Leuze electronic

the sensor people

BCL34
Barcode reader

GB 05-10/08 50038851

TECHNICAL DESCRIPTION

Leuze electronic GmbH + Co. KG
P.O. Box 1111, D-73277 Owen / Teck
Tel. +49(0) 7021/ 573-0,
Fax +49(0) 7021/ 573-199
info@leuze.de • www.leuze.com

Sales and Service

Germany

Sales Region North
Phone 07021/573-306
Fax 07021/9850950

Postal code areas
20000-38999
40000-65999
97000-97999

Sales Region South
Phone 07021/573-307
Fax 07021/9850911

Postal code areas
66000-96999

Sales Region East
Phone 035027/629-106
Fax 035027/629-107

Postal code areas
01000-19999
39000-39999
98000-99999

Worldwide

AR (Argentina)
Nortécnica S. R. L.
Tel. Int. + 54 1147 57-3129
Fax Int. + 54 1147 57-1088

AT (Austria)
Schmachtl GmbH
Tel. Int. + 43 732 76460
Fax Int. + 43 732 785036

AU + NZ (Australia + New Zealand)
Balluff-Leuze Pty. Ltd.
Tel. Int. + 61 3 9720 4100
Fax Int. + 61 3 9738 2677

BE (Belgium)
Leuze electronic nv/sa
Tel. Int. + 32 2253 16-00
Fax Int. + 32 2253 15-36

BG (Republic of Bulgaria)
ATICS
Tel. Int. + 359 2 847 6244
Fax Int. + 359 2 847 6244

BR (Brasil)
Leuze electronic Ltda.
Tel. Int. + 55 11 5180-6130
Fax Int. + 55 11 5181-3597

BY (Republic of Belarus)
Logoprom ODO
Tel. Int. + 375 017 235 2641
Fax Int. + 375 017 230 8614

CH (Switzerland)
Leuze electronic AG
Tel. Int. + 41 44 834 02-04
Fax Int. + 41 44 833 26-26

CL (Chile)
Imp. Tec. Vignola S.A.I.C.
Tel. Int. + 56 3235 11-11
Fax Int. + 56 3235 11-28

CN (People's Republic of China)
Leuze electronic Trading
(Shenzhen) Co. Ltd.
Tel. Int. + 86 755 862 64909
Fax Int. + 86 755 862 64901

CO (Colombia)
Componentes Electronicas Ltda.
Tel. Int. + 57 4 3511049
Fax Int. + 57 4 3511019

CZ (Czech Republic)
Schmachtl CZ s.r.o.
Tel. Int. + 420 244 0015-00
Fax Int. + 420 244 9107-00

DK (Denmark)
Desim Elektronik APS
Tel. Int. + 45 7022 00-66
Fax Int. + 45 7022 22-20

ES (Spain)
Leuze electronic S.A.
Tel. Int. + 34 93 4097900
Fax Int. + 34 93 4903515

FI (Finland)
SKS-automaatio Oy
Tel. Int. + 358 20 764-61
Fax Int. + 358 20 764-6820

FR (France)
Leuze electronic sarl.
Tel. Int. + 33 160 0512-20
Fax Int. + 33 160 0503-65

GB (United Kingdom)
Leuze Mayser electronic Ltd.
Tel. Int. + 44 14 8040 85-00
Fax Int. + 44 14 8040 38-08

GR (Greece)
UTECO A.B.E.E.
Tel. Int. + 30 211 1206 900
Fax Int. + 30 211 1206 999

HK (Hong Kong)
Sensortech Company
Tel. Int. + 852 26510188
Fax Int. + 852 26510388

HR (Croatia)
Tipteh Zagreb d.o.o.
Tel. Int. + 385 1 381 6574
Fax Int. + 385 1 381 6577

HU (Hungary)
Kvalix Automatika Kft.
Tel. Int. + 36 272 2242
Fax Int. + 36 272 2244

ID (Indonesia)
P.T. Yabestindo Mitra Utama
Tel. Int. + 62 21 92861859
Fax Int. + 62 21 6451044

IL (Israel)
Galoz electronics Ltd.
Tel. Int. + 972 3 9023456
Fax Int. + 972 3 9021990

IN (India)
Global-Tech (India) Pvt. Ltd.
Tel. Int. + 91 20 24470085
Fax Int. + 91 20 24470086

IR (Iran)
Tavan Ressan Co. Ltd.
Tel. Int. + 98 21 2606766
Fax Int. + 98 21 2002883

IT (Italy)
Leuze electronic S.r.l.
Tel. Int. + 39 02 26 1106-43
Fax Int. + 39 02 26 1106-40

JP (Japan)
C. illies & Co., Ltd.
Tel. Int. + 81 3 3443 4143
Fax Int. + 81 3 3443 4118

KE (Kenia)
Profa-Tech Ltd.
Tel. Int. + 254 20 828095/6
Fax Int. + 254 20 828129

KR (South Korea)
Leuze electronic Co., Ltd.
Tel. Int. + 82 31 3828228
Fax Int. + 82 31 3828522

KZ (Republic of Kazakhstan)
KazPromAutomatics Ltd.
Tel. Int. + 7 7212 50 11 50
Fax Int. + 7 7212 50 11 50

MK (Macedonia)
Tipteh d.o.o. Skopje
Tel. Int. + 389 70 399 474
Fax Int. + 389 23 174 197

MX (Mexico)
Leuze Lumiflex México, S.A. de C.V.
Tel. Int. + 52 8183 7186-16
Fax Int. + 52 8183 7185-88

MY (Malaysia)
Ingermark (M) SDN.BHD
Tel. Int. + 60 360 3427-88
Fax Int. + 60 360 3421-88

NG (Nigeria)
SABROW HI-TECH E. & A. LTD.
Tel. Int. + 234 80333 86366
Fax Int. + 234 80333 84463518

NL (Netherlands)
Leuze electronic BV
Tel. Int. + 31 418 65 35-44
Fax Int. + 31 418 65 38-08

NO (Norway)
Elteco A/S
Tel. Int. + 47 35 56 20-70
Fax Int. + 47 35 56 20-99

PL (Poland)
Balluff Sp. z o. o.
Tel. Int. + 48 71 338 49 29
Fax Int. + 48 71 338 49 30

PT (Portugal)
LA2P, Lda.
Tel. Int. + 351 214 447070
Fax Int. + 351 214 447075

RO (Romania)
O´BOYLE s.r.l
Tel. Int. + 40 2 56201346
Fax Int. + 40 2 56221036

RS (Republic of Serbia)
Tipteh d.o.o. Beograd
Tel. Int. + 381 11 3131 057
Fax Int. + 381 11 3018 326

RU (Russian Federation)
Leuze electronic OOO
Tel. Int. + 7 495 9337505
Fax Int. + 7 495 9337505

SE (Sweden)
Leuze electronic AB
Tel. + 46 8 7315190
Fax + 46 8 7315105

SG + PH (Singapore + Philippines)
Balluff Asia pte Ltd
Tel. Int. + 65 6252 43-84
Fax Int. + 65 6252 90-60

SI (Slovenia)
Tipteh d.o.o.
Tel. Int. + 386 1200 51-50
Fax Int. + 386 1200 51-51

SK (Slowakia)
Schmachtl SK s.r.o.
Tel. Int. + 421 2 58275600
Fax Int. + 421 2 58275601

TH (Thailand)
Industrial Electrical Co. Ltd.
Tel. Int. + 66 2 6426700
Fax Int. + 66 2 6424249

TR (Turkey)
Leuze electronic San.ve.Tic.Ltd.Sti.
Tel. Int. + 90 216 456 6704
Fax Int. + 90 216 456 3650

TW (Taiwan)
Great Cofue Technology Co., Ltd.
Tel. Int. + 886 2 29 83 80-77
Fax Int. + 886 2 29 85 33-73

UA (Ukraine)
SV Altera OOO
Tel. Int. + 38 044 4961888
Fax Int. + 38 044 4961818

US + CA (United States + Canada)
Leuze electronic, Inc.
Tel. Int. + 1 248 486-4466
Fax Int. + 1 248 486-6699

ZA (South Africa)
Countapulse Controls (PTY.) Ltd.
Tel. Int. + 27 116 1575-56
Fax Int. + 27 116 1575-13

07/2008

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 barcode reader BCL 34, the modular hoods with integrated connectors MS 34 103/ MS 34 105, and the optional modular service display MSD 1 101 have been developed and manufactured under observation of the applicable European standards and directives.

The barcode reader models BCL 34 ... 100 **without integrated heating** also fulfil the UL requirements (Underwriters Laboratory Inc.) for the USA and Canada.

Notice!

You can find the corresponding declaration of conformity in the appendix of the manual.

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 barcode reader BCL 34, the modular hoods with integrated connectors MS 34 103/ MS 34 105, and the optional modular service display MSD 1 101 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 34 are conceived as stationary, high-speed scanners with integrated decoders for all current bar codes used for automatic object recognition.

The modular hoods with integrated connectors MS 34 103/MS 34 105 are intended for the easy connection of barcode readers of type BCL 34 in a PROFIBUS system and for the setting of the respective PROFIBUS address (see chapter 7.3 "Address setting").

The modular service display MSD 1 101, which is optionally available, displays operational data of the BCL 34 and is used as a simple means of access to the service interface.

In particular, unauthorised uses include:

- rooms with explosive atmospheres
- operation for medical purposes

Areas of application

The barcode reader BCL 34 is intended especially for the following areas of application:

- labelling and packaging machines
- space-critical barcode 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!

WARNING: The barcode reader BCL 34 operates with a red light laser of class 2 acc. to EN 60825-1. If you look into the beam path over a longer time period, the retina of your eye may be damaged!

Never look directly into the beam path!

Do not point the laser beam of the BCL 34 at persons!

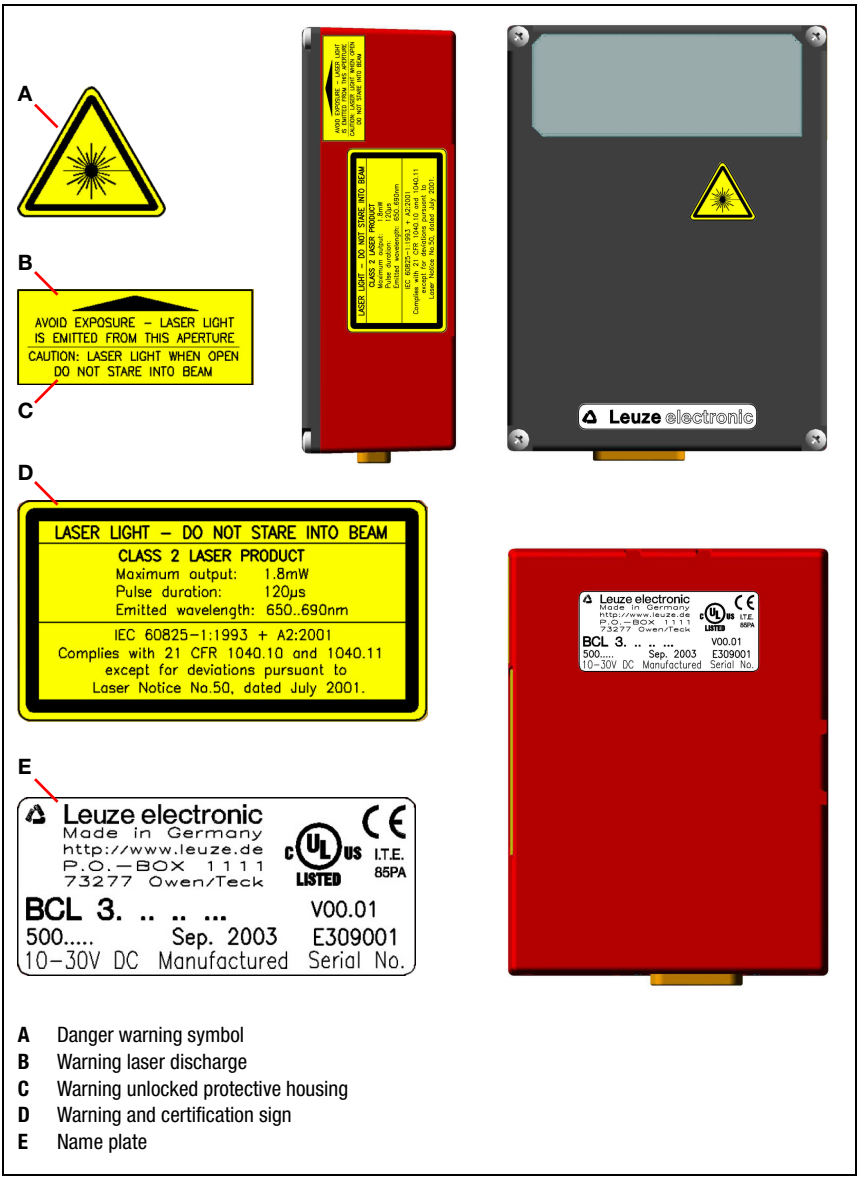
When mounting and aligning the BCL 34, take care to avoid reflections of the laser beam off reflective surfaces!

Heed the laser safety regulations according to DIN EN 60825-1 in their most current version! The output power of the laser beam at the reading window is at most 1.8mW acc. to EN 60825-1.

The BCL 34 uses a laser diode with low power in the visible red light range with an emitted wavelength of 650 … 690nm.

CAUTION - the use of operating and adjusting devices other than those specified here or carrying out of differing procedures may lead to dangerous exposure to radiation!

The housing of the bar code reader BCL 34 is labelled on the side, below the scanner window and on the rear with the following logotypes:



A Danger warning symbol
B Warning laser discharge
C Warning unlocked protective housing
D Warning and certification sign
E Name plate

Figure 2.1: Attachment of the sticky labels with warning notices at the BCL 34

3 Commissioning steps at a glance

Notice!

*Below you will find a **short description for the initial commissioning** BCL 34of the bar-code reader. Detailed explanations for all listed points can be found throughout the manual.*

1 Mechanical design

Mounting the device BCL 34

There are two different types of mounting arrangements for the BCL 34:

1. Using 4 M4x6 screws on the rear of the device.
2. Using a mounting device (BT 56) on the dovetail fastening grooves.

Notice!

The installation dimensions listed in the following figure must absolutely be adhered to. Optically, it must be ensured that the scanner has an unobstructed view of the barcode at all times. The scanning beam's angle of incidence on the label of at least 10° must be adhered to.

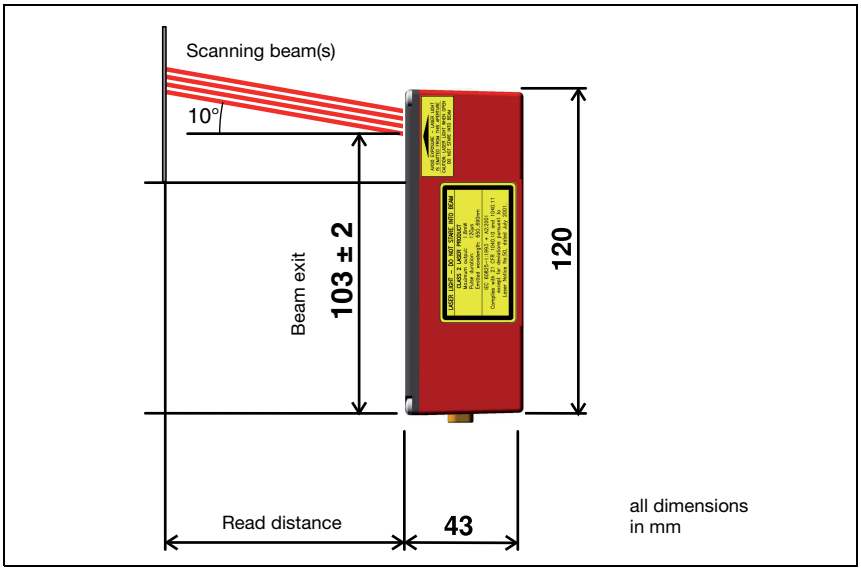


Figure 3.1: Beam exit and device arrangement of the BCL 34

Notice!

During installation, the working range of the reading field curve must be taken into account.

② Setting the PROFIBUS address

The PROFIBUS address must be set in the MS 34 10x connector plug hood.

