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

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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.

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.

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

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.

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.).

Label
Barcode label

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.

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

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

PD
Programming device

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

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.

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.

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.

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

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

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.

CE 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 43 mm
- Reading height of 70 mm at a distance of 10 mm
- Maximum reading distance up to 700 mm (depending on type of optics)
- Raster or line scanner (R1 = raster, S = single line) max. 1200 scans/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").

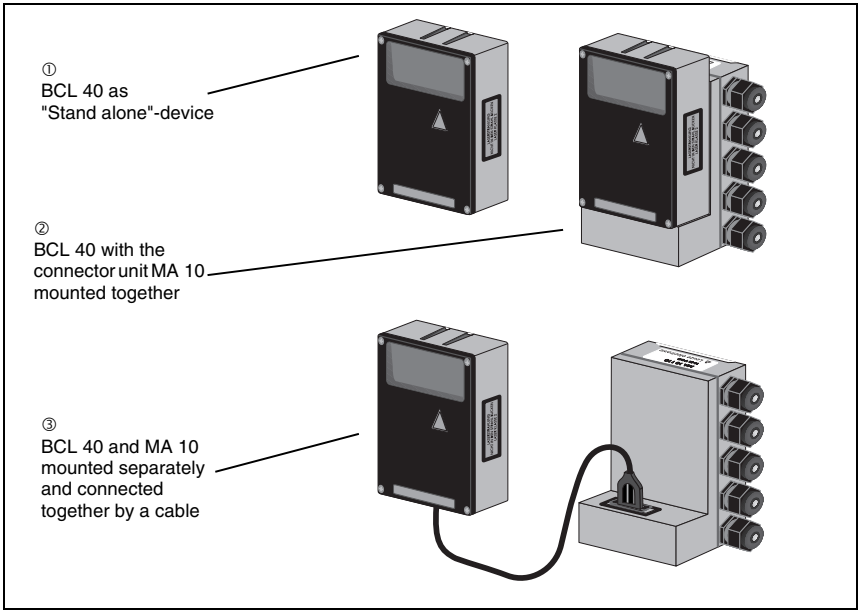


Figure 3.1: Possible combinations of the BCL 40 / MA 10

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.

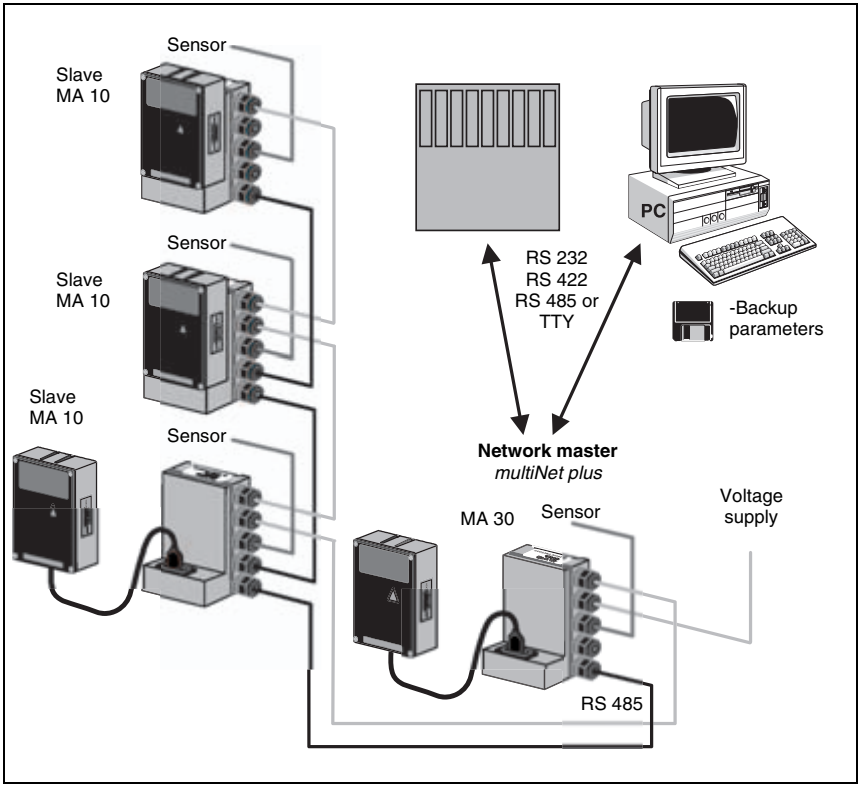


Figure 3.2: Networking possibilities using the multiNet plus

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

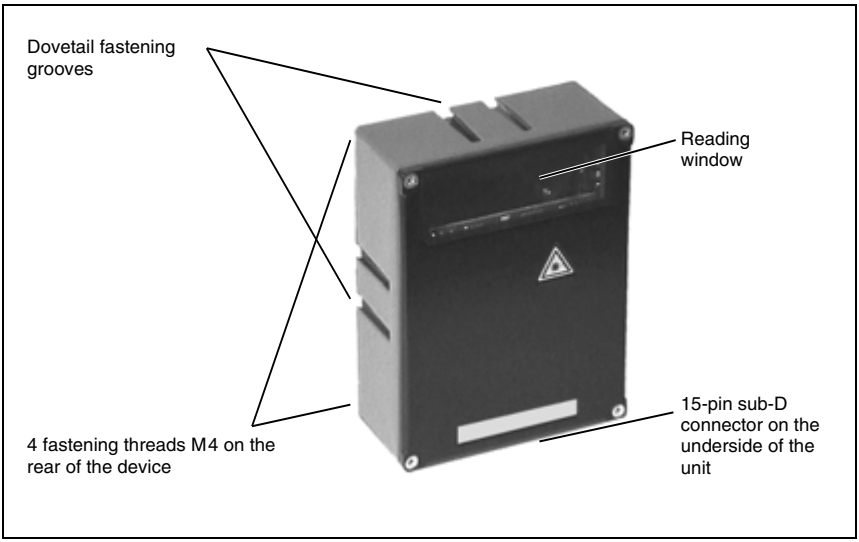


Figure 3.3: BCL 40/device construction

3.3.2 Device construction MA 10

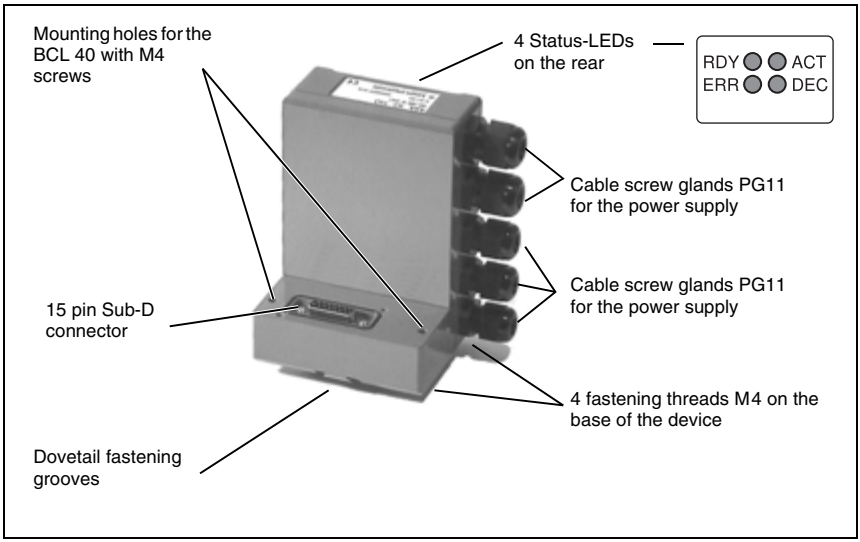


Figure 3.4: Connector unit MA 10

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 650 nm
Scanning rate	BCL with N, M, F optics: 1200 scans/s BCL with L optics: 900 scans/s
Resolution	0.1 mm … 1.2 mm module width
Beam deflection	by means of rotating polygon mirror wheel
Reading distance	0 … 700 mm (depending on type of optics: N, M, F, L), see chapter 4.5.4 "Reading curves BCL 40 standard version"
Reading field opening	70 mm at a distance of approx. 10 mm (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 22 mm at 100 mm scanner distance 33 mm at 200 mm scanner distance 45 mm at 300 mm scanner distance 65 mm at 500 mm scanner distance 95 mm at 800 mm 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) TTY / RS 422 optional with MA 10
Baud rate	110 … 57600 Bd (host interface only)
Data formats	data bits: 7, 8, 9 parity: None, Even, Odd Stop bit: 1, 2
Protocols	with/without frame protocol ACK/NAK, 3964 (R) RK 512, RTS/CTS X ON / X OFF, multiNet plus
Ports	1 switching input
LED green	device ready (Power On)

Switching input	12 … 36 V DC/AC voltage, selectable galvanic isolation or supplied operating voltage, max. insulation voltage: 250 V (with galvanic isolation)
Operating voltage	18 … 36 V
Power consumption	5 VA max.
Mechanical data	
Protection class	IP 65
Weight	approx. 430 g
Dimensions (WxHxD)	120 x 90 x 43 mm
Housing	diecast aluminium
Environmental data	
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.

