



# Barcode reader BCL 31/32 with integrated decoder

## Technical Description



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<b>1</b>	<b>General Information .....</b>	<b>4</b>
1.1	Explanation of Symbols .....	4
1.2	Declaration of Conformity .....	4
<b>2</b>	<b>Safety Notices .....</b>	<b>5</b>
2.1	Safety Standards .....	5
2.2	Intended Use.....	5
2.3	Working Safely .....	6
<b>3</b>	<b>Description .....</b>	<b>8</b>
3.1	The Bar Code Readers BCL 31/32 .....	8
3.2	Standalone operation.....	9
3.3	Networking .....	9
3.3.1	multiNet plus.....	9
3.3.2	Daisy Chain .....	10
<b>4</b>	<b>Technical Data.....</b>	<b>11</b>
4.1	General Specifications BCL 31/32 .....	11
4.2	Dimensioned and Connection Drawings .....	12
4.3	Optical Data .....	13
4.3.1	Type overview.....	13
4.3.2	Raster aperture.....	14
4.3.3	Optics variants and reading fields.....	14
4.4	Automatic reflector activation "AutoReflAct" .....	16
<b>5</b>	<b>Accessories / Order Designation .....</b>	<b>18</b>
5.1	Accessories.....	18
5.1.1	Connector units.....	20
5.1.2	Fastening Accessories.....	26
5.1.3	Connection cable.....	26
<b>6</b>	<b>Installation .....</b>	<b>27</b>
6.1	Storage, Transportation .....	27
6.2	Mounting .....	28
6.2.1	Device Arrangement .....	29
6.3	Connection.....	31
6.3.1	Connecting the BCL 31 (RS485).....	31
6.3.2	Connecting the BCL 32 (RS232).....	33
6.3.3	Connection of switching inputs and outputs .....	35
6.3.4	Wire Lengths and Shielding.....	36
6.4	Disassembling, Packing, Disposing.....	36

<b>7</b>	<b>Commissioning</b> .....	<b>37</b>
7.1	Measures to be performed prior to the first commissioning .....	37
7.2	Function Test .....	37
7.3	Setting the Parameters .....	38
7.3.1	Parameter sets .....	38
7.3.2	Service Operating Mode .....	39
<b>8</b>	<b>Operation</b> .....	<b>41</b>
8.1	Error Handling .....	41
<b>9</b>	<b>Communicating with the Device</b> .....	<b>42</b>
9.1	Installing the "BCLConfig"-software .....	42
<b>10</b>	<b>Important Parameters</b> .....	<b>44</b>
10.1	Code menu .....	44
10.1.1	Properties of the Code menu .....	45
10.2	Output menu .....	46
10.3	Control .....	47
10.4	Communication .....	48
10.4.1	Communication properties .....	49
10.5	Reference code .....	50
10.6	Sensor .....	51
10.7	Laser .....	52
10.8	Switching output .....	55
<b>11</b>	<b>Online commands</b> .....	<b>56</b>
11.1	Overview of Commands and Parameters .....	56
11.1.1	General 'Online' Commands .....	57
11.1.2	'Online' Commands for System Control .....	63
11.1.3	'Online' command for querying error messages .....	65
11.1.4	'Online' Commands for Parameter Set Operations .....	66
<b>12</b>	<b>Maintenance</b> .....	<b>69</b>
12.1	General Maintenance Information .....	69
12.2	Repairs, Servicing .....	69

Bild 2.1:	Labeling of the BCL 31/32 with logotypes .....	7
Figure 3.1:	BCL 31/32 device construction.....	8
Figure 3.2:	Networking possibilities using the multiNet plus (BCL 31) .....	10
Table 4.1:	General specifications .....	12
Figure 4.1:	Dimensioned drawing BCL 31/32.....	12
Table 4.2:	Type overview .....	13
Figure 4.2:	Reading field, optics model M (medium density, normal range) .....	14
Figure 4.3:	Reading field, optics model F (low density, long range) .....	15
Figure 4.4:	Reading field, optics model L (low density, long range) .....	15
Bild 4.5:	Reading field, optics model J (for ink-jet applications) .....	16
Table 4.3:	Examples of reflectors which may be used .....	17
Figure 4.6:	Reflector arrangement for AutoReflAct .....	17
Table 5.1:	Accessories / Order Designation.....	19
Figure 5.1:	Connector unit MA 2/MA 2 L .....	20
Figure 5.2:	Dimensioned drawing connector unit MA 2/MA 2 L .....	21
Figure 5.3:	Connector unit MA 4/MA 4 D.....	22
Figure 5.4:	Dimensioned drawing connector unit MA 4/MA 4 D.....	23
Bild 5.5:	Connector unit MA 4 1xx/MA 4 D 1xx/MA 4 1xx L .....	24
Bild 5.6:	Dimensioned drawing MA 4 1xx/MA 4 D 1xx/MA 4 1xx L .....	25
Figure 5.7:	Mounting device BT 56.....	26
Figure 6.1:	Device type plate BCL 31/32.....	27
Figure 6.2:	Mounting example BCL 31/32 .....	28
Figure 6.3:	Emitted beam of BCL 31/32 .....	29
Figure 6.4:	Application example "conveyor chain" .....	30
Figure 6.5:	BCL 31 Sub D pin assignments .....	31
Table 6.1:	Connection description BCL 31 .....	32
Table 6.2:	Address setting BCL 31.....	33
Figure 6.6:	BCL 32 Sub D pin assignments .....	33
Table 6.3:	Wiring description BCL 32 .....	34
Figure 6.7:	Connection diagram switching inputs and outputs BCL 31/32 .....	35
Table 6.4:	Wire Lengths and Shielding .....	36
Figure 7.1:	Connecting the service interface to a PC or terminal .....	40
Figure 9.1:	Installation window .....	42
Figure 9.2:	Installation directory .....	43
Figure 10.1:	Default setting of the code menu.....	44
Figure 10.2:	Standard setting of the properties of the code menu .....	45
Figure 10.3:	Output menu.....	46
Figure 10.4:	Control menu default settings.....	47
Figure 10.5:	Standard setting of the communication menu .....	48
Figure 10.6:	Standard setting of the property menu .....	49
Figure 10.7:	Reference code menu .....	50
Figure 10.8:	Standard setting of the switching input menu.....	51
Figure 10.9:	Laser menu .....	52
Figure 10.10:	AutoReflAct Wizard .....	53
Figure 10.11:	Standard setting of the switching output menu .....	55

# 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 Declaration of Conformity

The bar code reader BCL 31/32 and the optional connector units MA 2/MA 2 L/MA 4.../MA 22 DC have been developed and manufactured under observation of the applicable European standards and directives.

The bar code reader BCL 31/32 also meets the requirements of UL (Underwriters Laboratory Inc.) for the USA and Canada.



**Notice!**

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

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



## 2 Safety Notices

### 2.1 Safety Standards

The bar code readers BCL 31/32 and the optional connector units MA 2/MA 2 L/MA 4.../MA 22 DC 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 31/32 are conceived as stationary, high-speed scanners with integrated decoders for all current bar codes used for automatic object recognition.

The optional connector and interface units MA 2/MA 2 L/MA 4.../MA 22 DC are intended for the easy connection of bar code readers of type BCL 31/32.

In particular, unauthorised uses include:

- rooms with explosive atmospheres
- operation for medical purposes

**Areas of application**

The bar code readers BCL 31/32 with optional connector unit MA 2/MA 2 L/MA 4.../MA 22 DC are conceived particularly for the following fields of application:

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

## 2.3 Working Safely



### **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.



### **Attention Laser Radiation!**

**The BCL 31/32 barcode readers comply with safety standards IEC 60825-1:1993 + A2:2001 for a class 2 product. They also comply with the U.S. 21 CFR 1040.10 and CFR 1040.11 regulations for a class II product except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.**

**Radiant Energy: The BCL 31/32 uses a low power visible laser diode. The emitted wavelength is 650 ... 690 nm. The peak output power of the scanning laser beam is 1.8mW. Laser radiation observed at 120mm above the window through a 7 mm aperture and averaged over 1000 seconds is less than 1mW per CDRH class II specification.**

**Adjustments: Do not attempt any adjustments to or alterations of this products. Do not remove the scanner's protective housing. There are no user-serviceable parts inside.**

**The scanner window is the only aperture through which laser radiation may be observed on this product. A failure of the scanner motor, while the laser diode continues to emit a laser beam, may cause emission levels to exceed those for safe operation. The scanner has safeguards to prevent this occurrence. If, however, a stationary beam is emitted, the failing scanner should be disconnected from its power source immediately.**

**CAUTION: Use of controls or adjustments or performance of procedures other than specified herein may result in hazardous radiation exposure. The use of optical instruments with the product will increase eye hazard.**



The housing of the barcode readers BCL 31/32 is labeled on the side, below the scanner window and on the rear with the following logotypes:

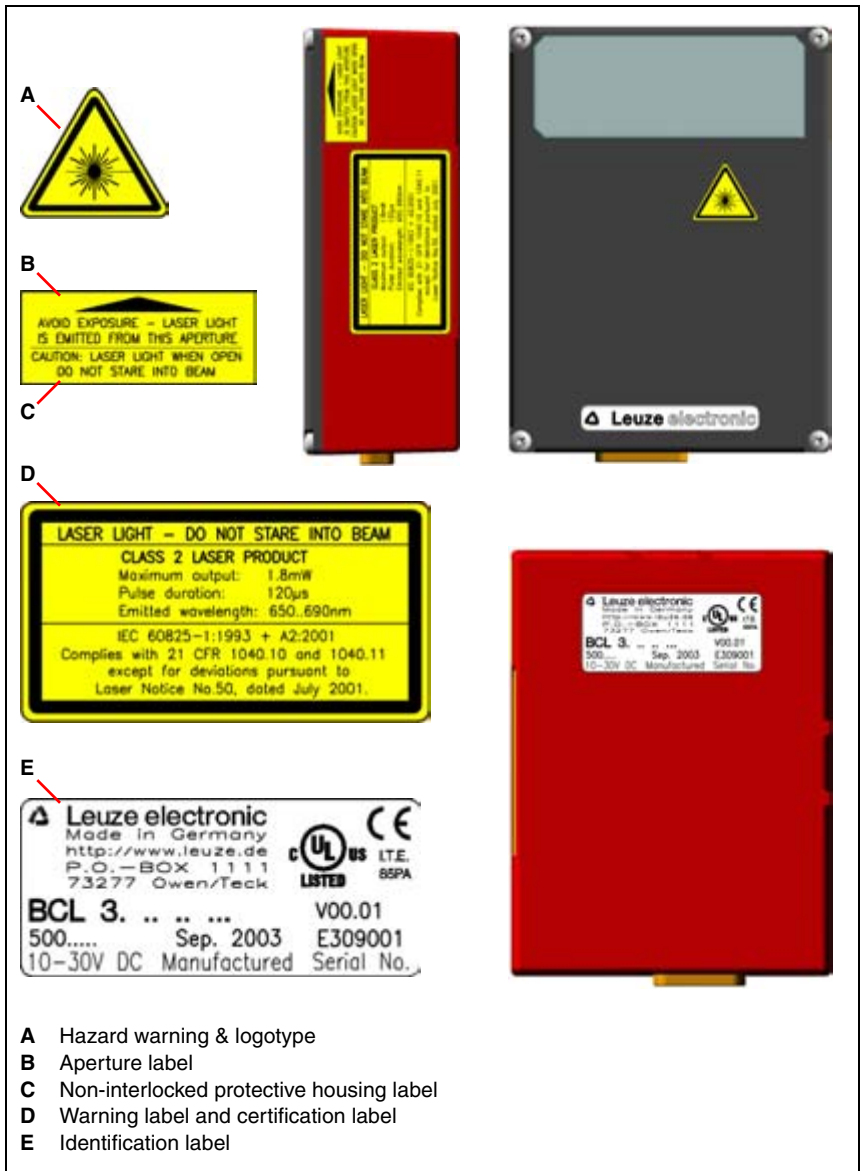


Bild 2.1: Labeling of the BCL 31/32 with logotypes

### 3 Description

#### *BCL 31/32 device construction*

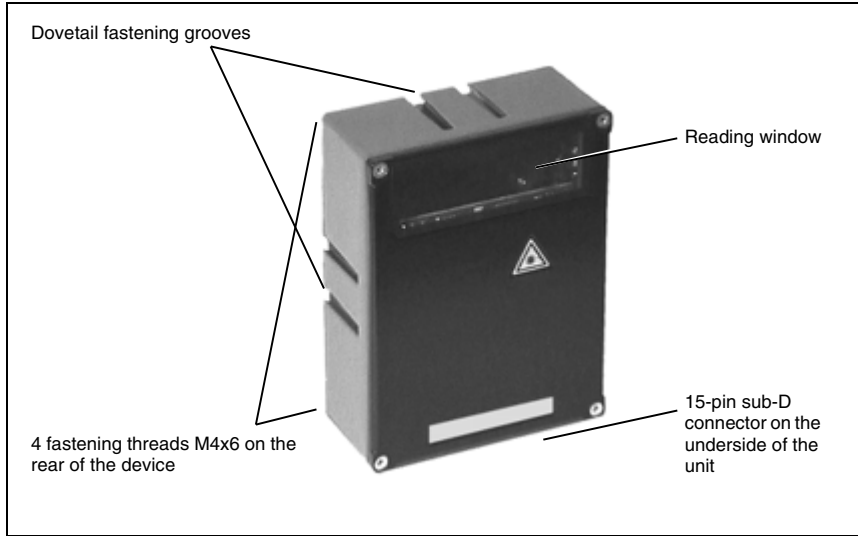


Figure 3.1: BCL 31/32 device construction

#### 3.1 The Bar Code Readers BCL 31/32

The bar code readers BCL 31/32 are high-speed scanners 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 the small dimensions of the unit and the short minimum reading distance, the BCL 31/32 may also be used in highly constrained spaces.