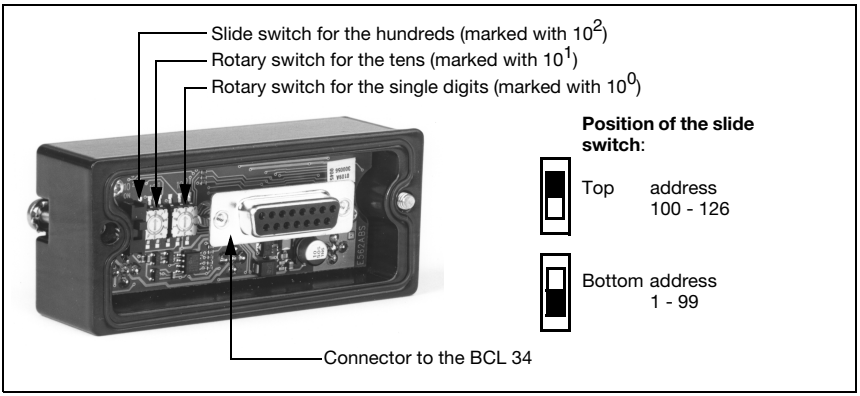


Figure 3.2: View of the inside of the MS 34

③ Connecting the voltage supply and PROFIBUS

The BCL 34, in combination with an MS 34 103 or MS 34 105, is connected via M12 connectors.

Connecting the voltage supply

The voltage supply is connected via the **PWR** M12 connection.

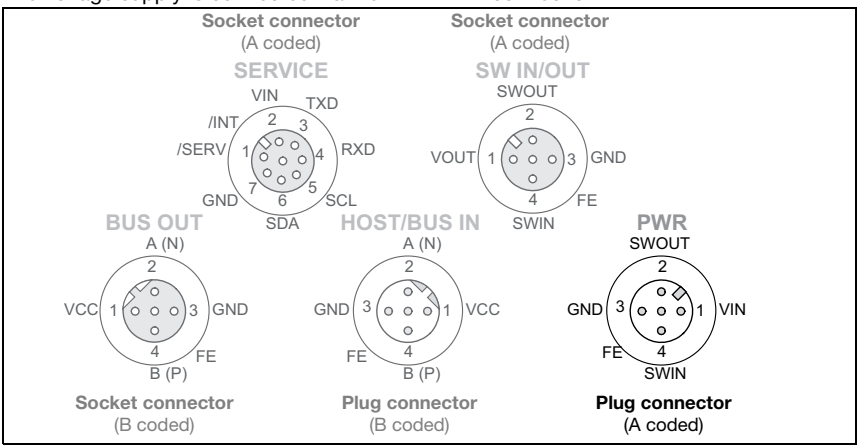


Figure 3.3: BCL 34 with MS 34 103/MS 34 105 - Connection PWR

Connecting the PROFIBUS

The PROFIBUS is connected via **HOST/BUS IN** or, in the case of a continuing network, via **BUS OUT**. If **BUS OUT** is not used, the PROFIBUS must be terminated at this point with an M12 terminator plug (see "Accessories" on page 29.).

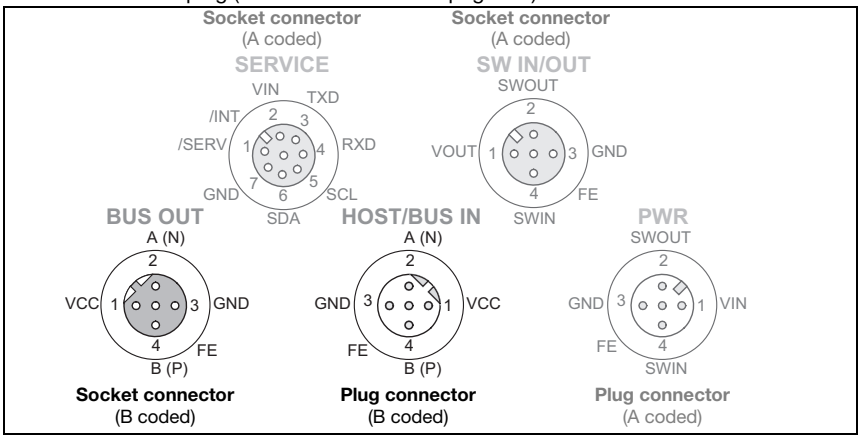


Figure 3.4: BCL 34 with MS 34 103/MS 34 105 - Connection HOST/BUS IN and BUS OUT

④ Configuration via the PROFIBUS hardware manager

PROFIBUS manager

Install the GSE file associated with the BCL 34 in the PROFIBUS manager of your control. Activate the required modules, including at least one of the modules 20 … 27.

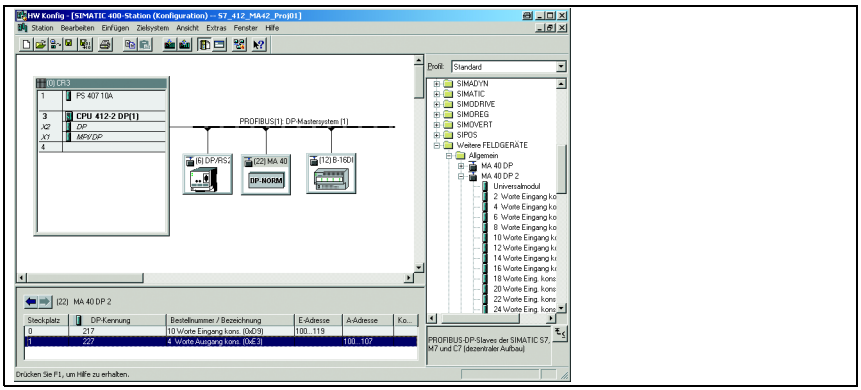


Figure 3.5: Example PROFIBUS manager

Store the slave address for the BCL 34 in the PROFIBUS manager. Ensure that the address is the same as the address configured in the device. As soon as the BCL 34 is addressed and configured correctly and the PROFIBUS functions, the status LED at the MS 34 104 or MS 34 105 lights up in green.

5 Connecting the switching input/switching output at the BCL 34

The switching input/switching output is connected via SW IN/OUT.

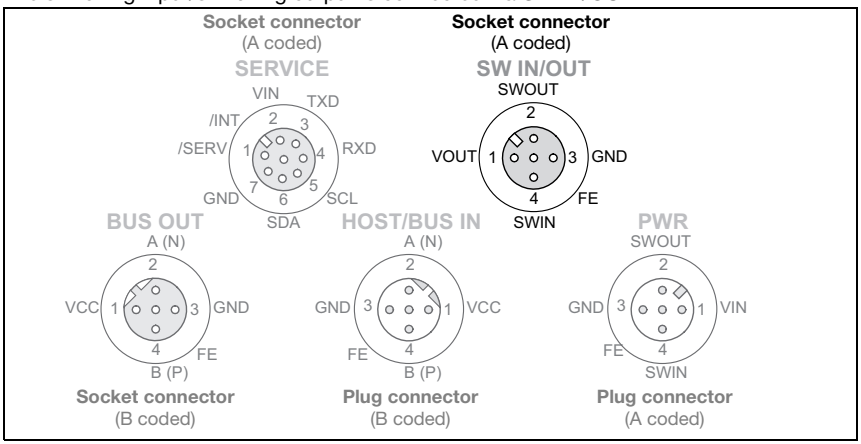


Figure 3.6: BCL 34 with MS 34 103/MS 34 105 - Connection SW IN/OUT

6 Connecting the Modular Service Display MSD 1 101

The MSD 1 101 is connected via cable KB 034-2000 (M12 connection on SERVICE and M12 connection on MSD 1 101, see "Connection cable KB 034 2000" on page 32. on).

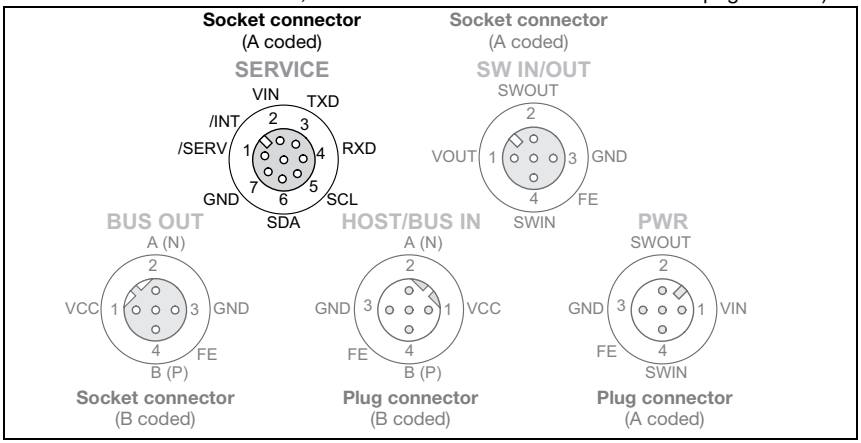


Figure 3.7: BCL 34 with MS 34 103/MS 34 105 - Connection SERVICE

The BCL 34 can be accessed via the MSD 1 101 using the service interface.

Notice!

Changes which were made via the service interface on the BCL 34 are lost following initialisation on the PROFIBUS.

4 Description

BCL 34 device construction

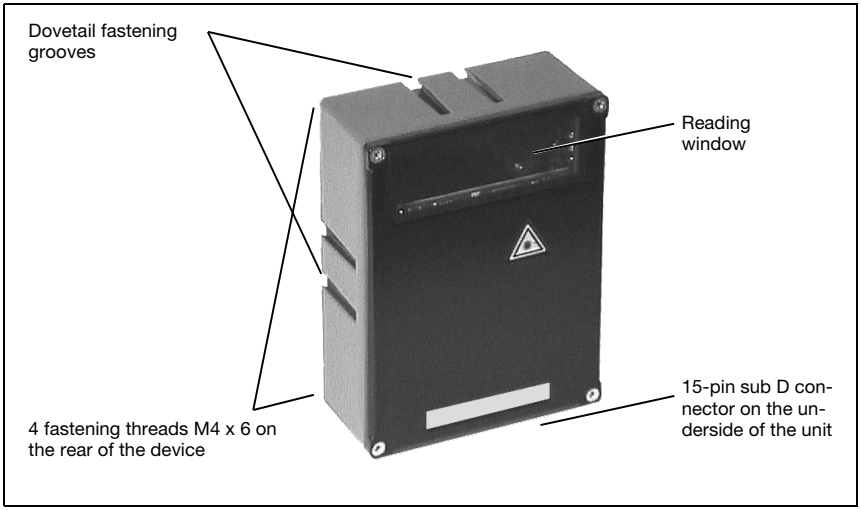


Figure 4.1: BCL 34 device construction

4.1 On the barcode readers BCL 34

The bar code readers BCL 34 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 via PROFIBUS modules permit its adaptation to a multitude of reading tasks. Due to the small dimensions of the unit and the short minimum reading distance, the BCL 34 may also be used in highly constrained spaces.

A special barcode reader with optics version J is available for all ink jet applications. This reader has been optimised for low contrast barcodes that generally feature gaps. Furthermore, device variants with integrated heating are available.

Information on technical data and characteristics can be found in chapter 5.

AutoReflAct

AutoReflAct 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 barcode 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.

4.2 Modular hoods with integrated connectors MS 34 103/MS 34 105

The modular hoods with integrated connectors are necessary accessories for connecting a BCL 34 in a PROFIBUS system. They are used to feed through the PROFIBUS connections, set the PROFIBUS address, and supply voltage to the BCL 34.

MS 34 103

The MS 34 103 offers the following interfaces:

- PROFIBUS In (HOST/BUS IN)
- PROFIBUS Out (BUS OUT)
- Voltage supply (PWR) and 1 switching input and output each (SW IN/OUT)

Figure 4.2: MS 34 103

MS 34 105

In addition, the MS 34 105 offers the following interfaces:

- Service interface (SERVICE)
- 1 further switching input and output each (SW IN/OUT)

Figure 4.3: MS 34 103

Further information on the modular hoods with integrated connectors may be found in the following chapters.

4.3 Modular Service Display MSD 1 101

The modular service display is used to display the reading and operational data on the one hand, and as simple access to the service interface on the other. The RS 232 service interface of the BCL 34is tapped in this case and is made available at the 9-pin sub D connector of the MSD (for further information see page 30).

Figure 4.4: MSD 1 101

To connect to the MS 34 105, an 8-pin cable (M12) with a length of 2m is used (see chapter 6 "Accessories / Order Designation").

The MSD can be operated in different display modes which are stored in the parameter set of the BCL. The required parameter for setting up the display mode can be altered via the service interface. The LCD display contains two lines with 16 characters each. There are 3 display modes:

1. Single line:
   a result is output in one line. If the information is longer than 16 characters, the characters > 16 are cut off. This means that two results may be output on the LCD display.
2. Double line:
   a result is displayed over both lines. Thus, only one result is visible in the display.
3. Depending on the size:
   if a result is > 16 characters, both lines are used
   if a result is < 16 characters, one line is used and two results are displayed

Address	Size	Designation	Value Range	Standard
161	Byte	lcd_output_format	1: single line (two results) 2: double line (one result) 0: depending on the size	2: double line (one result visible)

The input can be specified as a PT commentary or in the BCL Config parameter list, e.g., PT0001610x.

Using the maintenance display, new settings for the BCL can be tried quickly and easily, without having to project these settings via the PROFIBUS. If these settings are to be accepted for standard operation, these must be configured via PLC.

Notice!

With very few exceptions, the BCL 34 is configured via the PROFIBUS connection group.Parameters which were set via the service interface are, therefore, overwritten in PROFIBUS operation by the parameters stored in the project. If parameters in the project were not explicitly changed, the corresponding default parameters are transferred.

In the BCLConfig configuration software, the parameter input fields which can be overwritten by the PROFIBUS are displayed with a blue background. Parameter input fields which are not overwritten by the PROFIBUS are displayed with a white background.

If these parameters were changed, they are stored in one of the available parameter memories in the MS 34. They are, thus, safely stored even if a BCL 34 is replaced.

5 Specifications

5.1 General specifications of the BCL 34

Optical data			
Light source	laser diode 650 nm		
Scanning rate	BCL with M optics:	1000 scans/s	
	BCL with F optics:	800 scans/s	
	BCL with L optics:	800 scans/s	
	BCL with J optics:	1000 scans/s	
Resolution	BCL 3x xM 100:	m = 0.2 mm … 0.5 mm	
	BCL 3x xF 100:	m = 0.3 mm … 0.8 mm	
	BCL 3x xL 100:	m = 0.35 mm … 0.8 mm	
	BCL 3x xJ 100:	application-dependent	
Reading distance	see reading curve		
Laser class	2 acc. to EN 60825-1, II acc. to CDRH		
Code types	all common code types		
Software features	selectable output format, autoControl, autoReflAct, reference code comparison, adjustment mode, diagnosis, reading gate control, control of switching inputs and switching outputs, etc.		
Electrical data			
Interface type	PROFIBUS DP		
Service interface	only in combination with MS 34 105: RS232 with fixed data format, 8 data bits, no parity, 1 stop bit, 9.6 kBd		
Ports	1 switching output, 1 switching input		
Operating voltage	without heating: 10 … 30 VDC		
	with heating: 22 … 26 VDC		
Power consumption	without heating: 5 W		
	with heating: max. 30 W (of which window heating accounts for: 1.5 W)		
Indicators			
LED	see chapter 5.2 "LED indicators"		
Mechanical data			
Protection class	IP 65		
	BCL 34		**MS 34**
Weight	without heating: 405 g		160 g
	with heating: 480 g		
Dimensions (W x H x D)	without heating: 120 x 90 x 43 mm		38 x 90 x 39 mm
	with heating: 120 x 90 x 52 mm		
Housing	diecast aluminium		diecast zinc

Environmental data		
Ambient temp. (operation/ storage)	without heating:	0°C … +40°C/-20°C … +60°C
	with heating:	-35°C … +30°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,	
Additional Functions		
autoReflAct	automatic reading activation via reflector	

Table 5.1: General Specifications

Notice!

The warm-up time before devices with integrated heating are ready for operation is approx. 30 min. (depending on the environmental conditions).

5.2 LED indicators

MS 34 103 / MS 34 105

On top of the modular hood with integrated connectors a red/green status LED is located between the M12 connectors HOST/BUS IN and BUS Out. It indicates the state of the PROFIBUS connection.

