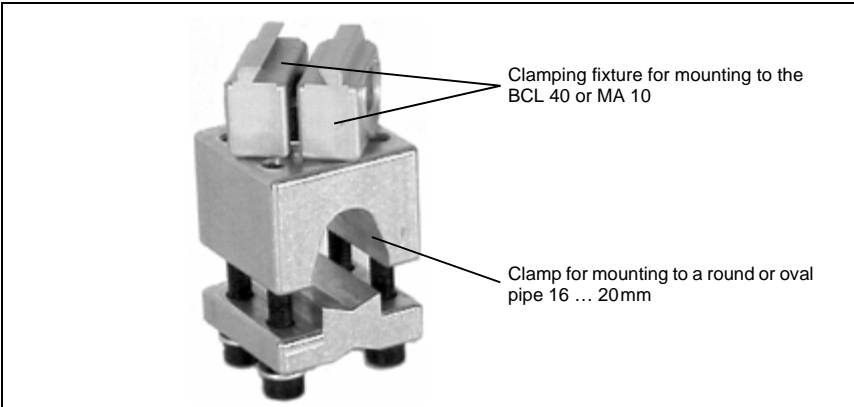


Figure 5.1: Mounting device BT 56

***Mounting device BT 57***

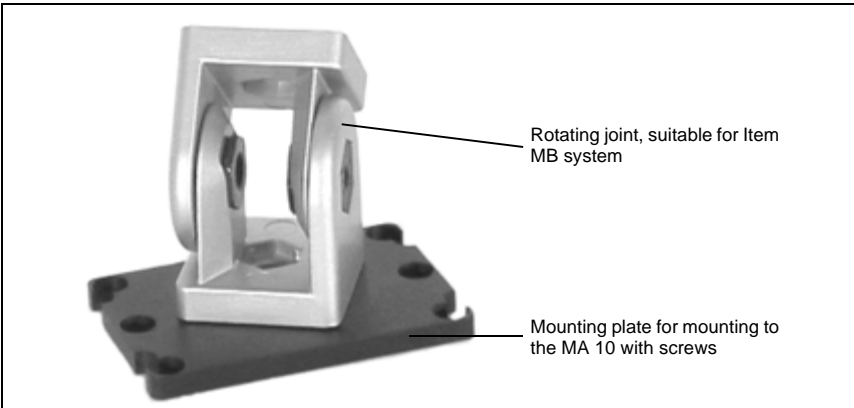


Figure 5.2: Mounting device BT 57

| Symbol | Order No. | Short Description   |
|--------|-----------|---|
| BT 56  | 500 27375 | Mounting kit with dovetail for mounting on round rods $\varnothing$ 16 ... 20mm |
| BT 57  | 500 27167 | Mounting kit suitable for ITEM MB system  |

### 5.1.4 Cable accessories



Figure 5.3: Connection cable between the BCL 40 and MA 10

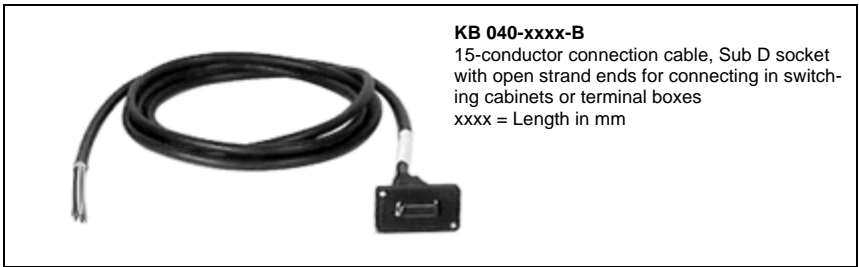


Figure 5.4: Connection cable between BCL 40 "stand alone"

| Symbol         | Order No. | Short Description  |
|----------------|-----------|--|
| KB 040-3000    | 500 26658 | 5-conductor connection cable BCL 40 / MA 10, Sub D plug and socket, length: 3m                 |
| KB 040-6000    | 500 29381 | as above, length: 6m   |
| KB 040-10000   | 500 29382 | as above, length: 10m  |
| KB 040-3000-B  | 500 29316 | 15-conductor connection cable BCL 40 "stand alone", open strand ends, Sub D socket, length: 3m |
| KB 040-6000-B  | 500 29317 | as above, length: 6m   |
| KB 040-10000-B | 500 29318 | as above, length: 10m  |

#### **Notice**

*The requirements for protection class IP 65 are fulfilled with this cable type only!*

### 5.1.5 Software

The "BCL Configuration Tool" software included in the delivery contents is a convenient tool which can be used to simplify operation and parameterisation.

## 6 Installation

### 6.1 Storage, Transportation

**Attention!**

*When transporting, 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 nameplate
  - accessories
  - operating manual

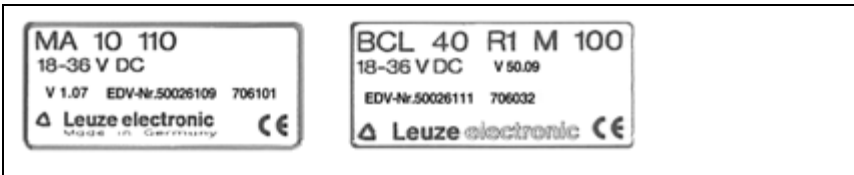
**Name plates**

Figure 6.1: Device nameplates MA 10 and BCL 40

- ✚ *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 local regulations regarding disposal and packaging.*

**Cleaning**

- ✚ *Clean the glass window of the BCL 40 with a soft cloth before mounting. Remove any remaining packaging from the device such as cardboard fibres and Styrofoam balls, particularly in the area of the connector socket.*

**Attention!**

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



## 6.2 Mounting

### 6.2.1 Types of Mounting

#### **Accessories**

A wide range of mounting accessories are available for mounting the BCL 40 and MA 10: for more information see chapter 5 "Accessories / Order Designation".

#### **Mounting the BCL 40**

There are two basic types of mounting arrangements for the BCL 40:

- using the dovetail groove and the corresponding mounting accessories (see figure 6.2)
- using the fastening threads on the back- and underside of the devices (see chapter 4.4 "Dimensioned drawings")

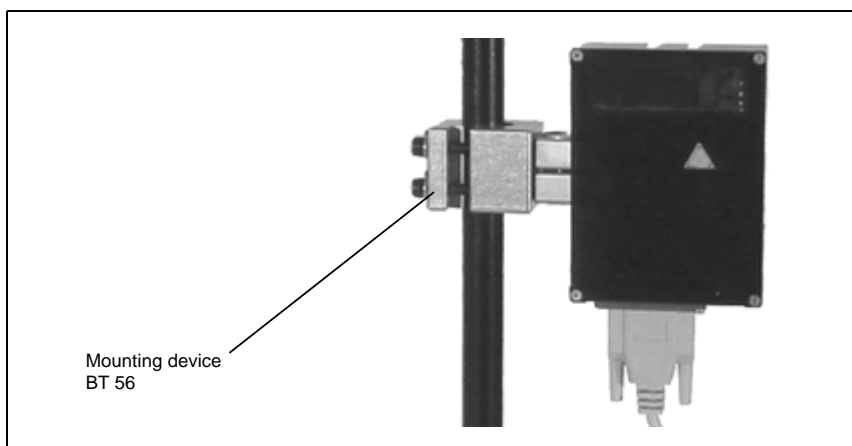


Figure 6.2: Mounting example BCL 40 "stand alone"

## Mounting BCL 40 and MA 10

You can fasten the scanner BCL 40 and connector unit MA 10 tightly together to form a single compact unit.

↳ Plug the two devices together at the 15 pin Sub D connector.

*Be sure that there is no dirt in the area of the seal (this guarantees an IP 65 protection class). Insert the two M4 x 30 screws included with the connector unit MA 10 into the countersunk drill holes on the bottom side of the MA 10, screw them into the corresponding threads in the BCL 40 and tighten them down.*

There are three basic mounting arrangements for the BCL 40 / MA 10 unit:

- using the dovetail groove of the BCL 40 or the MA 10 and the corresponding mounting accessories to the two upper fastening threads on the rear of the BCL 40
- using the four fastening threads on the underside of the MA 10 (see chapter 4.4 "Dimensioned drawings")



### Notice!

*The cable screw glands of the MA 10 can be set either on the right or the left side of the unit. Loosen the four Phillips screws on the back side of the MA 10, carefully lift off the cover, replace it into the desired position and tighten down the four screws again. Be careful not to damage the ribbon cable.*



Figure 6.3: Mounting example for the combined BCL 40 / MA 10 unit

### ***Independent mounting BCL 40 / MA 10***

Independent mounting of the BCL 40 and MA 10 is necessary when

- the available mounting depth is not sufficient for both devices, e.g. is less than 85 mm, or access to the mounting location of the scanner is difficult, but easy
- installation, commissioning and service are required, or
- the operating status LEDs on the back side of the MA 10 must be easily seen.

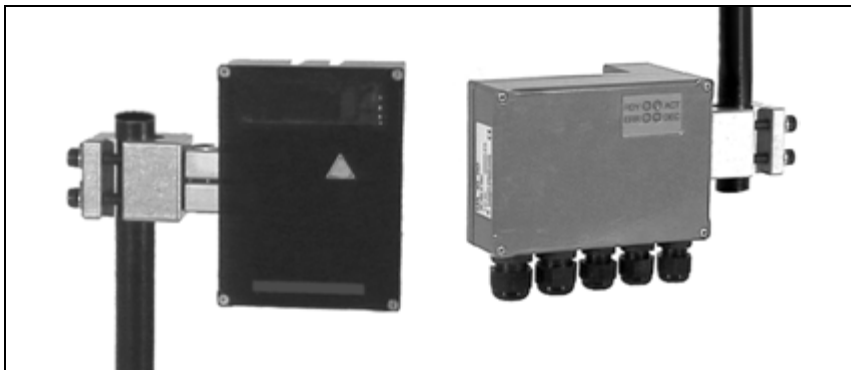


Figure 6.4: Mounting examples for the BCL 40 and MA 10 mounted independently

You can mount the individual devices in the following way as already described above:

- using the dovetail groove of the BCL 40 or the MA 10 and the corresponding mounting accessories
- using the fastening threads on the back- or underside of the devices
- the connector unit can additionally be mounted using two M5 screws into the threaded holes that are otherwise used for fastening the BCL 40. The threaded holes have M5 threads.

## 6.2.2 Device Arrangement

### **Selecting a mounting location**

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

- size, orientation, and position tolerance of the bar codes on the objects to be scanned
- the reading field of the BCL 40 in relation to the bar-code module width
- the resulting minimum and maximum reading distance from the respective reading field

For specific information, please refer to chapter "Optical Data" on page 20.



#### **Notice!**

*The best reading results are obtained when*

- the bar code is moved in a plane that is parallel to the reading window
- the reading distance lies in the middle area of the reading field
- high gloss labels or labels made from thermopaper are not used.

The minimum reading distance of a bar code scanner is often decisive when using label or packaging machines due to the proximity of the scanner and labels.

### **Zero-distance scanner**

The BCL 40 M 100 is a "zero-distance" scanner, i.e. it already has a reading field width of 70 mm at a reading distance of 10 mm (module = 0.5). Labels are also read directly at the scanner window. In practice, however, this can lead to scratching of the scanner window and should be avoided.



#### **Notice!**

*On the BCL 40, the beam is not emitted perpendicular to the cover of the housing, but with an angle of 10° towards the top. This angle is intended in order to avoid a total reflection of the laser in the case of glossy labels. For highly reflective surfaces, this angle may be widened by tilting the BCL.*

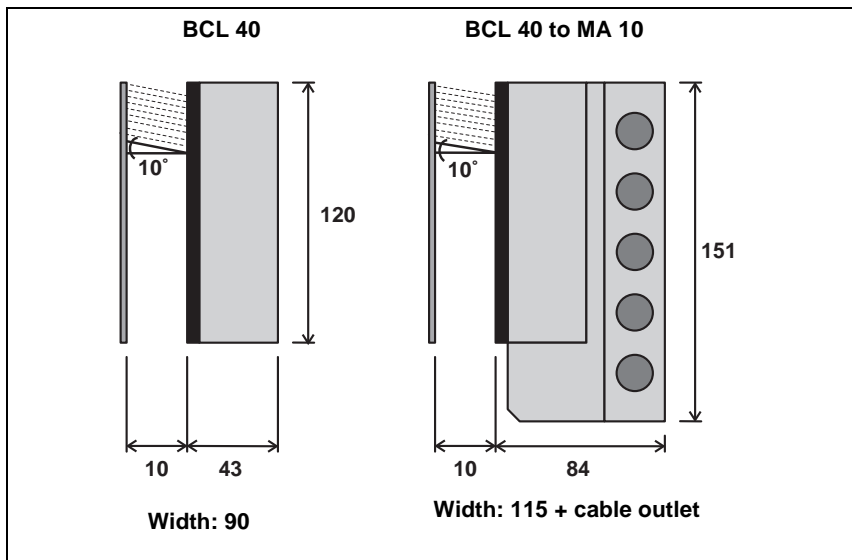


Figure 6.5: Minimum space requirements for installation

### ***Mounting location***

↳ *When selecting a mounting location, pay attention to*

- maintaining the required environmental conditions (humidity, temperature),
- possible soiling of the reading window due to liquids, abrasion by boxes, or packaging material residues,
- lowest possible chance of damage to the scanner by mechanical collision or jammed parts.

**Application example**

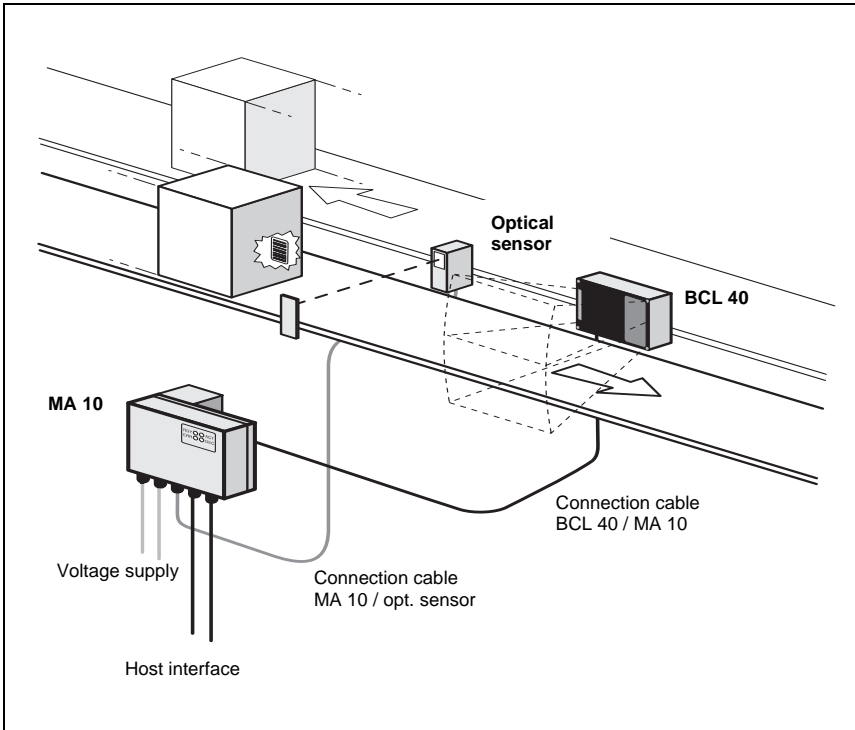


Figure 6.6: Application example "conveyor chain"

With its high scan rate of 1200 scans/s, the BCL 40 is particularly well suited for use with high-speed conveyor belts.