A special bar code reader with optics version J is available for all ink jet applications. This reader has been optimised for low contrast bar codes that generally feature gaps.

Information on technical data and characteristics can be found in Chapter 4.

##### ***auto ReflAct***

**auto ReflAct** stands for automatic Reflector Activation and permits an activation without additional sensors. This is achieved by directing the scanner with reduced scanning beam towards a reflector mounted behind the conveyor path. As long as the scanner is targeted at the reflector, the read gate remains closed. If, however, the reflector is blocked by an object such as a container with a bar code label, the scanner activates the read procedure, and the label on the container is read. When the path from the scanner to the reflector has cleared, the read procedure has completed and the scanning beam is reduced and again directed onto the reflector. The reading gate is closed.

## 3.2 Standalone operation

The bar code reader BCL 31/32 is operated as a "stand-alone" device. The BCL features a 15-pin sub-D connector for the electrical connection of the supply voltage, the interface, and the switching inputs.

### ***With connector units***

The connector units simplify the electrical installation of the bar code readers in standalone operation.

In addition, they permit the networking of several bar code readers; they can store operating parameters (MA 4...), and can show parameters and operating data on a display (MA 4 D...).

A listing of the available connector units and associated short descriptions may be found in Chapter 5. Separate data sheets are available that contain further details about the connector units.

## 3.3 Networking

### 3.3.1 multiNet plus

Up to 30 scanners can be networked together using the connector units MA 2, MA 2 L or MA 4... and a bus master MA 31. To achieve this, each BCL 31/32 is assigned a separate hardware address in the respective connector unit. The devices are networked by connecting the individual RS 485 interfaces in parallel.

In the Leuze multiNet plus, the individual network devices sequentially transfer their data to the network master MA 31 when requested. In addition, each network device that is declared as slave receives a device address. It is set via a coding switch in the respective connector unit. When exchanging a scanner, the device address remains stored in the MA 2/MA 2 L. The connector units MA 4... also store the operating parameters of the scanner.

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 spent programming the software.

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

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

### ***Interface modules***

Shielded, twisted pair conductors should be used for the multiNet. This allows a total network length of up to 1200 m. Connection of the network to the primary computer is made via the host interface of the MA 31 which can be equipped with 4 different physical interface modules. Modules are available for RS 422, RS 232, TTY and RS 485.

### Networking via multiNet plus

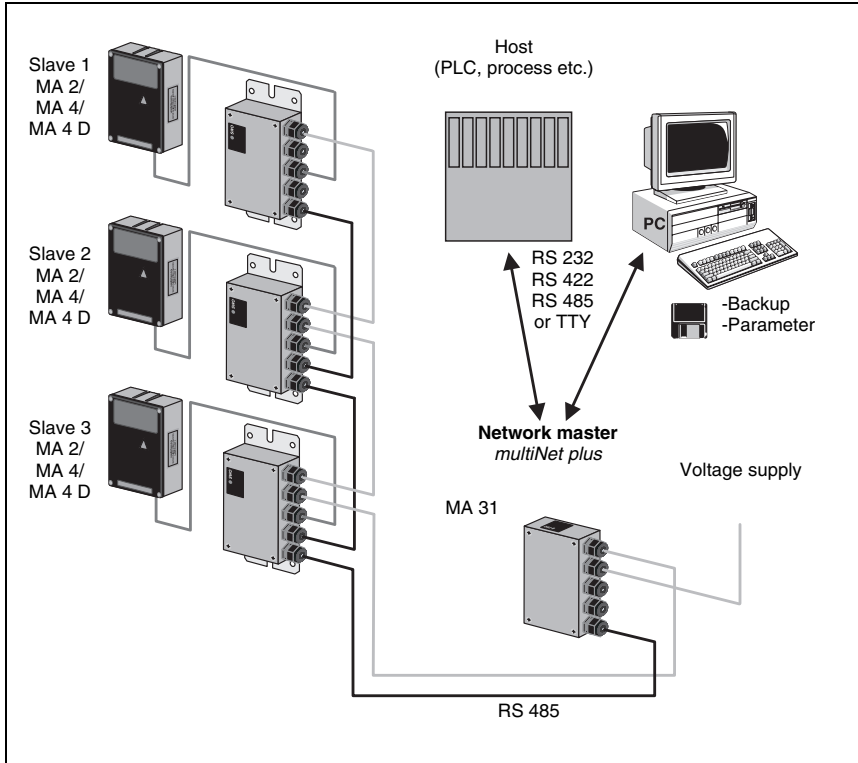


Figure 3.2: Networking possibilities using the multiNet plus (BCL 31)

### 3.3.2 Daisy Chain

The connector unit MA 22 DC permits the networking of up to 4 bar code readers BCL 32 without an additional network master. The MA 22 DC features two host interfaces, one of which can be used to cascade a further connector unit MA 22 DC. This permits the networking of in total eight BCL 32 without an additional master.

For details regarding the networking with MA 22 DC, please refer to the description of the MA 22 DC.

## 4 Technical Data

### 4.1 General Specifications BCL 31/32

#### Optical Data

Light source	Laser diode 650nm
Scanning rate	BCL with M optics: 1000scans/s BCL with F optics: 800scans/s BCL with L optics: 800scans/s BCL with J optics: 1000scans/s
Resolution	BCL 3x xM 100: m = 0.2mm ... 0.5mm BCL 3x xF 100: m = 0.3mm ... 0.8mm BCL 3x xL 100: m = 0.35mm ... 0.8mm BCL 3x xJ 100: dependent on application
Beam deflection	by means of rotating polygon mirror wheel
Reading distance	see reading curve
Reading field opening	see reading curve
Laser safety class	2 accord. to IEC 60825-1:1993 + A2:2001 II accord. to CDRH
Code types	2/5 Interleaved, Code 39, Code 128, EAN 128, EAN/UPC, EAN Addendum, Codabar, Pharma Code, Code 93
Software features	selectable output format, autoConfig, autoControl, autoReflAct, 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	BCL 31: RS 485 BCL 32: RS 232
Service interface	RS232 with fixed data format, 9600Bd, 8 data bits, no parity, 1 stop bit
Baud rate	110 ... 115400Bd
Data formats	data bits: 7, 8, 9 parity: None, Even, Odd stop bits: 1, 2
Protocols	with/without frame protocol ACK/NAK, 3964 (R) RK 512, RTS/CTS X ON / X OFF, multiNet plus
Ports	BCL 31: 1 switching output, 1 switching input BCL 32: 2 switching outputs, 2 switching inputs
Operating voltage <sup>1)</sup>	10 ... 30VDC
Power consumption	3.2 W

#### Additional Functions

autoReflAct	automatic reading activation via reflector
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1) The unit is to be supplied by a Limited Power Supply complying with Cl. 2.5 of UL 60950 (NEC Class 2) and rated from 10Vdc to 30Vdc, min. 320 mA.  
The unit shall be installed in accordance to the NEC, Article 725-52.

**Mechanical data**

Protection class	IP 65
Weight	400 g
Dimensions (W x H x D)	120 x 90 x 43mm
Housing	diecast aluminium

**Environmental data**

Ambient temp. (operation/storage)	0°C ... +40°C/-20°C ... +60°C
Air humidity	max. 90% rel. humidity, non-condensing
Vibration	IEC 60068-2-6, test FC
Shock	IEC 60068-2-27, test Ea
Electromagnetic compatibility	EN 61326-1, IEC 61000-4-2, -3, -4 and -6,

Table 4.1: General specifications

**4.2 Dimensioned and Connection Drawings**

***BCL 31/32***

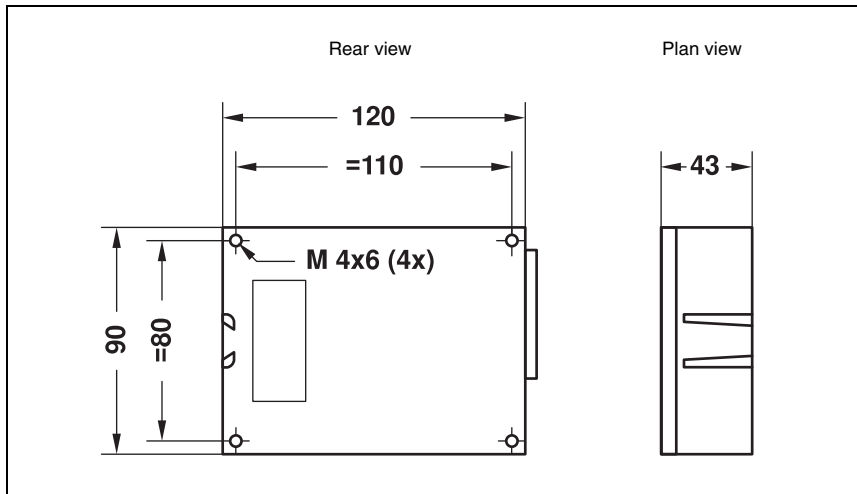


Figure 4.1: Dimensioned drawing BCL 31/32

### 4.3 Optical Data



**Notice!**

Please note that the size of the bar code module influences the maximum reading distance and the width of the reading field. 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 31/32 is available in various versions, both as a raster scanner and as a single line scanner. Please refer to the following table or the respective scanning curves for ratings.

#### 4.3.1 Type overview

Model	Range	Module/ resolution (mm)	Scanning rate (scan/s)	Scanner type	Part No.
BCL 31 S M 100	up to 220mm	0.2 ... 0.5	1000	Single line	500 36276
BCL 31 R1 M 100				Raster	500 36275
BCL 32 S M 100				Single line	500 36272
BCL 32 R1 M 100				Raster	500 36271
BCL 31 S F 100	up to 450mm	0.3 ... 0.8	800	Single line	500 36278
BCL 31 R1 F 100				Raster	500 36273
BCL 32 S F 100				Single line	500 36274
BCL 32 R1 F 100				Raster	500 36277
BCL 31 S L 100	up to 750mm	0.35 ... 0.8	800	Single line	500 41379
BCL 31 R1 L 100				Raster	500 41380
BCL 32 S L 100				Single line	500 41384
BCL 32 R1 L 100				Raster	500 41383
BCL 31 R1 J 100	dependent on application	dependent on application	1000	Raster	500 41798
BCL 32 R1 J 100				Raster	500 41800

Table 4.2: Type overview



**Notice!**

BCL 31: interface RS 485  
 BCL 32: interface RS 232

### 4.3.2 Raster aperture

Raster aperture depending on various distances:

Scanner distance [mm]	50	100	200	300	400	450	700
Raster line field [mm]	15	21	32	44	55	61	84

### 4.3.3 Optics variants and reading fields

The BCL 31/32 is available with two different optics. The optics differ in range and resolution (see Chapter 4.3.1).

- Optic M: for small to medium modules
- Optic F: for medium to large modules
- Optic L: for medium to large modules
- Optic J: For ink-jet applications or if the bar codes are of low contrast or have gaps

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



**Notice!**

Please notice that the real scanning curves are also influenced by factors such as labelling material, printing quality, scanning angle, printing contrast etc., and may thus deviate from the scanning curves specified here.