State	Meaning
off	voltage off or device not yet recognised [1] by the PROFIBUS
green flashing	initialisation of the device, establishment of the PROFIBUS communication
green, continuous light	data operation
red, flashing	error on the PROFIBUS, error can be resolved by a reset
red, continuous light	error on the PROFIBUS, error cannot be resolved by a reset
orange, continuous light	SERVICE operation active

Table 5.2: LED states MS 34 103 / MS 34 105

1) Note: The LED remains off until the BCL 34 is recognised by the PROFIBUS. Only after the PROFIBUS has addressed the BCL 34 for the first time do the following status descriptions apply.

5.3 Device Construction and Components

A modular hood of type MS 34 103 or MS 34 105 with integrated connectors is part of every BCL 34. The two hoods with integrated connectors are used to connect the BCL 34 to the PROFIBUS. For this, they feature one HOST/BUS IN and BUS OUT connection each, as well as an internal switch for address setting.

If only the connection to the PROFIBUS is intended, type MS 34 103 is sufficient.

If, in addition, switching input and output or a modular service display are to be connected, an MS 34 105 is required. Although switching inputs and outputs are available on the voltage supply connector, the switching inputs of the MS 34 105 have the advantage that a standard sensor connector can be used.

Figure 5.1: BCL 34 with MS 34 105

5.3.1 Dimensioned and Connection Drawings

BCL 34

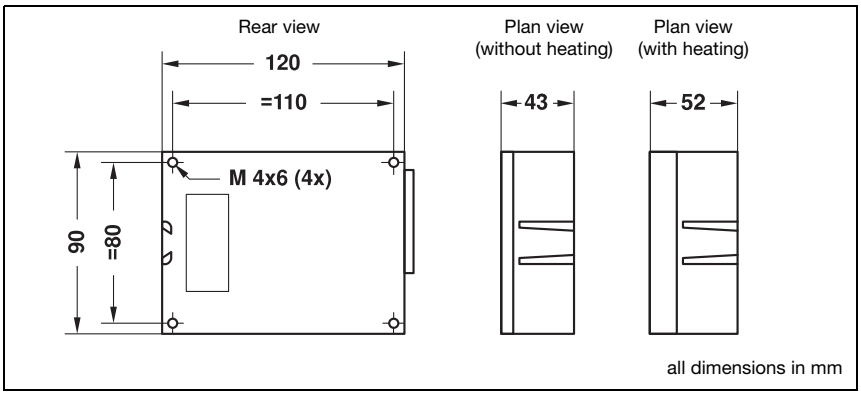
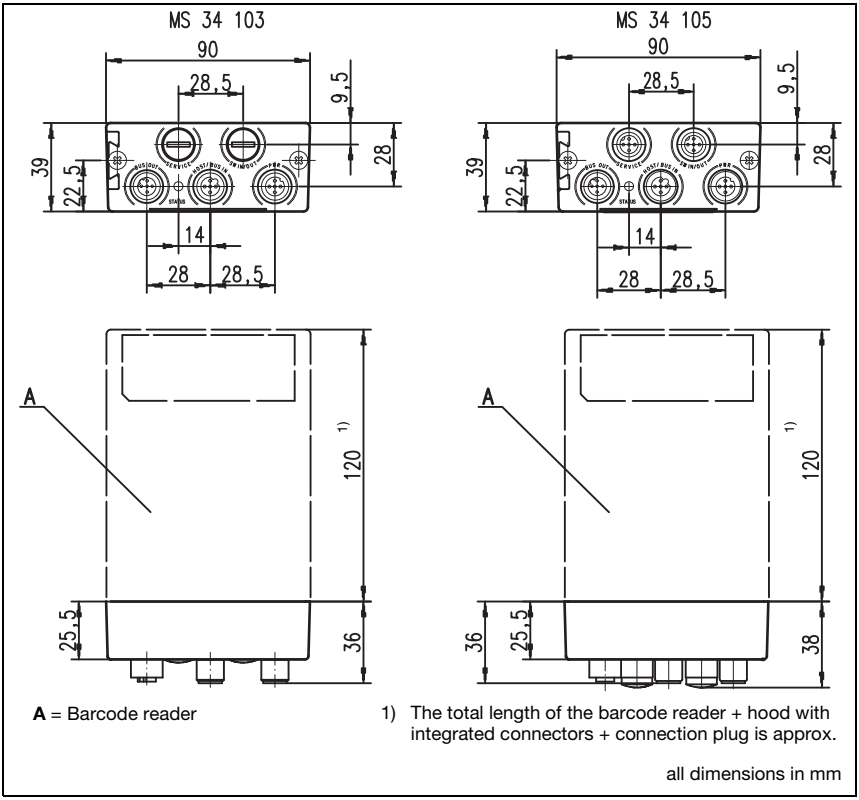


Figure 5.2: Dimensioned drawing of the BCL 34

MS 34 103 / MS 34 105



A = Barcode reader

1) The total length of the barcode reader + hood with integrated connectors + connection plug is approx.

all dimensions in mm

Figure 5.3: Dimensioned drawing MS 34 103 / MS 34 105

5.4 Optical data

Notice!

Please note that the size of the barcode module influences the maximum reading distance and the width of the reading field. Therefore, when selecting a mounting location and/or the barcode label, take into account the different reading characteristics of the scanner with various barcode modules.

For different reading tasks, the BCL 34 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.

5.4.1 Type overview

Models without integrated heating

Model	Maximum possible operating range	Module/ resolution (mm)	Scanning rate (scans/s)	Scanner type	Order No.
BCL 34 S M 100	up to 220 mm	0.2 … 0.5	1000	Single line	500 37229
BCL 34 R1 M 100				Raster	500 37227
BCL 34 S F 100	up to 550 mm	0.3 … 0.8	800	Single line	500 37228
BCL 34 R1 F 100				Raster	500 37226
BCL 34 S L 100	up to 750 mm	0.35 … 0.8	800	Single line	500 41381
BCL 34 R1 L 100				Raster	500 41382
BCL 34 S J 100	up to 570 mm	0.5 … 0.8	1000	Single line	501 04023
BCL 34 R1 J 100				Raster	500 41801

Table 5.3: Type overview BCL 34 without integrated heating

Models with integrated heating

Model	Maximum possible operating range	Module/ resolution (mm)	Scanning rate (scans/s)	Scanner type	Order No.
BCL 34 S M 100 H	up to 210 mm	0.2 … 0.5	1000	Single line	500 39129
BCL 34 R1 M 100 H				Raster	500 39130
BCL 34 S F 100 H	up to 550 mm	0.3 … 0.8	800	Single line	500 39128
BCL 34 R1 F 100 H				Raster	500 39127
BCL 34 S L 100 H	up to 650 mm	0.35 … 0.8	800	Single line	501 01903
BCL 34 R1 L 100 H				Raster	501 01901
BCL 34 R1 J 100 H	up to 550 mm	0.5 … 0.8	1000	Raster	501 01902

Table 5.4: Type overview BCL 34 Devices with integrated heating

5.4.2 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

5.4.3 Optics variants and reading fields

The BCL 34 is available with different optics. The optics differ in range and resolution (see chapter 5.4.1).

- M optics: for small to medium modules
- F optics: for medium to large modules
- L optics: for medium to large modules
- J Optics: for ink-jet applications or if the barcodes are of low contrast or have gaps.

The following graphics display the ranges 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.
The reading curves specified here were determined under the following conditions: code type 2/5 interleaved, ratio = 1:2.5, label class A.

Reading curves BCL 34 without heating with M optics

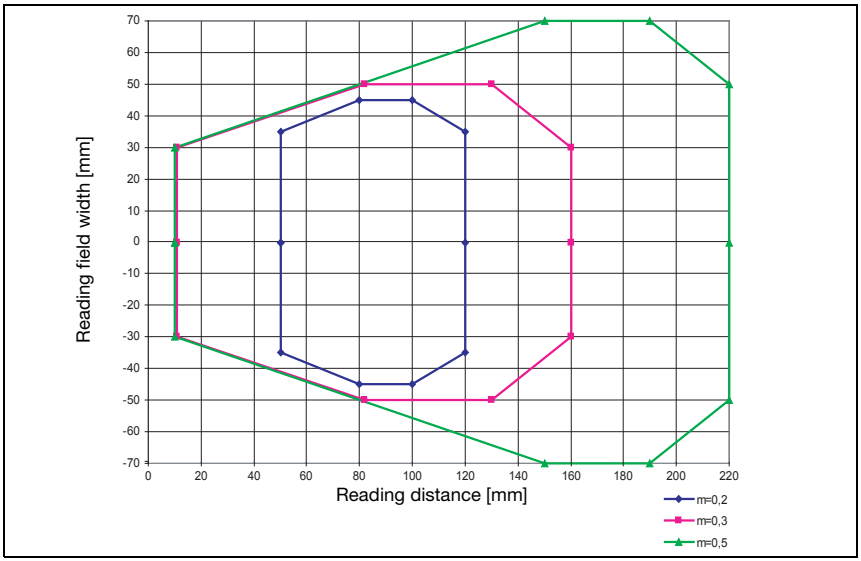


Figure 5.4: BCL 34 … 100: Reading field, M optics (medium density, normal distance)

Reading curves BCL 34 without heating with F optics

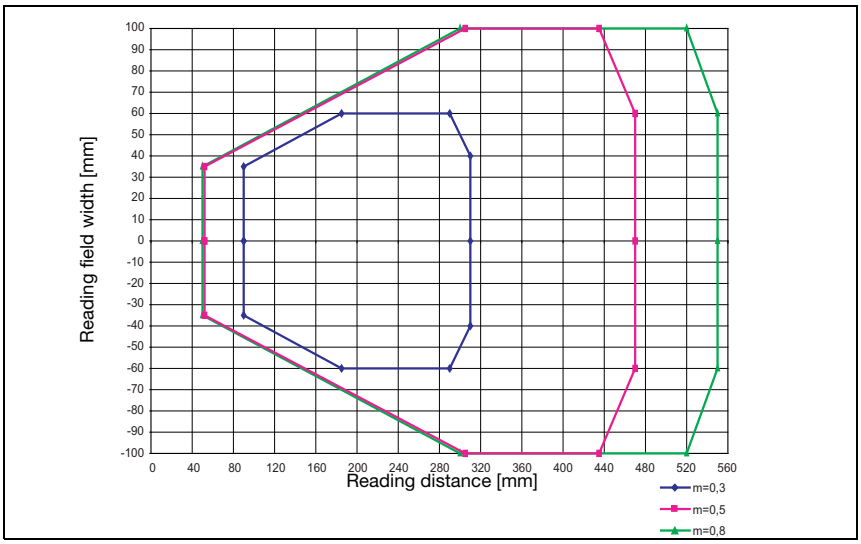


Figure 5.5: BCL 34 … 100: Reading field, F optics (low density, normal distance)

Reading curves BCL 34 without heating with L optics

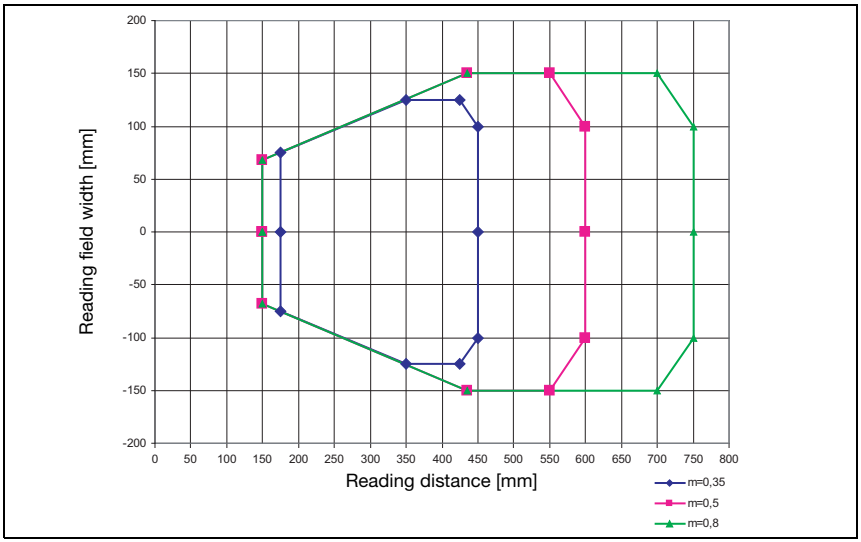


Figure 5.6: BCL 34 … 100: Reading field, L optics (low density, long distance)

Reading curves BCL 34 without heating with J optics

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.

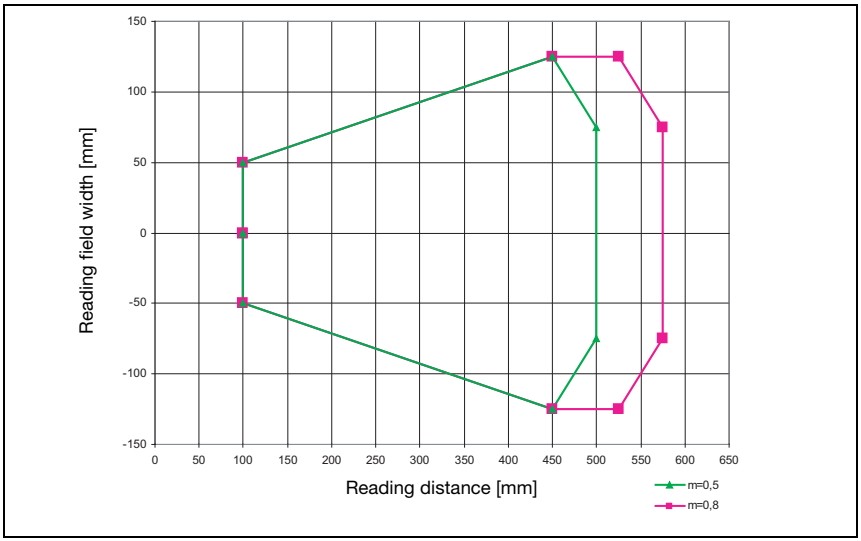


Figure 5.7: BCL 34 … 100: Reading field, J optics (for ink-jet applications)

Reading curves BCL 34 with heating with M optics

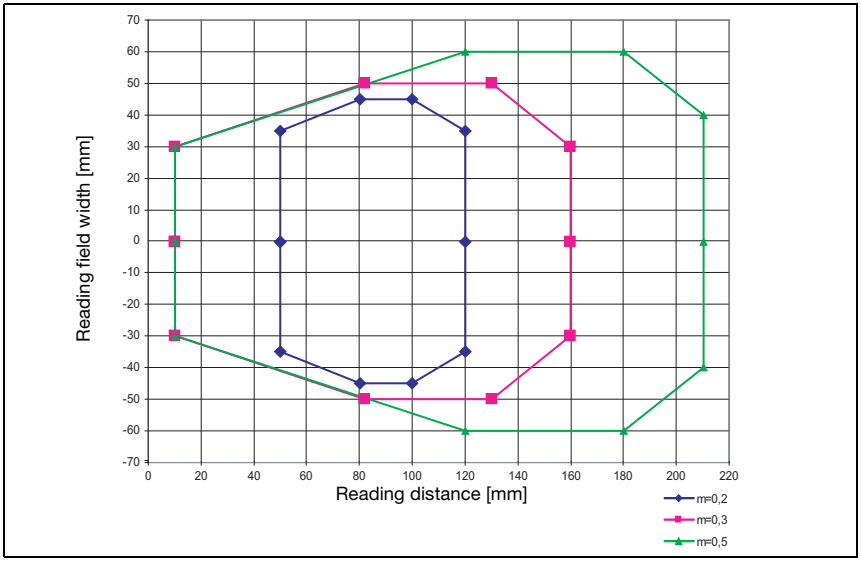


Figure 5.8: BCL 34 … 100 H: Reading field, M optics (medium density, normal distance)