## 6.3 Connection



### **Attention!**

*Never open the device yourself, as this may compromise protection class IP 65.*

*Before connecting the device, be sure that the supply voltage agrees with the value printed on the nameplate.*

*Connection of the device and maintenance work while under voltage must only be carried out by a qualified electrician.*

*The power supply unit used to power the BCL 40 and MA 10 must have protected electrical separation by way of a safety transformer with double insulation according to DIN VDE 0551 (IEC 742).*

*Be sure that the earthing conductor is connected correctly. Error-free operation is only guaranteed when the device is properly earthed.*

*If faults cannot be corrected, the device should be removed from operation and protected against possible use.*

### 6.3.1 Connecting the BCL 40 for "Stand Alone" Operation

If you would like to connect the BCL 40 for "stand alone" operation, you must make a corresponding connector cable with a 15 pin Sub D plug (female) for the following connections:

- power supply of 18 ... 36VDC, 5W max. power
- host RS 232 interface, or RS 485 when operating as a "multiNet slave"
- a sensor connection for triggering a read process

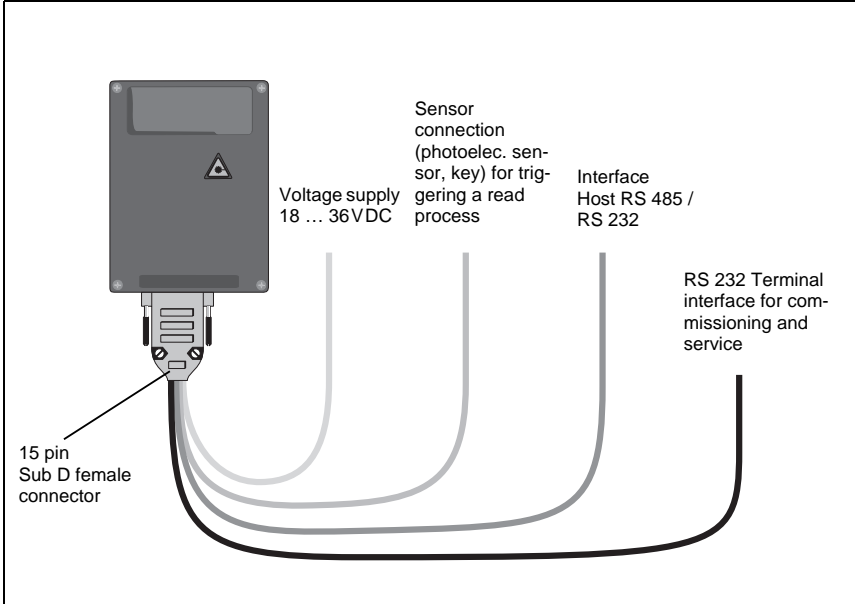


Figure 6.7: Connecting the BCL 40 for "Stand Alone" Operation



#### **Attention!**

*When using a normal 15 pin Sub D plug, the device only has a protection class of IP 54 instead of IP 65!*

*Therefore, use the original Leuze cable from the accessories list. These cables are fitted with a seal so that protection class IP 65 is maintained.*

#### **Switching inputs**

A read process can be triggered by applying a voltage of 12 ... 36VDC to the switched input connections "Sensor 1A" and "Sensor 1B". The switched input maintains an electrical separation of up to max. 250V.



### BCL 40 Sub D pin assignments

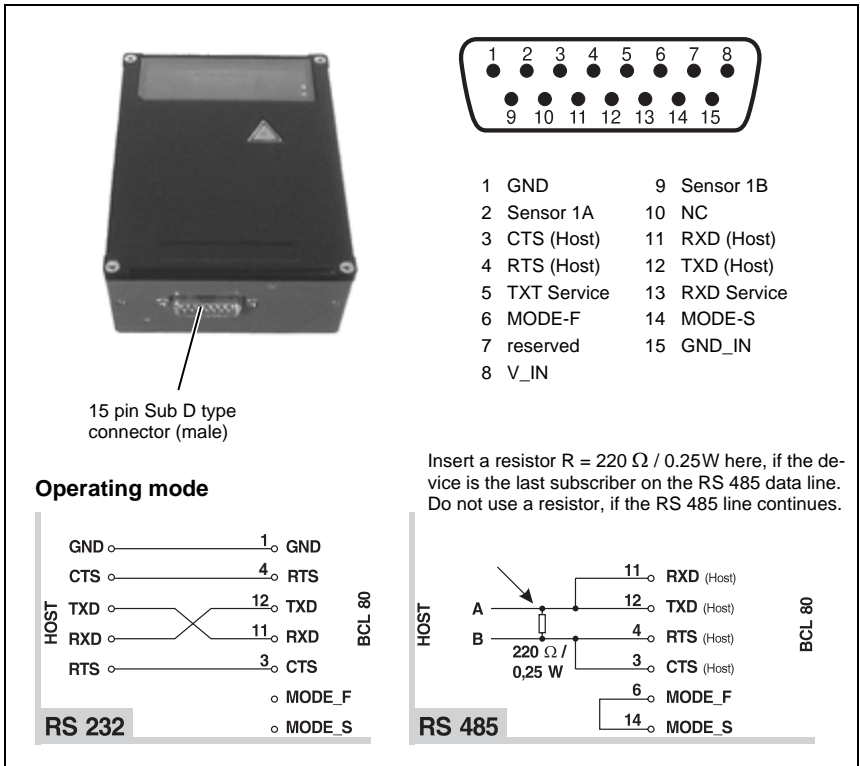


Figure 6.8: Connection diagram for the Sub D connector plug

**Wiring description**

|        |             |   |
|--------|-------------|---|
| Pin 1  | GND         | 0V signal reference potential (RS 232 / RS 485)   |
| Pin 2  | Sensor 1A   | switched input 1A, 12 ... 36VDC,<br>see figure 6.18 and figure 6.19 for wiring                |
| Pin 3  | CTS (Host)  | CTS signal, host interface RS 232 / RS 485 B  |
| Pin 4  | RTS (Host)  | RTS signal, host interface RS 232 / RS 485 B  |
| Pin 5  | TXD Service | used when MA 10 is connected /<br>without MA 10: service interface, standard protocol         |
| Pin 6  | MODE_F      | RS 232: open; RS 485: connect with MODE_S   |
| Pin 7  | reserved    | must not be used  |
| Pin 8  | V_IN        | supply voltage +18 ... 36VDC  |
| Pin 9  | Sensor 1B   | switched input 1B, 12 ... 36VDC,<br>see figure 6.18 and figure 6.19 for wiring                |
| Pin 10 | NC          | not used  |
| Pin 11 | RXD (Host)  | RXD signal, host interface RS 232 / RS 485 A  |
| Pin 12 | TXD (Host)  | TXD signal, host interface RS 232 / RS 485 A  |
| Pin 13 | RXD         | service used when MA 10 is connected /<br>without MA 10: service interface, standard protocol |
| Pin 14 | MODE_S      | RS 232: open; RS 485: connect with MODE_F   |
| Pin 15 | GND_IN      | supply voltage 0VDC   |

Table 6.1: Wiring description BCL 40

**6.3.2 Connecting the BCL 40 with the connector unit MA 10**

Connection of the BCL 40 is considerably easier when using the MA 10.

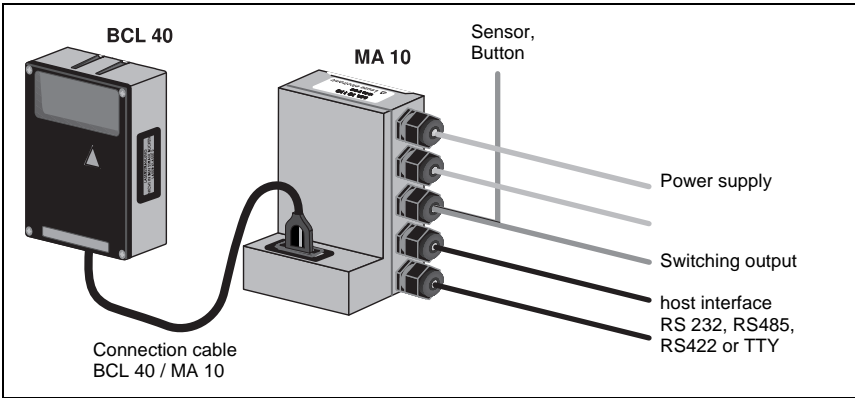


Figure 6.9: Connecting the BCL 40 with the connector unit MA 10

### **Open the MA 10 housing**

- ✚ Loosen the four Phillips screws on the back side of the MA 10 and carefully lift off the part with the electronics on it.

The two halves of the housing are now connected to each other only by the ribbon cable. You can now disconnect the ribbon cable from the electronic circuit board for better access, as shown in figure 6.10.

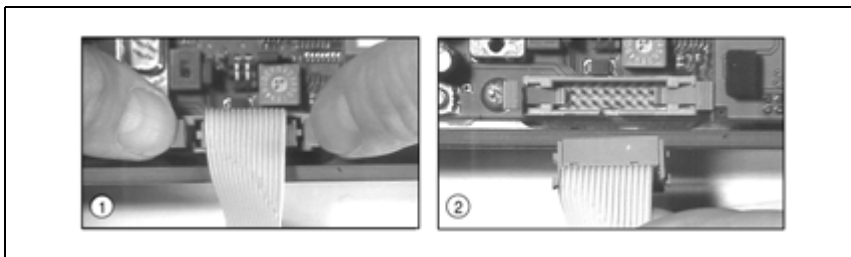


Figure 6.10: Disconnecting the ribbon cable inside the MA 10

- ✚ To disconnect the ribbon cable, carefully press down the two latches of the ribbon cable plug at the same time, as shown in figure 6.10 of ①.

The cable is now free (② in figure 6.10) and the half with the electronics and the connection terminal can be removed for unhindered connection.

- ✚ To reconnect the ribbon cable, insert the ribbon cable plug back into its socket, observing the correct orientation, until it securely latches.



#### **Notice!**

All electrical connections can be carried out on the terminal strip quickly and **without screwing down or soldering**. Wires with ferruled ends can be inserted directly into the terminal without depressing the clamping lever.

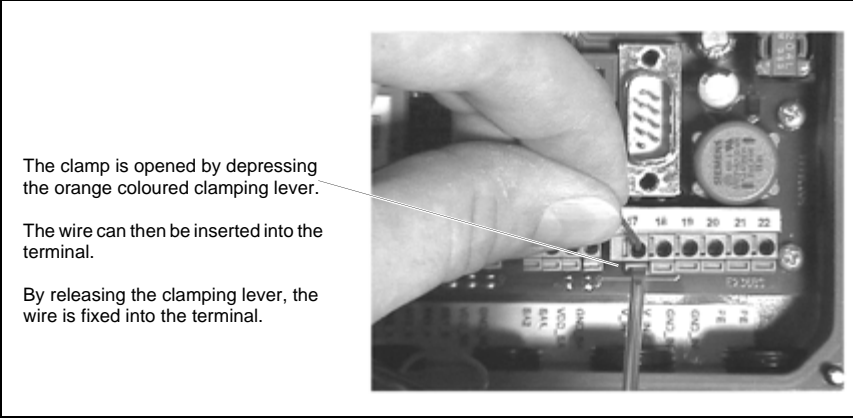


Figure 6.11: Wiring to the terminal strip without screwing down or soldering



**Attention**

*The pin assignment of the connection terminals depends on the inserted interface module. Leuze offers four modules which can be used with the serial interfaces RS 485, RS 232, TTY or RS 422. The terminal designations are printed on the module.*

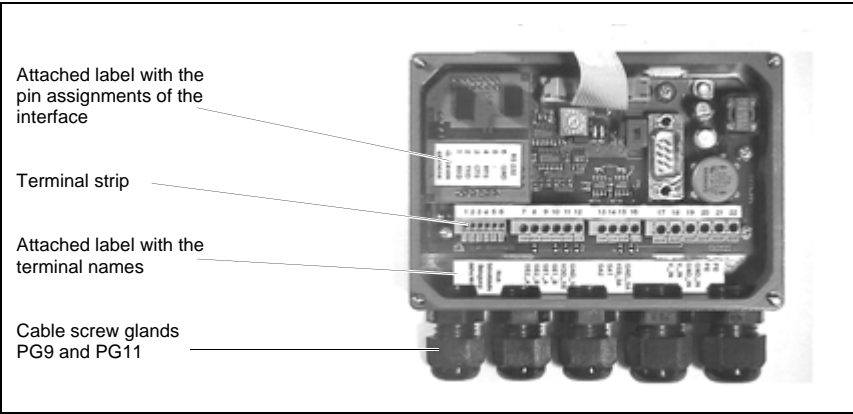


Figure 6.12: Position of the connections for the MA 10

### **Type overview**

The following table lists the MA 10 device types and which interface is installed.

|           |                  |
|-----------|------------------|
| MA 10 100 | RS 485 interface |
| MA 10 110 | RS 232 interface |
| MA 10 120 | TTY interface    |
| MA 10 130 | RS 422 interface |

↳ *Make the connections to the terminal strip as described below.*

### **Wiring description**

Terminals 1 through 6 are used depending on the type of interface:

| RS 232   |          | RS 422   |          |
|----------|----------|----------|----------|
| Terminal | Signal   | Terminal | Signal   |
| 1        | RXD      | 1        | TX+      |
| 2        | TXD      | 2        | TX-      |
| 3        | CTS      | 3        | RX+      |
| 4        | RTS      | 4        | RX-      |
| 5        | not used | 5        | not used |
| 6        | GND      | 6        | GND      |
| RS 485   |          | TTY      |          |
| Terminal | Signal   | Terminal | Signal   |
| 1        | 485A     | 1        | TX+      |
| 2        | 485A     | 2        | TX-      |
| 3        | 485B     | 3        | RX+      |
| 4        | 485B     | 4        | RX-      |
| 5        | GND      | 5        | not used |
| 6        | GND      | 6        | GND      |