**Scanning curves BCL 31/32 with optic M**

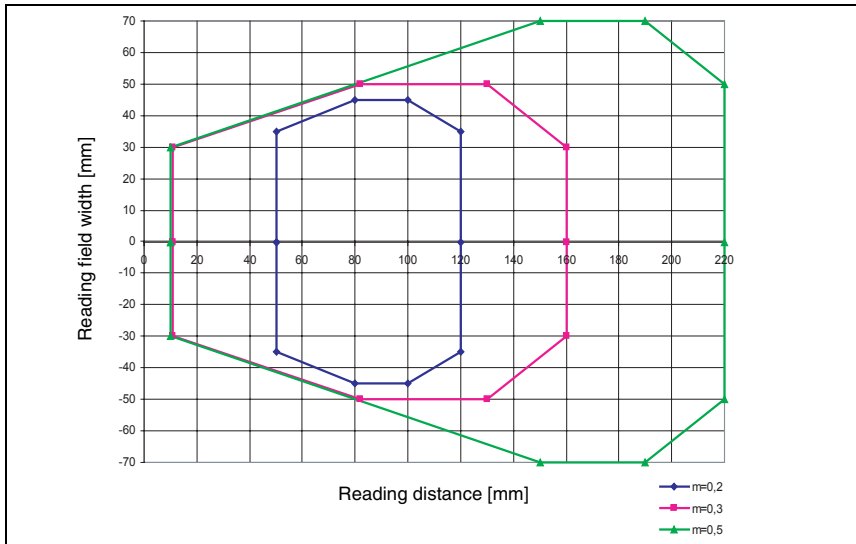


Figure 4.2: Reading field, optics model M (medium density, normal range)



**Scanning curves BCL 31/32 with optic F**

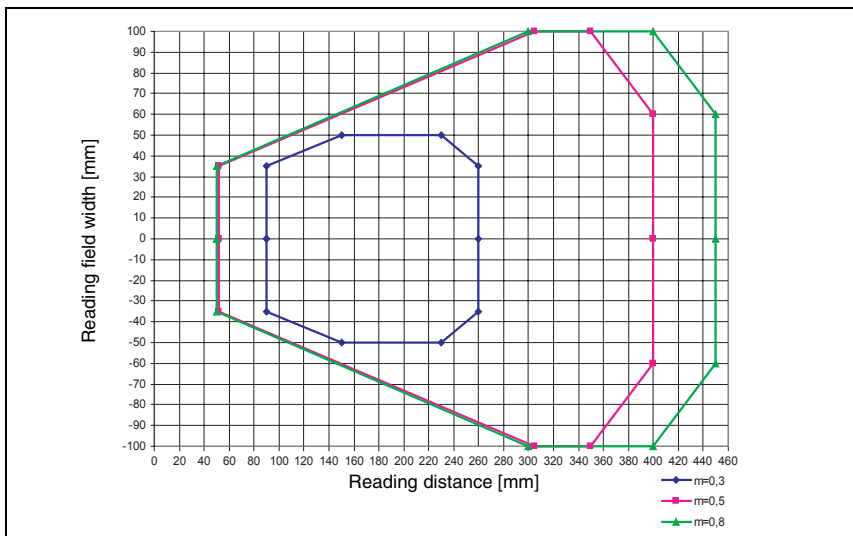


Figure 4.3: Reading field, optics model F (low density, long range)

**Scanning curves BCL 31/32 with optic L**

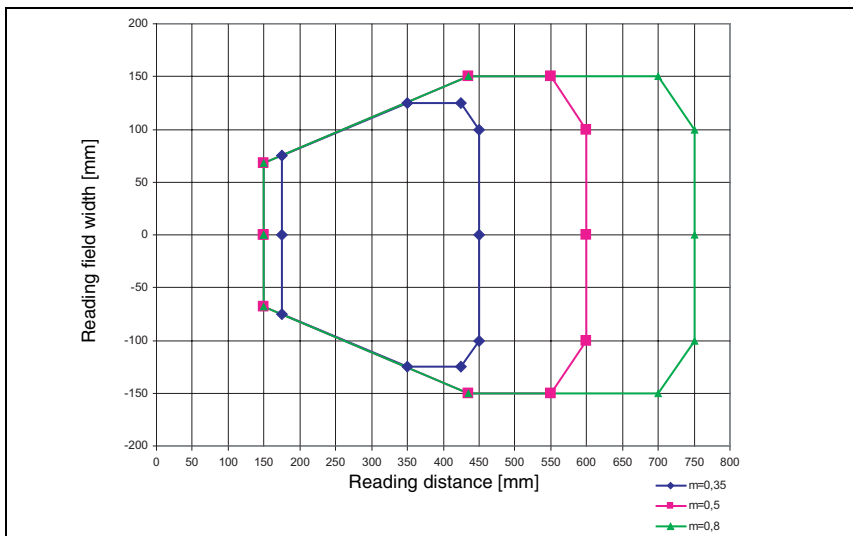


Figure 4.4: Reading field, optics model L (low density, long range)

**Scanning curves BCL 31/32 with optic J**



**Notice!**

The specified reading curve applies to the standard case:  
black on white, sharp contours, homogeneously printed code.

The actual reading field for an ink-jet application must be checked for the respective application.

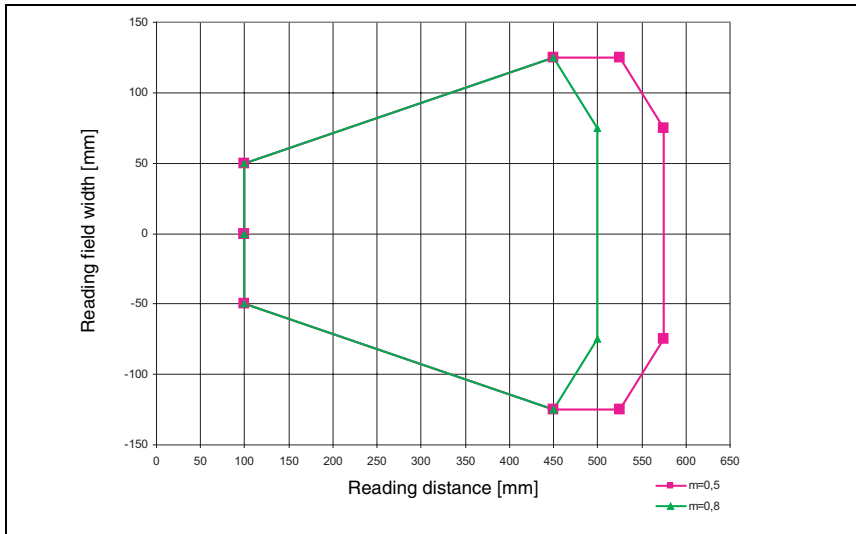


Bild 4.5: Reading field, optics model J (for ink-jet applications)

**4.4 Automatic reflector activation "AutoReflAct"**

The **AutoReflAct** function uses the scanning beam to simulate a photoelectric sensor and thus permits an **activation without additional sensory mechanism**. This is achieved by directing the scanner with reduced scanning beam towards a reflector mounted behind the conveyor path.

As long as the scanner is targeted at the reflector, the read gate remains closed. If, however, the reflector is blocked by an object such as a container with a bar code label, the scanner activates the read procedure, and the label on the container is read. When the path from the scanner to the reflector has cleared, the read procedure has completed and the scanning beam is reduced and again directed onto the reflector. The reading gate is closed.



**Notice!**

*AutoReflAct does not function if the barcodes which are to be read are put on reflecting surfaces, e.g. foils.*

Our recommendation:

- Use BCL 31/32 R1 X 100
- AutoRefl mode with or without reading gate control (single)

The maximum distances between the reflector and the BCL depend on the reflector used. A summary is provided in the following table. The fundamental arrangement of reflector and BCL is shown in Figure 4.6.

Reflector type/reflective tape	max. distance (mm)	max. angle (°)	Order No.
reflective tape no. 2 *)	1200	15	500 11523
TK 100x100	2000	20	500 03192
TKS 50x50	1000	20	500 22814

Table 4.3: Examples of reflectors which may be used

\*) Reflective tape no. 2 is included

**Application example: automatic reflector activation**

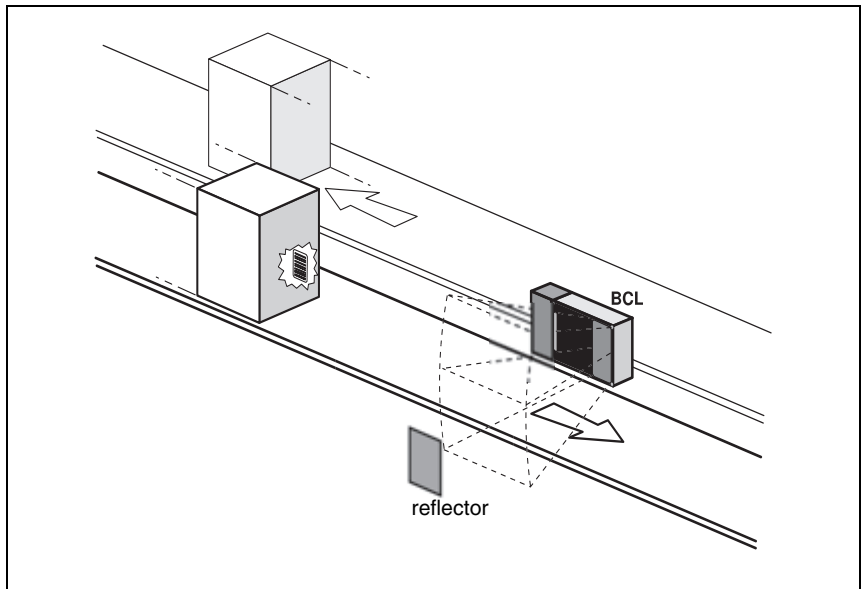


Figure 4.6: Reflector arrangement for AutoReflAct

## 5 Accessories / Order Designation

### 5.1 Accessories



**Notice!**

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

Symbol	Order No.	Short Description
MA 2	50031256	Connector unit for BCL 31/32 Stand alone or multiNet slave
MA 2 L	50036186	Connector unit for BCL 31/32 Stand alone or multiNet slave with L-shaped housing
MA 22 DC	50031496	Daisy Chain connector unit for four BCL 32
MA 4	50031537	Connector unit for BCL 31/32 with parameter memory
MA 4 D	50031536	Connector unit for BCL 31/32 with parameter memory and display
MA 4 110	50039659	Connector unit for BCL 32 with parameter memory and RS 232 host interface, galvanically isolated
MA 4 120	50039660	Connector unit for BCL 32 with parameter memory and TTY host interface
MA 4 130	50039661	Connector unit for BCL 32 with parameter memory and RS 422 host interface
MA 4 D 110	50039662	Connector unit for BCL 32 with parameter memory, display and RS 232 host interface, galvanically isolated
MA 4 D 120	50039663	Connector unit for BCL 32 with parameter memory, display and TTY host interface
MA 4 D 130	50039664	Connector unit for BCL 32 with parameter memory, display and RS 422 host interface
MA 4 100 L	50039655	Connector unit for BCL 32 with parameter memory, L-shaped housing and RS 485 host interface, galvanically isolated
MA 4 110 L	50039656	Connector unit for BCL 32 with parameter memory, L-shaped housing and RS 232 host interface, galvanically isolated
MA 4 120 L	50039657	Connector unit for BCL 32 with parameter memory, L-shaped housing and TTY host interface
MA 4 130 L	50039658	Connector unit for BCL 32 with parameter memory, L-shaped housing and RS 422 host interface
BT 56	500 27375	Mounting bracket with dovetail for rod

<b>Symbol</b>	<b>Order No.</b>	<b>Short Description</b>
KB 031-3000	500 35355	Connection cable between BCL and MA, length: 3m
KB 040-3000	500 26658	Connection cable between BCL and MA in L version, length: 3m
KB 040-6000	500 29381	Connection cable between BCL and MA in L version, length: 6m
KB 040-10000	500 29382	Connection cable between BCL and MA in L version, length: 10m
BCLConfig	500 60298	Programming software

Table 5.1: Accessories / Order Designation

### 5.1.1 Connector units

**Notice!**

The connector units are described here in brief only. For further information regarding the connector units please refer to the relevant data sheets.

**Connector unit MA 2/MA 2 L**

The connector units MA 2/MA 2 L are used to simplify the electrical installation of the BCL 31/32. They have the following advantages compared to the installation of the BCL 31/32 as a standalone device:

- Terminals for switching inputs and outputs, including supply voltage
- Terminals for feed-through of the RS 485 connection
- 9-pin sub D plug for service interface
- Operating mode switch: service operation/standard operation
- Rotary switch for address setting