Reading curves BCL 34 with heating with F optics

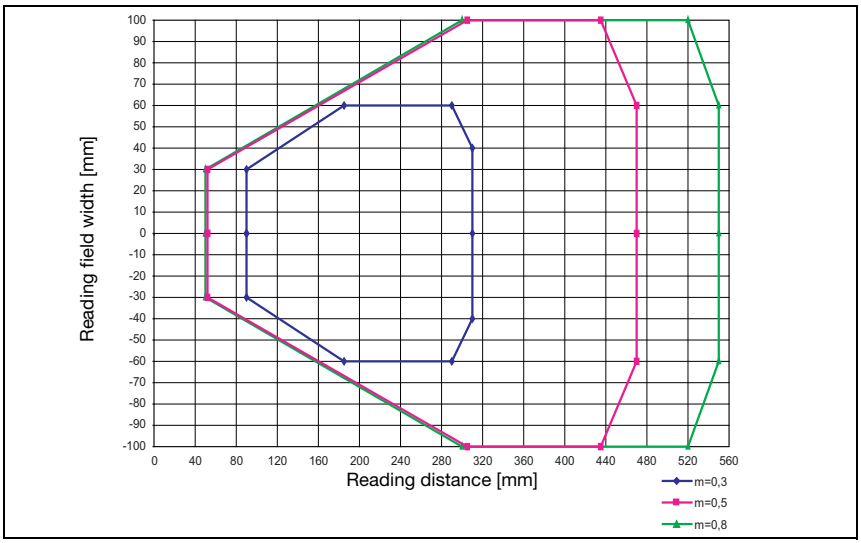


Figure 5.9: BCL 34 … 100 H: Reading field, F optics (low density, normal distance)

Reading curves BCL 34 with heating with L optics

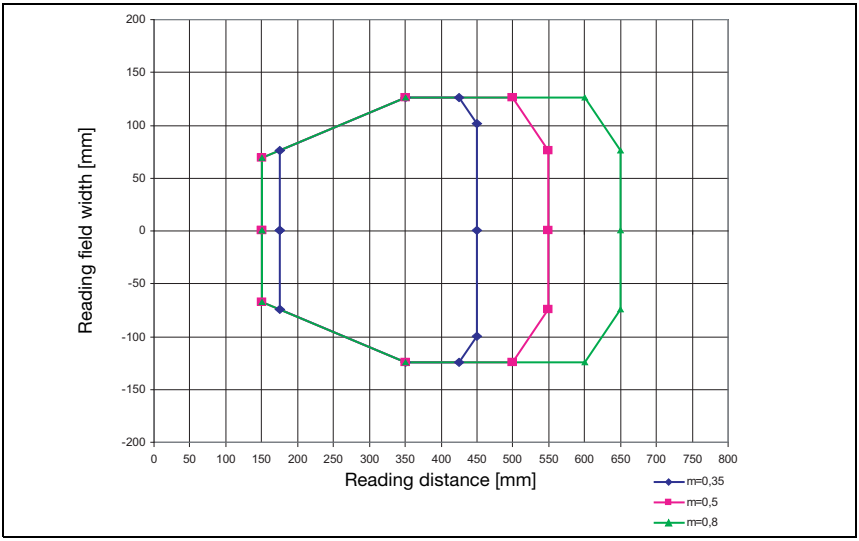


Figure 5.10: BCL 34 … 100 H: Reading field, L optics (low density, long distance)

Reading curves BCL 34 with heating with J optics

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.

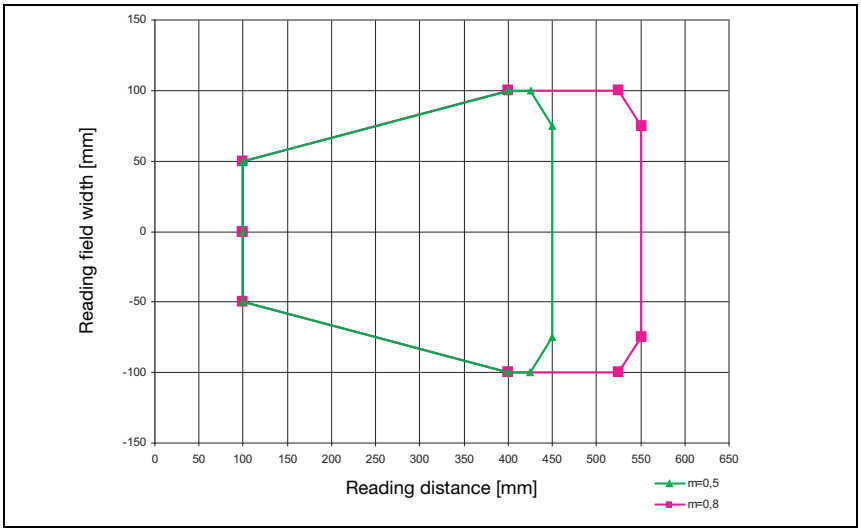


Figure 5.11: BCL 34…100 H: Reading field, J optics (for ink-jet applications)

5.5 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 bar codes which are to be read are put on reflecting surfaces, e.g. foils.

Our recommendation:

- Use BCL 34 R1x100
- 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 5.12.

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 5.5: Examples of reflectors which may be used

*) Reflective tape no. 2 is included

Application example: automatic reflector activation

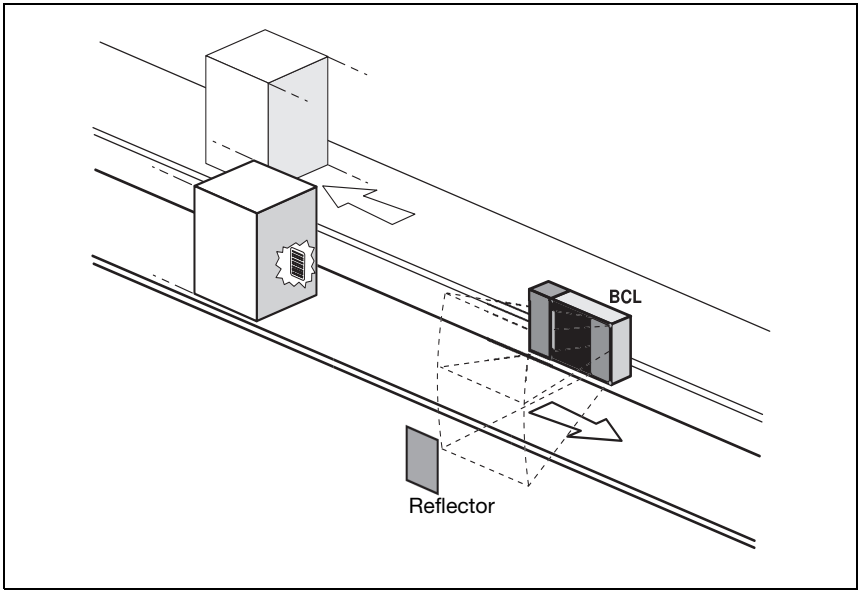


Figure 5.12: Reflector arrangement for autoReflAct

6 Accessories / Order Designation

6.1 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.

Designation	Order No.	Short Description
MS 34 103	500 37230	Modular hood with integrated connectors for BCL 34 with 3 M12 connectors
MS 34 105	500 37231	Modular hood with integrated connectors for BCL 34 with 5 M12 connectors
MSD 1 101	500 37232	Modular service display MSD 1 101 for BCL 34 with 8-pin M12 connector
BT 56	500 27375	Mounting device with dovetail for rod
KB 034 - 2000	500 37543	Connection cable between MS 34 105 and MSD 1 101, length: 2m
KD 02-5-SA	500 38537	PROFIBUS plug B-coded
KD 02-5-BA	500 38538	PROFIBUS socket B-coded
TS 02-4-SA	500 38539	Terminating resistor B-coded
KD 095-5A	500 20501	Voltage supply 5-pin
Ready-made PROFIBUS cables		
Connector axial - open cable end		
KB PB-2000-SA	501 04188	PROFIBUS cable, M12 plug - open cable end, 2m
KB PB-5000-SA	501 04187	PROFIBUS cable, M12 plug - open cable end, 5m
KB PB-10000-SA	501 04186	PROFIBUS cable, M12 plug - open cable end, 10m
KB PB-15000-SA	501 04185	PROFIBUS cable, M12 plug - open cable end, 15m
KB PB-20000-SA	501 04184	PROFIBUS cable, M12 plug - open cable end, 20m
KB PB-25000-SA	501 04183	PROFIBUS cable, M12 plug - open cable end, 25m
KB PB-30000-SA	501 04182	PROFIBUS cable, M12 plug - open cable end, 30m
Socket axial - open cable end		
KB PB-2000-BA	501 04181	PROFIBUS cable, M12 socket - open cable end, 2m
KB PB-5000-BA	501 04180	PROFIBUS cable, M12 socket - open cable end, 5m
KB PB-10000-BA	501 04179	PROFIBUS cable, M12 socket - open cable end, 10m
KB PB-15000-BA	501 04178	PROFIBUS cable, M12 socket - open cable end, 15m
KB PB-20000-BA	501 04177	PROFIBUS cable, M12 socket - open cable end, 20m
KB PB-25000-BA	501 04176	PROFIBUS cable, M12 socket - open cable end, 25m
KB PB-30000-BA	501 04175	PROFIBUS cable, M12 socket - open cable end, 30m

Designation	Order No.	Short Description
Plug axial - socket axial		
KB PB-1000-SBA	501 04096	PROFIBUS cable, M12 plug - M12 socket, 1 m
KB PB-2000-SBA	501 04097	PROFIBUS cable, M12 plug - M12 socket, 2 m
KB PB-5000-SBA	501 04098	PROFIBUS cable, M12 plug - M12 socket, 5 m
KB PB-10000-SBA	501 04099	PROFIBUS cable, M12 plug - M12 socket, 10 m
KB PB-15000-SBA	501 04100	PROFIBUS cable, M12 plug - M12 socket, 15 m
KB PB-20000-SBA	501 04101	PROFIBUS cable, M12 plug - M12 socket, 20 m
KB PB-25000-SBA	501 04174	PROFIBUS cable, M12 plug - M12 socket, 25 m
KB PB-30000-SBA	501 04173	PROFIBUS cable, M12 plug - M12 socket, 30 m

Table 6.1: Accessories / Order Designation

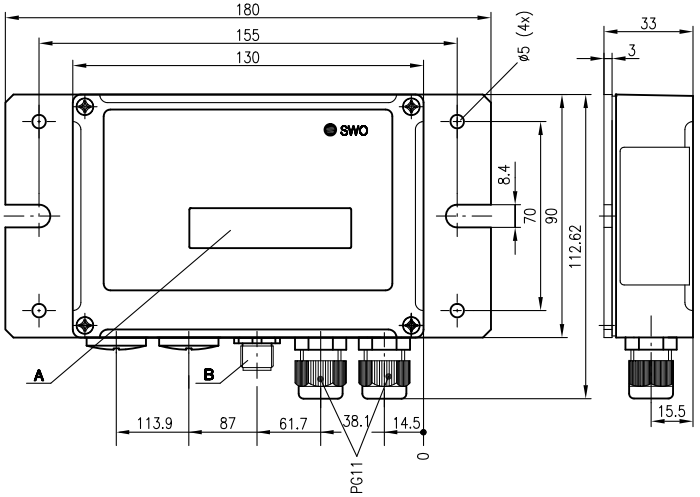
6.1.1 Modular Service Display MSD 1 101

The modular service display MSD 1 101 is used to display device messages or the data that has been read.

- The device has a service interface in the form of a 9-pin sub-D connector (pin assignment: 2=RxD, 3=TxD, 5=GND).
  Transmission in the standard Leuze format 9600/8/Non/1 frame STX/…/CR/LF.
- Connection to the PC via null modem cable
- **All** parameters of the BCL 34 are accessible via the service interface.
- Operating mode switch: service operation/standard operation
- Display
- Prerequisite for use: modular hood with integrated connectors MS 34 105

Attention!

If parameters are changed that can also be set via the PROFIBUS, they are overwritten with the parameter setting defined in the PROFIBUS after PROFIBUS start-up. If device or module parameters are to be changed permanently, they must be set in the PROFIBUS project.



A LED indicator

B Device connector M12, 8-pin

all dimensions in mm

Figure 6.1: Modular Service Display MSD 1 101

6.1.2 Fastening Accessories

The mounting device BT 56 is available for mounting the BCL 34. It is designed for rod installation.

BT 56 mounting device

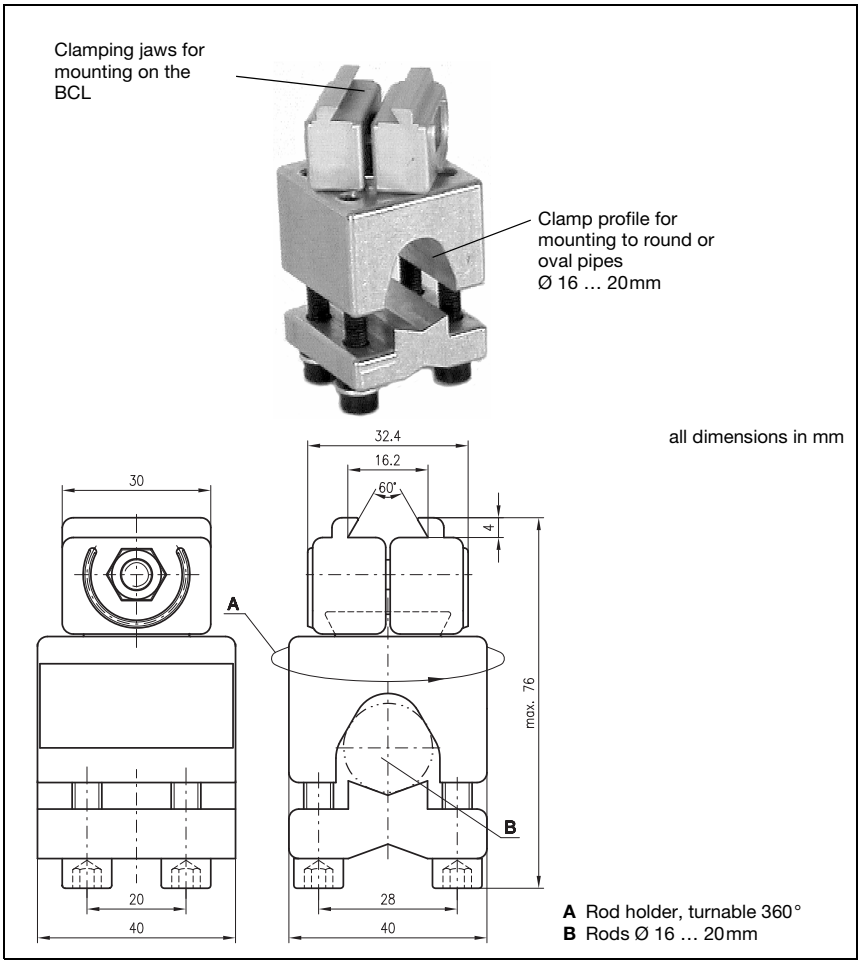


Figure 6.2: Mounting device BT 56

6.1.3 Connection cable KB 034 2000

A special connection cable of 2m length is available for the connection between MS 34 105 and MSD 1 101.

7 Installation

7.1 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
  - operation manual with GSD file

The name plates provide information as to what BCL type your device is. For specific information, please refer to chapter 5.4.1.

Name plate of the BCL models

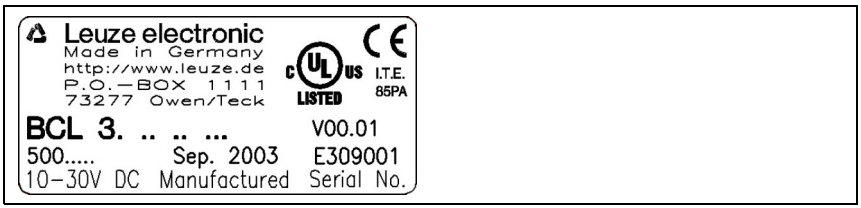


Figure 7.1: Device name plate BCL 34

- *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 34 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.

7.2 Mounting

Accessories

The mounting system BT 56 is available for installation. It may be ordered separately from Leuze electronic. For order numbers, see table 6.1 "Accessories / Order Designation" on page 30.