Optical Data	
Light source	Laser diode 660 nm
Resolution	0.25 mm … 1.0 mm module width
Reading distance	0 … 630 mm (depending on type of optics: M, F, L) 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 … 70 mm narrower see chapter 4.5.5 "Reading curves BCL 40 with heating"
Electrical data	
Operating voltage	24 V DC ± 2 V
Power consumption	10 W max.
Mechanical data	
Weight	approx. 500 g
Dimensions (WxHxD)	120 x 90 x 52 mm
Environmental data	
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 78 mm
Weight	approx. 740 g
Protection class	IP 65
Interfaces	
Type (optional)	RS 232, with galvanic isolation RS 422, with galvanic isolation RS 485, with galvanic isolation TTY, with galvanic isolation
Service interface	RS 232 internal, 9 pin Sub D plug, male
Inputs/outputs	
2 switched inputs	galvanically isolated,with supply voltage terminal for sensors 12 … 36 V DC/AC, insulation voltage 500 V
2 switched outputs	can be operated galvanically isolated or not isolated switching voltage 5 … 48 V DC, max. load 500 mA
Power supply	
Operating voltage	18 … 36 V DC
Power consumption	2 VA max.
Environmental data	
Ambient temperature (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

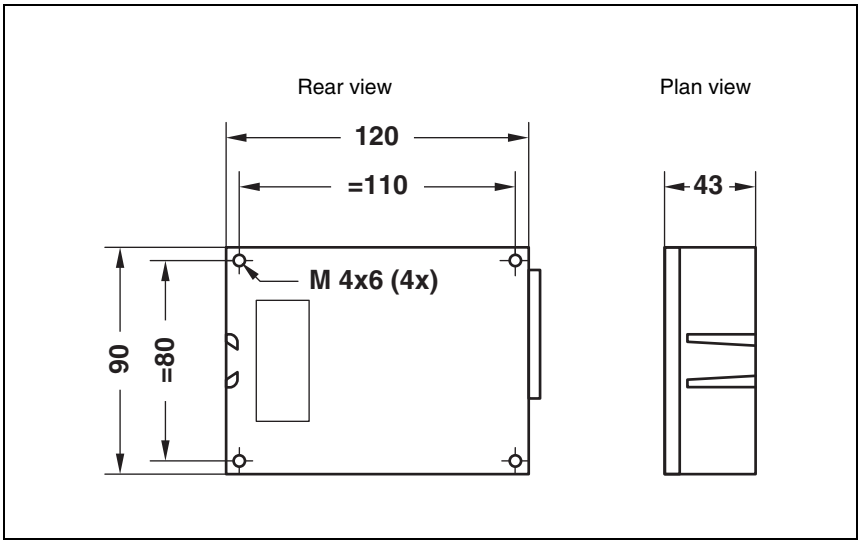


Figure 4.1: Dimensioned drawing BCL 40

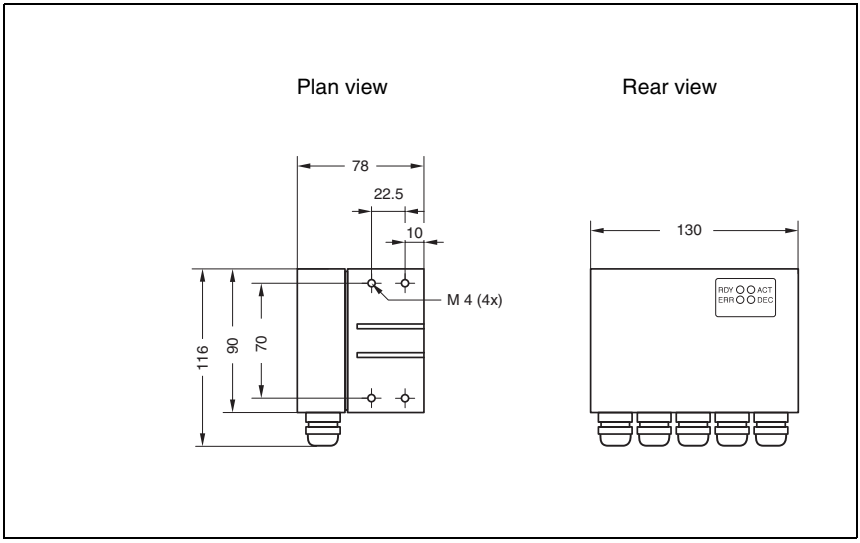
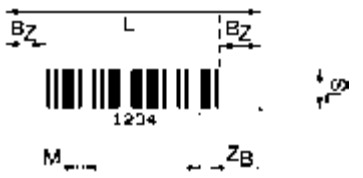


Figure 4.2: Dimensioned drawing MA 10

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.



M = Module: The narrowest line or space of a bar code in mm
ZB = Wide elements: Wide lines and spaces are a multiple (ratio) of the module
Module x Ratio = ZB (Normal Ratio 1:2.5)
BZ = Quiet zone: The quiet zone should be at least 10 times the module, but not less than 2.5 mm.
L = Code length: The length of the bar code in mm including the start and stop characters. The quiet zone is included depending on the code definition.
SL = Element length: Height of the elements in mm

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

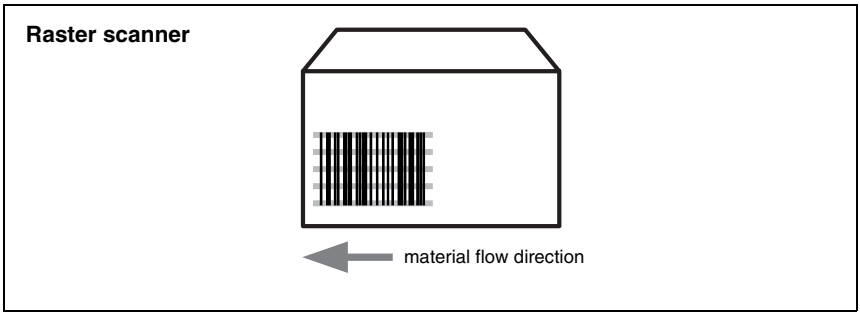


Figure 4.4: Sweep principle of the raster scanner

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

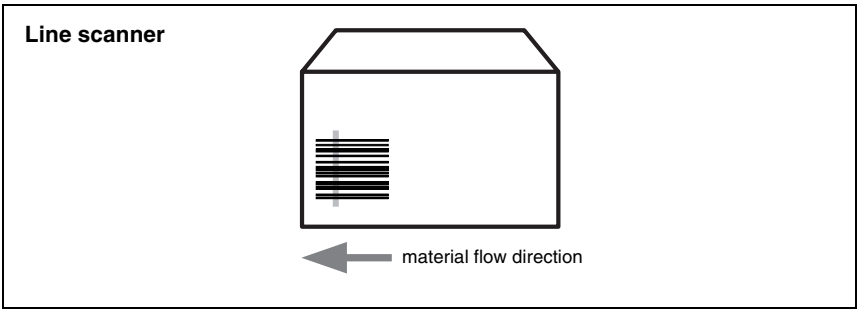


Figure 4.5: Sweep principle for the line scanner

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:

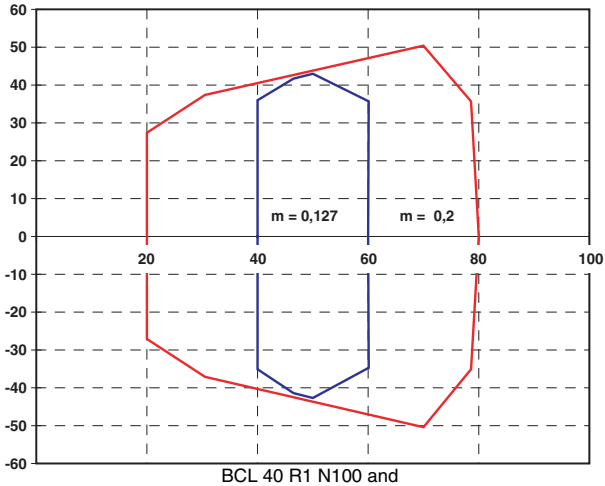
Middle to large scanning ranges with middle to large sized modules.

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

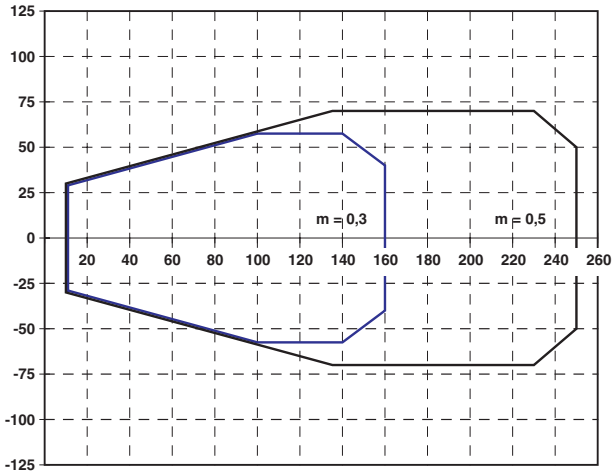
Notice!