**RS 485 interface**

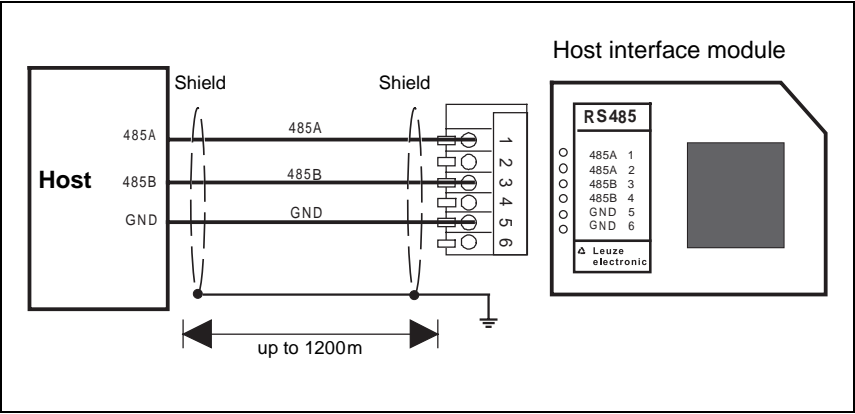


Figure 6.13: Connecting the MA 10 to a RS 485 Host

**RS 232 interface**

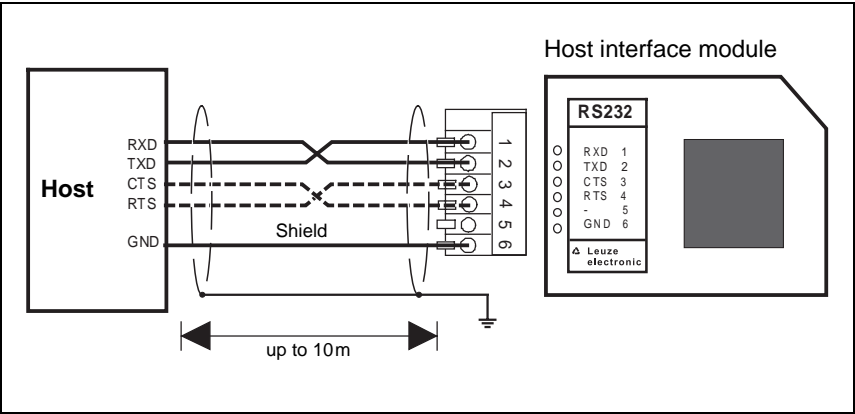


Figure 6.14: Connecting the MA 10 to a RS 232 Host



**Notice for connecting the RS 232 interface:**

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

### TTY interface

#### MA 10 active / Host passive

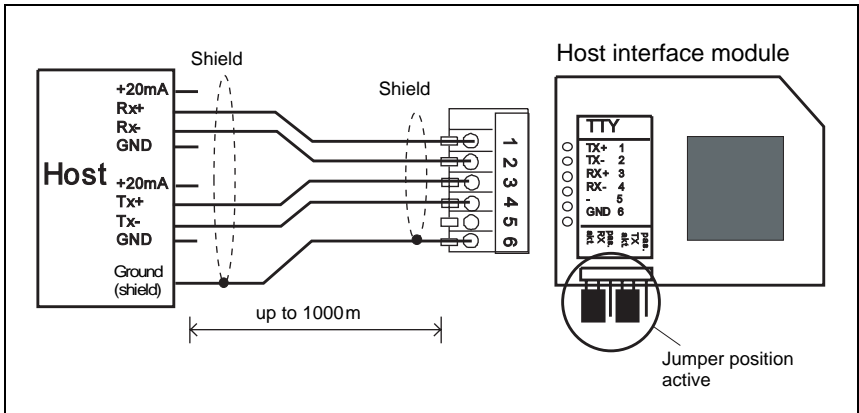


Figure 6.15: Connecting the MA 10 as active subscriber to a TTY Host

#### MA 10 passive / Host active

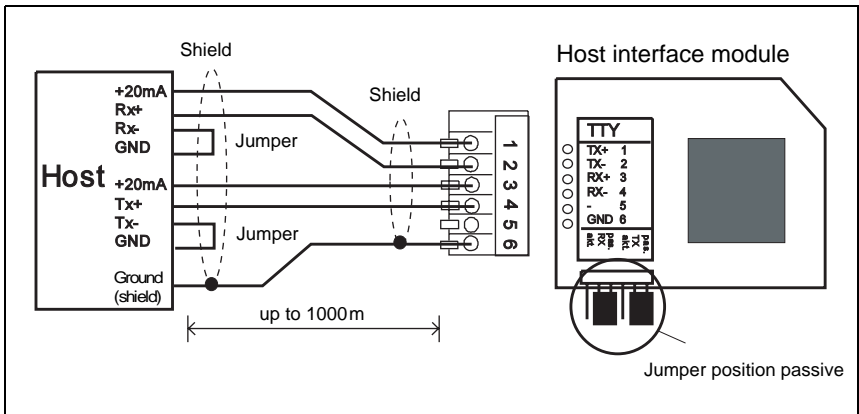


Figure 6.16: Connecting the MA 10 as passive subscriber to a TTY Host



#### Hints for connecting the TTY interface:

The active subscriber is the one which supplies the current (20mA).

Switching between active/passive on the host interface card is carried out using two jumper pairs, independent for transmit (Tx) and for receive (Rx).

*The jumpers for active/passive switching must always be changed in pairs (upper and lower jumpers in the same position). This switches the MA 10 host interface module power source and GND internally.*

*Mixed operation is possible (transmit active/receive passive or the opposite).*

*When switching from active to passive operation or the reverse, the wiring of the connection cable (pin order) changes.*

### RS 422 Interface

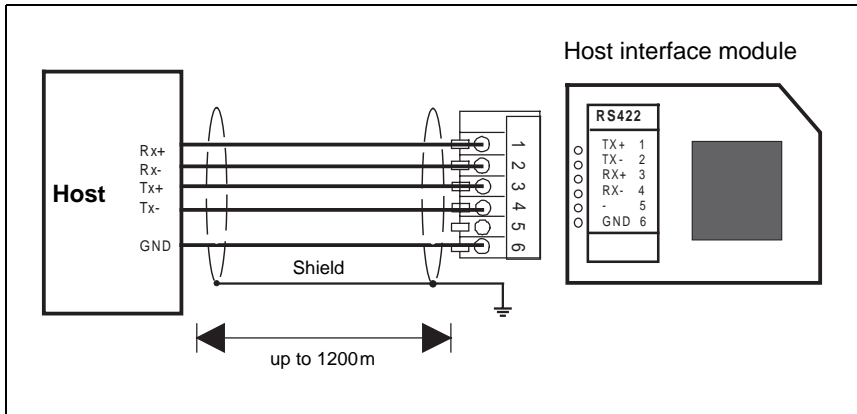


Figure 6.17: Connecting the MA 10 to a RS 422 Host

The additional pins are uniformly assigned for all MA 10 models and are described below.

### Switching inputs 1 and 2

#### Switching inputs

The MA 10 has two galvanically isolated switching inputs SE1 and SE2.

- Input voltage: 12 ... 36VDC/AC.
- Insulation voltage: 500V

Each switching input is supplied with bi-directional optical couplers and protective resistors. The switching voltage and GND can be externally applied or taken from the operating voltage VDD\_SE and GND\_SE.



| Terminal | Signal | Function   |
|----------|--------|--|
| 7        | SE2_A  | switching input 2, connection A                            |
| 8        | SE2_B  | switching input 2, connection B                            |
| 9        | SE1_A  | switching input 1, connection A                            |
| 10       | SE1_B  | switching input 1, connection B                            |
| 11       | VDD_SE | supply voltage, switching input,<br>equal to V_IN device   |
| 12       | GND_SE | supply voltage, switching input,<br>equal to GND_IN device |

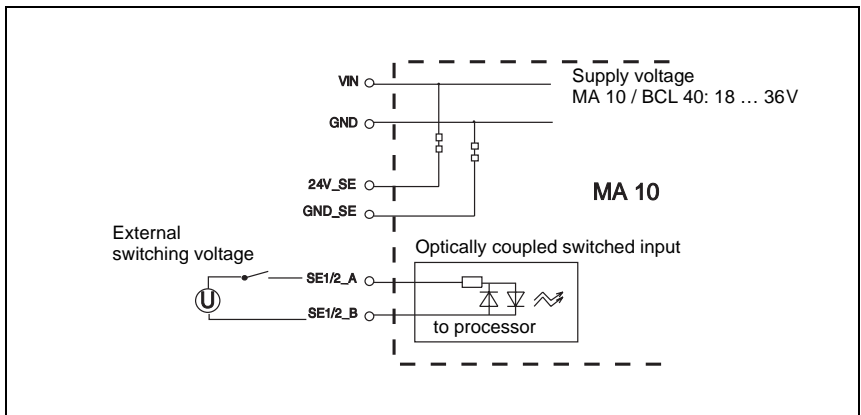


Figure 6.18: Connection of the switching input with an external switching voltage

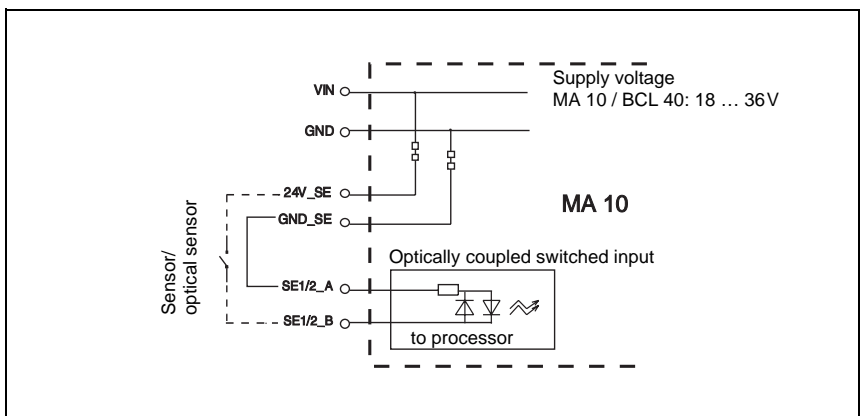


Figure 6.19: Connection of the switching input without an external switching voltage

**Switching outputs 1 and 2**

**Switching outputs**

The MA 10 comes standard with two switching outputs (SA1 and SA2) that can be programmed for various switching functions using the BCL software.

- Output voltage: 5 ... 48VDC
- Insulation voltage: 250V (only in combination with connection type b))
- Output current: I<sub>max</sub> = 500mA (at VDD\_SA = 5 ... 32V)  
I<sub>max</sub> = 300mA (at VDD\_SA = 32 ... 48V)

The switching voltage can be connected in two different ways:

- The operating voltage V\_IN is used as the switching voltage VDD\_SA (factory setting):  
VDD\_SA = V\_IN  
GND\_SA = GND\_IN
- An external voltage is connected as switching voltage (galv. decoupled)  
VDD\_SA V\_IN  
GND\_SA GND\_IN

| Terminal | Signal | Function   |
|----------|--------|--|
| 13       | SA2    | Switching output 2   |
| 14       | SA1    | Switch 1   |
| 15       | VDD_SA | external voltage supply for switched output<br>5 ... 48VDC |
| 16       | GND_SA | external voltage supply for switched output 0VDC           |

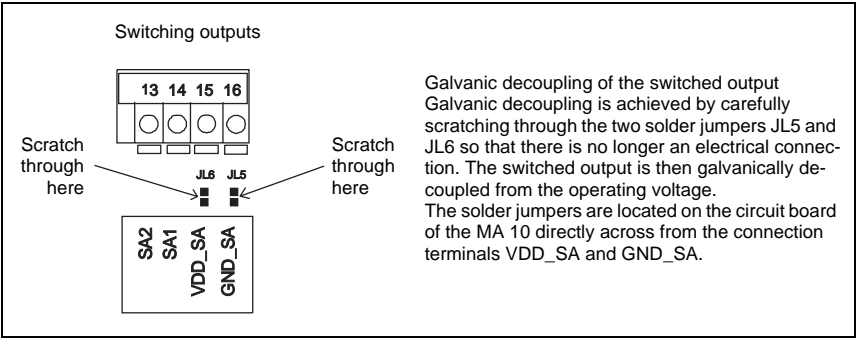


Figure 6.20: Position of the solder jumpers JL5 and JL6

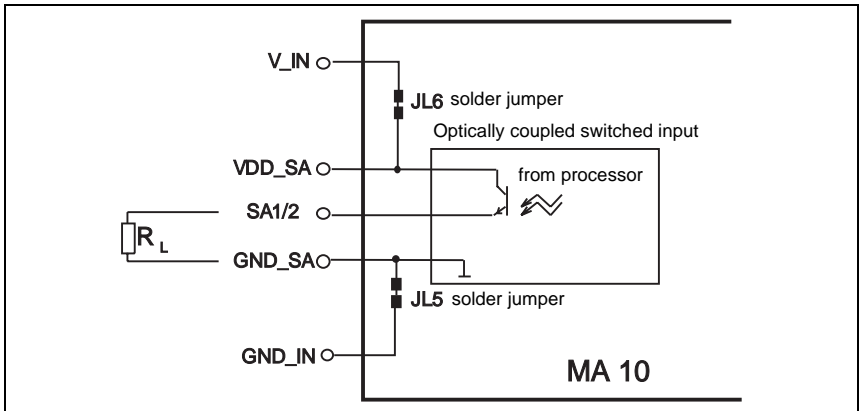


Figure 6.21: Operating voltage used as the switching voltage

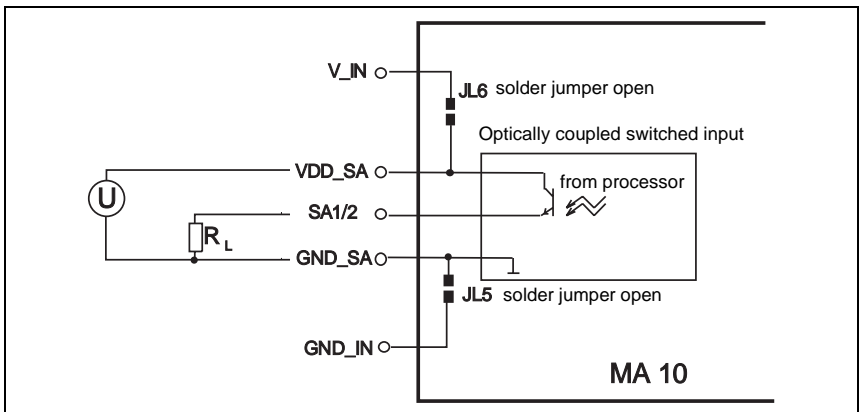


Figure 6.22: Switching voltage connected externally (galvanically decoupled)

### **Controlling the function of the switching outputs**

The function of the switching outputs can be controlled by removing the cover to the MA 10. Sitting directly next to the connection terminals for the switching outputs are red SMD-LEDs that illuminate when the respective switching output is in the HI state (log.1). Please note that the event which sets the switching outputs must be set and activated in the software setup of the BCL 40.