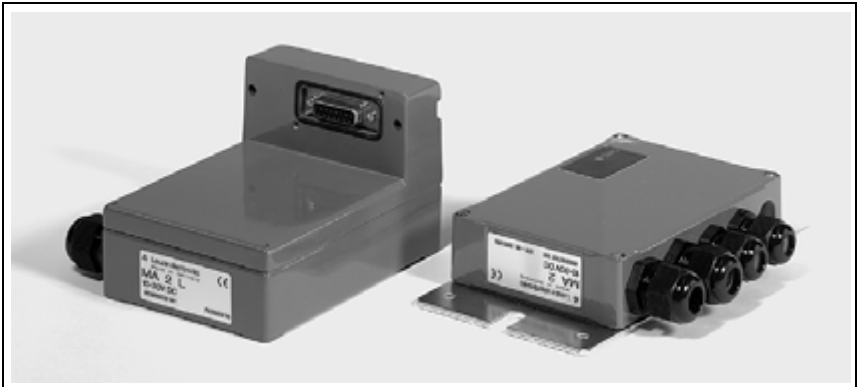


Figure 5.1: Connector unit MA 2/MA 2 L

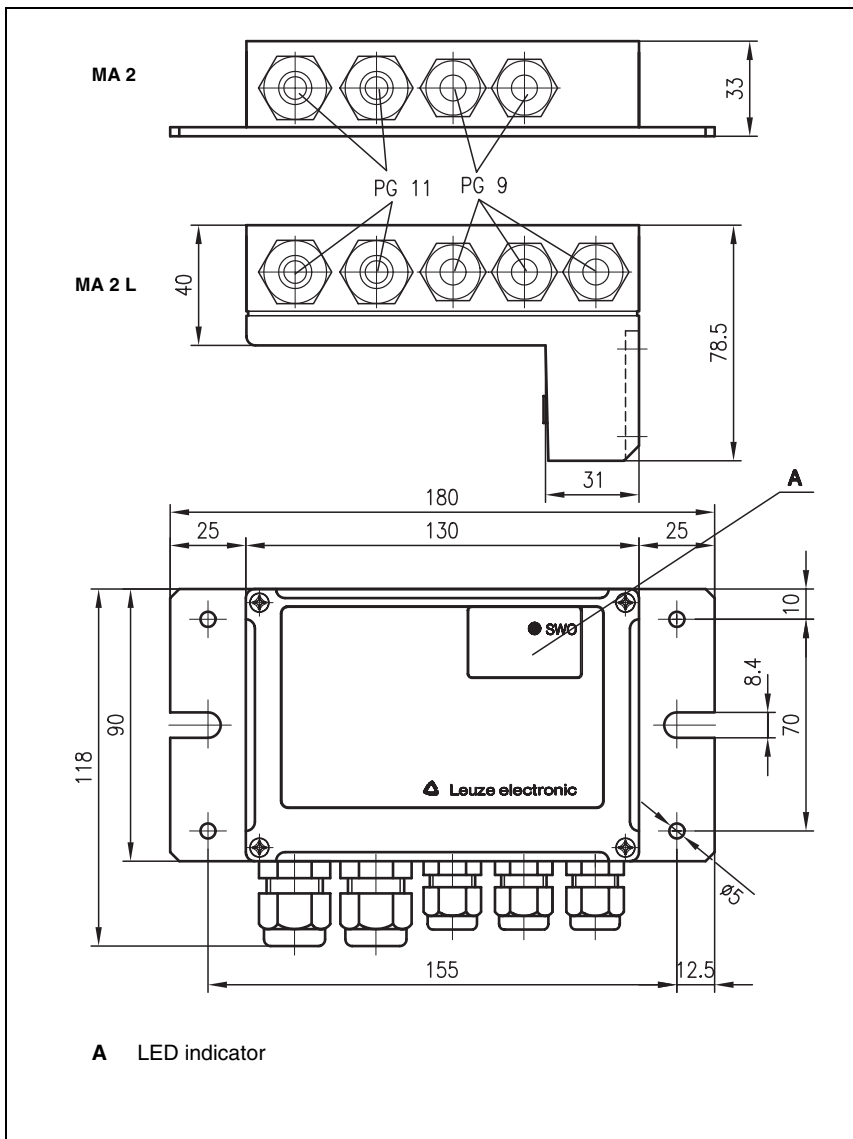


Figure 5.2: Dimensioned drawing connector unit MA 2/MA 2 L





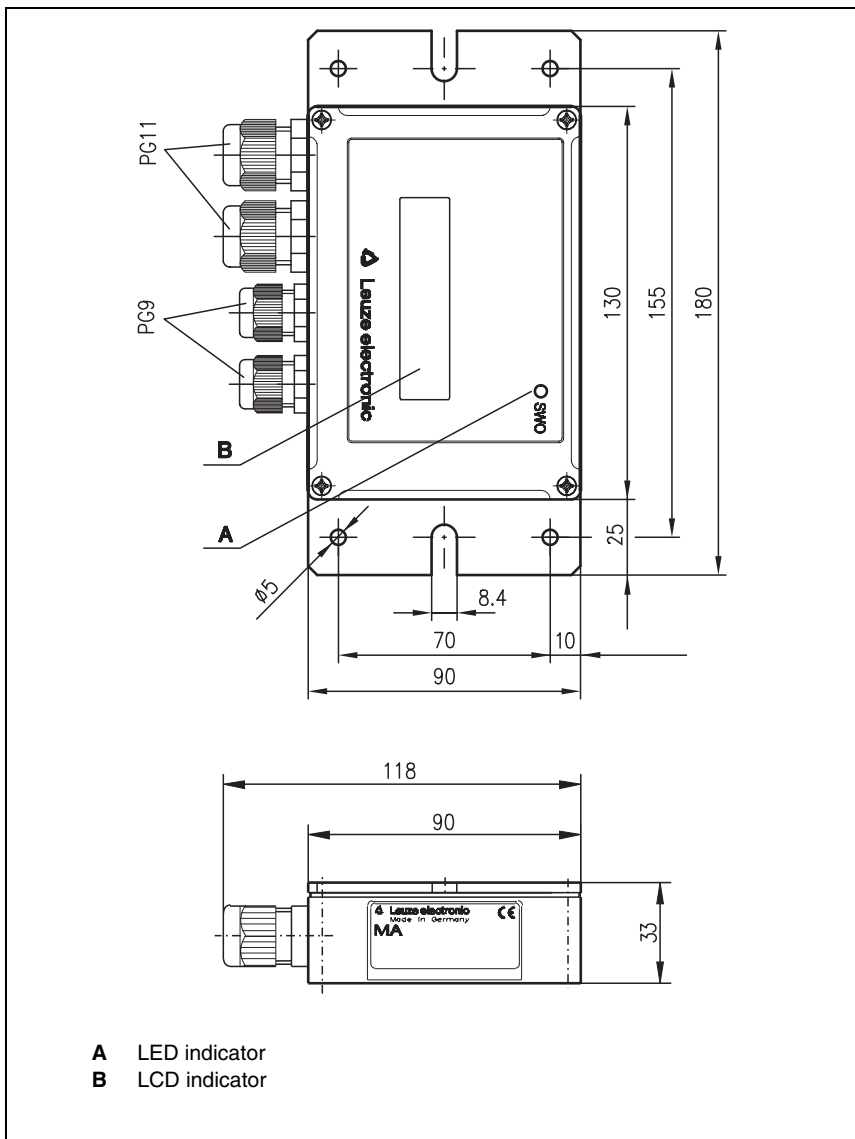


Figure 5.4: Dimensioned drawing connector unit MA 4/MA 4 D

**Connector unit MA 4 1xx/MA 4 D 1xx/MA 4 1xx L**

Only the BCL 32 can be connected to these devices. Compared to the MA 4/MA 4 D, additional features of this connector unit are:

- L-cover for the direct connection of the BCL 32: MA 4 1xx L model only
- Various pluggable interface modules, such as RS 232, RS 485, TTY, and RS 422.



Bild 5.5: Connector unit MA 4 1xx/MA 4 D 1xx/MA 4 1xx L

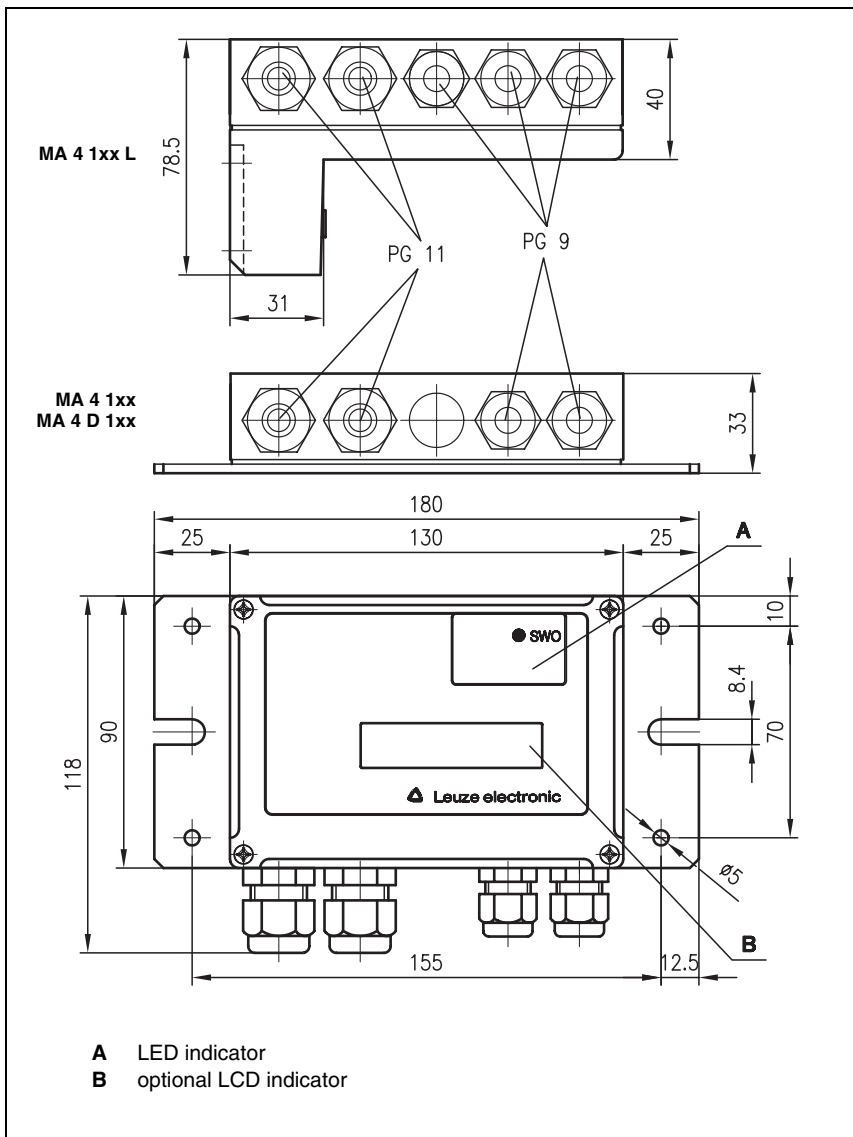


Bild 5.6: Dimensioned drawing MA 4 1xx/MA 4 D 1xx/MA 4 1xx L

### 5.1.2 Fastening Accessories

The mounting unit BT 56 is available for mounting the BCL 31/32. It is designed for rod installation.

#### *Mounting device BT 56*

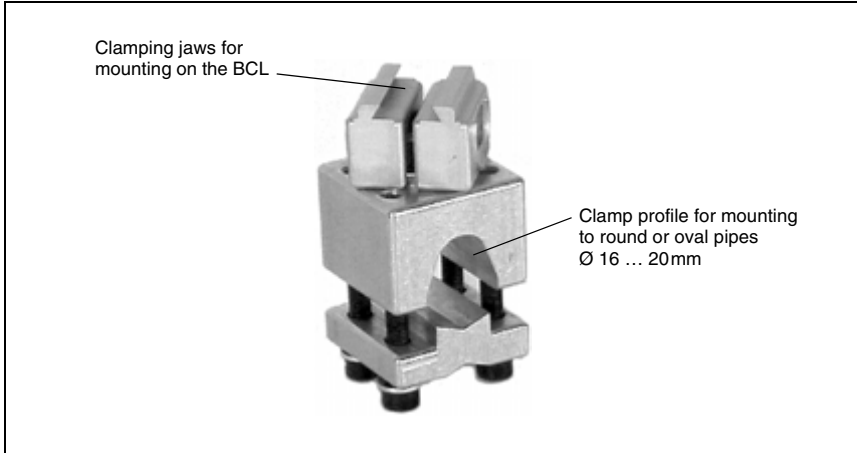


Figure 5.7: Mounting device BT 56

### 5.1.3 Connection cable

Specific connection cables in various lengths are available for the connection between BCL and connector unit, depending on the model of the connector unit (standard version or L version). These connection cables may be used for the connector units MA 2/MA 2 L as well as for MA 4....

## 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

The name plates provide information as to what BCL-type your device is. For specific information, please refer to Chapter 4.3.1.

**Name plates, BCL-models**

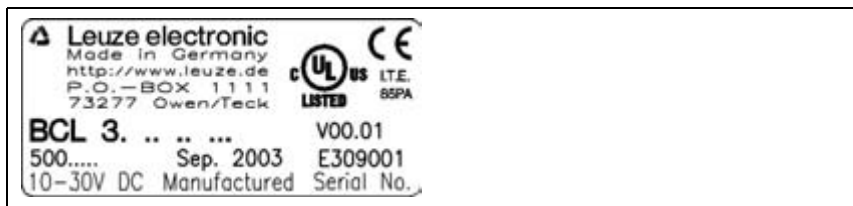


Figure 6.1: Device type plate BCL 31/32

- ↪ 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 31/32 with a soft cloth before mounting. Remove all packaging remains, e.g. carton fibres or Styrofoam balls.



**Attention!**

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

## 6.2 Mounting

### **Accessories**

The mounting system BT 56 is available for installation. It may be ordered separately from Leuze electronic. For order numbers, see table 5.1 "Accessories / Order Designation" on page 19.