MountingBCL 34

There are two basic types of mounting arrangements for the BCL 34:

- using the dovetail groove and the corresponding mounting accessories (see figure 7.2)
- using the fastening threads on the backside of the devices (chapter 5.3)

Mounting example BCL 34

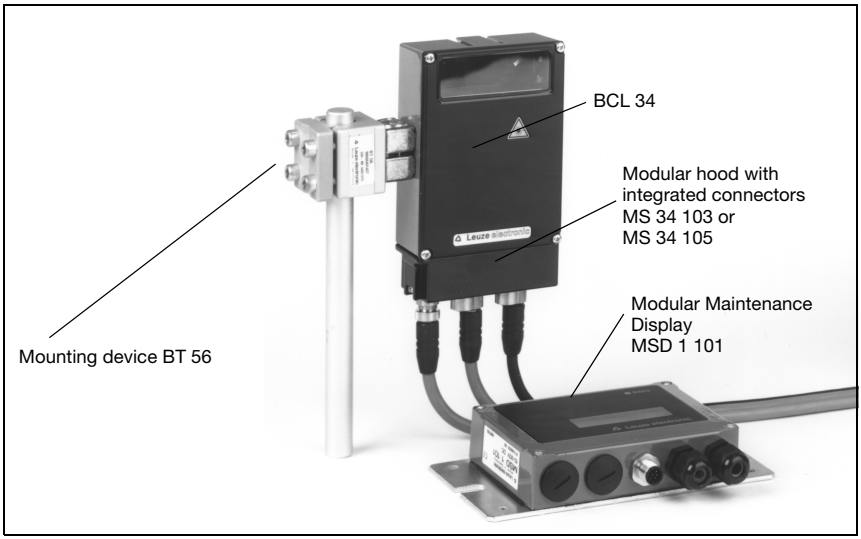


Figure 7.2: Mounting example BCL 34

Mounting the MSD 1 101

You can mount the modular service display individually through the holes located on the mounting plate (see figure 6.1).

Subsequently, connect the MSD to the MS 34 105 which is part of the BCL 34 via the respective cable (see chapter 6.1.3).

7.2.1 Arrangement of devices

Selecting a mounting location

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

- Size, orientation, and position tolerance of the barcodes on the objects to be scanned.
- The reading field of the BCL 34 in relation to the barcode module width.
- the resulting minimum and maximum reading distance from the respective reading field

For specific information, please refer to chapter 5.4.

Notice!

The best reading results are obtained when

- the barcode 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 34, 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.

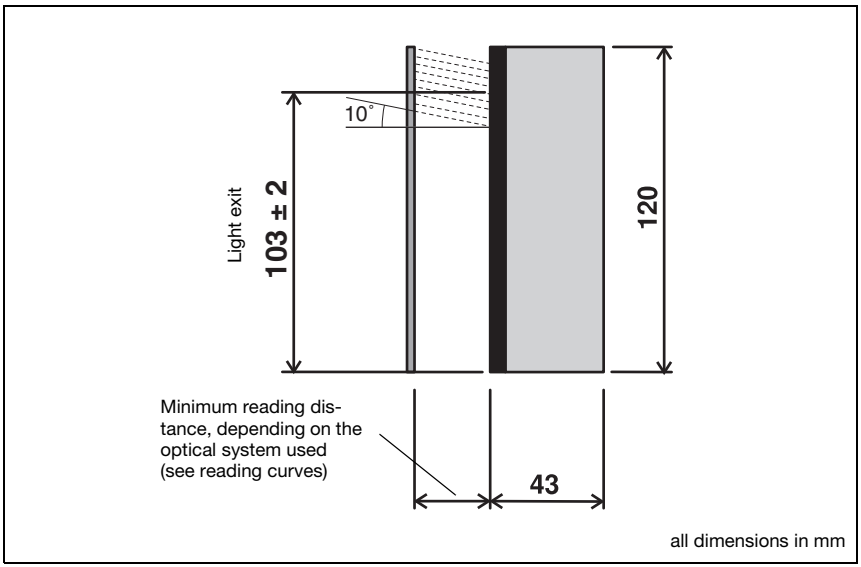


Figure 7.3: Beam exit on BCL 34

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.

Mounting outdoors/devices with integrated heating

When mounting outdoors or for devices with integrated heating, also observe the following points:

- Mount the BCL 34 in a way which provides maximum thermal isolation to the machine foundation plate, e.g. using rubber-bonded metal.
- mount in such a way that the device is protected from draughts; mount additional shields if necessary.
- when using outdoors, we recommend mounting in an additional protective housing.

Application example

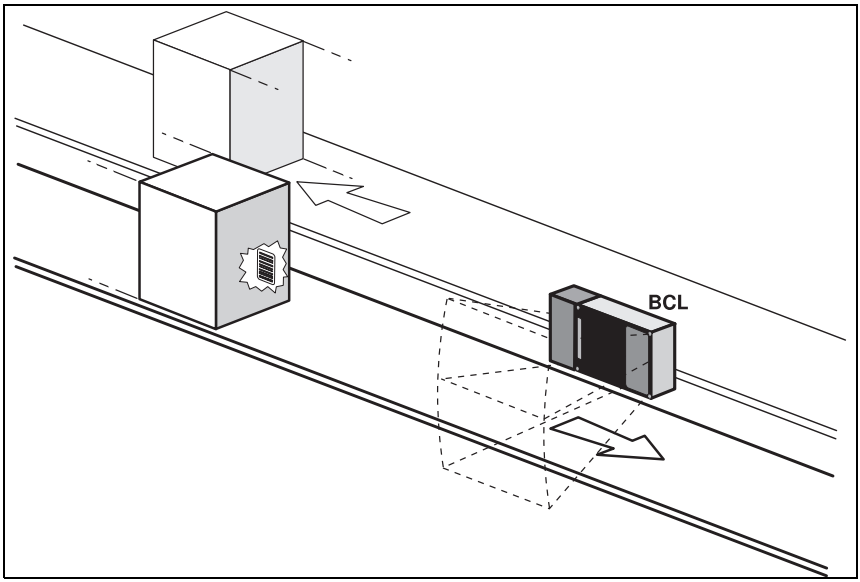


Figure 7.4: Application example "conveyor chain"

7.3 Address setting

In the modular hoods with integrated connectors MS 34 103 and MS 34 105, the PROFIBUS address can be set via two rotary switches and one slide switch.

The address switches are positioned as follows.

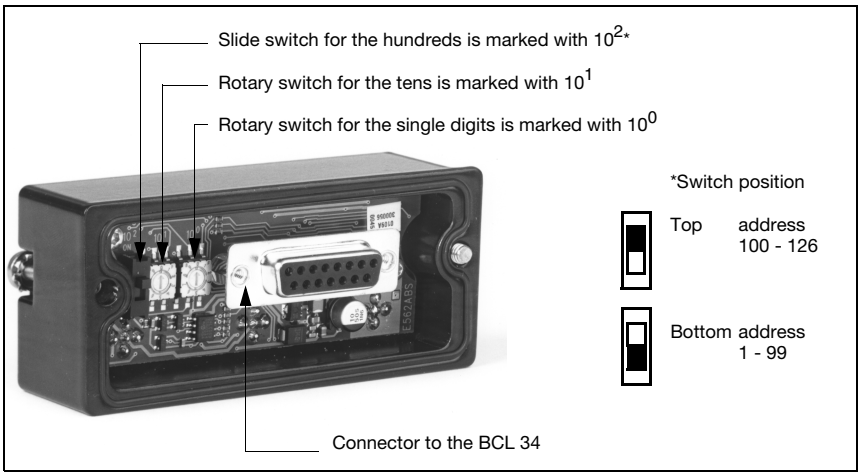


Figure 7.5: View of the inside of the MS 34

7.4 Connection

Attention!

Do not open the device yourself under any circumstances! There is otherwise a risk of uncontrolled emission of laser radiation from the device. The housing of the BCL 34 contains no parts that need to 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.

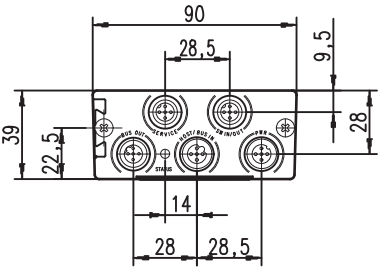
The power supply unit for the generation of the supply voltage for the BCL 34 and the respective connector units must have a secure electrical insulation through double insulation and safety transformers according to DIN VDE 0551 (IEC 742).

Be sure that the functional earth is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly.

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

7.4.1 ConnectionBCL 34

Connections MS 34 103 / MS 34 105



all dimensions in mm

PWR	= voltage supply
HOST/BUS IN	= PROFIBUS IN
BUS OUT	= PROFIBUS OUT
SERVICE	= Modular Service Display (MS 34 105 only)
SW IN/OUT	= switching input/output (MS 34 105 only)

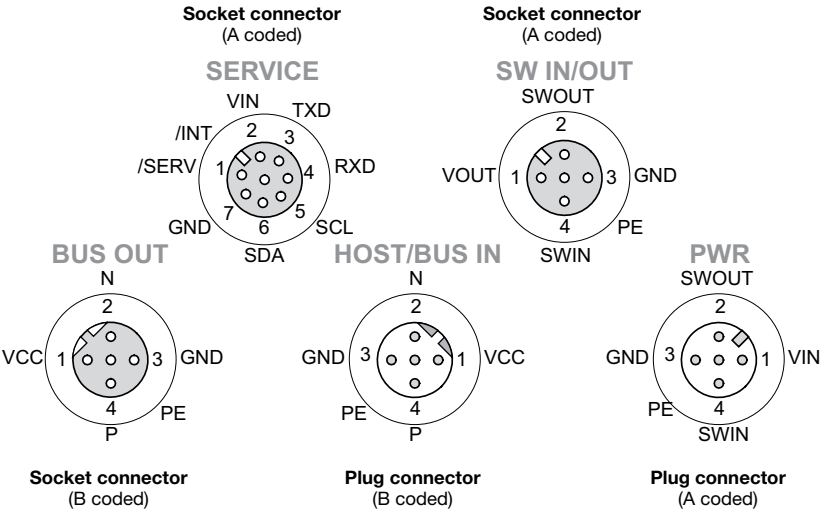


Figure 7.6: Pin assignment BCL 34 with MS 34 103 / MS 34 105

Wiring description PWR (voltage supply)

Attention!

For devices with integrated heating, the supply voltage must be wired with a minimum 0.5mm² (recommended 0.75mm²) core cross section. It is not possible to loop the supply voltage through to other loads!

Pin 1	VIN	Voltage supply without heating: 10 … 30VDC Voltage supply with heating: 22 … 26VDC
Pin 2	SW OUT	Switching output
Pin 3	GNDIN	GND for voltage supply
Pin 4	SW IN	Switching input
Pin 5	FE	Functional earth

Table 7.1: Pin assignments - PWR

Connection description SERVICE (PC or MSD 1 101)

To be able to use the service interface, the Module 50 (RS 232) must be activated.

You can then connect a PC or a service display MSD 1 101 to the SERVICE interface of the MS 34 105

The connection between the MSD 1 101 and the MS 34 105 is established via the pre-configured cable KB 034 2000.

A PC can also be connected directly to the SERVICE socket of the MS 34 105 using either a user-configured cable or the subbed plug inside the MSD 1 101.The pin configuration of the 9-pin sub-D connector corresponds to a standard RS232 interface: 2 = RxD, 3 = TxD, 5 = GND.

Connection description SW IN/OUT (Switching Input/Output)

Pin 1	V OUT	24V voltage supply for the sensors
Pin 2	SW OUT	Switching output
Pin 3	GND OUT	GND for the sensors
Pin 4	SW IN	Switching input
Pin 5	FE	Functional earth

Table 7.2: Pin assignment SW IN/OUT

You can configure the switching input and output according to your requirements. Please refer to figure 7.8. If you use a sensor with a standard M12 connector, then please note the following:

Attention!

Only use sensors ***without*** *switching output on pin 2 or sensor wiring configured* ***without*** *pin 2, as the switching output is not protected against feedback. For example, having the inverted sensor output incident on pin 2 leads to erroneous behaviour of the switching output.*

Connection description HOST/BUS IN / BUS OUT (PROFIBUS IN/OUT)

Pin 1	VCC	5V for bus termination
Pin 2	N	N or A line of the PROFIBUS (green)
Pin 3	GND	Ground for bus termination
Pin 4	P	P or B line of the PROFIBUS (red)
Pin 5	FE	Functional earth

Table 7.3: Pin assignment HOST/BUS IN / BUS OUT

Notice!

If the device is the last participant on the PROFIBUS, use the appropriate terminating resistor TS 02-4-SA. For further information, see also chapter 6.1.

7.4.2 Ready-made PROFIBUS connection cable

For the simple wiring, ready-made PROFIBUS cables are available. These are available in various versions and lengths. For the order code and part no. please refer to the following table (special types on request).

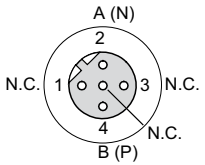
Designation	Order No.	Short Description
Connector axial - open cable end		
KB PB-2000-SA	501 04188	PROFIBUS cable, M12 plug - open cable end, 2m
KB PB-5000-SA	501 04187	PROFIBUS cable, M12 plug - open cable end, 5m
KB PB-10000-SA	501 04186	PROFIBUS cable, M12 plug - open cable end, 10m
KB PB-15000-SA	501 04185	PROFIBUS cable, M12 plug - open cable end, 15m
KB PB-20000-SA	501 04184	PROFIBUS cable, M12 plug - open cable end, 20m
KB PB-25000-SA	501 04183	PROFIBUS cable, M12 plug - open cable end, 25m
KB PB-30000-SA	501 04182	PROFIBUS cable, M12 plug - open cable end, 30m
Socket axial - open cable end		
KB PB-2000-BA	501 04181	PROFIBUS cable, M12 socket - open cable end, 2m
KB PB-5000-BA	501 04180	PROFIBUS cable, M12 socket - open cable end, 5m
KB PB-10000-BA	501 04179	PROFIBUS cable, M12 socket - open cable end, 10m
KB PB-15000-BA	501 04178	PROFIBUS cable, M12 socket - open cable end, 15m
KB PB-20000-BA	501 04177	PROFIBUS cable, M12 socket - open cable end, 20m
KB PB-25000-BA	501 04176	PROFIBUS cable, M12 socket - open cable end, 25m
KB PB-30000-BA	501 04175	PROFIBUS cable, M12 socket - open cable end, 30m
Plug axial - socket axial		
KB PB-1000-SBA	501 04096	PROFIBUS cable, M12 plug - M12 socket, 1m
KB PB-2000-SBA	501 04097	PROFIBUS cable, M12 plug - M12 socket, 2m
KB PB-5000-SBA	501 04098	PROFIBUS cable, M12 plug - M12 socket, 5m

Designation	Order No.	Short Description
KB PB-10000-SBA	501 04099	PROFIBUS cable, M12 plug - M12 socket, 10m
KB PB-15000-SBA	501 04100	PROFIBUS cable, M12 plug - M12 socket, 15m
KB PB-20000-SBA	501 04101	PROFIBUS cable, M12 plug - M12 socket, 20m
KB PB-25000-SBA	501 04174	PROFIBUS cable, M12 plug - M12 socket, 25m
KB PB-30000-SBA	501 04173	PROFIBUS cable, M12 plug - M12 socket, 30m

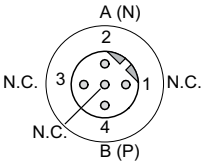
Table 7.4: Accessories / Order Designation

Contact assignment for PROFIBUS connection cable KB PB...

PROFIBUS connection cable (5-pin socket/connector, B-coded)



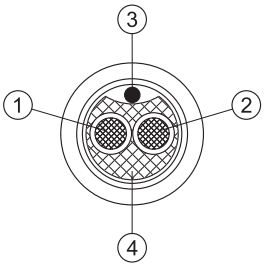
M12 socket (B-coded)



M12 plug (B-coded)

Pin	Name	Core colour
1	N.C.	–
2	A (N)	**green**
3	N.C.	–
4	B (P)	**red**
5	N.C.	–
Thread	FE	**bright**

Cable structure for PROFIBUS connection cable KB PB...



1 Conductor with **red** insulation
2 Conductor with **green** insulation
3 Drain wire
4 Fibrous fleece

Figure 7.7: Cable structure of PROFIBUS connection cable

Specifications of PROFIBUS connection cable

Operating temperature range	in rest state: -40°C ... +80°C in motion: -5°C … +80°C
Material	the lines fulfil the PROFIBUS requirements, free of halogens, silicone and PVC
Bending radius	> 80mm, suitable for drag chains

7.4.3 User-configurable PROFIBUS connectors

When using the user-configurable PROFIBUS connectors **KD 02-5-SA** or **KD 02-5-BA**, please observe the wiring notes on the connector packaging. Contact assignment see page 41.