**Supply voltage**

| Terminal | Signal | Function                        |
|----------|--------|---------------------------------|
| 17       | V_IN   | Operating voltage +18 ... 36VDC |
| 18       | V_IN   | Operating voltage +18 ... 36VDC |
| 19       | GND_IN | Operating voltage 0VDC          |
| 20       | GND_IN | Operating voltage 0VDC          |
| 21       | PE     | Protective earth, grounding     |
| 22       | PE     | Protective earth, grounding     |

**6.3.3 Wire Lengths and Shielding**

The following maximum lengths for wires and the type of shielding to be used must be observed:

| Connection        | Interface       | Max. wire length | Shielding   |
|-------------------|-----------------|------------------|---|
| BCL 40 - MA 10    | RS 232 / RS 485 | 10m              | absolutely required, shield meshing                     |
| BCL 40 - Host     | RS 232 / RS 485 | 10m              | absolutely required, shield meshing                     |
| MA 10 - Host      | RS 485          | 1200m            | absolutely required,<br>flexible leads as twisted pairs |
| MA 10 - Host      | RS 422          | 1200m            | absolutely required,<br>flexible leads as twisted pairs |
| MA 10 - Host      | RS 232          | 10m              | absolutely required,<br>flexible leads as twisted pairs |
| MA 10 - Host      | TTY             | 1000m            | not required<br>loop resistance < 100                   |
| Switching inputs  |                 | 10m              | not necessary   |
| Switching outputs |                 | 10m              | not necessary   |

Table 6.2: Wire Lengths and Shielding

**6.4 Disassembling, Packing, Disposing**

***Repacking***

For later re-use, the device is to be packed so that it is protected against shocks and dampness. Optimal protection is achieved when using the original packaging.



***Notice!***

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

## 7 Commissioning

### 7.1 Measures to be performed prior to the first commissioning

- ↳ Before commissioning, familiarise yourself with the operation and configuration of the device(s)!
- ↳ Before switching on, recheck all connections and ensure that they have been properly made.

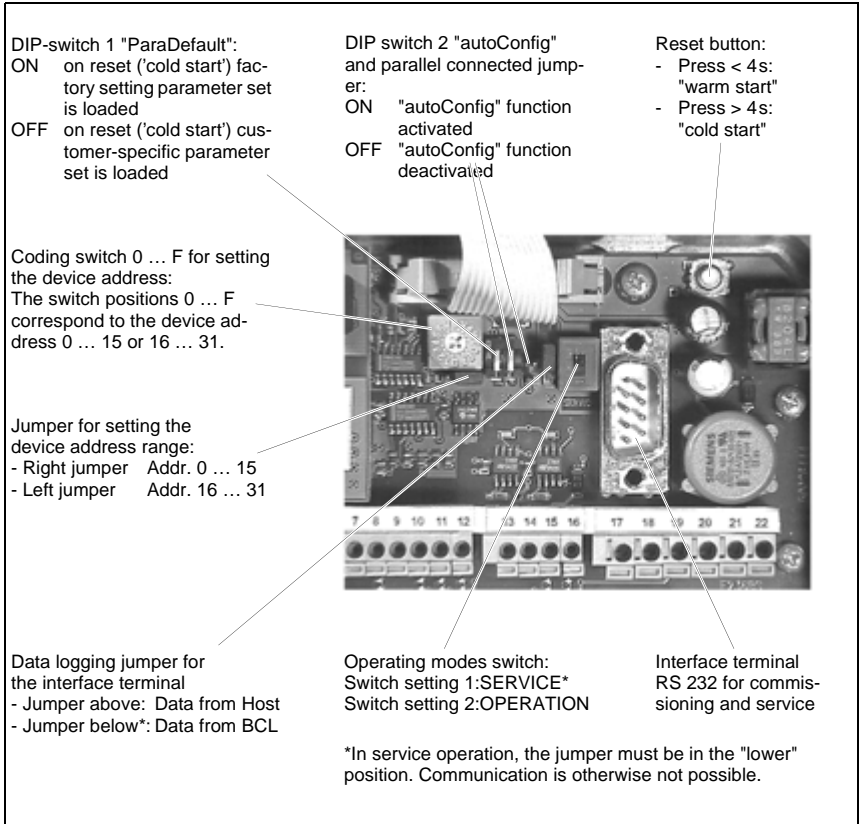


Figure 7.1: Control elements of the MA 10

### Setting the device address

The device address is set in the MA 10 using a rotary code switch.

✎ Set the device address on the code switch to:

- **0**, if the combined BCL 40 / MA 10 unit will not be operated in a network,
- **1 ... 31**, if several BCL 40 / MA 10 units will be operated in a network. Each multiNet plus network device must have a different device address assigned to it.  
If the RS 485 module is plugged in and connected to the multiNet master, the BCL 40 / MA 10 automatically becomes a multiNet plus slave device.

### Reset

Both devices can be reset using the reset button in the MA 10:

#### "Warm start"

If the reset button in the MA 10 is pressed for a short time (0.2 to 4 sec.), a so-called "warm start" will be carried out. This will reinitialise both devices and load the current parameter set into memory from the EEPROM.

#### "Cold start"

If the reset button in the MA 10 is pressed until all four LEDs on the back of the device illuminate (longer than 4 seconds), a so-called "cold start" will be carried out. This will reinitialise both devices and, depending on the DIP switch setting "ParaDefault", will either load the customer-specific parameter set or the factory default parameter set into memory.

DIP switch setting 1 "ParaDefault":

- OFF - the customer-specific parameter set is loaded.
- ON - the factory default parameter set is loaded.



#### Notice!

*The customer-specific parameter set is a backup copy of the current parameter set. It must be explicitly loaded using the command "PC01" after saving the BCL set-up and is only available in the MA 10 (not the BCL 40).*

*The customer-specific parameter set can then be loaded by executing a 'cold-start'. For specific information, see chapter 9.3.5 "'Online' Commands for Parameter Set Operations".*

✎ Set DIP switch 1 corresponding to the parameter set that should be loaded after a "cold start" has been initiated.

After resetting the device, all four LEDs on the back side of the MA 10 illuminate for approx. 1/2 second. During software initialisation, the green "RDY" (ready) LED blinks.

If the green "RDY" LED continuously illuminates, the initialisation is complete and the device is ready for operation.



**Notice!**

*If the BCL 40 is to be operated as a "stand alone" device, a reset is only possible via software. There is a small green LED inside the BCL 40 at the lower edge of the reading window that displays the operation readiness. The LED can also be used to monitor the operating status of the BCL 40 in "stand alone" operation. During a reset, the LED remains dark and continuously illuminates when the device is ready for operation.*

## 7.2 Function Test

### **"Power On" test**

After connecting the operating voltage, the devices carry out an automatic "Power On" function test. All four LEDs on the back of the MA 10 illuminate for approx. 1/2 second. During software initialisation, the green "RDY" (ready) LED blinks.

Once the green "RDY" LED continuously illuminates, the device is ready for operation.

### **Interface**

Proper function of the interface can be tested easiest in service operation using the service interface with the "BCL Configuration Tool" software and a notebook computer.

### **"Online" commands**

Using the "Online" commands, the important device functions can be checked, e.g. proper functioning of the laser( see chapter 9 "Communicating with the Device").

### **Problems**

Should problems occur during device commissioning, refer first to chapter 8.2. Should a problem persist after checking all electrical connections and settings on the devices and host, please contact a Leuze service office near you (see the back page of this operating manual).

## 7.3 Setting the Parameters

You have now commissioned the BCL. Usually, you will have to configure it before you can use it. Using the parameter options made available by the BCL, you may configure the BCL to suit your individual area of application. For instructions regarding the various setting options refer to chapter 9 or to the online help of the configuration software "BCL Configuration Tool".

In order to operate the BCL, it is typically sufficient to set code type and code length in accordance with the bar codes that are to be read. However, depending on the application, you will configure the switching inputs and outputs according to your requirements.

The setting of code type and code length is usually accomplished by using the program "BCL Configuration Tool", see chapter 9.2 "Graphic configuration using the "BCL Configuration Tool" software".

To understand what is happening during the parameter setting, the chapter 7.3.1 briefly explains the various parameter sets.

The setting of the parameter sets then takes place in the operating mode "service", which is described in chapter 7.3.2.

### **7.3.1 Parameter sets**

Three different parameter sets are maintained by the MA 10 when using the BCL 40 / MA 10 combined unit:

- the factory default parameter set
- the customer-specific parameter set
- the current parameter set

Before a parameter set is loaded into the BCL 40 processor memory, the validity of the parameter set is checked using checksums.

#### ***Factory default parameter set***

This parameter set contains the default settings made ex works for all BCL 40 parameters. It is permanently stored in the ROM of the BCL 40. The parameter set with the default settings is loaded into the memory of the BCL 40,

- the first time the device is commissioned after delivery
- after a "cold start" reset ("ParaDefault" switch ON)
- if the check sums of the current and the customer-specific parameter set are invalid.

#### ***Customer-specific parameter set***

In this parameter set, customer-specific settings for all device parameters can be stored. There are two ways to store the parameter set in the EEPROM of the MA 10:

- by copying a valid parameter set, i.e. an already stored and tested 'current parameter set' from the EEPROM of the MA 10.
- by copying (parameter "Download") a valid parameter set from the host computer (e.g. a PC or PLC).

The customer-specific parameter set is copied into the current parameter set:

- after a "cold start" reset ("ParaDefault" switch OFF)
- if the checksum of the current parameter set is invalid



### **Current parameter set**

In this parameter set, the current settings for all device parameters are stored. If the BCL 40 is in "stand alone" operation, the parameter set is stored in the EEPROM of the BCL 40. If an MA 10 is also used, the parameter set is stored in EEPROM of the MA 10 and a copy thereof in the EEPROM of the BCL 40. The current parameter set can be stored in three ways:

- by changing and storing the current parameter set using the integrated SETUP program of the BCL 40
- by copying (parameter "Download") a valid parameter set from the host computer (e.g. a PC or PLC).
- by means of an off-line setup with the program "BCL Configuration Tool"

The current parameter set is loaded into the memory of the BCL 40:

- each time the supply voltage is connected
- after a "warm start" reset, as well as a software reset

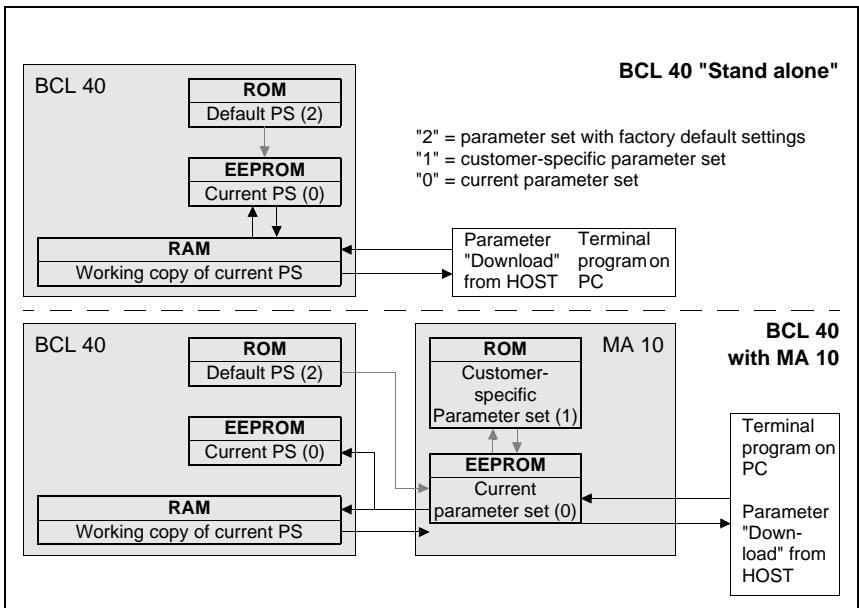


Figure 7.2: Block diagram storage concept for parameter sets



### **Notice!**

By storing all current and customer-specific values in the connector unit MA 10, a connected BCL 40 can be exchanged without difficulty since all parameters are maintained.

7.3.2 Service Operating Mode

Setting the required parameters is carried out easiest in the "service" operating mode.

**Interface terminal**

By switching the operating mode switch from operation (setting 2) to service (setting 1), the connection to the host computer is broken and the RS 232 service interface is activated.

The MA 10 offers a service interface for commissioning the read station in a network. The interface consists of a 9 pin SubD connector (male) and can be reached by removing the housing cover on the MA 10.

**Connection**

A PC or terminal can be connected to the MA 10 via the RS 232/V.24 serial interface and used to set the parameters of the BCL 40. The connection is made using a crossed RS 232 connection cable that establishes the RxD, TxD and GND connections. A hardware handshake via RTS, CTS is not supported at the service interface.

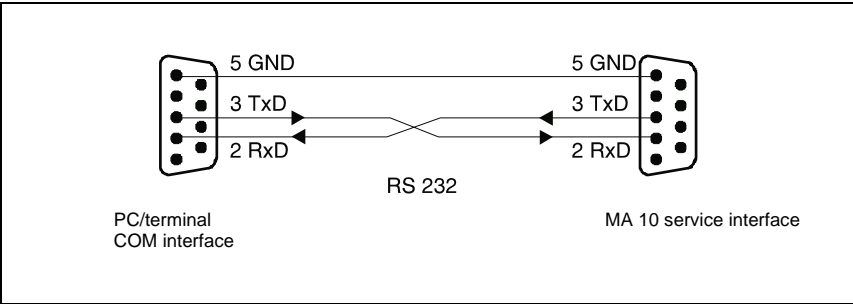


Figure 7.3: Connecting the service interface to a PC or terminal

For specific information, see figure 7.1 "Control elements of the MA 10" on page 51.

Communication to the host computer via the host interface is no longer possible. Switching to service mode results in a pre-set transfer protocol with the following parameters:

- transfer rate 9600baud
- no parity
- 8 data bits
- 1 stop bit
- prefix: STX
- postfix: CR, LF

| Construction of the data frame at the service interface |          |                 |              |              |
|---|----------|-----------------|--------------|--------------|
|   | Prefix 1 | Data            | Terminator 1 | Terminator 2 |
| ASCII   | STX      | e.g.: "CODE"    | CR           | LF           |
| HEX   | 02h      | 43h 4Fh 44h 45h | 0Dh          | 0Ah          |

### ***Wiring description***

The 9 pin Sub D RS 232 Terminal connector (male) has the following pin assignments:

|       |          |   |
|-------|----------|---|
| Pin 1 | NC       | not used  |
| Pin 2 | RXD      | receive signal of the RS 232 service interface  |
| Pin 3 | TXD      | transmit signal of the RS 232 service interface |
| Pin 4 | NC       | not used  |
| Pin 5 | GND      | signal reference potential 0VDC                 |
| Pin 6 | RXD_Host | receive signal of the host interface            |
| Pin 7 | NC       | not used  |
| Pin 8 | NC       | not used  |
| Pin 9 | reserved | for service purposes only                       |

Using a PC and a terminal program, the set-up program of the BCL 40 can be called, online commands sent and data received via this interface terminal.