### **Mounting the BCL 31/32**

There are two basic types of mounting arrangements for the BCL 31/32:

- using the dovetail groove and the corresponding mounting accessories (see figure 6.2)
- using the fastening threads on the backside of the devices (Chapter 4.2)

### **Mounting example BCL 31/32**

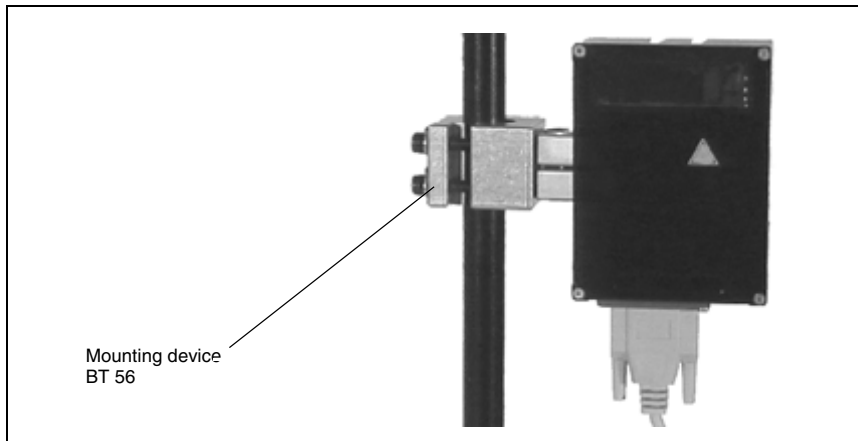


Figure 6.2: Mounting example BCL 31/32

### **Mounting MA**

You can mount all connector units individually through the holes located on the mounting plate (see Figure 5.2, Figure 5.4 and Figure 5.6).

Subsequently, connect the BCL 31 with the connector unit via the respective cable (see Chapter 5.1.3).

### 6.2.1 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 31/32 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 4.3.



**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.
- you do not use high-gloss labels.



**Notice!**

*On the BCL 31/32, 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.*

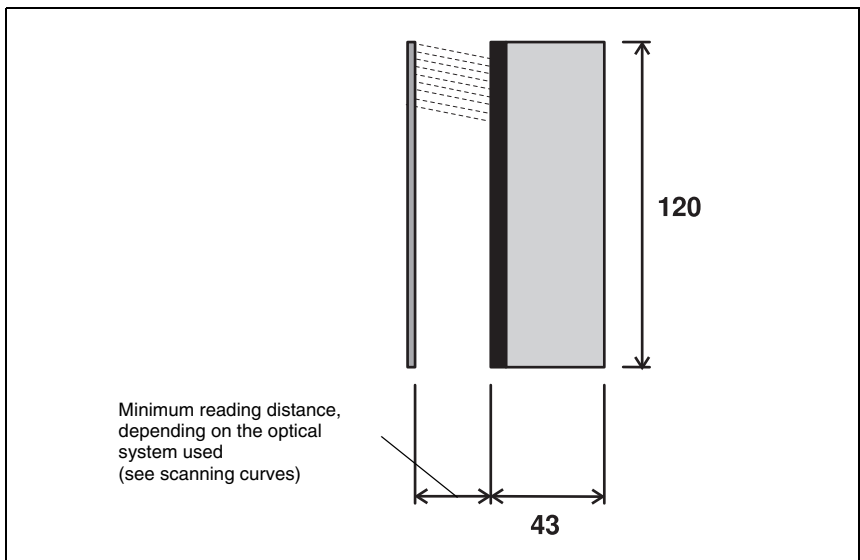


Figure 6.3: Emitted beam of BCL 31/32

### 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

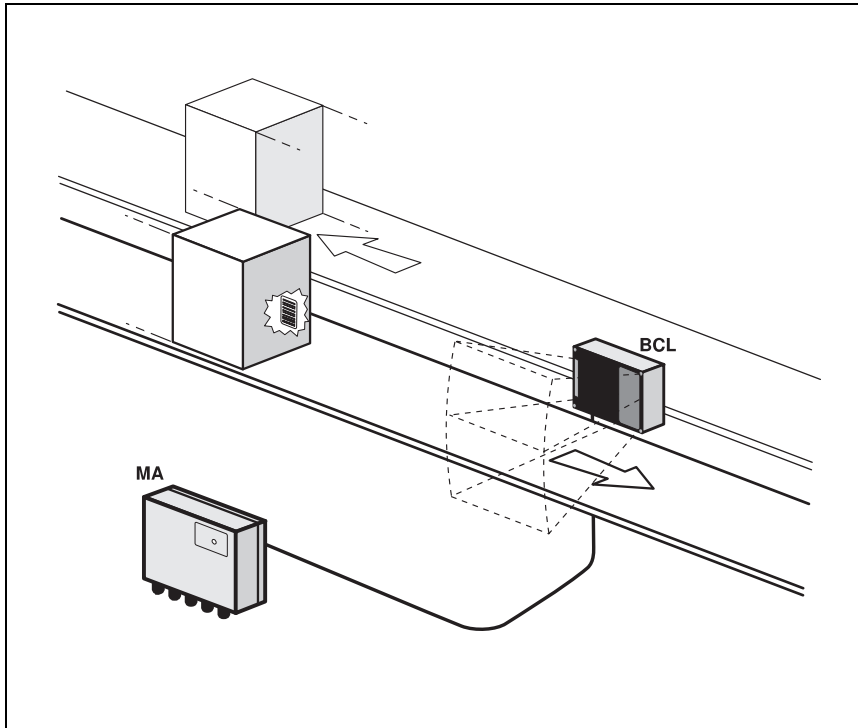


Figure 6.4: Application example "conveyor chain"



### 6.3 Connection



**Attention!**

Never open the device yourself! Otherwise, there is a danger that laser radiation could be emitted from the device in an uncontrolled way. The housing of the BCL 31/32 does not contain any parts that must be adjusted or maintained by the user.

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.

Power supply: The unit is to be supplied by a Limited Power Supply complying with Cl. 2.5 of UL 60950 (NEC Class 2) and rated from 10 Vdc to 30 Vdc, min. 320 mA. The unit shall be installed in accordance to the NEC, Article 725-52.

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 31 (RS485)

**BCL 31 Sub D pin assignments**

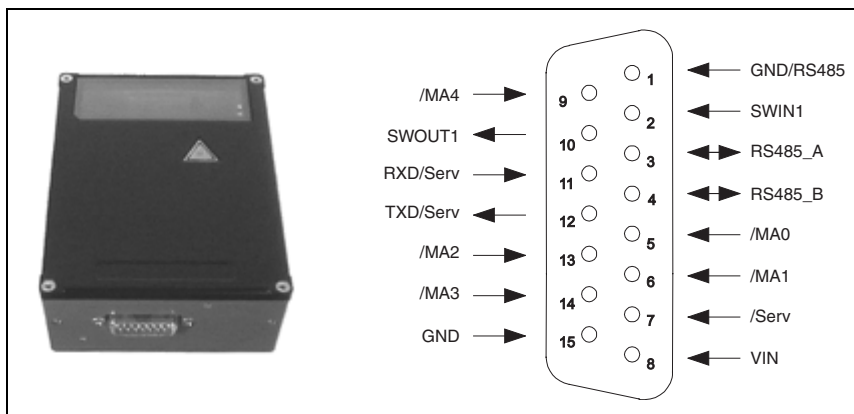


Figure 6.5: BCL 31 Sub D pin assignments

### Wiring description

<b>Pin 1</b>	GND/RS485	Reference ground RS 485
<b>Pin 2</b>	SWIN1	Switching input 1 (+12 ... 30VDC)
<b>Pin 3</b>	RS485_A	Signal line A RS485
<b>Pin 4</b>	RS485_B	Signal line B RS485
<b>Pin 5</b>	/MA0	Address selection bit0
<b>Pin 6</b>	/MA1	Address selection bit1
<b>Pin 7</b>	/Serv	Bridge to pin 15: service operation via RS232 interface
<b>Pin 8</b>	VIN	supply voltage +10 ... 30VDC
<b>Pin 9</b>	/MA4	Address selection bit4
<b>Pin 10</b>	SWOUT1	Switching output 1 (max. 100mA)
<b>Pin 11</b>	RXD/Serv	RXD signal, service interface RS 232
<b>Pin 12</b>	TXD/Serv	TXD signal, service interface RS 232
<b>Pin 13</b>	/MA2	Address selection bit2
<b>Pin 14</b>	/MA3	Address selection bit3
<b>Pin 15</b>	GND	Supply voltage 0VDC

Table 6.1: Connection description BCL 31

### Address setting

When integrating the BCL 31 into a network, you have to set its individual address and create connections between the individual BCLs.



#### Notice!

*The setting of the address takes place most conveniently together with a connector unit. In the connector units, there are rotary coding switches for address setting.*

Here it is described how you may set the address without a connector unit:

As an example, a BCL 31 with the address 5 is to be included into the multiNet plus with an MA 31 110 as the master.

Please connect through the following connection from slave to slave: VIN, GND, RS485\_A, RS485\_B, RS485 GND. Connect the shield **on one side** with the brass clamp PE inside the MA 31 110.

To set the address (address 5), you connect the pins /MA0 and /MA2 with a jumper lead to the GND of the voltage supply. The address 0 is set if all /MAx pins are open.

The following table shows the possible settings:

Address	/MA0	/MA1	/MA2	/MA3	/MA4
1	GND	open	open	open	open
2	open	GND	open	open	open
3	GND	GND	open	open	open
4	open	open	GND	open	open
5	GND	open	GND	open	open
...	...	...	...	...	...
30	GND	GND	GND	GND	open
<b>31 = Parameter Reset</b>	<b>GND</b>	<b>GND</b>	<b>GND</b>	<b>GND</b>	<b>GND</b>

Table 6.2: Address setting BCL 31

As the table shows, you may set the addresses 1 to 30.



**Notice!**

**Address 31 is used for the parameter reset.**

The address is always adopted according to the connection of the /MA inputs when the BCL is switched on, and remains saved while it remains switched on. A parameter reset loads the parameter set with the default settings into the BCL. With regard to the meaning of a parameter reset please refer also to "Parameter sets" on page 38.

### 6.3.2 Connecting the BCL 32 (RS232)

#### **BCL 32 Sub D pin assignments**

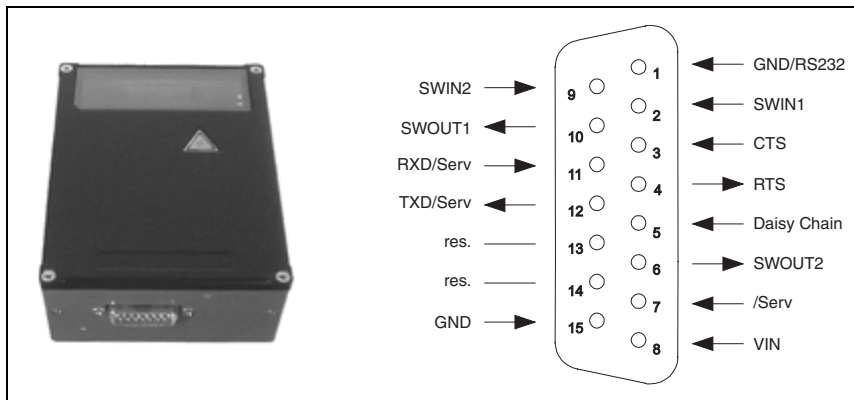


Figure 6.6: BCL 32 Sub D pin assignments

**Wiring description**

<b>Pin 1</b>	Res.	Reserved
<b>Pin 2</b>	SWIN1	Switching input 1 (+12 ... 30VDC)
<b>Pin 3</b>	CTS	CTS signal, host interface RS 232
<b>Pin 4</b>	RTS	RTS signal, host interface RS232
<b>Pin 5</b>	Daisy Chain	Bridge with pin 15: Daisy chain is active
<b>Pin 6</b>	SWOUT2	Switching output 2 (max. 100mA)
<b>Pin 7</b>	/Serv	Bridge with pin 15: service operation
<b>Pin 8</b>	VIN	supply voltage +10 ... 30VDC
<b>Pin 9</b>	SWIN2	Switching input 2 (+12 ... 30VDC)
<b>Pin 10</b>	SWOUT1	Switching output 1 (max. 100mA)
<b>Pin 11</b>	RXD/Serv	RXD signal, service interface RS 232
<b>Pin 12</b>	TXD/Serv	TXD signal, service interface RS 232
<b>Pin 13</b>	Res.	Reserved
<b>Pin 14</b>	Res.	Reserved
<b>Pin 15</b>	GND	Supply voltage 0VDC

Table 6.3: Wiring description BCL 32

### 6.3.3 Connection of switching inputs and outputs

The BCL 31 has one switching input and one switching output — the BCL 32 has two switching inputs and two switching outputs each. The connection of the switching inputs and outputs is carried out according to Figure 6.7:

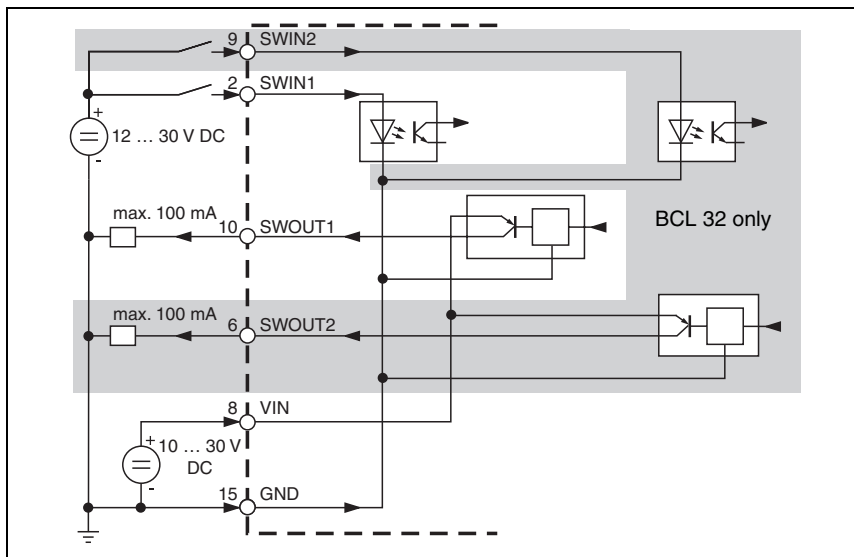


Figure 6.7: Connection diagram switching inputs and outputs BCL 31/32

#### Switching inputs

In the standard setting, you can trigger a reading action via the switching input connections SWIN1/SWIN2 by applying a voltage of 12 ... 30VDC between SWIN1 (pin 2) or SWIN2 (pin 9) and GND (pin 15).