Notice!

It is recommended to connect the drain wire also to Pin 5 of the PROFIBUS connector. This ensures proper potential equalisation between the two connected devices.

7.4.4 Connection of switching inputs and outputs

The BCL 34 is provided with a switching input and a switching output. The connection of the switching inputs and outputs is carried out according to figure 7.8:

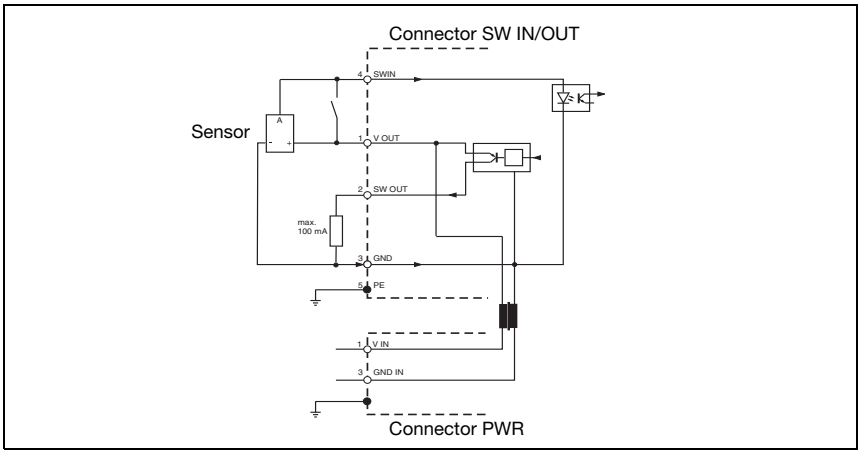


Figure 7.8: Connection diagram switching inputs and outputs BCL 34

Switching input

In the standard setting, you can trigger a reading action via the switching input connection SWIN by connecting SWIN (pin 4) and VOUT (pin 1). Likewise, the BCL 34 can be activated via a Leuze sensor that is connected to the MS 34 105 through a standard sensor cable.

Switching output

The switching output connection between SWOUT (pin 2) and GND (pin 3) is normally open. In the standard setting, SWOUT is closed in case of a reading error.

Notice!

You can configure the switching inputs and outputs according to your requirements by using the modules 13 (Switching input) and 14 (Switching output).

7.5 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.

8 PROFIBUS

8.1 General Information

The BCL 34 with MS 34 103/MS 34 105 was developed as a PROFIBUS device. The functionality of the device is defined via parameter sets which are clustered in modules. These modules are included in a GSD file, which is supplied as an integral part of the device. By using a user-specific project tool, such as, e.g., Simatic Manager for the programmable logic control by Siemens, the required modules are integrated into a project during commissioning and its settings and parameters are adjusted accordingly. These modules are provided by the GSD file.

All input and output modules described in this documentation are described from the controller's perspective:

- Input data arrives at the controller
- Output data is sent out by the controller

Preparing the control system for consistent data transmission

During programming the control system must be prepared for the consistent data transmission. This varies from control system to control system. The following possibilities are available for the Siemens control systems.

S7

The specific function blocks SFC 14 for input data and SFC 15 for output data must be integrated in the program. These are standard function blocks and are used to facilitate consistent data transmission.

S5 with IM 308C

- Up to Release 5 together with Comprofibus software up to Release 2 and
- Release 6 and above together with Comprofibus software Release 3 and above

Here, the function block FB 192 must be integrated, which is used to transmit the consistent data.

S5 with IM 308B

With the IM 308B consistent data transmission must be programmed via load transfer commands.

8.1.1 GSD File

The GSD file can be found on the disc supplied with this documentation. It is named Leuz05d8.GSD.

This file stores all the data required for the operation of the BCL 34. These are device parameters for reading barcodes, PROFIBUS operation parameters, and the definition of the control and status bits. If parameters are changed in the project, for example, these changes are stored in the project, not in the GSD file.

The GSD file is a certified part of the device and must not be changed manually. The file is not changed by the system either.

8.1.2 Permanently defined parameters (device parameters)

On the PROFIBUS, parameters may be stored in modules or may be defined permanently in a PROFIBUS participant.

The permanently defined parameters are called "common" parameters or device-specific parameters, depending on the project tool.

Hilscher Master Controller

In SyCon, the permanently defined parameters are set via "slave configuration" ⇨ "parameter data" ⇨ "common".

The module parameters are set via "slave configuration" ⇨ "parameter data" ⇨ "module".

Simatic S7 Controller

In Simatic Manager, the permanently defined parameters are set via object properties of the device.

The module parameters are set via the module list of the selected device. By selecting the project properties of a module, the respective parameters may be set if required.

The permanently defined parameters in the BCL 34 which are available independently of the modules, are listed below.

Notice!

*In the following detailed descriptions of the modules you will find **cross references (CR) to device parameters (#) and to parameters and input/output data of other modules** in the last column of the tables. These are directly related to the parameter described. These cross references must be observed during configuration.*

*The individual **modules** are **numerically** labelled from **1 … 50**.*
*The **parameters and input/output data** within a module are **alphanumerically labelled** from* a *…* z*.*

Parameters

Parameter	Description	Value Range	Default	Unit	CR to module
a **Code type**	Released code type; no code means that all subsequent code tables are also deactivated. The valid number of digits also depends on the code type.	0: no code 1: 2/5 Interleaved 2: Code39 6: UPC, UPCE 7: EAN8, EAN13 8: Code128 9: Pharmacode 10: EAN Addendum 11: Codabar 12: Code93		–	1 … 4 a
b **Number-of-digits mode**	Specifies how the subsequent digit numbers are to be interpreted.	0: Enumeration 1: Range	see table 8.2 "Code type and code length, Tables 1-4" on page 46	dec	1 … 4 b … e
c **Number of digits 1**	Decodable number of digits; in the case of a range, this number defines the lower limit	1 … 63			
d **Number of digits 2**	Decodable number of digits; in the case of a range, this number defines the upper limit	1 … 63			
e **Number of digits 3**	Decodable number of digits in the enumeration mode.	1 … 63			
Parameter length: 1 byte					

Table 8.1: "Common" Parameters

Parameter length: 16 bytes

Input Data

none

Output Data

none

A maximum of 4 code types, all of them with separately adjustable numbers of digits (code lengths), are used. These are defined in 4 tables with an identical structure. These tables are called [T1]-[T4] in the configuration program. The standard values of the parameters described above, which depend on the code type, can be found in the following table.

Standard values

	Standard values			
Parameter	**2/5 Interleaved (T1)**	**Code 39 (T2)**	**EAN8, EAN13 (T3)**	**Code128 (T4)**
Number-of-digits mode	Enumeration	Range	Enumeration	Range
Number of digits 1	10	4	8	4
Digits 2	0	48	13	63
Number of digits 3	0	0	0	0

Table 8.2: Code type and code length, Tables 1-4

8.2 Structure of the project modules

In the current version, a total of 50 modules are available for use. A "Device Module" (see "Permanently defined parameters (device parameters)" on page 45) is used for basic scanner configuration and is permanently integrated into the project. A further 50 modules may be included into the project according to requirements and application.

The modules fall into the following categories:

- Parameter module for the scanner configuration
- Status or control modules that influence the input and output data.
- Modules that may include both parameters and control or status information.

The category of each module is marked with a cross in the overview.

8.2.1 Overview of the project modules

Notice!

Inputs and outputs are described from the perspective of the PROFIBUS master.

Module No.	Module	Description	Parameter	Output data	Input data
1	Code table extension	Extension of the permanently defined code table (see table 8.1 on page 46)	X		
2	Code table extension	Extension of the permanently defined code table (see table 8.1 on page 46)	X		
3	Code table extension	Extension of the permanently defined code table (see table 8.1 on page 46)	X		
4	Code table extension	Extension of the permanently defined code table (see table 8.1 on page 46)	X		
5	Multilabel	Output of several barcodes per reading gate	X	X	X
6	Reading Gate Control	Extended control of the reading gate	X		
7	Check Digit	Processing of the barcode checksum	X		
8	EAN designator	Search for an EAN128 designator	X		
9	Laser control	Alignment and limitation of the laser beam onto the barcode.	X		
10	Pharmacode Properties	Definitions for Pharmacode readings	X		
11	Code Type Properties	The module permits changing the muted zones, the line-gap-ratios as well as the Equal Scans	X		
12	Data Formatting	Specification for formatting the data output	X		
13	Switching input	Specification of the switching input	X		X
14	Switching output	Specification of the switching output	X	X	
15	AutoReflAct (automatic reflector activation) Module 15	Automatic reading activation	X	X	X
16	AutoControl	Automatic monitoring of the reading properties	X		X
17	Reference Code Comparison	Activation of reference code comparison and specification of the mode of operation	X	X	X

Table 8.3: Overview of the project modules

Module No.	Module	Description	Parameter	Output data	Input data
18	Activations	Control bits for standard reading operation		X	
19	Activations with ACK	Control bits for reading operation with acknowledged data communication		X	
20	Decoding state	State of device for the standard reading operation			X
21	Decoding Result 1	Barcode information 4 bytes max.			X
22	Decoding Result 2	Barcode information 8 bytes max.			X
23	Decoding Result 3	Barcode information 12 bytes max.			X
24	Decoding Result 4	Barcode information 16 bytes max.			X
25	Decoding Result 5	Barcode information 20 bytes max.			X
26	Decoding Result 6	Barcode information 24 bytes max.			X
27	Decoding Result 7	Barcode information 28 bytes max.			X
28-32		Reserved			
33	Interlinked read result	Combines several individual decoding results into one read result	X		
34	Fragmented Reading Result	Transmission of the reading results in the fragmented mode	X	X	X
35	Reading Gate Activations	Number of reading gate activations since system start-up			X
36	Reading gate number	Number of the reading gate since system start-up			X
37	Number of scans per reading gate	Number of the scans in the reading gate			X
38	Code Position	Relative position of the barcode label in the scanning beam			X
39	Reading Security (Equal Scans)	Number of redundant pieces of information for the barcode			X
40	Scans per barcode	Number of scans between the first and the last time of detecting the barcode			X
41	Scans With Information	Number of scans with processed information			X
42	Decoding quality	Quality of the reading result			X
43	Code Direction	Orientation of the barcode			X
44	Number Of Digits	Number of digits in the barcode			X
45	Code type	Barcode type			X
46	Alignment mode 1	Function for device positioning		X	X
47	Service	All parameters are set to the factory settings		X	X
48	Alignment mode 2	Function for device positioning (output in %)		X	X
49	Switching output expansion	Additional parameters for the switching output (Module 14)	X		X
50	RS 232	Controls the data output on the serial interface			

Table 8.3: Overview of the project modules

8.3 Description of the individual project modules

Notice!

*In the following detailed descriptions of the modules you will find **cross references (CR) to device parameters (#) and to parameters and input/output data of other modules** in the last column of the tables. These are directly related to the parameter described. These cross references must be observed during configuration.*

*The individual **modules** are **numerically** labelled from **1 … 50**.*
*The **parameters and input/output data** within a module are **alphanumerically labelled** from* a *…* z*.*

Example:

The parameter e **Check digit output Code 39** in Module 7 becomes active only if Code 39 has been enabled under a **Code type** or in Module 1 … 4 under a **Code type** as the code type to be decoded.

8.3.1 Code table extension Modules 1-4

The modules extend the code type tables of the device parameters and permit the additional definition of a further 4 code types together with the respective number of digits.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Code type**	Released code type; no code means that all subsequent code tables are also deactivated. The valid number of digits also depends on the code type.			**0: No code** 1: 2/5 Interleaved 2: Code39 6: UPCA, UPCE 7: EAN8, EAN13 8: Code128, EAN128 9: Pharmacode 10: EAN Addendum 11: Codabar 12: Code93	**0**	–	GP a, 7 a … l
b **Number-of-digits mode**	Specifies how the subsequent digit numbers are to be interpreted.			**0: Enumeration** 1: Range	**0**	–	GP b
c **Number of digits 1**	Decodable number of digits, first option in mode 0 (enumeration), in mode 1 (range) this number defines the lower limit			1 … 63	**0**	dec	GP c … e
d **Number of digits 2**	Decodable number of digits, second option in mode 0 (enumeration), in mode 1 (range) this number defines the upper limit			1 … 63	**0**		
e **Number of digits 3**	Decodable number of digits, third option in mode 0 (enumeration), in mode 1 (range) an entry in "digits 3" is without effect			1 … 63	**0**		
Parameter length: 16 bytes (4 bytes per module)							

Input Data

none

Output Data

none

8.3.2 Multilabel Module 5

The module permits the definition of barcode types with a different number of digits and/or code type in the reading gate and provides the necessary input data.

If several barcodes are read in a reading gate, these barcodes are transmitted in sequence in order to save memory in the controller. This requires a handshake, which is achieved by using the input and output data.

Example:

3 barcodes are to be transmitted. Accordingly, the parameter "number of barcodes" is set to the value 3. After a reading gate activation (module 18) and the reading of 3 barcodes, the first barcode is transmitted automatically. This barcode is available from the decoding results module (module 21 - 27).

In the input byte "number of decoding results" of module 5, the BCL indicates that there are still 2 decoded barcodes in the BCL's buffer memory. If the first barcode in the controller has been processed or stored, the BCL receives an acknowledgement via the output bit "acknowledge". This bit is a toggle bit, i.e., each edge transition (0->1 and 1->0) is an acknowledgement.

The BCL now immediately tries to transmit the next barcode from the buffer memory. On the one hand, the controller recognises the successful transmission by the change of the input byte from 2 to 1, on the other hand, it is essential that the "new result" bit and the associated toggle bit in the decoding results (module 21 -27) are evaluated. Only if a new barcode is actually present in the decoding results and has been processed or stored, the next acknowledgement should be carried out via the acknowledge bit. If this is not taken into account, decoding results may be lost.

It is also important that all transmitted barcodes are really acknowledged. It is better to acknowledge the last barcode one time too many than not at all. Otherwise, the buffer of the device (module 20 -27) may overflow quickly.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Number of barcodes**	Number of different barcode types scanned for per reading gate. Only if this number of barcodes has been reached, the reading gate is terminated prematurely.			1 … 20	**1**	–	20 or 21…27 5c
Parameter length: 1 byte							

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
b **Number of decoding results**	Number of decoding results which have not been fetched.	0	unsign8	0 … 255	**0**	–	20 or 21…27
Input data length: 1 byte							

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
c **Acknowledge**	Control bit signals that the data have been processed by the master.	0,0	Bit	1 -> 0: Data has been processed by the master 0 -> 1: Data has been processed by the master	**0**	–	20 or 21…27
Output data length: 1 byte							

8.3.3 Reading Gate Control Module 6

With the module, the reading gate control of the barcode scanner can be adapted to the application. With different parameters from the barcode scanner, a time-controlled reading gate may be created. In addition, it defines the internal criteria for the reading gate's termination.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Automatic reading gate repeat**	The parameter defines the automatic repeat of reading gates			**0: No** 1: Yes	**0**	–	11a or 5a
b **Reading gate termination mode**	With this parameter, the reading gate termination can be made to depend on the decoding results. A premature termination of the reading gate can be triggered by reaching the defined reading security (Module 11/) or by reaching the specified number of barcodes per reading gate (Module 5). Obviously, the relevant modules must be transferred into the project.			0: independent of decoding **1: dependent on decoding**	**1**	–	
c **Restart-Delay**	The parameter specifies a time after which a reading gate is restarted. This means, the BCL generates its own periodic reading gate.			0 … 60,000	**0**	ms	
d **Maximum reading gate time when scanning**	The parameter switches off the reading gate after the set time has elapsed, thus limiting the reading gate to the set period.			0 … 60,000	**0**	ms	18a or 19a
e **Reading gate termination after scans without data**	A reading gate can be terminated with this parameter if a barcode was read and no data was found during the subsequent number of scans defined in the parameter.			0 … 60,000	**0**	Scans	18a or 19a
Parameter length: 8 bytes							

Input Data

none

Output Data

none

8.3.4 Check Digit Module 7

The module defines the properties of the check digit verification for the various code types and the output of the check digit in the decoding result.

Notice!