### ***Notice!***

*In setting 2 ("operation") of the operating mode switch, the terminal connector can be used as a data monitor. In this case, data sent from the BCL 40 (jumper in figure 7.1 in lower position) or data received from host (jumper in figure 7.1 in upper position) can be logged. The data protocol is set by the host interface in the latter case.*

### ***Configuration software***

Leuze offers a convenient program "BCL Configuration Tool" for setting the required device parameters (see chapter 5 "Accessories / Order Designation").

## **7.3.3 Setting Parameters "Offline"**

### ***Setting parameters***

The parameters are programmed on a PC without direct connection to the BCL 40 ("Offline" programming) and saved in a file (parameter file).

### ***Downloading parameters***

After successful programming, the parameters are loaded into the BCL 40 (parameter "Download"). This causes the required parameters to be transferred from the host computer, or a computer connected to the interface terminal of the MA 10, to the BCL 40 or MA 10, respectively.

### 7.3.4 Setting Parameters "Online"

The other possibility for setting the required operating parameters of the BCL 40 is through "Online" programming via the integrated, two-language set-up program (English, German) in the BCL 40.

#### ***Setup program***

Using a PC (notebook) connected to the interface terminal, the menu-driven set-up program can be called while in the service operating mode.

"Online" commands can then be directly entered that query data or carry out a software reset.

Communication is carried out using a terminal program or more conveniently using the Leuze configuration program.

A detailed description of the setup program along with all parameters which can be set, as well as the most important "Online" commands can be found in chapter 9.

### 7.3.5 Setting the Bar Code Parameters Using "autoConfig"

The parameters of the bar codes which are to be read can be easily set using the function "autoConfig".

In order to check the programmed bar codes, the BCL 40 should be connected to a data terminal. The detection of the desired bar code(s) can be checked on the terminal.

#### ***Manual or "Online" activation***

- The "autoConfig" function is activated on the MA 10 using DIP switch 2 (see figure 7.1 for the location of the DIP switch).
- The "autoConfig" function can be activated and deactivated via the serial interface (host or service interface) using the "Online" commands 'CA+' (activate) and 'CA-' (deactivate).

Details of "Online" commands can be found in chapter 9.

If "autoConfig" is active, the ERR LED and RDY LED on the MA 10 alternately blink.

#### ***Setting parameters***

After activating the "autoConfig" function, the BCL 40 can read from one to eight example labels containing the bar codes which are to be read. The BCL 40 decodes the labels and displays, via the interface, the code type, the number of decoded characters and the character itself.

#### ***Number of labels to be decoded***

While "autoConfig" is active, have the BCL 40 read as many labels in row as it will later during a reading cycle when in normal operation. The number of labels can be set from "Set Code" in the submenu "Decoding" of the setup program. The number of labels is limited to 8 when using the "autoConfig" program.

***Code type and No. of characters of the label to be decoded***

The BCL 40 evaluates the number of labels, and at the same time, the code type and number of characters. This corresponds to the programming of the code types in the submenu "Decoding / Select Code Type" of the setup program.

***Normal state of the MA 10 switched input SE1***

The state (high or low) which is present at the switched input SE1 while the "autoConfig" function is active is taken as the new normal state for this switched input. This corresponds to the function "Inversion" in the submenu "Switched Inputs and Outputs / Switched Input Decoding (S1)" of the Setup program.

***Store parameters***

When the "autoConfig" program is deactivated, the programmed parameters are stored and copied into the current parameter set.

**Before** deactivating the "autoConfig" function, please remove any labels from the scanning area of the BCL 40 since the new code parameters otherwise will not be stored properly.

# 8      Operation

## 8.1    Display Elements

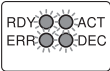
On the back side of the MA 10, there are 4 LEDs which display the momentary operating status.

| LED | Colour | Meaning             |
|-----|--------|---------------------|
| RDY | green  | Ready               |
| ERR | yellow | Error               |
| ACT | red    | Scanner active      |
| DEC | green  | Decoding successful |

### Status conditions of the LEDs



- All four LEDs illuminate
- for approx. 0.5 second after connecting the operating voltage.
  - after accepting a "cold start" reset (> 4s) up until the reset button is released.



- All four LEDs blink
- if the connection between the MA 10 and BCL 40 is interrupted.



- RDY blinks
- during the "Power On" function test.



- RDY illuminates
- when the devices are ready.



- ERR illuminates
- if a hardware error is encountered after the initialisation phase or in the case of a serious software error.



- RDY and ERR blink simultaneously
- when the setup program is activated.
- Notice: No read operations can be carried out.



- RDY and ERR blink alternately
- when the "autoConfig" function is activated by setting the corresponding DIP switch.
  - when a reference code is defined (Teach-In).



- ACT illuminates
- while the scanner is active, i.e. when the laser is in operation.



- ACT blinks
- if a warning is output during the 'autoControl' function.



- DEC illuminates
- for approx. 0.5 second after successfully completing a decoding process.

## 8.2 Important Functions During Operation

The BCL 40 has a function which automatically monitors the reading quality as well as the quality of the bar code label.

### ***"autoControl" function***

When the "autoControl" function is active, the BCL 40 constantly compares the total number of scans with the number of decoded scans. If the number of decodable scans falls below a user defined percent of the total scans, the MA 10 outputs a warning:

- the ACT LED blinks.
- a warning symbol can be output to the host.
- a switched output can be controlled.

A detailed description of all adjustable parameters can be found in chapter 9.

## 8.3 Error Handling

Errors are visibly indicated on the MA 10 via the ERR LED (see chapter 7.2 "Function Test").

Further error, warning and status messages are transferred via the host interface or the terminal interface.

### ***Types of errors***

Errors are divided up into the following types:

- Warnings
- Serious errors

### ***Warnings***

Warnings indicate temporary operating faults which do not effect the proper functioning of the device.

### ***Serious errors***

Serious errors impair the proper functioning of the device. The device must be reinitialised.

### ***Troubleshooting***

Isolated warnings can be ignored, since the BCL 40 will continue to function properly.

Following a serious error, you should reinitialise the BCL. It will then usually again function properly. If a hardware problem is present, the BCL 40 will not reinitialise.

Warnings and errors which occur frequently can be corrected easiest using the "BCL Configuration Tool" configuration and control software.

If you cannot correct faults and errors with the software, please contact a Leuze electronic sales office or service facility. For addresses, please refer to the back page of this operating manual.

## 9 Communicating with the Device

Device parameters can be set via commands or using the easy-to-use "BCL Configuration Tool" control software.

### 9.1 Installation of the "BCL Configuration Tool" software

✚ Place the installation CD in your CD drive.

✚ Call up the installation file (e.g. Setup.exe)

The following window appears:

#### **Installation window**

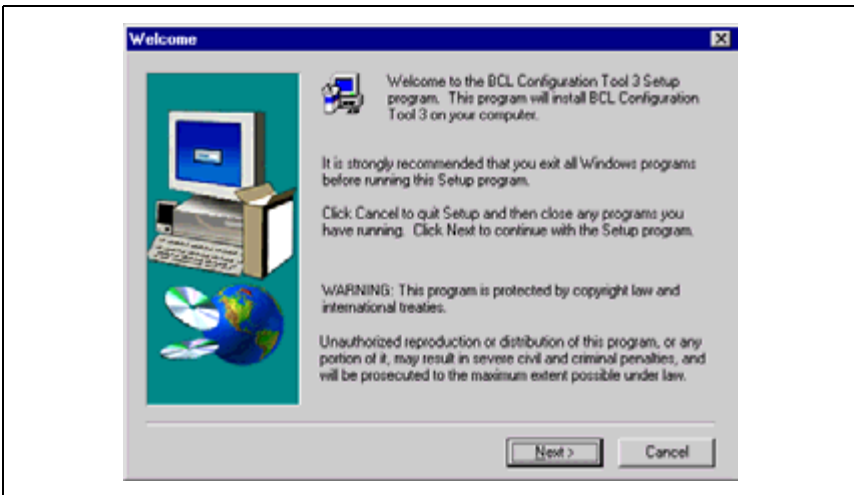


Figure 9.1: Installation window

✚ Confirm the following licence agreement and select the installation path in the following window:



### *Installation directory*

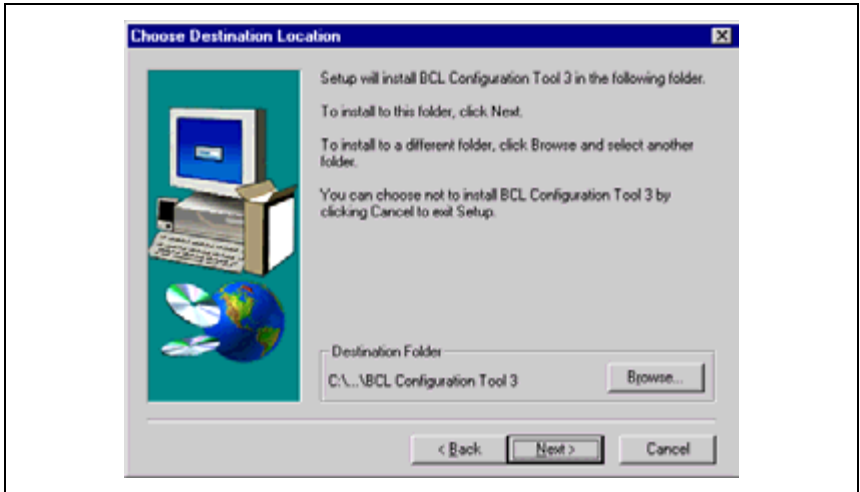


Figure 9.2: Installation directory

☞ *Confirm your entry with Continue, then follow the installation routine.*

For further details please refer to online help of the "BCL Configuration Tool" software.

## **9.2 Graphic configuration using the "BCL Configuration Tool" software**

In the following, you will find an overview and brief explanation of the adjustment options offered on the individual tabs.

9.2.1 Code menu

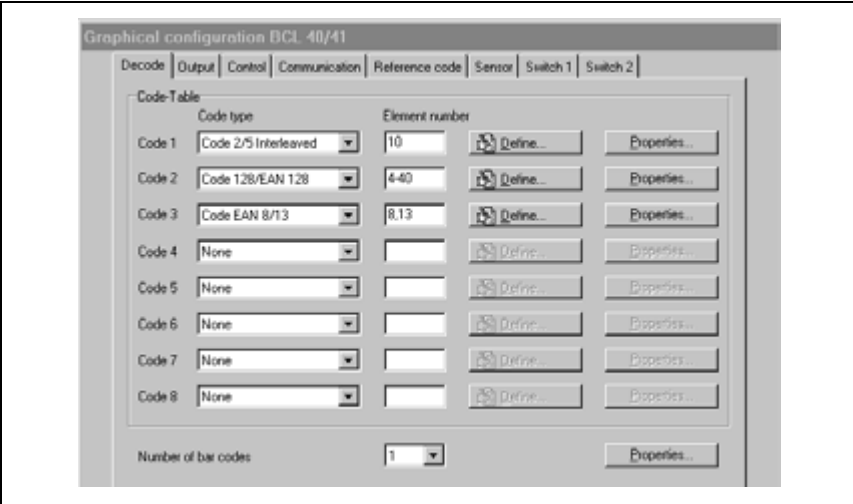


Figure 9.3: "Decode" menu, standard setting

| Option              | Explanation  |
|---------------------|--|
| Code table          | <p>Here, the codes which are to be decoded are set.</p> <p>As of software version V51.03 of BCL 40, the codes depicted above are enabled by default. We recommend enabling only the code types which are to actually be read with the corresponding element numbers.</p> <p><b>Notice:</b></p> <p>Code1 must always be selected. If multiple code types are to be used, set in sequential order: Code1, Code2...</p> |
| Element number      | <p>In the field Element number, up to 3 element entries may be entered. An area is represented by a dashed line: e.g. 4-40 digits.</p> <p>With 2 or 3 different element entries by a comma: e.g: 8,13 digits</p> <p>Both are possible as well: e.g.: 4-10,20 digits</p> <p><b>Notice:</b></p> <p>If the code EAN128 is to be read, 3 additional digits are to be set for the code identifier.</p>                    |
| Properties          | <p>Behind the "Properties" button, to the right of the respective code, the code-specific settings, such as the check digit, can be selected.</p>  |
| Number of bar codes | <p>Here, the number of the bar codes to be decoded within a read cycle (one reading gate) is set.</p>  |



**Attention!**

*Due to its internal design (hardware-ASIC-decoding), only one double-width code may be enabled for the BCL40.*

*Double-width codes are the codes Code 2/5 Interleaved, Code 39 and Codabar.*

*This means that only one of these three code types may be enabled!*

**Properties of the Code menu**

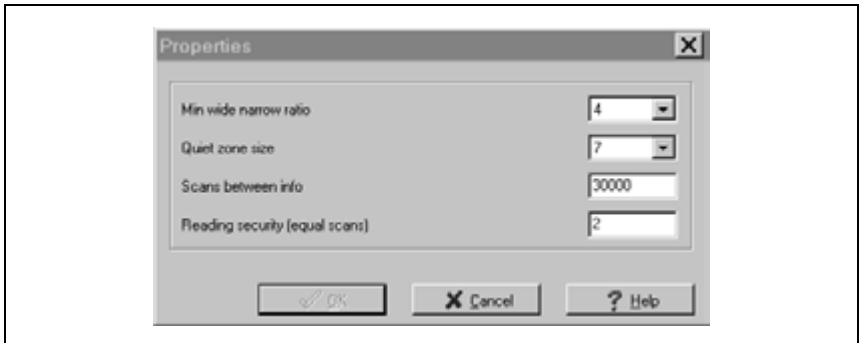


Figure 9.4: Properties of the Decode menu, standard setting

| Option                         | Explanation   |
|--------------------------------|---|
| Min wide narrow ratio          | This value may be changed only in special cases!  |
| Quiet zone size                | <p>Quiet zone: the area to the left and right of the bar code</p> <p>Module: width of the narrowest line in the bar code</p> <p>According to the code specifications, each bar code must have a quiet zone which is 10x as wide as the module of the bar code.</p> <p>Ex: for a code having a module of 0.5mm, 5mm blank space must be present at both the left and right of the code.</p> <p>By default, the scanner checks the a quiet zone which is 7 times greater than the module. This means that 7x or greater is o.k.</p> |
| Scans between info             | Number of scans which return no decodable data for a given label which must be performed before further data are classified as belonging to a different label. In this way it is possible to differentiate between sequential labels with identical data. This setting does not need to be changed in normal use.   |
| Reading security (equal scans) | Specifies how often a code must be decoded before the result is valid and output. This value can be increased for inspection and test purposes.   |