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



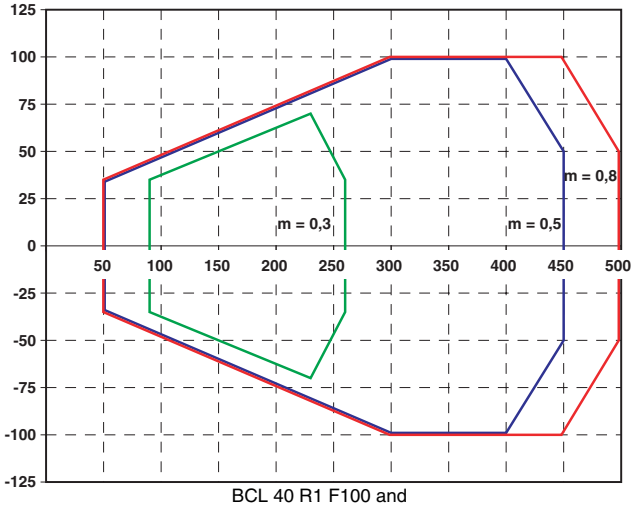
BCL 40 R1 N100 and
BCL 40 S N100



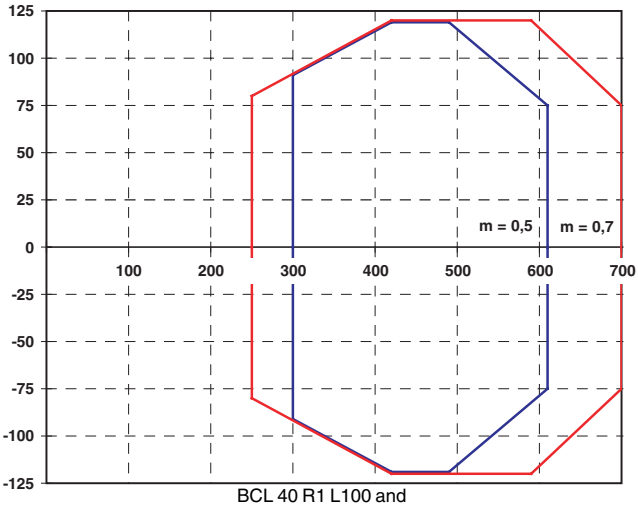
BCL 40 R1 M100 and
BCL 40 S M100

Notice:
All data in 'mm',
m = module width

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



BCL 40 R1 F100 and
BCL 40 S F100

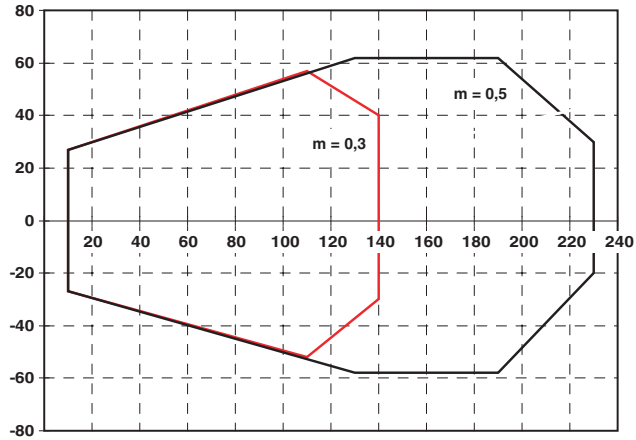


BCL 40 R1 L100 and
BCL 40 S L100

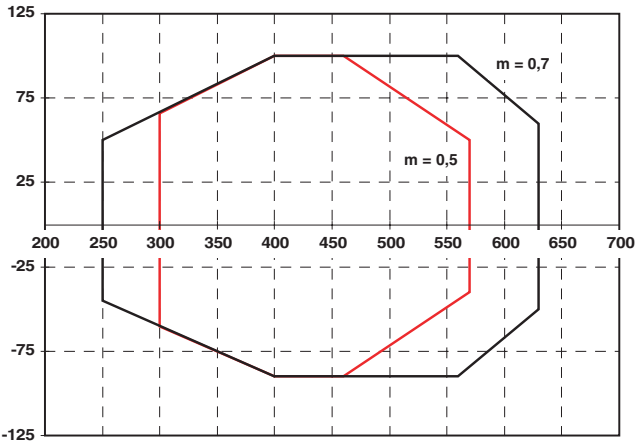
Notice:
All data in 'mm',
m = module width

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

4.5.5 Reading curves BCL 40 with heating



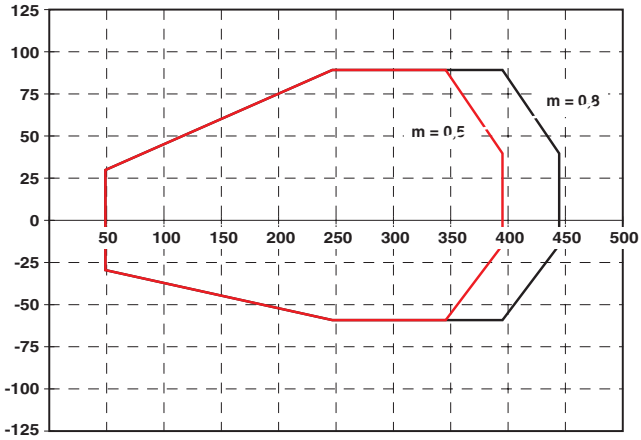
BCL 40 R1 M100 H and
BCL 40 S M100 H



BCL 40 R1 L100 H and
BCL 40 S L100 H

Notice:
All data in 'mm',
m = module width

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



BCL 40 R1 F100 H and
BCL 40 S F100 H

Notice:
All data in 'mm',
m = module width

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, multiNet Slave with host interface RS 485
MA 10 110	500 26109	standard, with host interface RS 232
MA 10 120	500 27186	standard, active and passive operation with 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

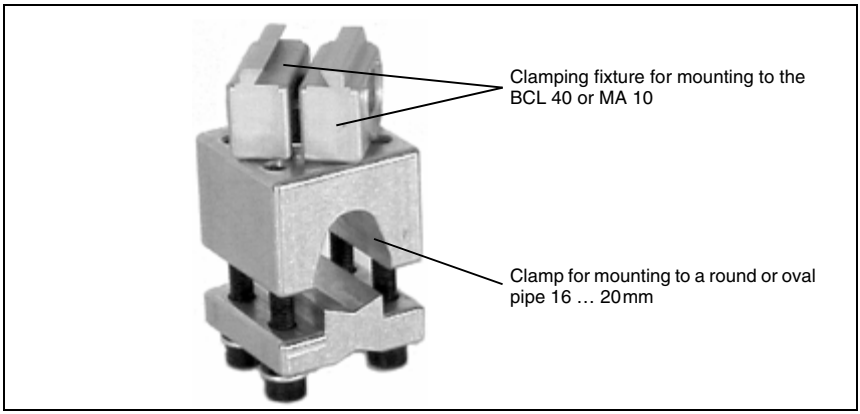


Figure 5.1: Mounting device BT 56

Mounting device BT 57

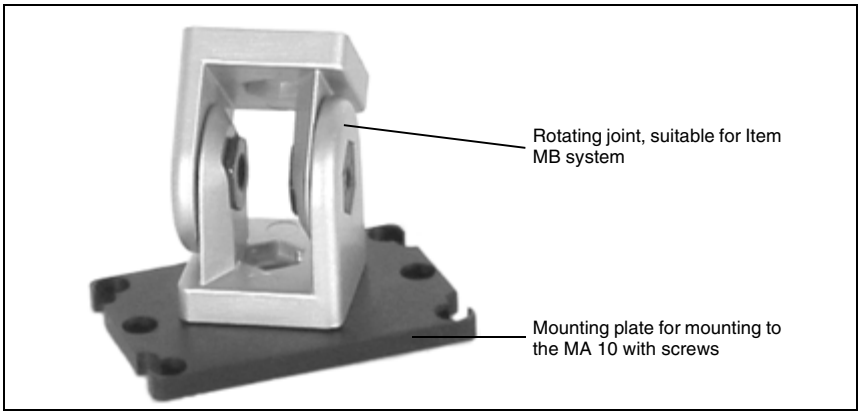


Figure 5.2: Mounting device BT 57

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

5.1.4 Cable accessories

KB 040 xxxx
15-conductor connection cable BCL 40 / MA 10, Sub D plug and socket
xxxx = length in mm

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

KB 040-xxxx-B
15-conductor connection cable, Sub D socket with open strand ends for connecting in switching cabinets or terminal boxes
xxxx = Length in mm

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")

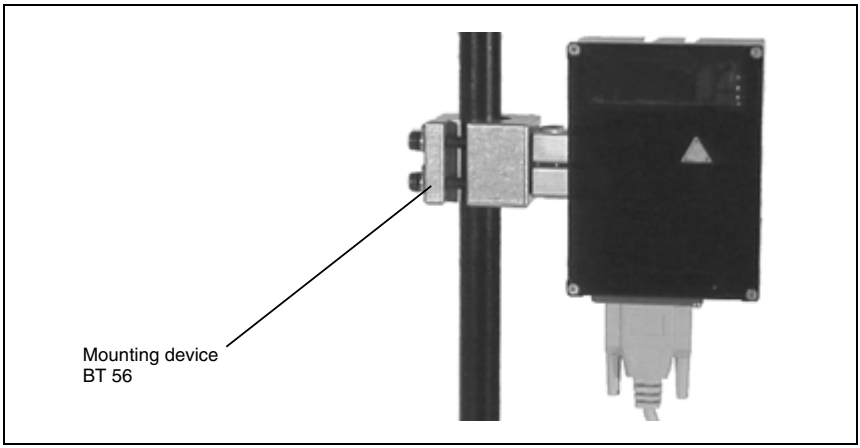


Figure 6.2: Mounting example BCL 40 "stand alone"

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
- using 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.

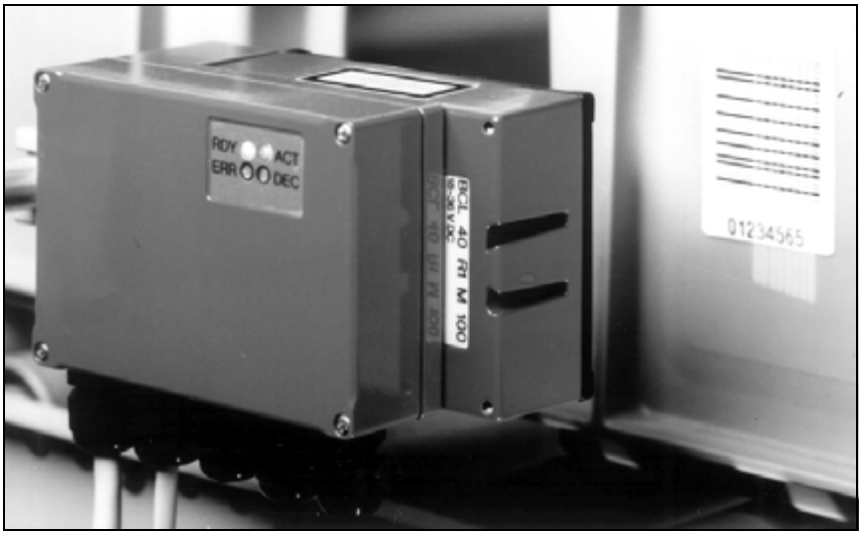


Figure 6.3: Mounting example for the combined BCL 40 / MA 10 unit

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.

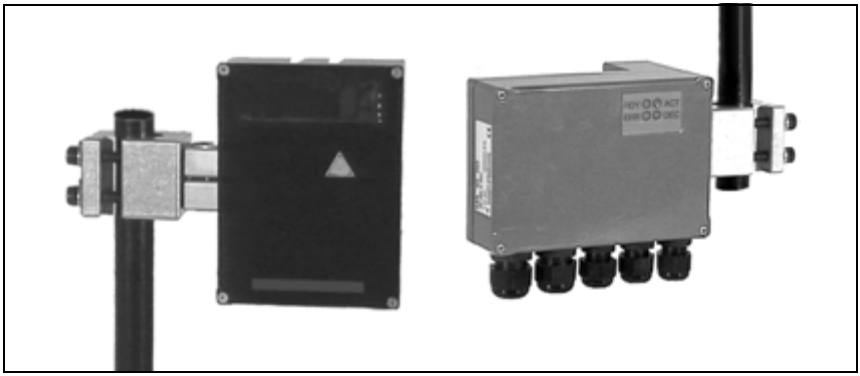


Figure 6.4: Mounting examples for the BCL 40 and MA 10 mounted independently

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.