#### Switching outputs

The switching output connections between SWOUT1 (pin 10) or SWOUT2 (pin 6) and GND (pin 15) are normally open. In the standard setting, SWOUT1 is closed in case of a reading error, SWOUT2 in the case of a detected code.

You can configure the switching inputs and outputs according to your needs, using the BCL Config program supplied.



#### Notice!

You can configure the switching inputs and outputs according to your needs, using the program **BCLConfig** supplied.

### 6.3.4 Wire Lengths and Shielding

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

Connecting	Interface	Max. wire length	Shielding
<b>BCL 31/32 - Service</b>	RS 232	10 m	absolutely required, shield meshing
<b>BCL 31/MA 2 - Host</b>	RS 485	1200m	absolutely required, flexible leads as twisted pairs
<b>Switching inputs 1+2</b>		10 m	not necessary
<b>Switching outputs 1+2</b>		10 m	not necessary

Table 6.4: Wire Lengths and Shielding

## 6.4 Disassembling, Packing, Disposing

### *Repacking*

For later reuse, 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.*

#### **Setting the device address**

The device addresses are set via address bits. For setting instructions refer to Chapter 6.3.1. If the BCL is connected to a connector unit, the device address can also be set conveniently via a rotary coding switch in the connector unit.

↳ *Set the device address to*

- **0**, if the BCL 31/32 will not be operated in a network,
- **1...30**, if several BCL 31 are operated in a network. Each multiNet plus network device must have a different device address assigned to it.
- **31**, if you want to carry out a parameter reset. The parameters set with the default settings will then be loaded into the BCL when it is switched off and on.



#### **Attention!**

*A parameter reset overwrites all customer-specific settings. Make sure that you only set the address 31 if you want to work with the default settings and if you have saved your customer-specific settings e.g., using the "BCLConfig" program.*



#### **Notice!**

*From the hardware address (device address > 0), the BCL 31 detects that networking is required. With the BCL 31/32, it is possible to perform a reset using the software and the online commands. In addition, it is possible to perform a reset by switching off the supply voltage. The parameters are not lost as a result of the reset. For information on the reset commands, see Chapter 9. The LED remains dark during a reset; the green LED illuminates when the device is ready for operation.*

### 7.2 Function Test

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

After connecting the operating voltage, the BCL 31/32 carry out an automatic "Power On" function test. Subsequently, the green LED lights up in the optics window of the BCL 31/32.

#### **Interface**

Proper function of the interface can be tested easiest in service operation using the service interface with the "BCLConfig" programming software and a notebook computer. For order numbers, see table 5.1 on page 19.

### ***Online commands***

Using the 'Online' commands, the important device functions can be checked, e.g. proper functioning of the laser.

### ***Problems***

Should problems occur during device commissioning, refer first to Chapter 8.1. 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 BCLConfig program.

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 additionally activate the autoReflAct function and 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 BCLConfig, see "Installing the "BCLConfig"-software" on page 42.

To understand what is happening during the parameter setting, the following 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**

In the BCL 31/32, three different parameter sets are administered:

- parameter set with the default settings in the ROM
- current parameter set in the EEPROM
- working copy of the current parameter set in the RAM

Before a parameter set is loaded into the memory of the BCL 31/32 processor, the validity of the parameter set is verified using checksums.

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

This parameter set contains the default settings made ex works for all BCL 31/32 parameters. It is permanently stored in the ROM of the BCL 31/32. The parameter set with the default settings is loaded into the memory of the BCL 31/32

- the first time the device is commissioned after delivery,
- following the command "Factory Default" in the parameterisation program,
- if the checksums of the current parameter set are invalid.



***Current parameter set***

In this parameter set, the current settings for all device parameters are stored. When the BCL 31/32 is in operation, the parameter set is stored in the EEPROM of the BCL 31/32. The current set can be stored:

- by copying a valid parameter set from the host computer
- by means of an off-line setup with the PC setup program BCLConfig

The current parameter set is loaded into the memory of the BCL 31/32

- each time the supply voltage is connected
- following a software reset

The current parameter set is overwritten by the parameter set with the default settings:

- by a parameter reset, see page 37

**7.3.2 Service Operating Mode**

Setting the required parameters is carried out easiest in the "service" operating mode. The operating mode "service" makes the following defined operating parameters available on a separately wired RS232 interface, independent from the BCL's configuration for standard operation:

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

***Service interface active***

The service interface is activated via a bridge between the pins 7 and 15 on the 15-pin sub-D connector. If the BCL 31/32 is operated with a connector unit, the service interface is activated through a switch in the connector unit.

**Connection**

You can connect a PC or terminal to the BCL 31/32 via the serial interface and configure the BCL 31/32 through this connection. For this, you need a crossed RS 232 connection cable (null modem cable) that provides the connections RxD, TxD and GND. A hardware handshake via RTS, CTS is not supported at the service interface.

If the BCL is connected to a connector unit, you can use the 9-pin sub-D service connector in the connector unit. For the respective connection specifications please refer to the data sheet of the connector unit.

**Service Operating Mode**

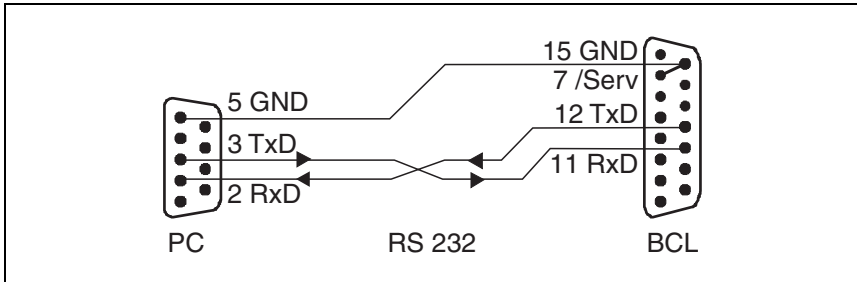


Figure 7.1: Connecting the service interface to a PC or terminal

## 8 Operation

### 8.1 Error Handling

Error, warning and status messages of the BCL 31/32 are transmitted via the host interface only.

#### ***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 re-initialised.

#### ***Troubleshooting***

Isolated warnings can be ignored, since the BCL 31/32 will continue to function properly.

Following a serious error, you should re-initialise the BCL. It will then usually again function properly. If a hardware problem is present, the BCL 31/32 will not re-initialise.

Warnings and errors which occur frequently can be corrected easiest using the BCLConfig 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 using the automatic configuration "autoConfig", via commands at the serial interface or using the easy-to-use "BCLConfig 3.xx" control software.

### 9.1 Installing the "BCLConfig"-software

↳ Insert the installation CD into your CD/DVD 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 information, please see the online help for the "BCLConfig" software.

↘ *After the successful installation, double-click on the file "BCLconfig.exe" to activate the configuration program.*

## 10 Important Parameters

### 10.1 Code menu

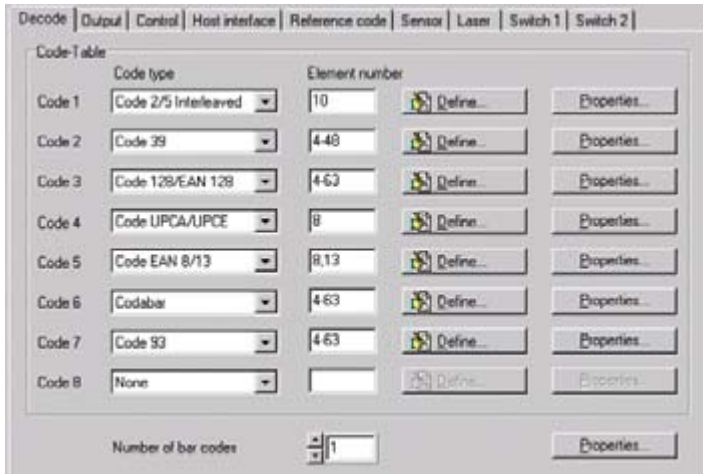


Figure 10.1: Default setting of the code menu

**Code table** Here, the codes which are to be decoded are set. We recommend enabling only the code types which are to actually be read with the corresponding element numbers.

IMPORTANT: Code 1 has to be selected always. For more than one code type select the codes in consecutive order Code 1, Code 2, ... .

**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

The combination is also possible, but the range must

be specified first: e.g.: 4-10,20 digits



**Notice!**

*If the code EAN128 is to be read, 3 additional characters 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.

### 10.1.1 Properties of the Code menu

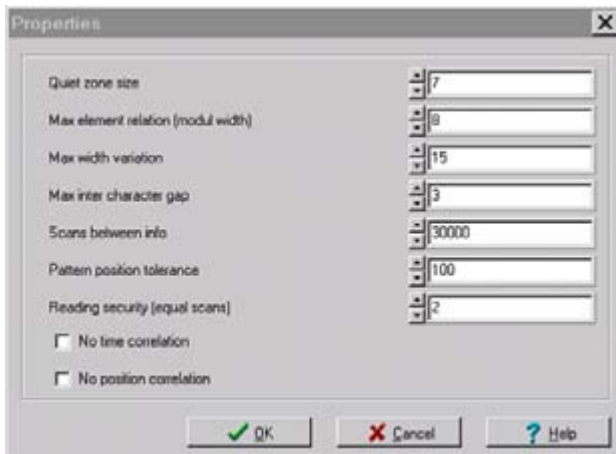


Figure 10.2: Standard setting of the properties of the code menu

**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.

**Reading Security (Equal Scans)** Specifies how often a code must be decoded before the result is valid and output. This value should be increased for inspection and test purposes only.

**No time correlation** If this parameter is set, a gap between two identical labels is ignored and they are treated as a single label.

**No position correlation** If this parameter is set, then the position of a bar code label in the reading beam is not taken into account. Identical labels are treated as a single label



**Notice!**

*In general, the remaining parameters must not be changed. In the worst case, this could corrupt the reading result!*

## 10.2 Output menu

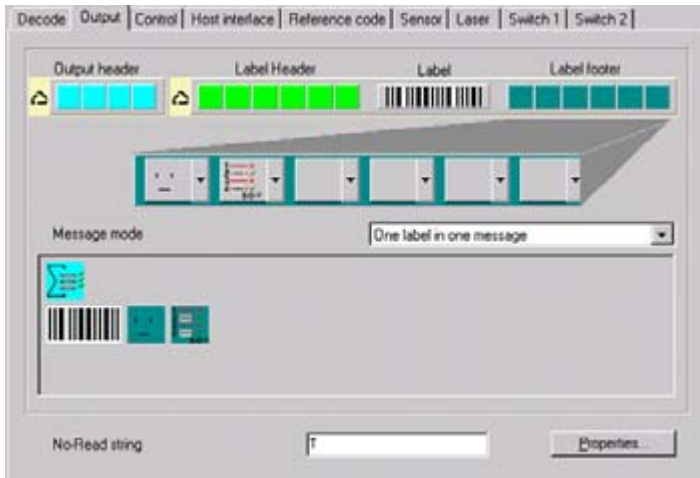


Figure 10.3: Output menu

- 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.
- Message mode** Selects whether the bar codes read are sent in concatenation or separately as individual strings.



**Notice!**

*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.



### 10.3 Control

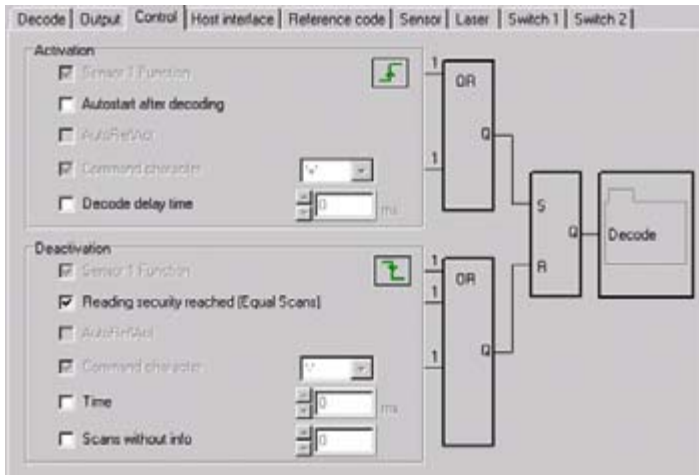


Figure 10.4: Control menu default settings

#### **Activation**

**Sensor 1 function** see menu "switching input"

**Autostart after decoding** In this mode, the scanner reads via an internal trigger signal with maximum performance. Attention: Up to 100 codes per second may be transmitted.