9.2.2 Output menu

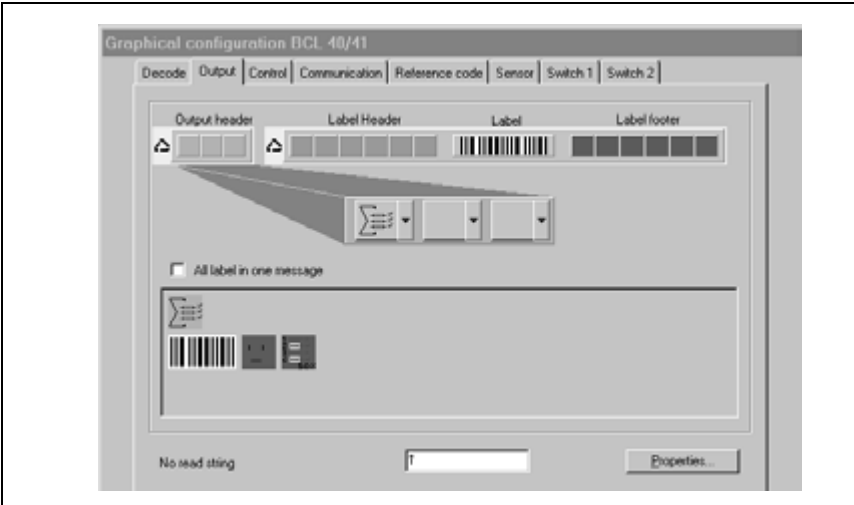


Figure 9.5: "Output" menu

| Option                    | Explanation  |
|---------------------------|--|
| Output header             | Select from the options listed below.<br>The output header is sent in a separate message before the read result.   |
| Label header              | The Label header is set directly before the code data.   |
| Label footer              | The label footer is appended directly to the code data.  |
| All labels in one message | If this item is activated, all read codes are sent together with the output header in a complete message.<br>-> The structure of this message string is depicted symbolically in the preview window. |
| No read string            | This character is set for each unrecognised bar code. Multiple characters (= string) may be entered here. Up to 20 characters are possible.  |
| Properties                | Set the desired formatting modes and formatting characters as necessary.   |

### 9.2.3 Control

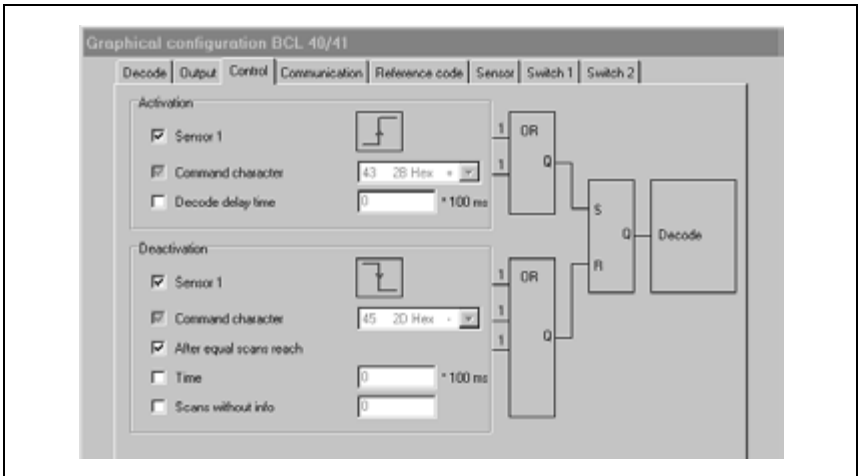


Figure 9.6: "Control" menu, standard setting

| Option             | Explanation   |
|--------------------|---|
| Activation         |   |
| Sensor 1           | If this item is selected, the scanner can be activated via its switching input 1 (= trigger start reading gate).  |
| Command characters | The standard online character for the trigger start is the "+" character. This character can be changed only via the tree structure.                              |
| Decode delay time  | This point is usually used only for test purposes. After the time set here has passed, the scanner automatically reactivates itself following a reading gate end. |
| Deactivation       |   |
| Sensor 1           | This item changes together with switching input 1 upon "Activation".  |
| Command characters | The standard online character for the trigger end is the "-" character. This character can be changed only via the tree structure.                                |

| Option                  | Explanation  |
|-------------------------|--|
| After equal scans reach | If this item is activated, the read result is output immediately after the bar code is decoded. If the item is deactivated, the read result is sent only after the trigger signal is returned (= end of reading gate). |
| Time                    | For test purposes.<br>If the scanner is activated, the reading gate is automatically closed by the scanner after this preset time has elapsed.   |
| Scans without info      | Following a successful read, the scanner waits for this number of scans (sequential scans with no read result) before it automatically deactivates itself.   |

9.2.4 Communication

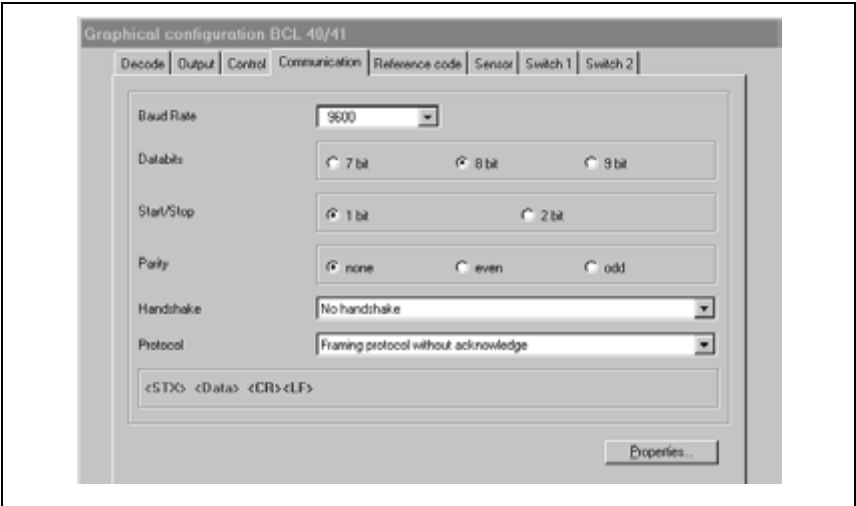


Figure 9.7: "Communication" menu, standard setting

Select the desired baud rate, the stop bits, the data bits and the parity here. In addition, several different handshake modes and protocols can be set here.

The RK512/3964 protocol can also be selected here. The individual parameters for this protocol can be found in the tree-structure configuration and **Communication -> Customer Interface -> 3964 / RK 512 Protocol**.



**Attention!**

If the BCL 40 is operated in a network ("Leuze multiNet"), no changes may be made here. The scanner automatically sets itself to the multiNet protocol!

### Communication properties

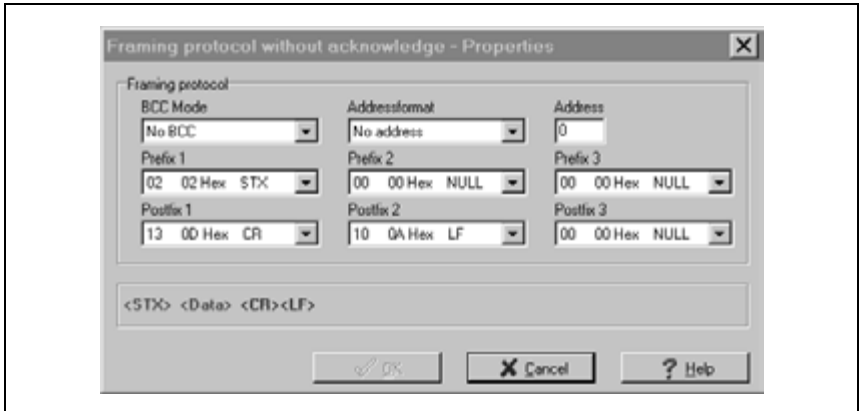


Figure 9.8: Properties of the Communication menu, standard setting

Here, the frame format (prefix/postfix), the address mode as well as a BCC mode can be set.



#### **Attention!**

*During Leuze multiNet operation, no changes may be made here!*

9.2.5 Reference code

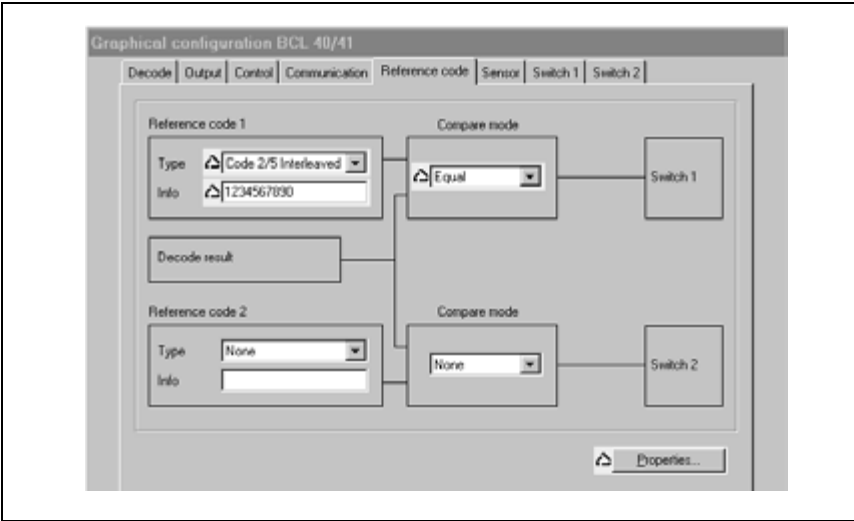


Figure 9.9: "Reference code" menu

A reference code is bar code information which is stored in the memory of the scanner. This reference code can be compared with the current decoded bar code in various modes and, thus, set appropriately for the switching output. To do this, the switching output must still be set to "By comparison of reference code X" in the "Switch" menu.

One way to store the reference code is to enter it manually in this menu. Other possibilities of the reference code teach-in see chapter 9.3.1 "General "Online" Commands" and chapter 9.2.6.

| Option       | Explanation  |
|--------------|--|
| Type         | Select the code type.  |
| Contents     | Contents of the reference code   |
| Compare mode | Select here how the internally stored reference code is to be compared with the decoded result.<br>For additional comparison possibilities, please select the "Properties" menu. |



## 9.2.6 Sensor

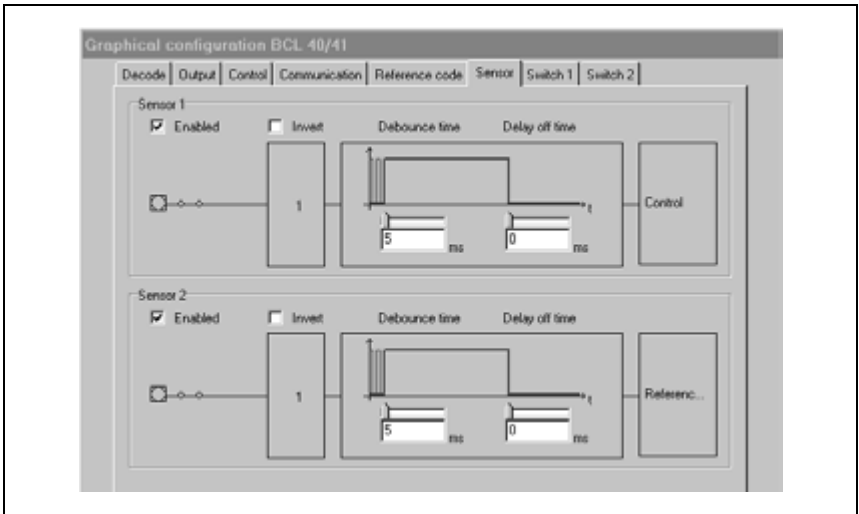


Figure 9.10: "Sensor" menu, standard setting



**Notice!**

*Sensor 1 must be used at the beginning of the reading gate (trigger).  
Sensor 2 can only be used for the reference code teach-in.*

| Option         | Explanation  |
|----------------|--|
| Enabled        | Switching input enabled or disabled.   |
| Invert         | Here, the input level can be inverted.   |
| Debounce time  | This amount of time is allowed to pass before the signal is passed on internally for further processing. |
| Delay off time | This parameter is used to extend the trigger signal internally by means of software.                     |



**Notice!**

*If a BCL40 is operated without a MA10 or MA30 connector unit, only switching input 1 is available!*

9.2.7 Switching outputs

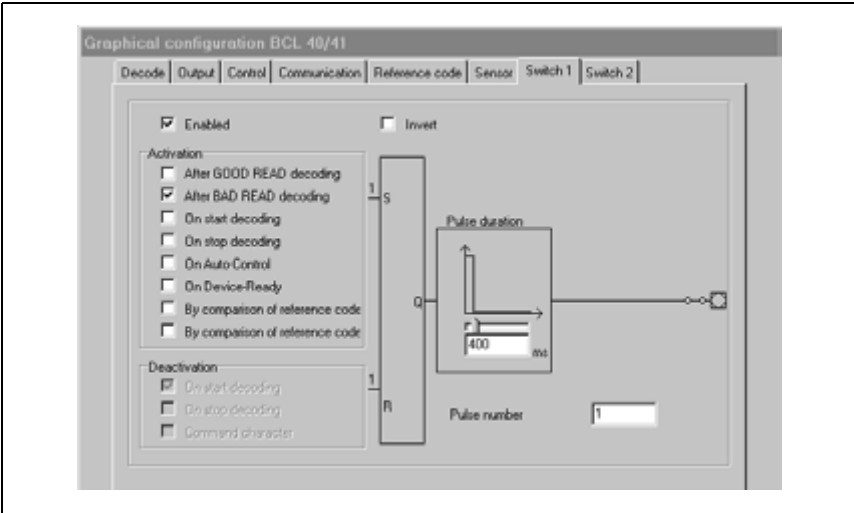


Figure 9.11: "Switch 1" menu, standard setting

| Option         | Explanation  |
|----------------|--|
| Enabled        | Switching output enabled or disabled.  |
| Invert         | Invert the level.  |
| Activation     | Select the desired event which is to initiate the switching of the switching output here. Multiple events can also be simultaneously activated.  |
| Deactivation   | Shown here is the event which results in the switching output being reset (if the set pulse duration has not yet expired). These events are only displayed and cannot be changed directly. |
| Pulse duration | Duration of the switching output impulse.  |
| Pulse number   | Number of pulses.<br>If the value here is set to 0, a continuous signal is applied to the switching output which is not reset until the event on "deactivation".                           |



**Notice!**

*If a BCL 40 is operated without a MA10 or MA30 connector unit, no switching output is available!*

## 9.3 Overview of Commands and Parameters

Online commands can be used to send commands directly to the device for control and configuration.

For this the BCL 40 / MA 10 must be connected to a host or service computer via the serial interface. The commands described can be sent either via the host or the service interface.

For information on the transmission protocol, please see chapter 7.3.3.