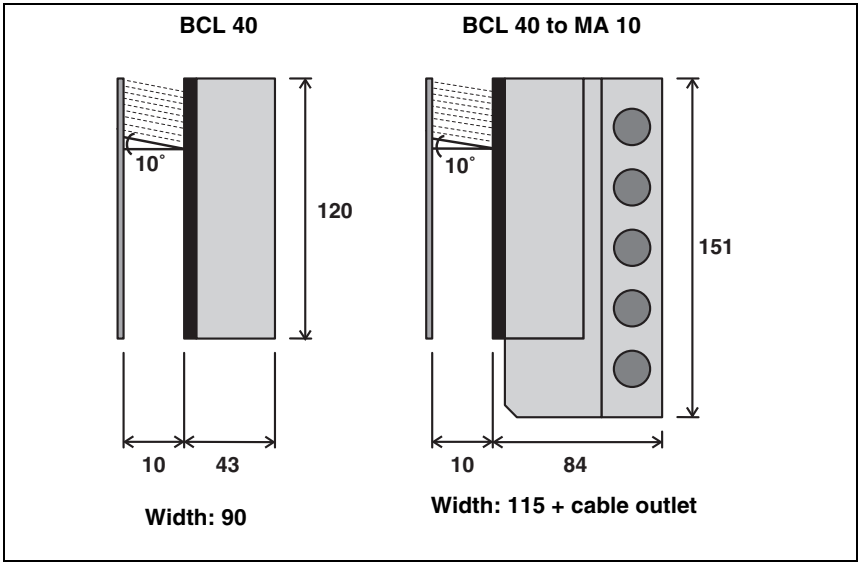


Figure 6.5: Minimum space requirements for installation

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

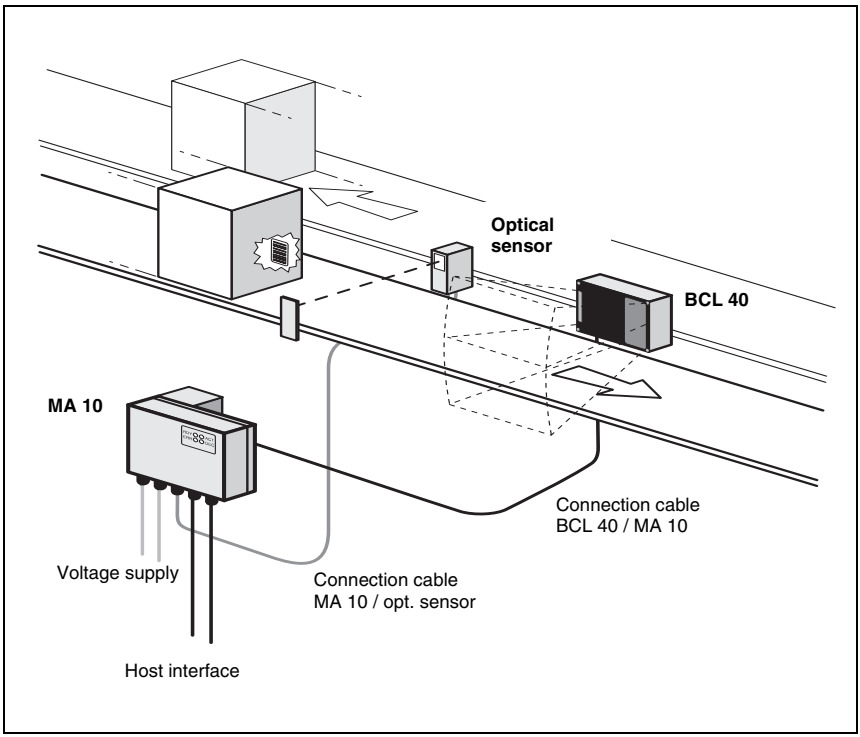


Figure 6.6: Application example "conveyor chain"

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

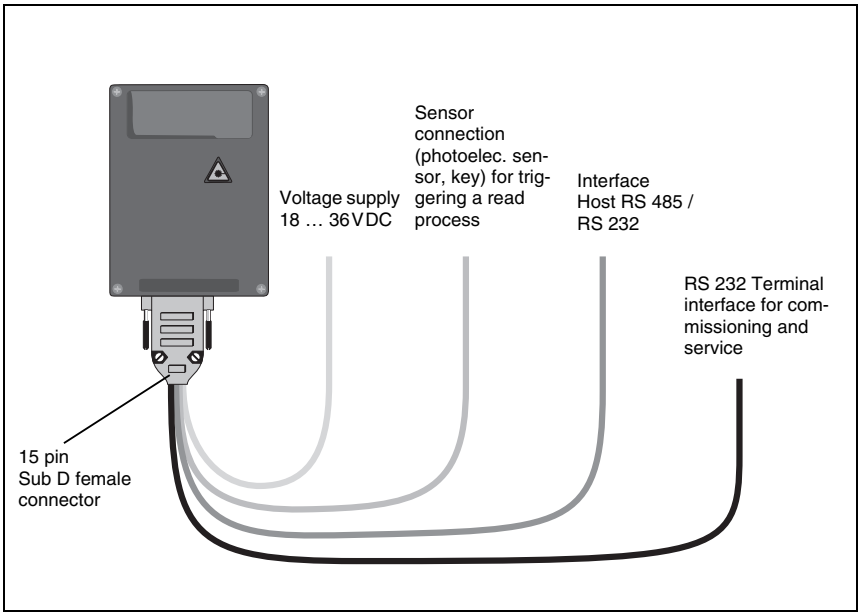


Figure 6.7: Connecting the BCL 40 for "Stand Alone" Operation

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 … 36 VDC to the switched input connections "Sensor 1A" and "Sensor 1B". The switched input maintains an electrical separation of up to max. 250 V.

BCL 40 Sub D pin assignments

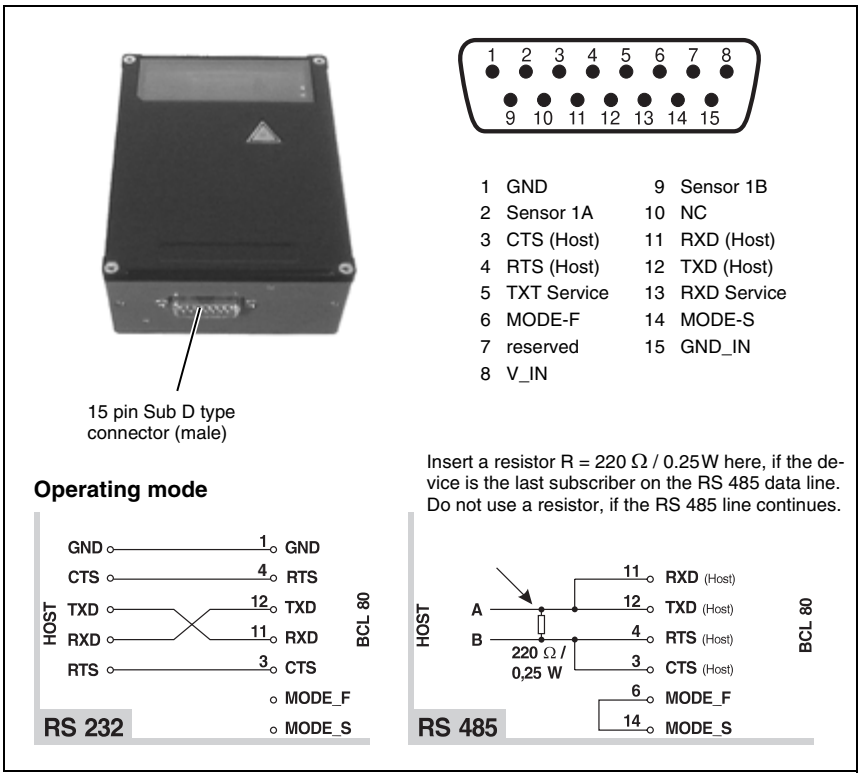


Figure 6.8: Connection diagram for the Sub D connector plug

Wiring description

Pin 1	GND	0V signal reference potential (RS 232 / RS 485)
Pin 2	Sensor 1A	switched input 1A, 12 … 36VDC, 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 / 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, 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 / 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.

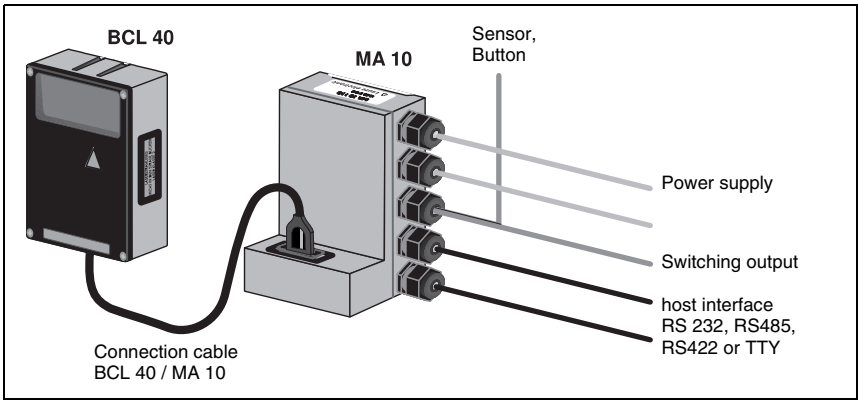


Figure 6.9: Connecting the BCL 40 with the connector unit MA 10

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.