*For the code types Code128, UPC, EAN, Code93, the verification of the check digit is **always** carried out. Thus, the parameter "check digit evaluation" is not specifically listed for these code types.*

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Check digit evaluation 2/5 Interleaved**	The parameter controls the verification of the check digit for the code type 2/5 Interleaved			**0: No** 1: Yes	**0**	–	GPa, 1 … 4a
b **Check digit evaluation Code 39**	The parameter controls the verification of the check digit for the code type Code 39			**0: No** 1: Yes	**0**	–	
c **Check digit evaluation Codabar**	The parameter controls the verification of the check digit for the code type Codabar			**0: No** 1: Yes	**0**	–	
d **Check digit output 2/5 Interleaved**	The parameter controls the output of the check digit in the barcode result for the code type 2/5 Interleaved			**0: No** 1: Yes	**0**	–	GPa, 1 … 4a
e **Check digit output Code 39**	The parameter controls the output of the check digit in the barcode result for the code type Code 39			**0: No** 1: Yes	**0**	–	
f **Check digit output UPCA, UPCE**	The parameter controls the output of the check digit in the barcode result for the code type UPC			0: No **1: Yes**	**1**	–	
g **Check digit output EAN 8/13**	The parameter controls the output of the check digit in the barcode result for the code type EAN			0: No **1: Yes**	**1**	–	
h **Check digit output CODE128, EAN128**	The parameter controls the output of the check digit in the barcode result for the code type CODE128			**0: No** 1: Yes	**0**	–	
i **Check digit output Pharmacode**	The parameter controls the output of the check digit in the barcode result for the code type Pharmacode			**0: No** 1: Yes	**0**	–	
j **Check digit output Codabar**	The parameter controls the output of the check digit in the barcode result for the code type Codabar			**0: No** 1: Yes	**0**	–	GPa, 1 … 4a
k **Check digit output Code93**	The parameter controls the output of the check digit in the barcode result for the code type Code 93			**0: No** 1: Yes	**0**	–	
l **Check digit mode 2/5 Interleaved**	The parameter specifies the check digit procedure for the code type 2/5 Interleaved.			**0: modulo 10, weighting 3** 1: modulo 10, weighting 2 - 9 2: modulo 10, weighting 2 3: modulo 10, weighting 4/9	**0**	–	
Parameter length: 5 bytes							

Input Data

none

Output Data

none

8.3.5 EAN designator Module 8

The module permits the search for an EAN128 field. The designator which is to be searched for is specified in the parameter.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **EAN 128-designator**	The parameter specifies the EAN128 designator which is to be searched for, i.e., the BCL provides only a result if the designator has been found.			0 … 10,000	**10,000**	–	GPa, 1 … 4a
b **(Do not) output data designator**	Specifies whether the EAN 128 data designator is included in the decoding result or not.			**0: not output** 1: output	**0**	–	
c **(Do not) output symbology identifier**	Specifies whether the EAN 128 symbology identifier ([C1) is included in the decoding result or not.			0: not output **1: output**	**1**	–	
Parameter length: 3 bytes							

Input Data

none

Output Data

none

8.3.6 Laser control Module 9

The module defines the switch-on and switch-off positions of the laser, and thus determines the length of the scan beam. The position is set as a percentage of the beam duration. The beam duration corresponds to the reading field width, which is specified in the diagrams in chapter "Optics variants and reading fields" on page 22.

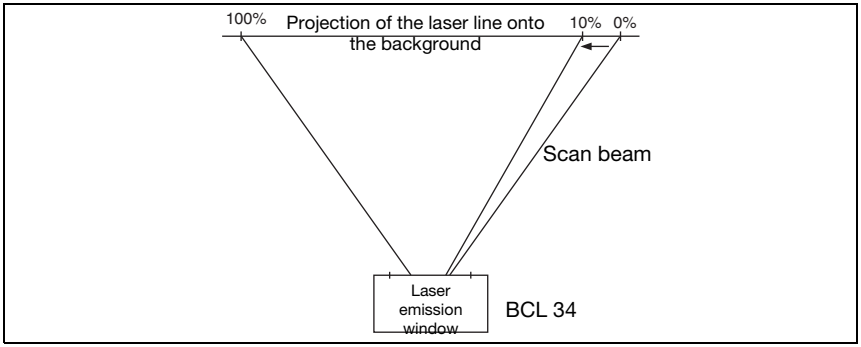


Figure 8.1: Specifying switch-on and switch-off positions of the laser

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Laser start position**	The parameter specifies the switch-on position of the laser.			0 … 99	**0**	%	
b **Laser stop position**	The parameter specifies the switch-off position of the laser.			0 … 100	**100**	%	
Parameter length: 2 bytes							

Input Data

none

Output Data

none

8.3.7 Pharmacode Properties Module 10

The module defines additional properties of the code type Pharmacode.

As a matter of principle, the parameters described in the following should be changed only if you are familiar with the characteristics of the Pharmacode, as incorrect settings may cause a misinterpretation of barcodes. The difficulty is that the bar widths of the narrow and wide bars used in the Pharmacode are not defined as fixed widths, but feature a relatively high tolerance range. This means that even within a barcode, deviations may occur, e.g., when wide bars of different widths are used.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Bar width ratio**	The parameter specifies the minimum width ratio between wide and narrow bars of the code type Pharmacode. A standard value of 185 means that a wide bar must be 1.85 times wider than a narrow bar.			0 … 255	**185**	* 0.01	
b **Verification of bar widths**	The parameter specifies the minimum ratio of bar and gap width for the code type Pharmacode. A standard value of 75 for wide bars means that a wide bar must be 0.75 times wider than a gap.			0 : Off 1 … 255	**75**	* 0.01	
c **Bar width distance**	The parameters specifies the size of the safety distance in per cent in the width value of narrow and wide bars. At a standard value for the verification of bar width of 75 (see above) and a bar width distance of 5, a wide bar must be at least 0.8 times as wide as a gap, and a narrow bar must be not more than 0.7 times as wide.			0 … 255	**5**	* 0.01	GPa, 1 … 4a
d **Gap width ratio**	The parameter specifies the maximum width relationship between wide and narrow gaps of the code type Pharmacode. I.e, this is the maximum possible deviation of the gaps that can occur.			0 … 255	**3**	* 0.01	
e **Reading direction**	The parameter specifies the reading direction for the decoding			0: Normal 1: Inverse	**0**	–	
Parameter length: 5 bytes							

Input Data

none

Output Data

none

8.3.8 Code Type Properties Module 11

The module defines extended properties which apply to several code types.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Reading Security (Equal Scans)**	The parameter defines the reading security for a barcode, i.e., it specifies the minimum number of identical decoding results.			1 … 255	**2**	–	6b
b **Quiet zone**	The parameter defines the minimum quiet zone in front of a barcode.			3 … 10	**7**	module widths	
c **Element ratio**	The parameter defines the maximum ratio between narrow and wide elements.			2 … 12	**8**	–	
d **Time interval between two labels**	The parameter activates (1) an internal time function. Two labels cannot follow each other arbitrarily quickly.			0: do not consider 1: do consider	**0**	–	
e **Position between two labels**	The parameter activates (1) an internal check to see whether there is a difference in position between two labels.			0: do not consider 1: do consider	**0**	–	
Parameter length: 4 bytes							

Input Data

none

Output Data

none

8.3.9 Data Formatting Module 12

The module defines the output string for the case that the BCL could not read a barcode. In addition, the initialisation of the data fields and the definition of unused data ranges may be set.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Text in the case of misreading**	The parameter defines the output characters if no barcode could be read.			1 … 20 bytes of ASCII characters	**63 ("?")**	–	20g or 21…27g
b **Decoding result at reading gate start**	The parameter defines the state of the data at the start of the reading gate.			0: Input data remain on the old value 1: Input data are reset to the init value 0	**0**	–	
c **Data alignment**	The parameter defines the alignment of the data in the result field			0: Left-justified 1: Right-justified	**0**	–	
d **Fill mode**	The parameter defines the fill mode for the unoccupied data ranges			0: No alignment 3: Fill up to the transmission length	**3**	–	12e
e **Fill character**	The parameter defines the character which is used for filling up the data areas.			0 … 255	**45 ("-")**	–	12d
Parameter length: 23 bytes							

Input Data

none

Output Data

none

8.3.10 Switching input Module 13

The module defines the mode of operation of the digital switching input.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Inversion**	The parameter defines the logic of the incident signal. In case of an inversion, an external HIGH level is interpreted internally as a LOW level.			0: No 1: Yes	**0**	–	
b **Mode**	The parameter can be used to control the processing of the switching input			0: Off 1 : On	**1**	–	
c **Debounce time**	The parameter defines a de-bouncing time which is implemented in software.			0 … 255	**5**	ms	
d **Start-up delay**	The parameter influences the timing during switch-on			0 … 65,535	**0**	ms	
e **Minimum switch-on time**	The parameter defines a minimum time period before the signal is reset.			0 … 65,535	**0**	ms	
f **Delay off time**	The parameter defines a time delay for the signal during switch-off.			0 … 65.535	**0**	ms	
g **Function**	The parameter specifies the function which is to be activated or deactivated by a change of state in the signal.			0: No function 1: Activation of the reading gate	**1**	–	
Parameter length: 10 bytes							

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
h **State**	State of the signal of the switching input	0.0	Bit	0.1	**0**	–	
Input data length: 1 byte							

Output Data

none

8.3.11 Switching output Module 14

The module defines the mode of operation of the digital switching output.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **DC bias level**	The parameter defines the DC bias level of the switching output.			0: LOW (0V) 1: HIGH (+Ub)	**0**	–	
b **Start-up delay**	With this parameter, the output pulse may be delayed by a set number of reading gates.			0 … 63	**0**	–	14d 14c
c **Switch-on time**	The parameter defines the switch-on time period for the switching output. If the value is 0, the signal is static.			0 … 1300	**400**	ms	
d **Switch-on function**	The parameter specifies the events which can set the switching output. - Reading gate end - Reading gate start - Positive reference code comparison 1 [1)] - Negative reference code comparison 1 [1)] - Valid reading result [1)] - Invalid reading result [1)] - Positive reference code comparison 2 - Negative reference code comparison 2 - AutoControl bad [1)] - AutoControl good [1)] - PROFIBUS pos. edge - PROFIBUS neg. edge			Each 0: Off 1 : On	**0020 h** **0** **0** **0** **0** **0** **1** **0** **0** **0** **0** **0** **0**	–	
e **Switch-off function**	The parameter specifies the events which can reset the switching output. - Reading gate end - Reading gate start - Positive reference code comparison 1 [1)] - Negative reference code comparison 1 [1)] - Valid reading result [1)] - Invalid reading result [1)] - Positive reference code comparison 2 - Negative reference code comparison 2 - AutoControl bad [1)] - AutoControl good [1)] - PROFIBUS pos. edge - PROFIBUS neg. edge			Each 0: Off 1 : On	**0002 h** **0** **1** **0** **0** **0** **0** **0** **0** **0** **0** **0** **0**	–	
Parameter length: 8 bytes							

1) During a start-up delay ≠ 0, only these functions may be configured. Otherwise, no start-up delay will take place. In addition, both values must always be specified, i.e., for the switch-on function and the switch-off function, e.g., switch-on function "positive reference code comparison 1" and switch-off function "negative reference code comparison 1".

Input Data

none

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
f **Switching output**	Signal, sets the state of the switching output Prerequisite: switch-on or switch-off function is configured to PROFIBUS edge	0,0	Bit	0: Switching output 0 1: Switching output 1	**0**	–	14d 14e
g **Reset Event Counter**	Resets the event counter (Module 49) of the activation function [AF] back to zero	0.1	Bit	0 -> 1: Perform reset 1 -> 0: No function	**0**	–	
Output data length: 1 byte							

8.3.12 AutoReflAct (automatic reflector activation) Module 15

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!

*The **AutoReflAct** function should not be used in connection with Module 46 (Alignment Mode 1) as this may lead to erroneous functionality.*

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Mode**	This parameter activates the function of the laser scanner. If "with reading gate control" (2 or 4) is set as the parameter value, the BCL activates the reading gate automatically if the reflector is obscured.			1: Normal (autoReflAct switched off) 2: with reading gate control (raster) 3: Without reading gate control (single-line) 4: With reading gate control (single-line) 5: without reading gate control (raster)	**1**	–	
b **Debounce time**	The parameter defines a de-bouncing time which is implemented in software.			0 … 31	**10**	ms	15a
Parameter length: 2 bytes							

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
c **State**	Signal state of the Auto-Refl-Act modules	0.0	Bit	0: Reflector is recognised 1: Reflector is hidden	**0**	–	15a
Input data length: 1 byte							

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
d **Reflector search**	Switches the alignment mode on or off.	0.0	Bit	0 -> 1: reflector search on 1 -> 0: reflector search off	**0**	–	15a
e **Save reflector position**[1)]	Stores the value defined in the alignment in the parameter set.	0.1	Bit	0 -> 1: position is stored	**0**	–	15a 15c
Output data length: 1 byte							

1) This bit should only be set from 0 -> 1 if the status "reflector detected" (0) is shown in the input data.

8.3.13 AutoControl Module 16

The module defines the mode of operation of the function AutoControl. The function monitors the quality of the decoded barcodes and compares these with a limit value. If the limit is reached, a status signal is set.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Mode**	The parameter defines the evaluation base of the AutoControl function. Depending on the setting, either the label quality or the decoding quality can be used as criteria for the reading quality. The label quality is the ratio between the scans which have collected information for the decoding, and the number of scans which were necessary to decode the entire barcode. $\text{Label quality} = \frac{\text{Scans with information per barcode}}{\text{Scans per barcode}}$ The decoding quality is computed as follows: ratio between the identical scans and the number of scans which were necessary to decode the entire barcode. $\text{Decoding quality} = \frac{\text{Identical scans}}{\text{Scans per barcode}}$			0: Off 1: Label quality 2: Decoding quality	**0**	–	
b **Limit for reading quality**	The parameter defines a threshold value for the average of the reading quality. If the value is not reached, a warning is generated.			0 … 100	**50**	%	
c **Sensitivity**	With this parameter the insensitivity towards changes in the reading ability can be specified. The higher the value, the less influence a change of reading ability has on the floating average.			0 … 255	**0**	–	
Parameter length: 3 bytes							

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
d **AutoControl status**	Signal indicates the state of the AutoControl function	0.0	Bit	0: Off 1: On	**0**	–	
e **AutoControl result**	Signal indicates whether the result of the AutoControl function was a good or bad reading. A bad reading quality has occurred if the limit defined in module 16 was not reached.	0.1	Bit	0: Quality good 1: Quality bad	**0**	–	16b
f **Scan quality**	This value is the current average of the scan quality.	1	unsign8	0 … 100	**0**	–	
Input data length: 2 byte							

Output Data

none

8.3.14 Reference Code Comparison Module 17

The module defines the mode of operation of the reference code comparison function. The function compares the currently decoded reading results with one or several stored patterns for comparison. The function is split into two comparison units which can be configured independently of each other.

The pattern for comparison is defined in addresses 9 and 10 in the parameter part of the module

Notice!

A detailed description of the parameters defined in this module and its settings would be too large for the following table. Thus, the table contains only the most important information. Explanations regarding the individual parameters and value ranges may be found below. Please see the relevant notes.

The abbreviation **RBC** is used below. It stands for "**R**eference**B**ar **C**ode".