Be sure that both data devices are set to the same protocol:

- service interface: 9600 Baud, 8-None-1
- host interface: protocol configured by user

### **"Online" commands**

With the commands, you can

- call the setup program,
- carry out a software reset in order to reinitialise the device,
- call up error messages,
- call up statistical device information,
- internally copy and test parameter sets,
- activate and test system components,
- control/decode reading gate,
- read/write/copy parameters,
- carry out an automatic configuration,
- teach/set reference code.

### **Syntax**

"Online" commands consist of one or two ASCII characters followed by command parameters.

No separation characters may be entered between the command and the command parameter(s). Both small and capitalised letters can be used.

Example:

Command '**CA**': autoConfig function

Parameter '**+**': Activation

Transmitted is: '**CA+**'

### **Notation**

Commands, command parameters and returned data are enclosed between single quotation marks ' '.

Most "online" commands are acknowledged by the BCL 40 and any requested data returned. For commands that are not acknowledged, command execution can be observed or monitored directly on the device.

9.3.1 General "Online" Commands

*Software version number*

| Command         | 'V'   |
|-----------------|---|
| Description     | Requests device version information   |
| Parameter       | no  |
| Acknowledgement | 'BCL 40'<br>'V 50.09'<br>'22.06.97'<br>'MA 10' (only when a 'V 01.07' MA 10 connector unit is installed)<br>The device type appears in the first line followed by the software version number and date. The device type on the connector unit appears on the fourth line followed by the version number. The data which are actually displayed may vary from the values given here. |



**Notice!**

*Using this command, you can check whether the connected host or service computer is properly connected and configured. If you do not receive an acknowledgement, please check interface connections, protocol and service switches.*

*Software reset*

| Command         | 'H'  |
|-----------------|--|
| Description     | Carries out a software reset. The device is restarted and reinitialised, leaving it in the same state as when the supply voltage is switched on. |
| Parameter       | no   |
| Acknowledgement | 'S' (start signal)   |

***Call the setup program***

| Command         | 'E'  |
|-----------------|--|
| Description     | Calls the set-up program. The main menu of the set-up program is displayed.  |
| Parameter       | no   |
| Acknowledgement | Acknowledgement, 'Load Parameter Set'<br>' '<br>' Setup'<br>'-----'<br>' 1: Language'<br>' 2: Decode Setup'<br>' '<br>'Enter:' |



***Notice!***

*Read/write operations cannot be carried out in the service mode. The set-up program must always be ended in order to return to normal operation.*

***"autoConfig"***

| Command         | 'CA'   |
|-----------------|--|
| Description     | Activates or deactivates the "autoConfig" function. Certain label reading parameters are programmed automatically in the setup by the labels which are read while the "autoConfig" function is active.   |
| Parameter       | '+' activates "autoConfig"<br>'/' rejects the last code read<br>'-' deactivates "autoConfig" and stores the decoded data in the current parameter set  |
| Acknowledgement | 'xx yy zzzzzz' (only with 'CA+')<br><b>xx:</b> Code type of the read code<br>'01' 2/5 Interleaved<br>'02' Code 39<br>'06' UPC (A, E)<br>'07' EAN<br>'08' Code 128, EAN 128<br>'10' Add-on for EAN/UPC<br>'11' Codabar<br><b>yy</b> No. of digits of the read code<br><b>zzzzzz</b><br>Contents of the decoded label. The ↑, appears if the label was not correctly read. |

*Manual definition of the reference code*

| Command          | 'RS'   |
|------------------|--|
| Description      | This command can be used to define a new reference code in the BCL 40 by means of direct entry via the serial interface. The data are saved in the parameter set according to their input under reference code 1 or 2 and stored in the working buffer for further processing. |
| Parameter        | <b>'RSyxxzzzzzzzz'</b><br>y, x and z are place holders (variables) for the actual input.<br>y: def. reference code No<br>'1' (Code 1)<br>'2' (Code 2) ...<br>xx def. code type (see command "CA" on page 75)<br>z def. code information (1 ... 31 characters)                  |
| Acknowledge-ment | no   |
| Example          | input = 'RS10678654331' (Code 1 (1), UPC (06), 78654331)   |

*Teach-In*

| Command          | 'RT'  |
|------------------|---|
| Description      | This command enables a reference code to be defined quickly by reading an example label.  |
| Parameter        | <b>'RTy'</b><br>y: <b>Function</b><br>'1' defines reference code 1<br>'2' defines reference code 2<br>'-' exit the Teach-In process |
| Acknowledge-ment | zzzzzz Contents of the decoded label  |



**Notice!**

*With this function, only code types are recognised that are identified using the "autoConfig" function or which were set in the set-up.*

✎ *After each reading via an 'RTx' command, explicitly switch off the function again using the 'RT-' command since failure to do so will interfere with other commands as well as prevent execution of a new 'RTx' command.*

### ***Detect code***

| Command         | 'CC'   |
|-----------------|--|
| Description     | Reads the code type and contents of an unknown label <b>without</b> storing it in Setup.   |
| Parameter       | no   |
| Acknowledgement | <b>xyyyzzzzzz</b><br>The acknowledgement is the same as that of the "autoConfig" function. |

## **9.3.2 "Online" Commands for System Control**

### ***Activate sensor input 1***

| Command         | '+'   |
|-----------------|---|
| Description     | Activates decoding (sensor input 1). A signal can be simulated on sensor input 1 with this command. |
| Parameter       | no  |
| Acknowledgement | no  |

### ***Deactivate sensor input 1***

| Command         | '-'   |
|-----------------|---|
| Description     | Deactivates decoding (sensor input 1). A signal can be simulated on sensor input 1 with this command. |
| Parameter       | no  |
| Acknowledgement | no  |

**Activate sensor input 2**

|                 |   |
|-----------------|---|
| Command         | ''  |
| Description     | Activates the definition of reference code 1 (sensor input 2). A signal can be simulated on sensor input 2 with this command. |
| Parameter       | no  |
| Acknowledgement | no  |

**Deactivate sensor input 2**

|                 |   |
|-----------------|---|
| Command         | ''  |
| Description     | Deactivates the definition of reference code 1 (sensor input 2). A signal can be simulated on sensor input 2 with this command. |
| Parameter       | no  |
| Acknowledgement | no  |

**9.3.3 "Online" Commands for System Checking**

**Diagnosis laser**

|                 |  |
|-----------------|--|
| Command         | 'DL'   |
| Description     | The command controls or tests the laser diode.   |
| Parameter       | '+' switches on the laser diode<br>'-' switches off the laser diode<br>'C' outputs the laser current<br>'T' outputs the laser temperature. |
| Acknowledgement | no<br>'DS03': invalid parameter for the command 'DL'<br>'DS04': invalid command length<br>'DTxxx.x'<br>'DCyyy'                             |
|                 | xxx.x is the laser temperature in °C<br>yyy is the laser current in mA   |



***Diagnosis motor***

| <b>Command</b>  | <b>'DMS'</b>   |
|-----------------|--|
| Description     | Returns the rotary frequency of the polygon mirror wheel drive motor.                |
| Parameter       | no   |
| Acknowledgement | <b>'DMSxxxxx'</b>  |
| Description     | <b>xxxxx</b> is the current rotary frequency of the motor in revolutions per minute. |

***Supply voltage***

| <b>Command</b>  | <b>'DUV'</b>                                    |
|-----------------|---|
| Description     | Returns the supply voltage of the BCL 40.       |
| Parameter       | no  |
| Acknowledgement | <b>'DUVxx.x'</b>                                |
| Description     | <b>xx.x</b> is the current supply voltage in V. |

9.3.4 "Online" Commands for Querying Statistical Data

*Query device statistics*

| Command              | 'SR'   |
|----------------------|--|
| Description          | Returns the current contents of the given field of the statistical device data memory.   |
| Parameter            | '00' to '19'   |
| Acknowledge-<br>ment | 'ST00XXXXX' to 'ST19XXXXX'   |
| Description          | <p><b>ST00XXXXX</b>: XXXXX is the length of time in seconds that the laser diode has been switched on since the last initialisation</p> <p><b>ST01XXXXX</b>: XXXXX is the length of time in minutes that the polygon wheel motor has been switched on since the last initialisation</p> <p><b>ST05XXXXX</b>: XXXXX the number of correctly received commands via the interface</p> <p><b>ST06XXXXX</b>: XXXXX the number of incorrectly received commands via the interface</p> <p><b>ST07XXXXX</b>: XXXXX the number of sent commands via the interface that have received positive acknowledgement</p> <p><b>ST08XXXXX</b>: XXXXX the number of sent commands via the interface that have received negative acknowledgement</p> <p><b>ST09XXXXX</b>: XXXXX the number of correctly received commands via the host</p> <p><b>ST10XXXXX</b>: XXXXX the number of incorrectly received commands via the host</p> <p><b>ST11XXXXX</b>: XXXXX the number of sent commands via the host that have received positive acknowledgement</p> <p><b>ST12XXXXX</b>: XXXXX the number of sent commands via the host that have received negative acknowledgement</p> <p><b>ST13XXXXX</b>: XXXXX is the number of scans since the last read enable</p> <p><b>ST14XXXXX</b>: XXXXX is the number of read scans since the last reset</p> <p><b>ST15XXXXX</b>: XXXXX is the number of read scans since the last read enable</p> <p><b>ST16XXXXX</b>: XXXXX the number of read labels from the last scan</p> <p><b>ST17XXXXX</b>: XXXXX is the number of read enables since the last reset</p> <p><b>ST18XXXXX</b>: XXXXX the number of correctly decoded labels since the last reset</p> <p><b>ST19XXXXX</b>: XXXXX the number of incorrectly decoded labels since the last reset</p> |

### 9.3.5 "Online" Commands for Parameter Set Operations

#### *Test parameter set*

| Command          | 'PA'  |
|------------------|---|
| Description      | Tests the given parameter set for validity using a checksum.  |
| Parameter        | <b>'0'</b> tests the current parameter set<br><b>'1'</b> tests the customer-specific parameter set (MA 10 only)   |
| Acknowledge-ment | <b>'Psx'</b><br><b>x:</b> Status<br><b>'0'</b> valid parameter set<br><b>'1'</b> invalid message<br><b>'2'</b> invalid message length<br><b>'3'</b> invalid block check type<br><b>'4'</b> invalid block check checksum<br><b>'5'</b> invalid data length<br><b>'6'</b> invalid message data<br><b>'7'</b> invalid start address<br><b>'8'</b> invalid parameter set<br><b>'9'</b> invalid parameter type |

**Copy parameter set**

| Command              | 'PC'   |
|----------------------|--|
| Description          | Copies the given source parameter set into the given target parameter set  |
| Parameter            | <b>BCL 40 Stand alone:</b><br>'0' Current parameter set.<br>'2' parameter set with factory default settings.   |
| Example              | 'PC20': Reset to factory default settings  |
|                      | <b>BCL 40 with MA 10:</b><br>'0' Current parameter set.<br>'1' customer-specific parameter set.<br>'2' parameter set with factory default settings.  |
| Example              | 'PC20': Reset to factory default settings<br>'PC01': The current parameter set is copied in the customer-specific parameter set (backup)<br>'PC10': Reset to customer-specific settings  |
| Acknowledge-<br>ment | <b>'PSx'</b><br>x: Status<br>' <b>0</b> ' valid parameter set<br>' <b>1</b> ' invalid message<br>' <b>2</b> ' invalid message length<br>' <b>3</b> ' invalid block check type<br>' <b>4</b> ' invalid block check checksum<br>' <b>5</b> ' invalid data length<br>' <b>6</b> ' invalid message data<br>' <b>7</b> ' invalid start address<br>' <b>8</b> ' invalid parameter set<br>' <b>9</b> ' invalid parameter type |



**Notice!**

A valid parameter set operation must be acknowledged with 'PS0'. Should an error occur, the command should be repeated. Repeated error acknowledgements indicate an error in the parameter set. If in doubt, contact your Leuze sales or service office (see back page for addresses).

## 10 Maintenance

### 10.1 General Maintenance Information

Usually, the barcode reader BCL 40 does not require any maintenance by the operator.

#### ***Cleaning***

Should it become soiled, clean the glass window of the BCL 40 with a soft cloth.



#### ***Notice!***

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

### 10.2 Repairs, Servicing

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

- ✎ *Contact your Leuze distributor or service organisation should repairs be required.  
For addresses, please refer to the back page of this operating manual.*

11     **Appendix**

11.1   **ASCII Table**

| ASCII | Dec. | Hex. | Oct. | Symbol            | Meaning                    |
|-------|------|------|------|-------------------|----------------------------|
| NULL  | 0    | 00   | 0    | NULL              | Null                       |
| SOH   | 1    | 01   | 1    | START OF HEADING  | Start of heading           |
| STX   | 2    | 02   | 2    | START OF TEXT     | Start of text characters   |
| ETX   | 3    | 03   | 3    | END OF TEXT       | End of text characters     |
| EOT   | 4    | 04   | 4    | END OF TRANSMISS. | End of transmission        |
| ENQ   | 5    | 05   | 5    | ENQUIRY           | Request for data trans.    |
| ACK   | 6    | 06   | 6    | ACKNOWLEDGE       | Positive acknowledgement   |
| BEL   | 7    | 07   | 7    | BELL              | Bell signal                |
| BS    | 8    | 08   | 10   | BACKSPACE         | Backwards step             |
| HT    | 9    | 09   | 11   | HORIZ. TABULATOR  | Horizontal tabulator       |
| LF    | 10   | 0A   | 12   | LINE FEED         | Line feed                  |
| VT    | 11   | 0B   | 13   | VERT. TABULATOR   | Vertical tabulator         |
| FF    | 12   | 0C   | 14   | FORM FEED         | Form feed                  |
| CR    | 13   | 0D   | 15   | CARRIAGE RETURN   | Carriage return            |
| SO    | 14   | 0E   | 16   | SHIFT OUT         | Shift out                  |
| SI    | 15   | 0F   | 17   | SHIFT IN          | Shift in                   |
| DLE   | 16   | 10   | 20   | DATA LINK ESCAPE  | Data link escape           |
| DC1   | 17   | 11   | 21   | DEVICE CONTROL 1  | Device control character 1 |
| DC2   | 18   | 12   | 22   | DEVICE CONTROL 2  | Device control character 2 |
| DC3   | 19   | 13   | 23   | DEVICE CONTROL 3  | Device control character 3 |
| DC4   | 20   | 14   | 24   | DEVICE CONTROL 4  | Device control character 4 |
| NAK   | 21   | 15   | 25   | NEG. ACKNOWLEDGE  | Negative acknowledgement   |
| SYN   | 22   | 16   | 26   | SYNCHRONOUS IDLE  | Synchronisation            |
| ETB   | 23   | 17   | 27   | EOF TRANSM. BLOCK | End of data trans. block   |
| CAN   | 24   | 18   | 30   | CANCEL            | Invalid                    |
| EM    | 25   | 19   | 31   | END OF MEDIUM     | End of message             |
| SUB   | 26   | 1A   | 32   | SUBSTITUTE        | Substitution               |
| ESC   | 27   | 1B   | 33   | ESCAPE            | Escape                     |
| FS    | 28   | 1C   | 34   | FILE SEPARATOR    | File separator             |
| GS    | 29   | 1D   | 35   | GROUP SEPARATOR   | Group separator            |
| RS    | 30   | 1E   | 36   | RECORD SEPARATOR  | Record separator           |