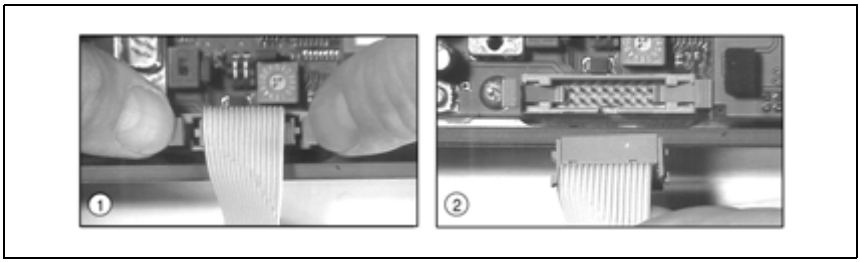


Figure 6.10: Disconnecting the ribbon cable inside the MA 10

↳ *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.*

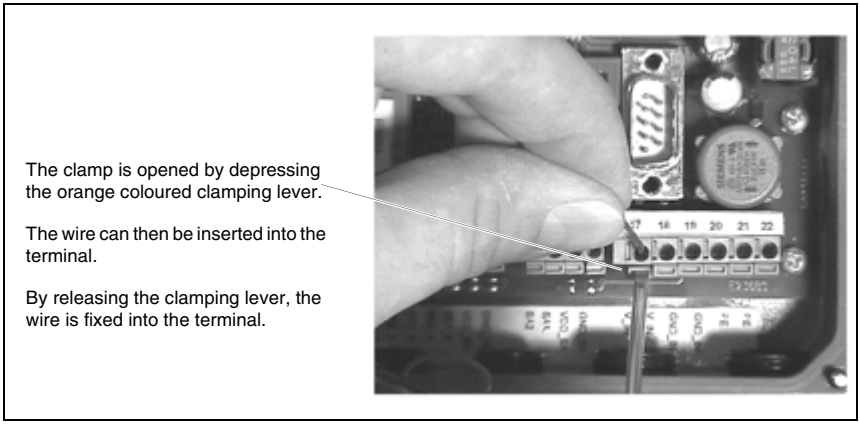


Figure 6.11: Wiring to the terminal strip without screwing down or soldering

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.

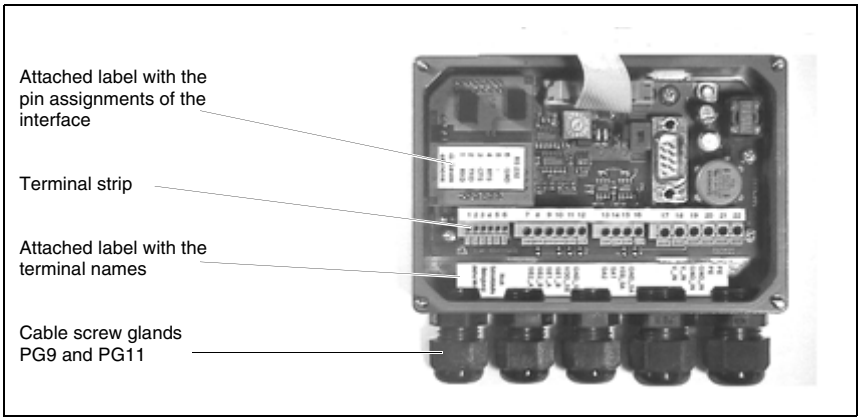


Figure 6.12: Position of the connections for the MA 10

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

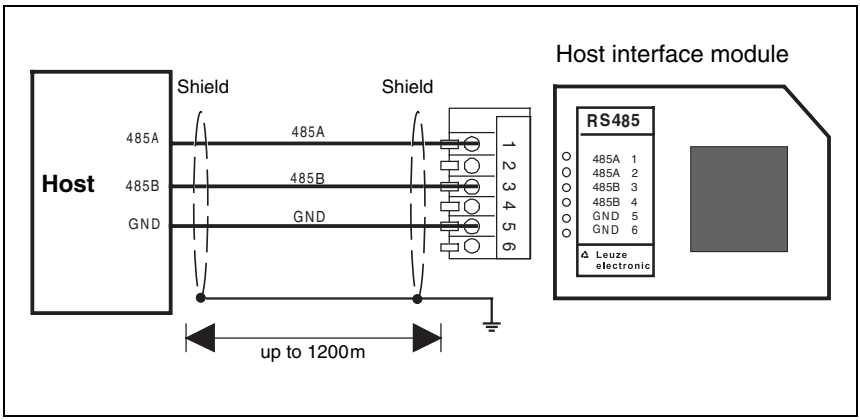


Figure 6.13: Connecting the MA 10 to a RS 485 Host

RS 232 interface

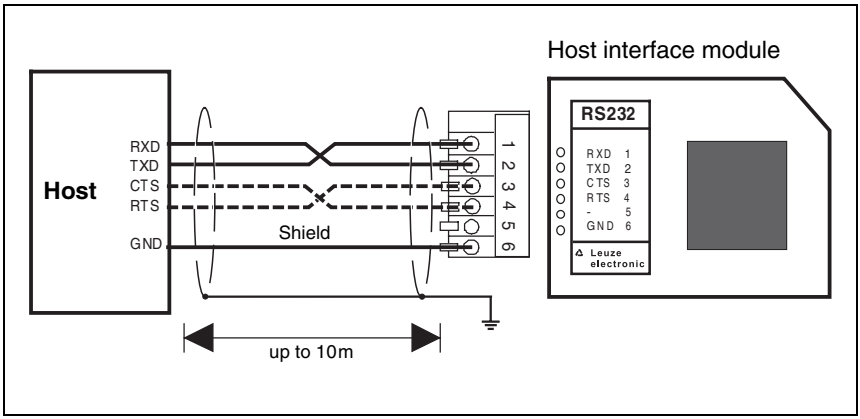


Figure 6.14: Connecting the MA 10 to a RS 232 Host

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

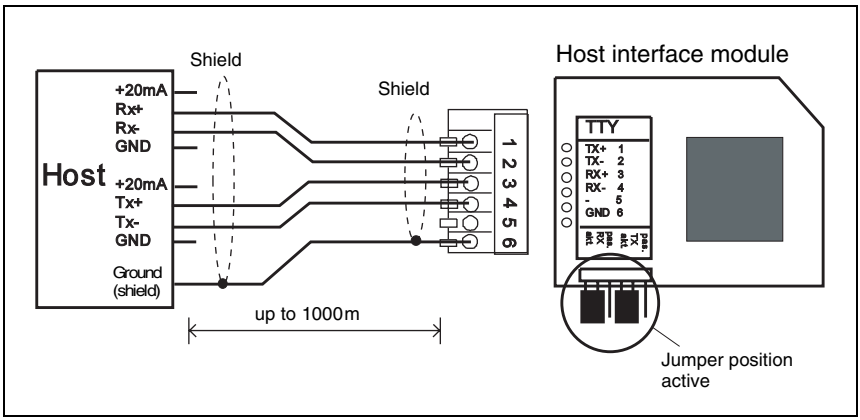


Figure 6.15: Connecting the MA 10 as active subscriber to a TTY Host

MA 10 passive / Host active

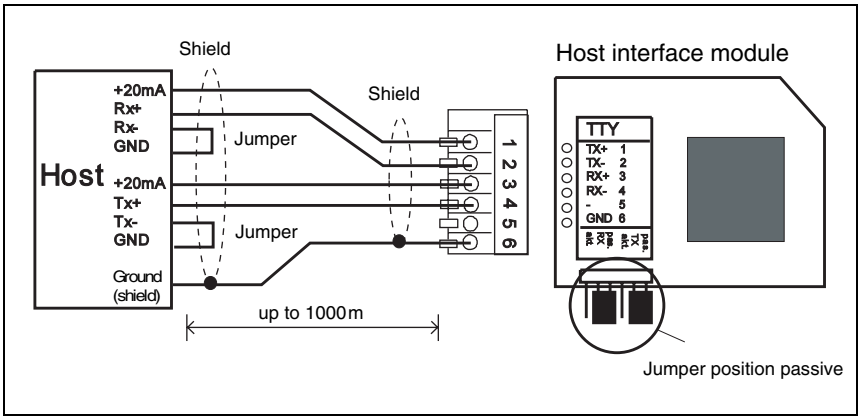


Figure 6.16: Connecting the MA 10 as passive subscriber to a TTY Host

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

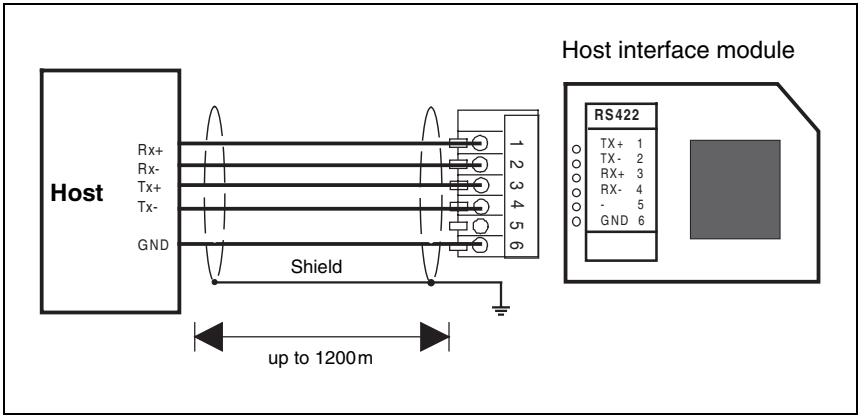


Figure 6.17: Connecting the MA 10 to a RS 422 Host

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 … 36 V DC/AC.
- Insulation voltage: 500 V

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, equal to V_IN device
12	GND_SE	supply voltage, switching input, equal to GND_IN device

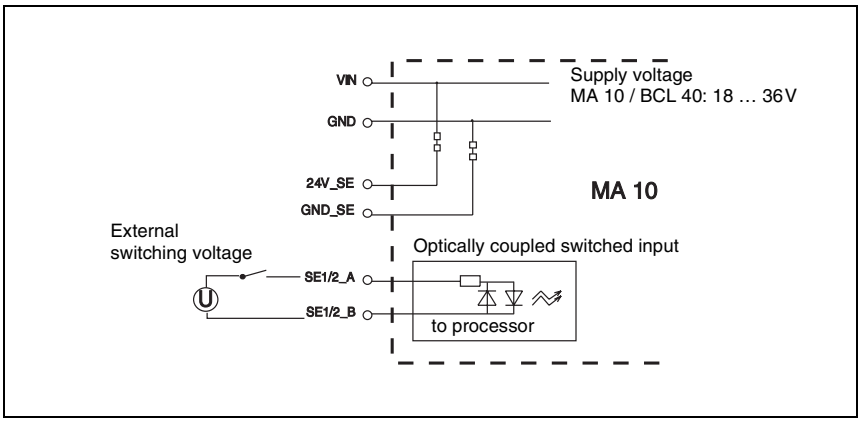


Figure 6.18: Connection of the switching input with an external switching voltage