**Command character** 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 function** see menu "switching input"

**Reading security reached (equal scans)** 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).

**Command character** The standard online character for the trigger end is the `´` character. This character can be changed only via the tree structure.

**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.

**10.4 Communication**

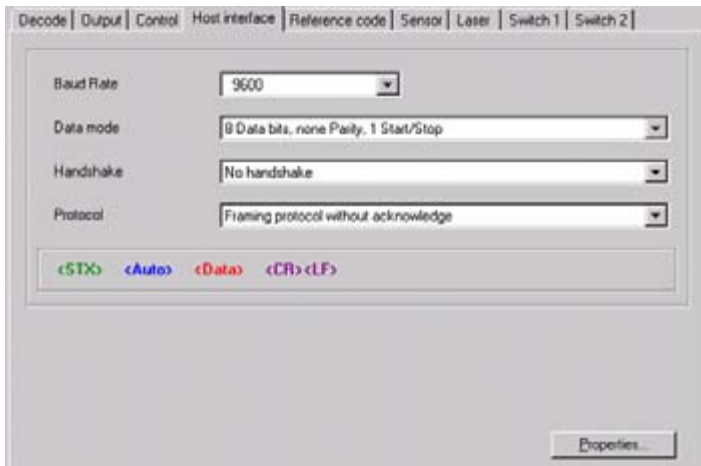


Figure 10.5: Standard setting of the communication menu

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

The RK512/3964 protocol can be set here too. The single parameters for this protocol can be found in the configuration structure under: communication -> Host interface -> 3964 / RK 512 protocol.



**Attention!**

*If the BCL 31 is operated in a network ("Leuze multiNet") no changes must be made here. The scanner adjusts itself automatically to the multiNet protocol.*

**10.4.1 Communication properties**

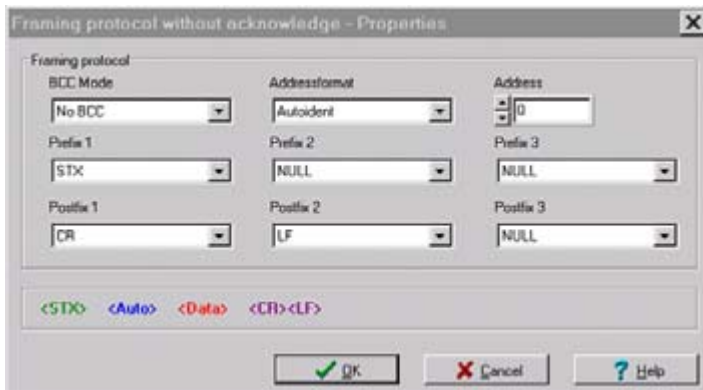


Figure 10.6: Standard setting of the property menu

The framing protocol (Prefix/Postfix), the address mode and a BCC mode can be set here.



**Attention!**

*If the BCL 31 is operated in a network ("Leuze multiNet") no changes must be made here!*

## 10.5 Reference code

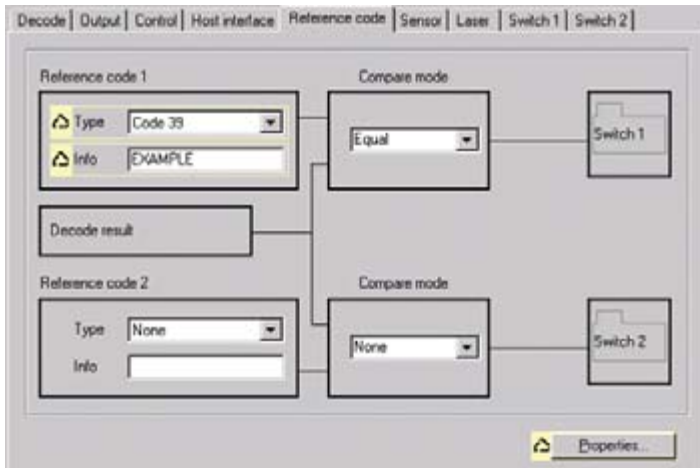


Figure 10.7: Reference code menu

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. You can find further options of the reference code teach-in in the chapter on online commands.

**Type** Select the code type.

**Info** 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

## 10.6 Sensor

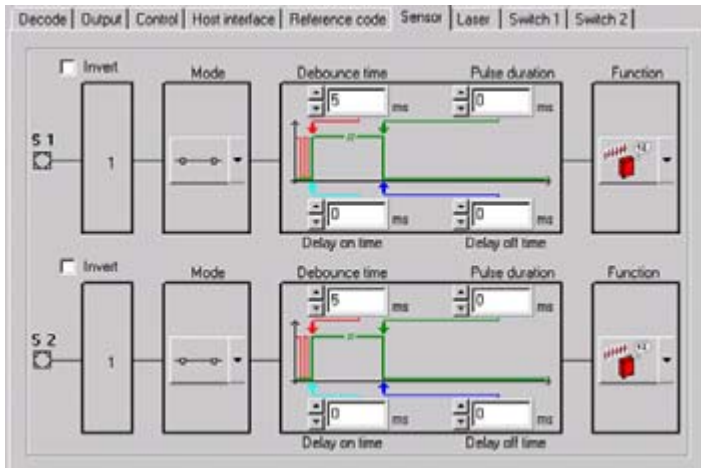


Figure 10.8: Standard setting of the switching input menu

**Invert** Here, the input level can be inverted.

**Enable** Switching input enabled or disabled.

**Debounce time** This time period must lapse until the trigger signal is regarded as valid.

**Delay on time** The trigger signal is passed on delayed by the specified time period.

**Pulse duration** If the value is higher than "0": duration of the activation, regardless of how long the trigger signal has been present.

**Delay off time** After the end of the trigger signal, the pulse is extended internally by this time period.



**Notice!**

*If the switch-off delay is activated, the parameter "pulse duration" should be "0".*

**Function** Event that is started when the switching input is activated.

## 10.7 Laser

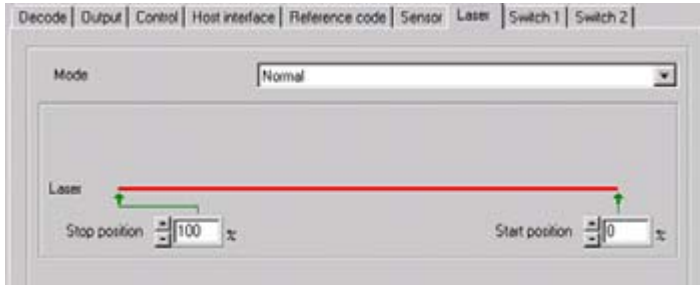


Figure 10.9: Laser menu

**Start position and stop position** Here, you can narrow down the reading field width of the laser beam.

### Mode

- **Mode (1) – normal reading mode.**

Additionally, 4 AutoRefAct modes, Mode (2) to Mode (5), are available.

- **Mode (2) – Reflector Polling **slowly with** automatic reading gate control.**

In this mode, the decoding of the label is started automatically after the scanning beam to the reflector is interrupted. This mode is intended for raster/line scanners and low conveyor speeds (about < 0.5m/s). This is because not every scan of the individual polygon wheel facets hits the reflector in the case of the raster scanner. As a result, only one scan per polygon wheel rotation can be used for a successful detection of a reflector.

- **Mode (3) – Reflector Polling **fast without** automatic reading gate control.**

In this mode, the decoding does not start automatically. The start must be activated via a controller or a switching input. This mode is intended for line scanners and high conveyor speeds (about > 0.5m/s). This is because, unlike Mode (2), every scanning beam is used for the evaluation of whether a reflector is present.

This mode is also useful if a PLC wants to know whether the scanning beam to the reflector is presently interrupted or not. If this is the case, the PLC can start the decoding by sending the + command.

The SPS is either informed about the change by receiving the character `las_reflector_is_detected_char` (parameter 311), or it continually polls the BCL using the `AR?` command and evaluates the response accordingly.

- **Mode (4) – Reflector Polling **fast with** automatic reading gate control.**

Same as Mode (2), but all scans are used for the detection of the reflector. This mode is suitable for **line scanners only** and is useful at high conveyor speeds.

- **Mode (5) – Reflector Polling **slowly without** automatic reading gate control.**

Same as Mode (3), but only one scan per polygon wheel rotation is used to evaluate whether a reflector is present. This mode is suitable for raster and line scanners and useful at low conveyor speeds.

**Notice!**

For Mode (3) and (4) ("fast"), all laser scan lines must hit the reflector!

Safest method for reflector polling if reflecting surfaces other than the reflector are present in the application:

- use grid scanner,
- use large reflector so that all eight laser scan lines hit the reflector,
- use fast Mode (3).

**Reflector polling**

Reflector polling, also called autoReflAct, is an operating mode in which no external sensor is required. The activation and deactivation of the scanner is carried out via the reflector supplied. It must be installed within the scan range of the BCL 31/32.

For easy alignment in the autoReflAct mode, please select the menu "Assistant for AutoReflAct".

If you select this menu, the wizard tries to establish a connection to the BCL 31/32 connected. If this is successful, please select one of the four reflector polling modes under "mode" in the menu that appears. A screen like the following appears:

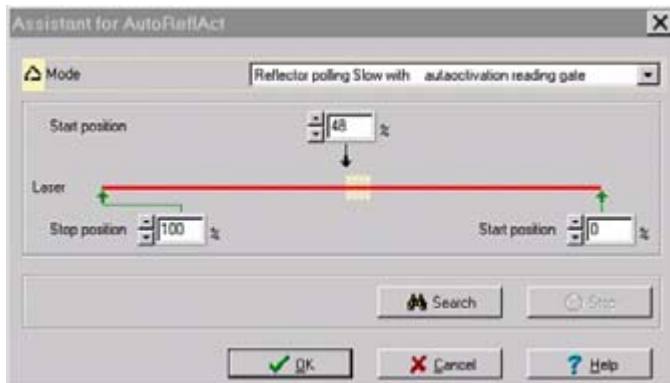


Figure 10.10:AutoReflAct Wizard

When you activate the "search" icon, the BCL 31/32 scans its reading range and tries to detect a reflector. For this, the reflector must be positioned in the reading range of the scanner.

After a reflector has been detected, it passes on the start position of the reflector in its reading range.

By clicking "OK", the values are stored in the scanner and in BCLConfig.

The scanner is now ready for the AutoReflAct operating mode.



**Attention!**

*If reflecting objects other than the reflector are in the reading window of the scanner, the application must be checked carefully, as these reflecting objects may cause an incorrect triggering at the scanner!*

*The "fast reflector polling ..." modes are more suitable for applications with reflecting objects than the "slow reflector polling ..." modes*



## 10.8 Switching output

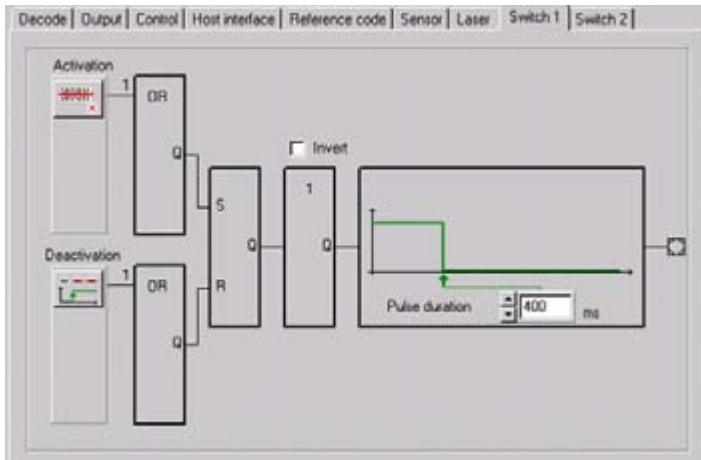


Figure 10.11: Standard setting of the switching output menu

- Activation** Select the desired event which is to initiate the switching of the switching output here. Multiple events can also be simultaneously activated.
- Deactivation** This implements the event that leads to the switching output being reset. (in case that the set pulse duration has not expired.) Multiple events can also be simultaneously activated.
- Invert** Level inverted
- Pulse duration** Duration of the switching output impulse. If the value "0" is entered here the output state is static, i.e. the signal is present until the event for deactivation occurs.

## 11 Online commands

### 11.1 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 31/ 32 has to be connected to a host or service computer via the serial interface. The commands can be sent either via the host or the service interface.

For information on the transmission protocol, please see Chapter 7.3.2.

With the commands, you can

#### **Online commands**

- Control/decode reading gate.
- Read/write/copy parameters.
- Carry out an automatic configuration.
- Teach/set reference code.
- Call up error messages.
- Call up statistical device information.
- Carry out a software reset in order to re-initialise the device.

#### **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 may 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 31/32 and any requested data returned. For commands that are not acknowledged, command execution can be observed or monitored directly on the device.