| ASCII | Dec. | Hex. | Oct. | Symbol            | Meaning                 |
|-------|------|------|------|-------------------|-------------------------|
| US    | 31   | 1F   | 37   | UNIT SEPARATOR    | Unit separator          |
| SP    | 32   | 20   | 40   | SPACE             | Space                   |
| !     | 33   | 21   | 41   | EXCLAMATION POINT | Explanation point       |
| "     | 34   | 22   | 42   | QUOTATION MARK    | Quotation mark          |
| #     | 35   | 23   | 43   | NUMBER SIGN       | Number sign             |
| \$    | 36   | 24   | 44   | DOLLAR SIGN       | Dollar sign             |
| %     | 37   | 25   | 45   | PERCENT SIGN      | Percent sign            |
| &     | 38   | 26   | 46   | AMPERSAND         | Ampersand               |
| '     | 39   | 27   | 47   | APOSTROPHE        | Apostrophe              |
| (     | 40   | 28   | 50   | OPEN. PARENTHESIS | Open parenthesis        |
| )     | 41   | 29   | 51   | CLOS. PARENTHESIS | Closed parenthesis      |
| *     | 42   | 2A   | 52   | ASTERISK          | Asterisk                |
| +     | 43   | 2B   | 53   | PLUS              | Plus sign               |
| ,     | 44   | 2C   | 54   | COMMA             | Comma                   |
| -     | 45   | 2D   | 55   | HYPHEN (MINUS)    | Hyphen                  |
| .     | 46   | 2E   | 56   | PERIOD (DECIMAL)  | Period                  |
| /     | 47   | 2F   | 57   | SLANT             | Slant                   |
| 0     | 48   | 30   | 60   | 0                 | Number                  |
| 1     | 49   | 31   | 61   | 1                 | Number                  |
| 2     | 50   | 32   | 62   | 2                 | Number                  |
| 3     | 51   | 33   | 63   | 3                 | Number                  |
| 4     | 52   | 34   | 64   | 4                 | Number                  |
| 5     | 53   | 35   | 65   | 5                 | Number                  |
| 6     | 54   | 36   | 66   | 6                 | Number                  |
| 7     | 55   | 37   | 67   | 7                 | Number                  |
| 8     | 56   | 38   | 70   | 8                 | Number                  |
| 9     | 57   | 39   | 71   | 9                 | Number                  |
| :     | 58   | 3A   | 72   | COLON             | Colon                   |
| ;     | 59   | 3B   | 73   | SEMI-COLON        | Semicolon               |
| <     | 60   | 3C   | 74   | LESS THEN         | Less than               |
| =     | 61   | 3D   | 75   | EQUALS            | Equal sign              |
| >     | 62   | 3E   | 76   | GREATER THEN      | Greater than            |
| ?     | 63   | 3F   | 77   | QUESTION MARK     | Question mark           |
| @     | 64   | 40   | 100  | COMMERCIAL AT     | Commercial at character |
| A     | 65   | 41   | 101  | A                 | Capital letter          |

| ASCII | Dec. | Hex. | Oct. | Symbol          | Meaning           |
|-------|------|------|------|-----------------|-------------------|
| B     | 66   | 42   | 102  | B               | Capital letter    |
| C     | 67   | 43   | 103  | C               | Capital letter    |
| D     | 68   | 44   | 104  | D               | Capital letter    |
| E     | 69   | 45   | 105  | E               | Capital letter    |
| F     | 70   | 46   | 106  | F               | Capital letter    |
| G     | 71   | 47   | 107  | G               | Capital letter    |
| H     | 72   | 48   | 110  | H               | Capital letter    |
| I     | 73   | 49   | 111  | I               | Capital letter    |
| J     | 74   | 4A   | 112  | J               | Capital letter    |
| K     | 75   | 4B   | 113  | K               | Capital letter    |
| L     | 76   | 4C   | 114  | L               | Capital letter    |
| M     | 77   | 4D   | 115  | M               | Capital letter    |
| N     | 78   | 4E   | 116  | N               | Capital letter    |
| O     | 79   | 4F   | 117  | O               | Capital letter    |
| P     | 80   | 50   | 120  | P               | Capital letter    |
| Q     | 81   | 51   | 121  | Q               | Capital letter    |
| R     | 82   | 52   | 122  | R               | Capital letter    |
| S     | 83   | 53   | 123  | S               | Capital letter    |
| T     | 84   | 54   | 124  | T               | Capital letter    |
| U     | 85   | 55   | 125  | U               | Capital letter    |
| V     | 86   | 56   | 126  | V               | Capital letter    |
| W     | 87   | 57   | 127  | W               | Capital letter    |
| X     | 88   | 58   | 130  | X               | Capital letter    |
| Y     | 89   | 59   | 131  | Y               | Capital letter    |
| Z     | 90   | 5A   | 132  | Z               | Capital letter    |
| [     | 91   | 5B   | 133  | OPENING BRACKET | Opening bracket   |
| \     | 92   | 5C   | 134  | REVERSE SLANT   | Reverse slant     |
| ]     | 93   | 5D   | 135  | CLOSING BRACKET | Closing bracket   |
| ^     | 94   | 5E   | 136  | CIRCUMFLEX      | Circumflex        |
| _     | 95   | 5F   | 137  | UNDERSCORE      | Underscore        |
| ‘     | 96   | 60   | 140  | GRAVE ACCENT    | Grave accent      |
| a     | 97   | 61   | 141  | a               | Lower case letter |
| b     | 98   | 62   | 142  | b               | Lower case letter |
| c     | 99   | 63   | 143  | c               | Lower case letter |
| d     | 100  | 64   | 144  | d               | Lower case letter |



| ASCII | Dec. | Hex. | Oct. | Symbol          | Meaning           |
|-------|------|------|------|-----------------|-------------------|
| e     | 101  | 65   | 145  | e               | Lower case letter |
| f     | 102  | 66   | 146  | f               | Lower case letter |
| g     | 103  | 67   | 147  | g               | Lower case letter |
| h     | 104  | 68   | 150  | h               | Lower case letter |
| i     | 105  | 69   | 151  | i               | Lower case letter |
| j     | 106  | 6A   | 152  | j               | Lower case letter |
| k     | 107  | 6B   | 153  | k               | Lower case letter |
| l     | 108  | 6C   | 154  | l               | Lower case letter |
| m     | 109  | 6D   | 155  | m               | Lower case letter |
| n     | 110  | 6E   | 156  | n               | Lower case letter |
| o     | 111  | 6F   | 157  | o               | Lower case letter |
| p     | 112  | 70   | 160  | p               | Lower case letter |
| q     | 113  | 71   | 161  | q               | Lower case letter |
| r     | 114  | 72   | 162  | r               | Lower case letter |
| s     | 115  | 73   | 163  | s               | Lower case letter |
| t     | 116  | 74   | 164  | t               | Lower case letter |
| u     | 117  | 75   | 165  | u               | Lower case letter |
| v     | 118  | 76   | 166  | v               | Lower case letter |
| w     | 119  | 77   | 167  | w               | Lower case letter |
| x     | 120  | 78   | 170  | x               | Lower case letter |
| y     | 121  | 79   | 171  | y               | Lower case letter |
| z     | 122  | 7A   | 172  | z               | Lower case letter |
| {     | 123  | 7B   | 173  | OPENING BRACE   | Opening brace     |
|       | 124  | 7C   | 174  | VERTICAL LINE   | Vertical line     |
| }     | 125  | 7D   | 175  | CLOSING BRACE   | Closing brace     |
| ~     | 126  | 7E   | 176  | TILDE           | Tilde             |
| DEL   | 127  | 7F   | 177  | DELETE (RUBOUT) | Delete            |

Table 11.1: ASCII Table

11.2 Example Bar Code Label Types

11.2.1 Module 0.3

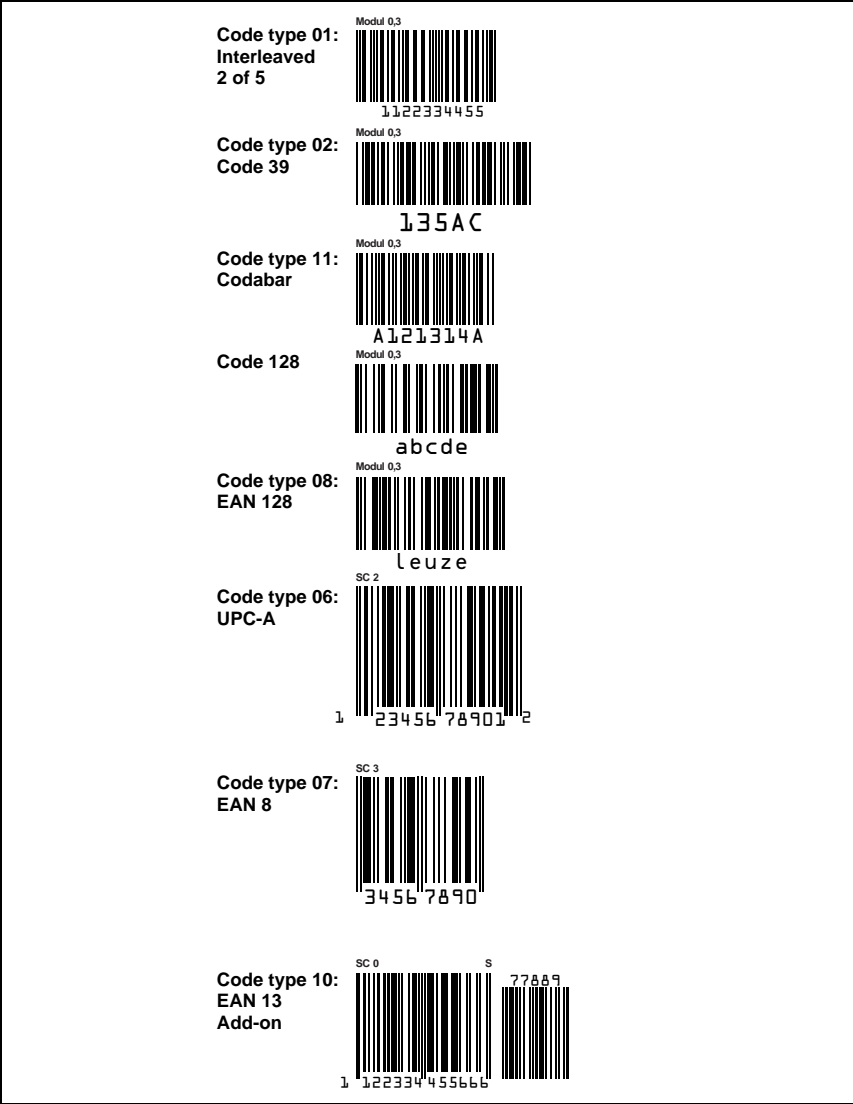


Figure 11.1: Bar code sample labels (module width 0.3)

## 11.2.2 Module 0.5

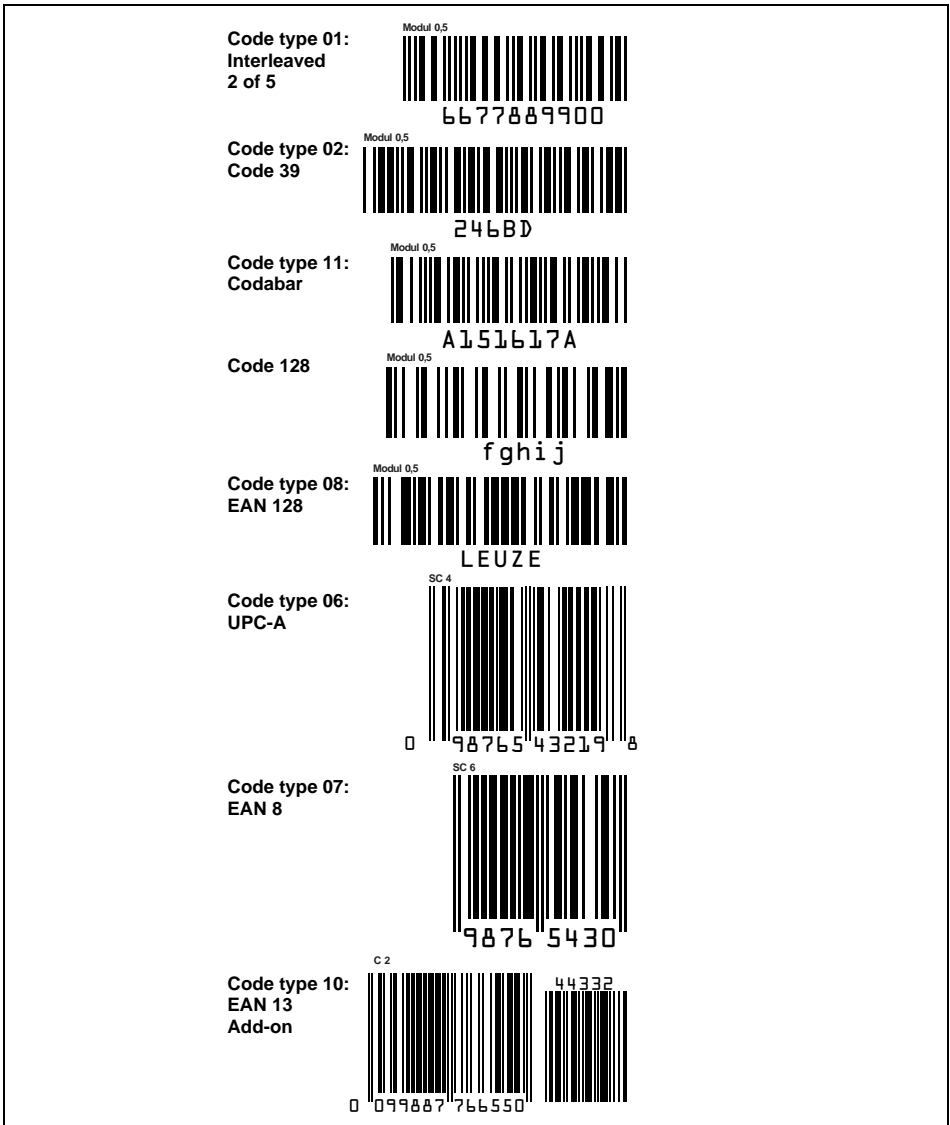


Figure 11.2: Bar code sample labels (module 0.5)



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