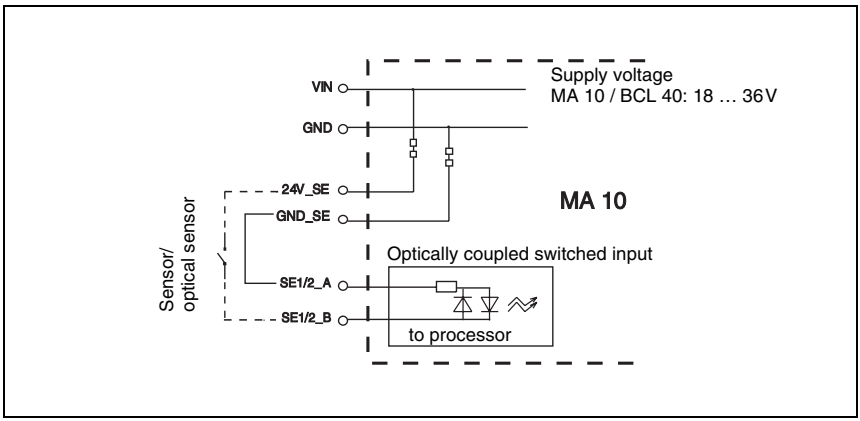


Figure 6.19: Connection of the switching input without an external switching voltage

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 … 48 VDC
- Insulation voltage: 250 V (only in combination with connection type b))
- Output current: Imax = 500 mA (at VDD_SA = 5 … 32 V)
  Imax = 300 mA (at VDD_SA = 32 … 48 V)

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 5 … 48 VDC
16	GND_SA	external voltage supply for switched output 0 VDC

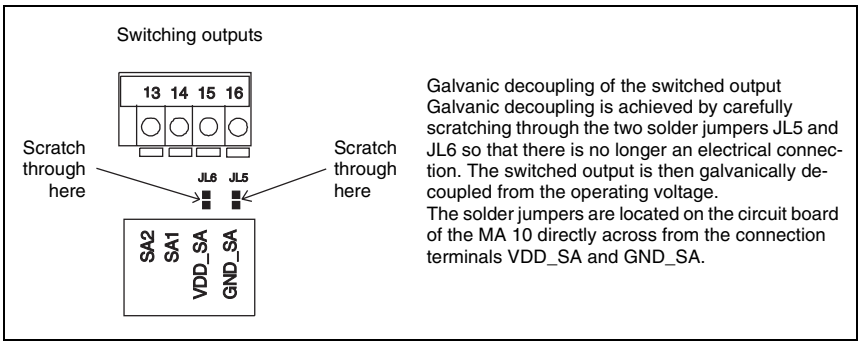


Figure 6.20: Position of the solder jumpers JL5 and JL6

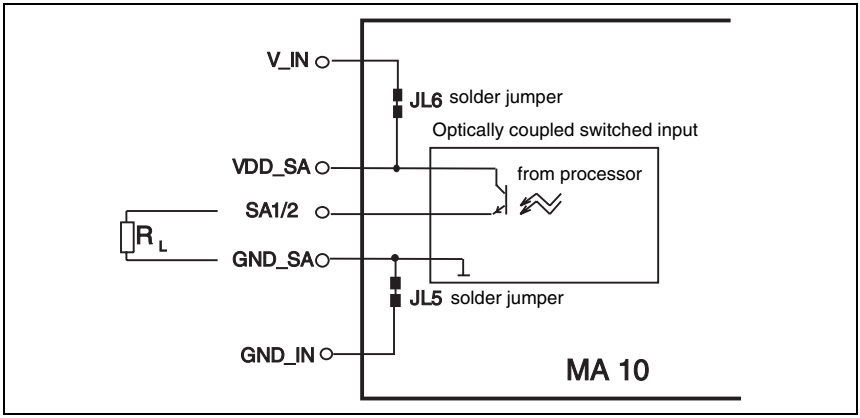


Figure 6.21: Operating voltage used as the switching voltage

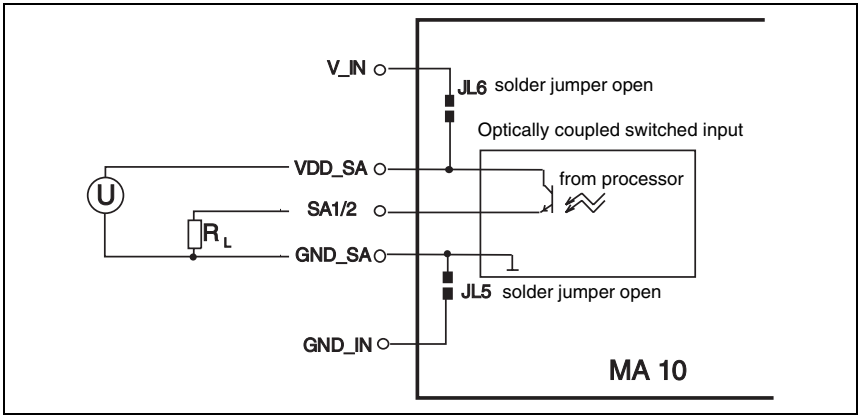


Figure 6.22: Switching voltage connected externally (galvanically decoupled)

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, flexible leads as twisted pairs
MA 10 - Host	RS 422	1200m	absolutely required, flexible leads as twisted pairs
MA 10 - Host	RS 232	10m	absolutely required, flexible leads as twisted pairs
MA 10 - Host	TTY	1000m	not required 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.*

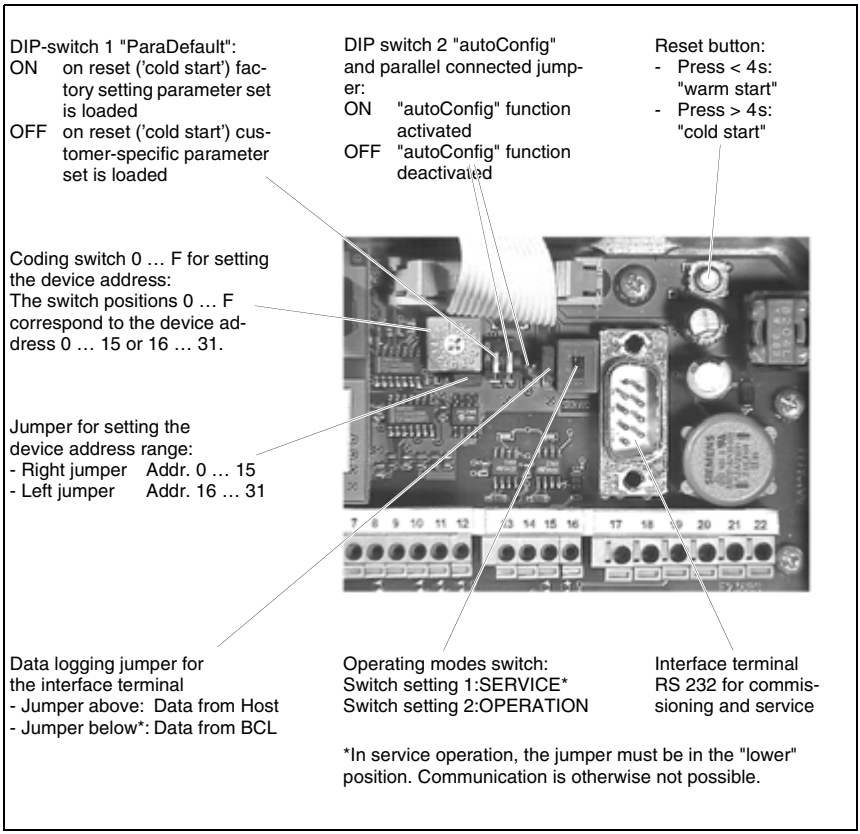


Figure 7.1: Control elements of the MA 10

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 mulitNet 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

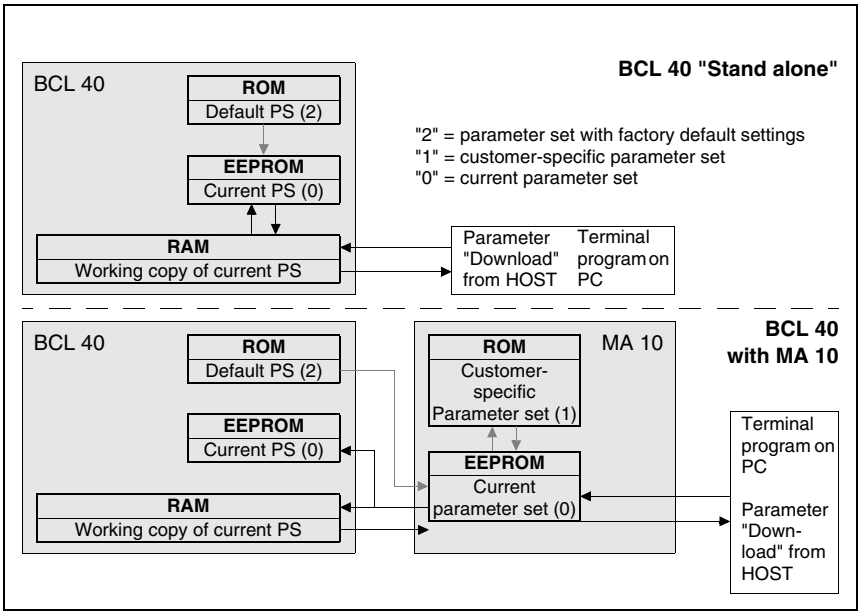


Figure 7.2: Block diagram storage concept for parameter sets

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.