**11.1.1 General 'Online' Commands**

**Software version number**

Command	'V'
Description	Requests device version information
Parameter	no
Acknowledgement	' <b>BCL 3x V 01.00 08.01.1999</b> ' The device type appears in the first line followed by the devices version number and date. The data which are actually displayed may vary from the values given here.



**Notice!**

*This command allows you to check whether a host or service computer is correctly 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	' <b>S</b> ' (start signal)

**Query: Supply Voltage**

Command	'DUV'
Description	Queries the supply voltage with which the bar code reader is supplied.
Parameter	no
Acknowledgement	' <b>DUVxx.x</b> ' <b>xx.x:</b> voltage value, e.g. 28.2 for 28.2 volts.

**Code recognition**

Command	'CC'
Description	Detects an unknown bar code and outputs number of digits, code type, and code information to the interface, without storing it in the parameter memory.
Parameter	no
Acknowledgement	<p><b>'xx yy zzzzzz'</b></p> <p><b>xx:</b> Number of digits of the code detected</p> <p><b>yy:</b> Code type of the read code</p> <p>'01' 2/5 Interleaved</p> <p>'02' Code 39</p> <p>'06' UPC (A, E)</p> <p>'07' EAN</p> <p>'08' Code 128, EAN 128</p> <p>'10' EAN/UPC</p> <p>'11' Codabar</p> <p><b>zzzzzz:</b> Contents of the decoded label. The ↑ appears if the label was not correctly read.</p>

**Alignment mode**

Command	'JP'
Description	<p>This command is used for the easy mounting and alignment of the BCL 31/32. After the function has been activated by '<b>JP+</b>', the scanner continuously supplies various status information via the serial interfaces.</p> <p>With this online command, the scanner is set to terminate the decoding after 100 successfully decoded labels and output the status information. Subsequently, the read process is reactivated automatically.</p> <p>As status, the output returns the following values:</p> <ul style="list-style-type: none"> <li>• scans that contain valid label information,</li> <li>• total number of scans that were required in order to decode the result, and</li> <li>• the decoding result.</li> </ul> <p>These values can be used to determine the decoding quality. In addition to the output of the status information, the laser beam is used to display the reading quality. Depending on how many labels were able to be extracted, the duration of the laser's "off" time increases.</p> <p>If the reading quality is high, the laser beam flashes in brief, regular intervals. The worse the decoder decodes, the longer the pauses become during which the laser is switched off. The flashing intervals become more and more irregular because the laser may, in total, be active for longer to extract more labels. The duration of the pauses has been stepped in such a way that they can be distinguished by the eye.</p>
Parameter	<p>'+' : starts the adjustment mode.                  '-' : ends the adjustment mode.</p>
Acknowledgement	<p>'<b>xxxxx_yyyyy_zzzzz</b>'</p> <p><b>xxxxx</b>: "Scans since reading gate release" (Scans_with info):                  Number of scans that contain valid label information. If the value is &gt; 100, then the values could not contribute to the end result.</p> <p><b>yyyyy</b>: "Number of labels extracted" (Scans_all):                  Total number of scans that were required in order to decode the result. A value of 100 stands for 100% reading quality.                  Up to a value of about 130 readings, the result can be taken as acceptable. If the value is larger than 130, process reliability cannot be ensured.</p> <p><b>zzzzz</b>: Bar code information.</p>

*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	'CSx' x: Status '0' valid 'CA' command '1' invalid command '2' autoConfig could not be activated '3' autoConfig could not be deactivated '4' Result could not be deleted
Description	'xx yy zzzzzz' xx: Number of digits of the code detected yy: 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' EAN/UPC '11' Codabar 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 2x 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 through 9 and stored in the working buffer for direct further processing.
Parameter	<p><b>'RSyvxxzzzzzzz'</b></p> <p><b>y, v, x</b> and <b>z</b> are placeholders (variables) for the actual input.</p> <p><b>y:</b> def. reference code No              '1' (Code 1)              '2' (Code 2) ...              '9' (Code 9)</p> <p><b>v</b> Storage location for the reference code:              '0' RAM+EEPROM              '3' only RAM</p> <p><b>xx</b> def. Code type (see Command 'CA')</p> <p><b>z</b> def. Code information (1 ... 63 characters)</p>
Acknowledgement	<p><b>'RSx'</b></p> <p><b>x:</b> Status              '0' valid 'Rx' command              '1' invalid command              '2' insufficient memory for reference code              '3' reference code has not been saved              '4' reference code invalid</p>
Example	Input = 'RS130678654331' (Code 1 (1), RAM only (3), UPC (06), code information

**Teach-In**

Command	'RT'
Description	This command enables a reference code to be defined quickly by reading an example label.
Parameter	<p><b>'RTy'</b></p> <p>Function</p> <ul style="list-style-type: none"> <li>'1' defines reference code 1</li> <li>'2' defines reference code 2 ...</li> <li>'9' defines reference code 9</li> <li>'+' activates the definition of reference code 1 up to the value of</li> </ul> <p>Parameter no_of_labels</p> <ul style="list-style-type: none"> <li>- Exit the Teach-In process</li> </ul>
Acknowledgement	<p>The BCL first responds with the command <b>'RS'</b> and corresponding status (see Command RS). After a barcode has been read, it sends the result in the following format:</p> <p><b>'RCyvxzzzzz'</b></p> <p><b>y, v, x</b> and <b>z</b> are placeholders (variables) for the actual input.</p> <p><b>y:</b> def. reference code No</p> <ul style="list-style-type: none"> <li>'1' (Code 1) ...</li> <li>'9' (Code 9)</li> </ul> <p><b>v:</b> Storage location for reference code</p> <ul style="list-style-type: none"> <li>'0' RAM+EEPROM</li> <li>'3' only RAM</li> </ul> <p><b>xx</b> def. Code type (see Command 'CA')</p> <p><b>z</b> def. Code information (1 ... 63 characters)</p>



**Notice!**

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

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



**Reading a reference code**

Command	'RR'
Description	The command reads out the reference code defined in the BCL. If no parameters are specified, all defined codes are output.
Parameter	<Reference code number> '1' '9' value range of reference codes 1 to 9
Acknowledgement	If no reference codes are defined, the BCL responds with the 'RS' command and corresponding status (see Command RS). For valid codes, the output corresponds to the following format: <b>RCyvxzzzzz</b> y, v, x and z are placeholders (variables) for the actual input. y: def. reference code No '1' (Code 1) ... '9' (Code 9) v: Storage location for reference code '0' RAM+EEPROM '3' only RAM xx def. Code type (see Command 'CA') z def. Code information (1 ... 63 characters)

**11.1.2 'Online' Commands for System Control**

**System stand-by**

Command	'SS'
Description	System Standby: puts the bar code reader in standby mode. The scanner cannot be triggered, and the polygon wheel motor is stopped.
Parameter	no
Acknowledgement	no

**System boot-up**

Command	'SA'
Description	System boot-up: reactivates the bar code reader from standby mode back to operating mode. The polygon wheel motor is started, the scanner works as usual.
Parameter	no
Acknowledgement	'S' (start signal)

**Activate sensor input 1**

<b>Command</b>	'+'
Description	The command activates decoding.
Parameter	no
Acknowledgement	no

**Deactivate sensor input 1**

<b>Command</b>	'-'
Description	The command deactivates decoding.
Parameter	no
Acknowledgement	no

**Activate sensor input 2**

<b>Command</b>	','
Description	The command activates the definition of reference code 1.
Parameter	no
Acknowledgement	no

**Deactivate sensor input 2**

<b>Command</b>	':'
Description	The command deactivates the definition of reference code 1.
Parameter	no
Acknowledgement	no

**Activate switching output**

<b>Command</b>	'OAx'
Description	The command activates a selected switching output.
Parameter	'OAx': Activate switching output x: Switching output No '1' (Output 1) '2' (Output 2)
Acknowledgement	no

***Deactivate switching output***

<b>Command</b>	<b>'OD'</b>
Description	The command deactivates a selected switching output.
Parameter	'ODx': Deactivate switching output x: Switching output No '1' (Output 1) '2' (Output 2)
Acknowledgement	no

**11.1.3 'Online' command for querying error messages**

***Query memory error messages***

<b>Command</b>	<b>'ER'</b>
Description	The command queries the buffer memory of the error messages.
Parameter	no
Acknowledgement	1st line: <b>New: cc</b> 2nd through 11th lines: '- 00.000' if no error has occurred 'F tt.fff' if a fatal error has occurred 'E tt.fff' if an error has occurred 'C tt.fff' if a critical warning has occurred 'W tt.fff' if a warning has occurred
Description	<b>cc:</b> number of (new) errors in the error buffer <b>tt:</b> task/ function number <b>fff:</b> error number Upon output, the counter for the number of errors in the error buffer is deleted, but not the buffer itself!



***Notice!***

*If an error occurs, note the error number and contact your local Leuze service organisation. The addresses can be found on the back page of this operating manual.*

### 11.1.4 'Online' Commands for Parameter Set Operations

#### Definitions

- **<BCC type>** type of the checksum calculation  
 '0': no checksum  
 '3': XOR checksum (mode 3)
- **<PS type>** type of the parameter set  
 '0': current parameter set (data stored in the EEPROM non-volatile)  
 '1': reserved  
 '2': standard parameter set (not changeable)  
 '3': operating values (data in the RAM, will be lost after reset)
- **<Status>** mode of the parameter processing  
 '0': does not perform a reset following the write operation; no other parameters follow.  
 '1': does not perform a reset following the write operation; other parameters follow.  
 '2': subsequently performs a reset, no other parameters follow.
- **<Start address>** Relative address of the parameter within the parameter set  
 valid values from '000' to '893'
- **<Para0L> <Para0H>... <Para122L> <Para122H>**:  
 Parameter-set data of the message. The sequence of the data is arranged identically to the BCL, i.e. when a word is transmitted, first the low byte is sent then the high byte. The parameter-set data are converted for transmission from HEX format to a 2-byte-ASCII format. In the conversion two ASCII characters - representing the lower and higher nipples - are created for each HEX value.  
 Example:

Decimal	HEX	Transmission
4660	0x1234	'1' '2' '3' '4' = 31h 32h 33h 34h

- Para0H = 31h, Para0L = 32h, Para1H = 33h, Para1L = 34h  
 Taking into consideration the maximum message length and the remaining command parameters, a maximum of 123 bytes of parameter data (246 bytes of message data) can be transmitted at one time.  
 valid values: '0' ... '9', 'A' ... 'F'
- **<Acknowledgement>**:  
 Acknowledgement of the transmitted message  
 '0' valid transmission  
 '1' invalid message  
 '2' invalid length of message  
 '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***

<b>Command</b>	<b>'PC'</b>
Description	The command copies complete parameter sets.
Parameter	'03' copy parameters from the EEPROM into the RAM and initialise all associated functions '20' copy standard parameters from the FLASH into the EEPROM <b>and</b> RAM and initialise all relevant functions '30' copy parameters from the RAM into the EEPROM
Acknowledgement	'PSx' x: Status '0' valid transmission '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

***Request parameter set from the BCL***

<b>Command</b>	<b>'PR'</b>
Description	The command requests parameter data from the BCL. The parameter <PS-Type> indicates from which parameter set the data are to be transmitted.
Parameter	<BCC type> <PS type> <Start address> <Data length>
Acknowledgement	'PSx' x: Status '0' valid transmission '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

**Acknowledge parameter message**

Command	'PS'
Description	The command acknowledges the received message and delivers an acknowledgement status which indicates whether the message was valid or invalid.
Parameter	<p>'PSx'</p> <p>x: Status</p> <ul style="list-style-type: none"> <li>'0' valid transmission</li> <li>'1' invalid message</li> <li>'2' invalid message length</li> <li>'3' invalid block check type</li> <li>'4' invalid block check checksum</li> <li>'5' invalid data length</li> <li>'6' invalid message data</li> <li>'7' invalid start address</li> <li>'8' invalid parameter set</li> <li>'9' invalid parameter type</li> </ul>

**Transmit parameters**

Command	'PT'
Description	The command transmits parameter data from the specified address and stores them in an intermediate buffer. If the status indicates that additional messages follow, they are also stored in the intermediate buffer before being stored under the appropriate parameter-set type in the EEPROM. The transmission can optionally take place with a block-check test of the message data.
Parameter	<BCC type> <PS type> <Status> <Start address> <Para0L> <Para0H> [... <Para122L>][<BCC>]
Acknowledgement	<p>'PSx'</p> <p>x: Status</p> <ul style="list-style-type: none"> <li>'0' valid transmission</li> <li>'1' invalid message</li> <li>'2' invalid message length</li> <li>'3' invalid block check type</li> <li>'4' invalid block check checksum</li> <li>'5' invalid data length</li> <li>'6' invalid message data</li> <li>'7' invalid start address</li> <li>'8' invalid parameter set</li> <li>'9' invalid parameter type</li> </ul>

## 12 Maintenance

### 12.1 General Maintenance Information

Usually, the barcode reader BCL 31/32 does not require any maintenance by the operator.

#### ***Cleaning***

Should it become soiled, clean the glass window of the BCL 31/32 with a soft cloth.



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

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

### 12.2 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.*







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