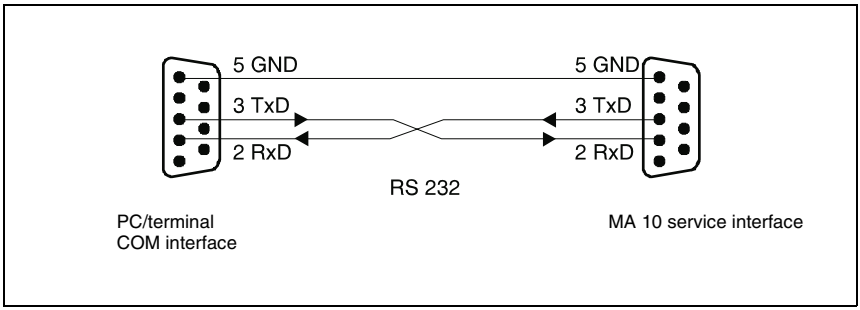


Figure 7.3: Connecting the service interface to a PC or terminal

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 9600 baud
- 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

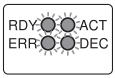
8.1 Display Elements

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 (> 4 s) up 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

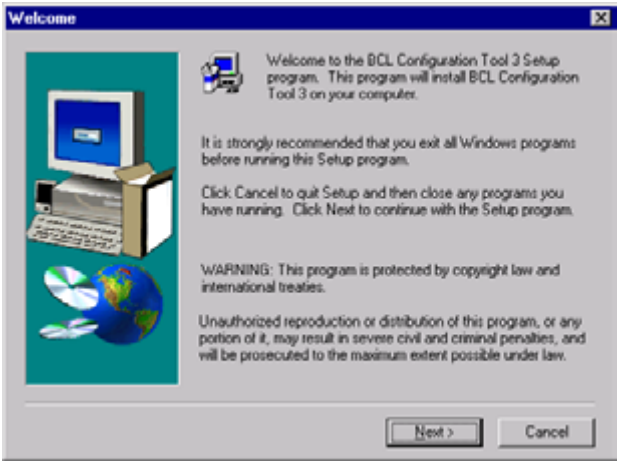


Figure 9.1: Installation window

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

Installation directory

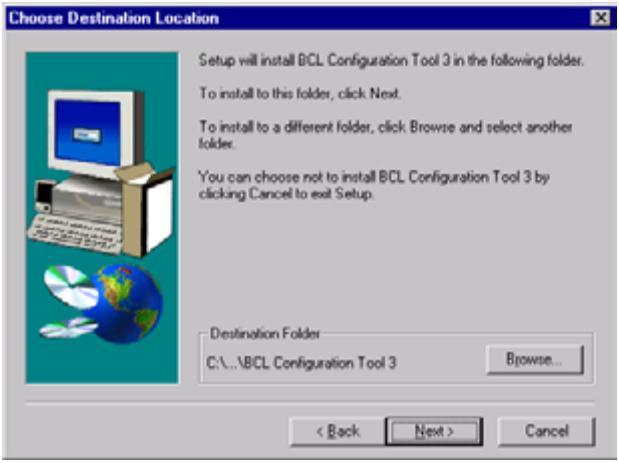


Figure 9.2: Installation directory

↳ *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

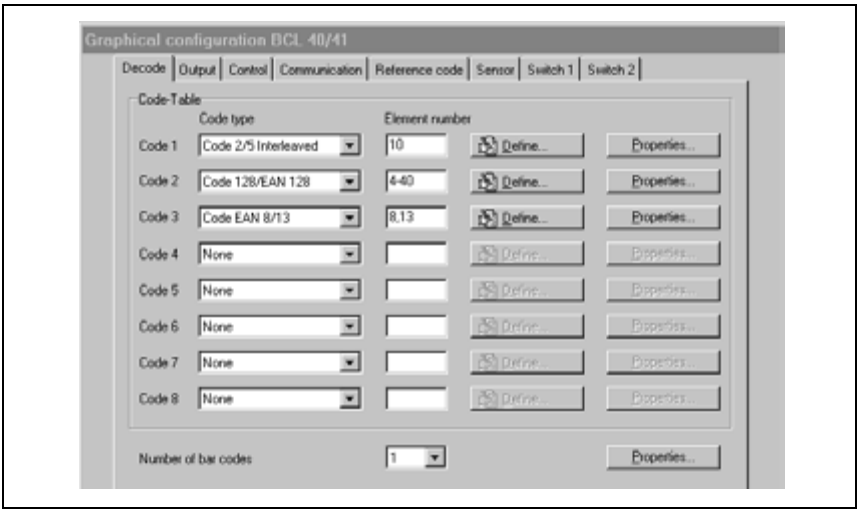


Figure 9.3: "Decode" menu, standard setting

Option	Explanation
Code table	Here, the codes which are to be decoded are set. 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. **Notice:** Code1 must always be selected. If multiple code types are to be used, set in sequential order: Code1, Code2…
Element number	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. With 2 or 3 different element entries by a comma: e.g: 8,13 digits Both are possible as well: e.g.: 4-10,20 digits **Notice:** If the code EAN128 is to be read, 3 additional digits are to be set for the code identifier.
Properties	Behind the "Properties" button, to the right of the respective code, the code-specific settings, such as the check digit, can be selected.
Number of bar codes	Here, the number of the bar codes to be decoded within a read cycle (one reading gate) is set.

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

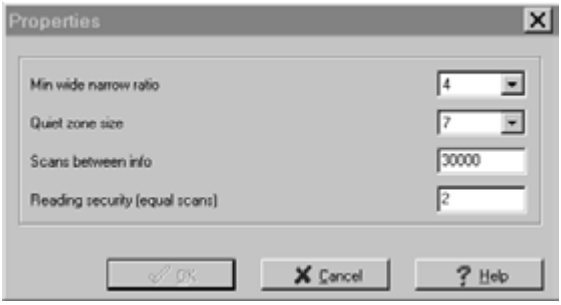


Figure 9.4: Properties of the Decode menu, standard setting

Option	Explanation
Min wide narrow ratio	This value may be changed only in special cases!
Quiet zone size	Quiet zone: the area to the left and right of the bar code Module: width of the narrowest line in the bar code 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. 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. 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.
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

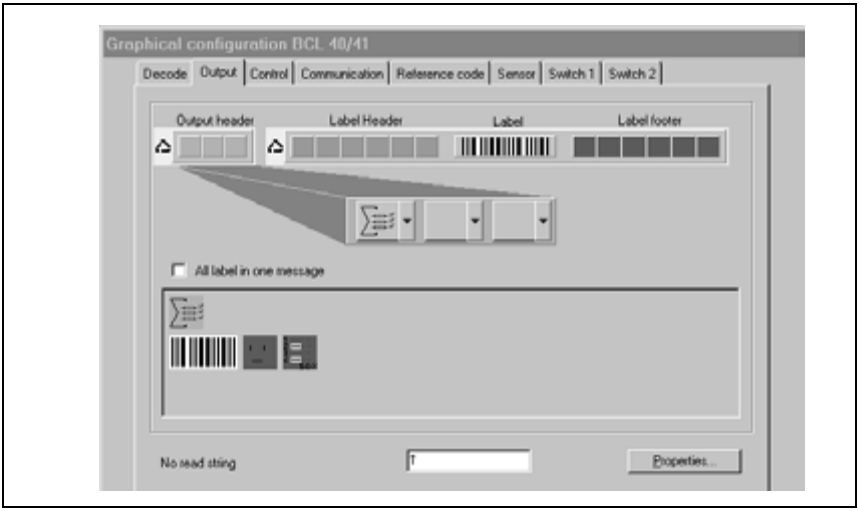


Figure 9.5: "Output" menu

Option	Explanation
Output header	Select from the options listed below. 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. -> 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

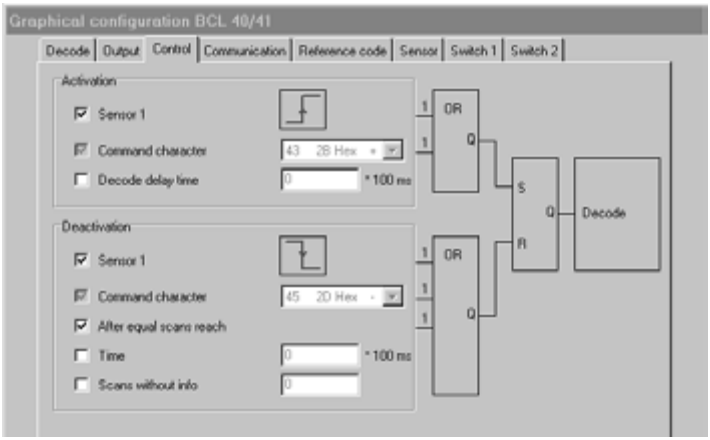


Figure 9.6: "Control" menu, standard setting

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. 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

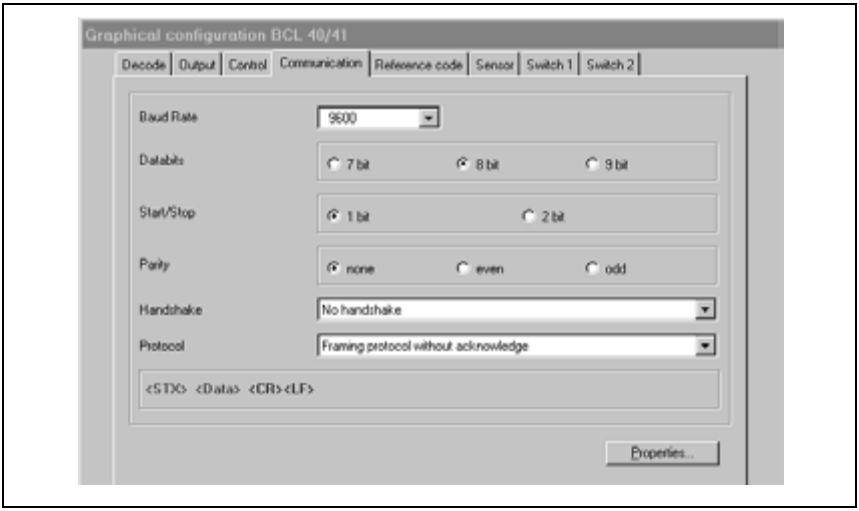


Figure 9.7: "Communication" menu, standard setting

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

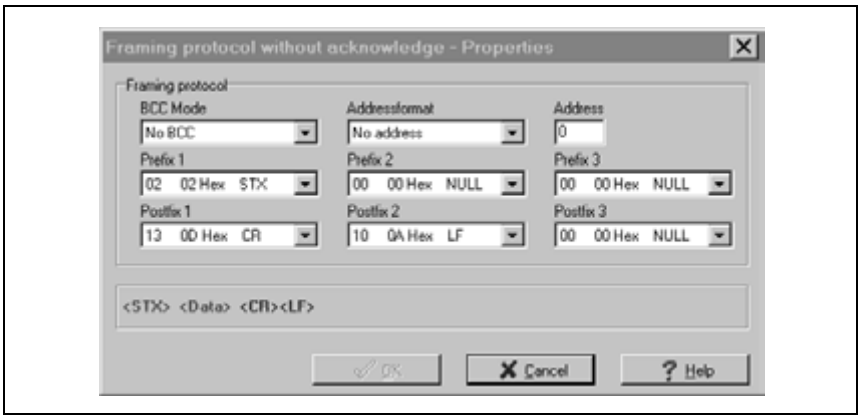


Figure 9.8: Properties of the Communication menu, standard setting

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

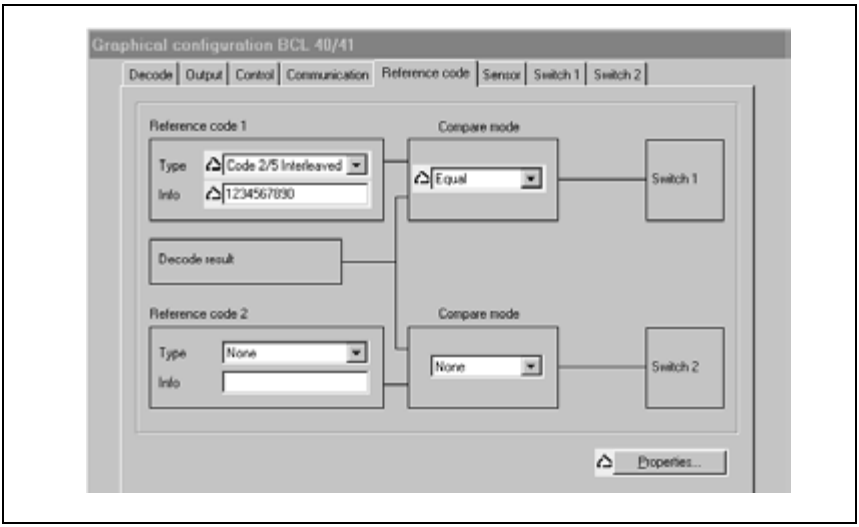


Figure 9.9: "Reference code" menu

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. For additional comparison possibilities, please select the "Properties" menu.

9.2.6 Sensor

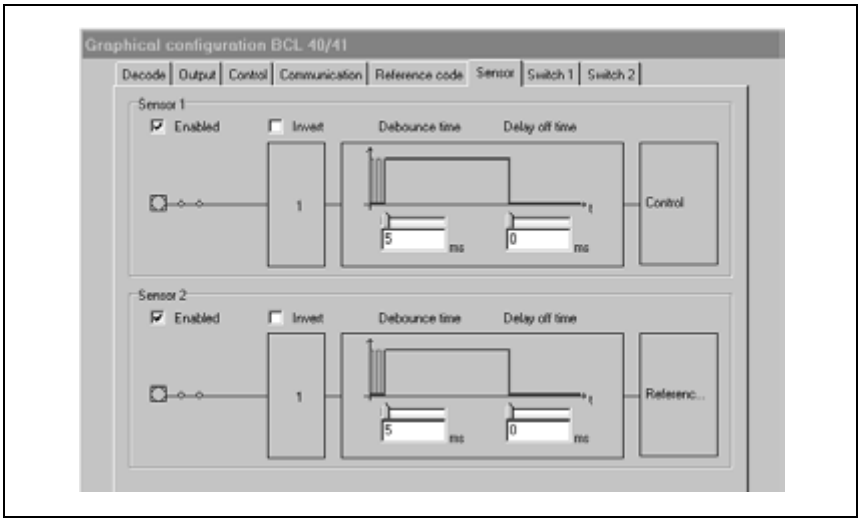


Figure 9.10: "Sensor" menu, standard setting

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

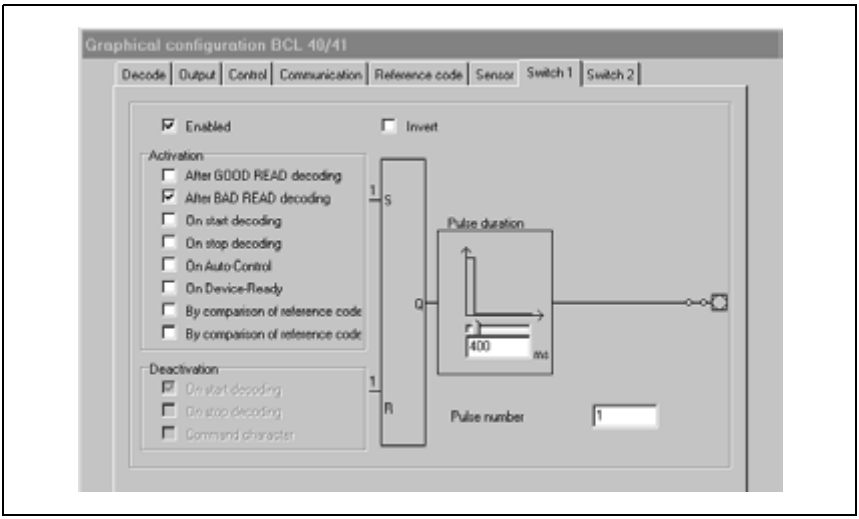


Figure 9.11: "Switch 1" menu, standard setting

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. 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' 'V 50.09' '22.06.97' 'MA 10' (only when a 'V 01.07' MA 10 connector unit is installed) 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' ' ' ' Setup' '----------' ' 1: Language' ' 2: Decode Setup' ' ' '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" **'/'** rejects the last code read **'-'** deactivates "autoConfig" and stores the decoded data in the current parameter set
Acknowledgement	**'xx yy zzzzzz'** (only with 'CA+') **xx**: Code type of the read code **'01'** 2/5 Interleaved **'02'** Code 39 **'06'** UPC (A, E) **'07'** EAN **'08'** Code 128, EAN 128 **'10'** Add-on for EAN/UPC **'11'** Codabar **yy** No. of digits of the read code **zzzzzz** 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	**'RSyxxzzzzzzzz'** **y**, **x** and **z** are place holders (variables) for the actual input. **y**: def. reference code No **'1'** (Code 1) **'2'** (Code 2) … **xx** def. code type (see command "'CA'" on page 75) **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	**'RTy'** **y**: **Function** **'1'** defines reference code 1 **'2'** defines reference code 2 **'-'** 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 **without** storing it in Setup.
Parameter	no
Acknowledge-ment	**xxyyzzzzzz** 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
Acknowledge-ment	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
Acknowledge-ment	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
Acknowledge-ment	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
Acknowledge-ment	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 **'-'** switches off the laser diode **'C'** outputs the laser current **'T'** outputs the laser temperature.
Acknowledge-ment	no **'DS03'**: invalid parameter for the command 'DL' **'DS04'**: invalid command length **'DTxxx.x'** **'DCyyy'**
	xxx.x is the laser temperature in °C **yyy** is the laser current in mA

Diagnosis motor

Command	**'DMS'**
Description	Returns the rotary frequency of the polygon mirror wheel drive motor.
Parameter	no
Acknowledge-ment	**'DMSxxxxx'**
Description	**xxxxx** is the current rotary frequency of the motor in revolutions per minute.

Supply voltage

Command	**'DUV'**
Description	Returns the supply voltage of the BCL 40.
Parameter	no
Acknowledge-ment	**'DUVxx.x'**
Description	**xx.x** 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-ment	'ST00XXXXX' to 'ST19XXXXX'
Description	**ST00XXXXX**': XXXXX is the length of time in seconds that the laser diode has been switched on since the last initialisation **'ST01XXXXX'**: XXXXX is the length of time in minutes that the polygon wheel motor has been switched on since the last initialisation **'ST05XXXXX'**: XXXXX the number of correctly received commands via the interface **'ST06XXXXX'**: XXXXX the number of incorrectly received commands via the interface **'ST07XXXXX'**: XXXXX the number of sent commands via the interface that have received positive acknowledgement **'ST08XXXXX'**: XXXXX the number of sent commands via the interface that have received negative acknowledgement **'ST09XXXXX'**: XXXXX the number of correctly received commands via the host **'ST10XXXXX'**: XXXXX the number of incorrectly received commands via the host **'ST11XXXXX'**: XXXXX the number of sent commands via the host that have received positive acknowledgement **'ST12XXXXX'**: XXXXX the number of sent commands via the host that have received negative acknowledgement **'ST13XXXXX'**: XXXXX is the number of scans since the last read enable **'ST14XXXXX'**: XXXXX is the number of read scans since the last reset **'ST15XXXXX'**: XXXXX is the number of read scans since the last read enable **'ST16XXXXX'**: XXXXX the number of read labels from the last scan **'ST17XXXXX'**: XXXXX is the number of read enables since the last reset **'ST18XXXXX'**: XXXXX the number of correctly decoded labels since the last reset **'ST19XXXXX'**: XXXXX the number of incorrectly decoded labels since the last reset

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	**'0'** tests the current parameter set **'1'** tests the customer-specific parameter set (MA 10 only)
Acknowledge-ment	**'Psx'** **x**: Status **'0'** valid parameter set **'1'** invalid message **'2'** invalid message length **'3'** invalid block check type **'4'** invalid block check checksum **'5'** invalid data length **'6'** invalid message data **'7'** invalid start address **'8'** invalid parameter set **'9'** invalid parameter type

Copy parameter set

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

Code type 01: Interleaved 2 of 5

Modul 0,5

Code type 02: Code 39

Modul 0,5

Code type 11: Codabar

Modul 0,5

Code 128

Modul 0,5

Code type 08: EAN 128

Modul 0,5

Code type 06: UPC-A

Code type 07: EAN 8

Code type 10: EAN 13 Add-on

Figure 11.2: Bar code sample labels (module 0.5)

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