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Reserved**		0					
b **Dont_Care character**	The character is not taken into account in a comparison	1	unsign8	0 … 7F h	**2Ah [*]**	–	
c **Event control**	The parameter specifies the associated output function after a reference barcode comparison.	2	unsign8	**0:** No event output **1:** Comparison with RBC 1 controls output 1 **2:** Comparison with RBC 1 AND 2 controls output 1 **4:** Comparison with RBC 1 OR 2 controls output 1	**1**	–	
d **Settings (comparison function 1)**	The parameter defines the components and the logic for code comparison for the comparison function 1.	3	unsign8	0 … FFh see "Explanations regarding the parameter "Settings"" on page 66.	**0Ah**	–	
e **Sequence (comparison function 1)**	The parameter defines the sequence in which the decoded barcodes are to be compared with the RBC for comparison function 1.	4	unsign8	1 … 4, 11 … 19, 22 …24 see "Explanations regarding the parameter "Sequence"" on page 67.	**1**	–	
f **Barcode comparison type (comparison function 1)**	The parameter defines under which conditions a positive result for an ASCII character comparison between decoded bare code and RBC occurs.	5	unsign8	01h … 80h see "Explanations regarding the parameter "Barcode comparison type"" on page 68.	**02h**	–	
g **Settings (comparison function 2)**	The parameter defines the components and the logic for code comparison for comparison function 2.	6	unsign8	0 … FFh see "Explanations regarding the parameter "Settings"" on page 66.	**0Ah**	–	

h **Sequence (comparison function 2)**	The parameter defines the sequence in which the decoded barcodes are to be compared with the RBC for comparison function 2.	7	unsign8	1 … 24 see "Explanations regarding the parameter "Sequence"" on page 67.	**1**	–	
i **Barcode comparison type (comparison function 2)**	The parameter defines under which conditions a positive result for an ASCII character comparison between decoded bare code and RBC occurs.	8	unsign8	01h … 80h see "Explanations regarding the parameter "Barcode comparison type"" on page 68.	**02h**	–	
j **Maximum comparison pattern length**	The parameter defines the reserved storage place per RBC. The RBCs themselves are deposited in the following parameter (addr. 10). If 0 is entered here, the individual RBCs are stored one after another according to their storage requirement. If, for example, 16 is entered, a fixed amount of 16 bytes per RBC is set and only a total of 4 RBCs can be defined.	9	unsign8	0 … 64 =0 :Dynamic arrangement >0: Storage size for one comparison pattern	**20**	–	
k **comparison pattern**	In this parameter, the individual RBCs are deposited one after another as hex values. For example, if the comparison pattern length is defined as 8, RBC 1 is in bytes 0-7, RBC 2 in bytes 8-15 and so on. In case RBC 1 uses only bytes 0 through 5, bytes 6 and 7 have to be set to 0. For each individual RBC, the code length is specified in the first byte and the code type in the second byte (see Modules 1-4) and the reference code itself in the following bytes.	10	64 * unsign8	0 … 7Fh	**00h**	–	
Parameter length: 74 bytes							

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
l **Processing state**	The signal indicates whether the reference code comparison is activated or not.	0.0	Bit	0 : Off 1: On	**0**	–	
m **Comparison state 1**	The signal indicates whether the decoded barcode corresponds to the RBC with regard to the comparison criteria as defined in the comparison function 1. If it matches, the value 1 is output.	0.1	Bit	0: Not equal 1: Equal	**0**	–	
n **Comparison state 2**	The signal indicates whether the decoded barcode corresponds to the RBC with regard to the comparison criteria as defined in the comparison function 2. If it matches, the value 1 is output.	0.2	Bit	0: Not equal 1: Equal	**0**	–	
Input data length: 1 byte							

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
d **Reserved**	–	–	–	–	–	–	
Output data length: 1 byte							

Notice!

1 byte output data was reserved for future applications. Currently, no function is assigned to this byte.

Explanations regarding the parameter "Settings"

The parameter "Settings" is described with the following bits:

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
c1	c2	-	mls	mlc	mts	mtc	mas

Using the two bits c1 and c2, it can be selected how the three components barcode length, barcode type and barcode ASCII character are to be connected in order to achieve a positive reference barcode comparison.

This results in the following basic structure of comparison options:

c1, c2	Logic
00	LENGTH **and** TYPE **and** ASCII
01	LENGTH **and** (TYPE **or** ASCII)
10	(LENGTH **or** TYPE) **and** ASCII
11	LENGTH **or** TYPE **or** ASCII

With the bits **mls**, **mts** and **mas** individual components may now be can be negated / inverted:

Bit Value	Meaning
mls = 0	No comparison of RBC length
mls = 1	Comparison of RBC length

mts = 0	No comparison of RBC model
mts = 1	Comparison of RBC type

mas = 0	No comparison of RBC ASCII character
mas = 1	Comparison of RBC ASCII character

Notice!

If the bits mls, mts and mas = 0, then the RBC comparison is deactivated!

Finally, the bits **mlc** and **mtc** determine whether the comparison result is positive:

Bit Value	Meaning
mlc = 0	Comparison positive if RBC length not equal to barcode length
mlc = 1	Comparison positive if RBC length equal to barcode length

mtc = 0	Comparison positive if RBC model not equal to barcode model
mtc = 1	Comparison positive if RBC model equal to barcode model

Explanations regarding the parameter "Sequence"

Generally, there is a distinction between the following reference barcode comparisons:

- Comparison in the decoding sequence:
  Each currently decoded barcode is compared with all RBCs (starting with the first).
- Comparison in the sequence of the activated RBCs:
  The first decoded barcode is compared only with the first RBC, the second decoded barcode only with the second RBC and so on.

The possible comparison sequences are described in the following table:

Value	Meaning
1	Comparison in the decoding sequence – The comparison result is positive if **at least one** barcode corresponds **to one** RBC.
2	Comparison in the decoding sequence – The comparison result is positive if **each** decoded barcode corresponds to **at least one** RBC.
3	Comparison in the sequence of the activated RBCs – The comparison result is positive if **at least one** barcode corresponds to one RBC.
4	Comparison in the sequence of the activated RBCs – The comparison result is positive if **each** decoded barcode corresponds to the RBC **it was compared with**.
11	First decoded barcode with RBC1
12	First decoded barcode with RBC2
13	First decoded barcode with RBC3
14	First decoded barcode with RBC4
15	First decoded barcode with RBC5
16	First decoded barcode with RBC6
17	First decoded barcode with RBC7
18	First decoded barcode with RBC8
19	First decoded barcode with RBC9
22	Comparison in the decoding sequence – The comparison result is positive if **each** decoded barcode corresponds to **at least one** RBC. (Number of the received barcodes must correspond to the number deposited in the parameter "number of barcodes per reading gate" (Module 5)).
23	Comparison in the sequence of the activated RBCs – The comparison result is positive if **at least one** barcode corresponds **to one** RBC. (Number of the received barcodes must correspond to the number deposited in the parameter "number of barcodes per reading gate" (Module 5)).
24	Comparison in the sequence of the activated RBCs – The comparison result is positive if **each decoded** barcode **corresponds** to the RBC it was compared with. (Number of the received barcodes must correspond to the number deposited in the parameter "number of barcodes per reading gate" (Module 5)).

Explanations regarding the parameter "Barcode comparison type"

The parameter "Barcode comparison type" is described with the following bits:

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
e7	e6	e5	e4	e3	e2	e1	e0

Whether a comparison is positive depends on which bit is set (obviously, only one must be set). The following table shows the individual conditions:

Bit	Comparison is positive if …
e0	Barcode != RBC
e1	Barcode == RBC
e2	Barcode > RBC
e3	Barcode >= RBC
e4	Barcode < RBC
e5	Barcode <= RBC
e6	RBCn <= Barcode <= RBCn+1
e7	Barcode < RBCn Barcode > RBCn+1

8.3.15 Activations Module 18

The module defines the control signals for the standard reading operation of the barcode scanner. The data is not protected through a handshake.

Attention!

The joint use of modules 18 and 19 may cause malfunctions. Use only one of the two modules at a time.

Parameters

none

Input Data

none

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Scan gate time**	Signal, activates the reading gate	0.0	Bit	1 -> 0: Reading gate off 0 -> 1: Reading gate active	**0**	–	
b	Free	0.1	Bit		**0**	–	
c	Free	0.2	Bit		**0**	–	
d	Free	0.3	Bit		**0**	–	
e	Free	0.4	Bit		**0**	–	
f **Data reset**	Signal, resets the following bit states and decoder results: • Module 16: Bit 0.1, input data • Module 20: Bit 0.0, input data Bit 0.1, input data Bit 0.2, input data • Module 21 … 27: Data, when the parameter "Decoding result at reading gate start" (module 12) has been set to value 1 (input data are reset to the init. value).	0.5	Bit	0 -> 1: Data reset	**0**	–	12b 16e 20abc 21 … 27i
g **System reset**	Signal, triggers a system reset if the level changes from 0 to 1.	0.6	Bit	0 -> 1: Reset	**0**	–	
h **Standby**	Signal, activates the standby function	0.7	Bit	0: Standby off 1: Standby on	**0**	–	20h
Output data length: 1 byte							

8.3.16 Activations with ACK Module 19

The module defines the control signals of the barcode scanner for the handshake operation of the reading results. The controller must acknowledge the data reception via the ACK bit before the new data is written into the input area.

Attention!

The joint use of modules 18 and 19 may cause malfunctions! Use only one of the two modules at a time.

Parameters

none

Input Data

none

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Scan gate time**	Signal, activates the reading gate	0.0	Bit	1 -> 0: Reading gate off 0 -> 1: Reading gate active	**0**	–	
b	Free	0.1	Bit		**0**	–	
c	Free	0.2	Bit		**0**	–	
d	Free	0.3	Bit		**0**	–	
e **Acknowledge**	The toggle bit signals via positive and negative edge that data has been processed by the master.	0.4	Bit	0 -> 1: Data has been processed by the master 1 -> 0: Data has been processed by the master	**0**	–	
f **Data reset**	Signal, resets the following bit states and decoder results: • Module 16: Bit 0.1, input data • Module 20: Bit 0.0, input data Bit 0.1, input data Bit 0.2, input data • Module 21 … 27: Data, when the parameter "Decoding result at reading gate start" (module 12) has been set to value 1 (input data are reset to the init. value).	0.5	Bit	0: Off 1: Data reset	**0**	–	12b 16e 20abc 21 … 27i
g **System reset**	Signal, triggers a system reset if the level changes from 0 to 1.	0.6	Bit	0: Run 0 -> 1: Reset	**0**	–	
h **Standby**	Signal, activates the standby function	0.7	Bit	0: Standby off 1: Standby on	**0**	–	20h
Output data length: 1 byte							

8.3.17 Decoding state Module 20

The module indicates the state of the decoding and of the automatic decoder configuration. Module 20 must not be used in connection with Modules 21 to 27, because the status information for modules 21 to 27 is not consistent or synchronous.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Reading gate state**	Signal, indicates the state of the reading gate.	0.0	Bit	0 : Off 1: On	0	–	
b **New decoding**	Signal, indicates that a new label has been decoded.	0.1	Bit	0: No 1: Yes	0	–	
c **Result state**	Signal, indicates whether the barcode has been read successfully.	0.2	Bit	0: Successful reading 1: NOREAD	0	–	
d **Further results in the buffer**	Signal, indicates whether further results are in the buffer.	0.3	Bit	0: No 1: Yes	0	–	
e **Buffer overflow**	Signal, indicates result buffer is occupied. Is this state reached, no further decoding may be started.	0.4	Bit	0: No 1: Yes	0	–	
f **New decoding**	Toggle bit, indicates whether decoding has occurred.	0.5	Bit	0 -> 1: new result 1 -> 0: new result	0	–	
g **Result state**	Toggle bit, indicates that the barcode has not been read.	0.6	Bit	0 -> 1: NOREAD 1 -> 0: NOREAD	0	–	12a
h **Standby state**	Signal, indicates the current state of the standby function	0.7	Bit	0 : Off 1: On	0	–	18h 19h
Input data length: 1 byte							

Output Data

none

8.3.18 Decoding Result Modules 21 to 27

The following describes various modules for the output of decoding results. They have the same structure but different output lengths. The PROFIBUS module concept does not cater for modules of variable data length. Accordingly, the modules are to be regarded as alternatives.

The module defines the transfer of the actually decoded reading results. The data are transmitted consistently over the entire range. If one of the modules 21 to 27 is used, the status information of the selected module must also be used. The modules only work consistently or synchronously in themselves.

Parameters

none

Input Data

Module No.	Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
21-27	a **Reading gate state**	Signal, indicates the state of the reading gate.	0.0	Bit	0 : Off 1: On	**0**	–	
21-27	b **New result**	Signal, indicates whether a new decoding result is present.	0.1	Bit	0: No 1: Yes	**0**	–	
21-27	c **Result state**	Signal, indicates whether the bar-code has been read successfully.	0.2	Bit	0: Successful reading 1: NOREAD	**0**	–	
21-27	d **Further results in the buffer**	Signal, indicates whether further results are in the buffer.	0.3	Bit	0: No 1: Yes	**0**	–	
21-27	e **Buffer overflow**	Signal, indicates that result buffers are occupied and the decoder rejects data.	0.4	Bit	0: No 1: Yes	**0**	–	
21-27	f **New result**	Toggle bit, indicates whether a new decoding result is present.	0.5	Bit	0 -> 1: new result 1 -> 0: new result	**0**	–	
21-27	g **Result state**	Toggle bit, indicates that the bar-code has not been read.	0.6	Bit	0 -> 1: NOREAD 1 -> 0: NOREAD	**0**	–	12a
21-27	h **Result state**	Signal, indicates the current state of the standby function	0.7	Bit	0 : Off 1: On	**0**	–	–
21-27	i **Actual data length**	Data length of the actual barcode information.	1	unsign8	0 … 48	**0**	–	
21	k **Data**	Barcode information with a length of consistently 4 bytes.	2 …	4 x unsign8	0 … FFh	**0**	–	
22	k **Data**	Barcode information with a length of consistently 8 bytes.	2 …	8 x unsign8	0 … FFh	**0**	–	
23	k **Data**	Barcode information with a length of consistently 12 bytes.	2 …	12 x unsign8	0 … FFh	**0**	–	
24	k **Data**	Barcode information with a length of consistently 16 bytes.	2 …	16 x unsign8	0 … FFh	**0**	–	
25	k **Data**	Barcode information with a length of consistently 20 bytes.	2 …	20 x unsign8	0 … FFh	**0**		
26	k **Data**	Barcode information with a length of consistently 24 bytes.	2 …	24 x unsign8	0 … FFh	**0**		
27	k **Data**	Barcode information with a length of consistently 28 bytes.	2 …	28 x unsign8	0 … FFh	**0**		
Input data length: 2 bytes consistently + 4 … 28 bytes of barcode information depending on the module								

Output Data

none

8.3.19 Interlinked read result Module 33

If this module is configured, several decoding results are interlinked into a single read result. A condition for linking is the increase of the number of barcodes in the Module 5 multilabel. In this case, the additional information regarding the barcode in Module 33 toModule 45 always refers to the last decoding result in the interlinked read result. Unless all barcodes are decoded, the most recent decoding result may be a non-reading, i.e., the additional information regarding the barcode refers to the non-reading. An application of the interlinked read result is, for example, in the disc application. In this application, several discs are located on top of a box and labelled with short (e.g., two-digit) barcodes. Only one barcode is visible for each disc and can be decoded. To avoid having to transfer these short barcodes individually to the control, an interlinking into a single read result can make sense. The decoding results can be partitioned with the configurable delimiter.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Delimiter**	A configured delimiter (value not equal to 0) is inserted between the decoding results. For example, if a dot is configured as a delimiter, the following read result could be transmitted to the control: “02.10.2008“; without delimiter (value 0) this read result would be transmitted to the control as “02102008“.			0 … 255	**0**	-	
Parameter length: 1 byte							

Input Data

none

Output Data

none

8.3.20 Fragmented Reading Result Module 34

The module defines the transfer of fragmented reading results. To occupy few i/o-data, the reading results may be split into several fragments with this module. The fragments can then be transmitted one after another with a handshake.

Notice!

The modules 21 to 27 are designed to transmit data of a length of up to 28 bytes only. If you would like to transmit longer data, this can be achieved by using Module 34.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Fragment length**	The parameter defines the maximum length of the barcode information per fragment.			1 … 28	**0**	Byte	
Parameter length: 1 byte							

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
b **Fragment number**	Current fragment number	0.0 … 0.3	Bitarea	0 … 15	**0**	–	34e
c **Remaining fragments**	Number of fragments which still have to be read for a complete result.	0.4 … 0.7	Bitarea	0 … 15	**0**	–	34e
d **Fragment size**	Number of digits of the fragment in the decoding result. Always corresponds to the configured fragment length, except for the last fragment	1	unsign8	0 … 48	**0**	–	34e
Input data length: 2 bytes consistently							

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
e **Acknowledge**	Control bit indicates that the fragment has been processed by the master	0.0	Bit	0 -> 1: Data has been processed by the master 1 -> 0: Data has been processed by the master	**0**	–	
Output data length: 2 bytes consistently							

8.3.21 Reading Gate Activations Module 35

The module defines input data for the communication of the reading gate activations since system start.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Reading Gate Activations**	Reading gate activations since system start.	0 … 1	unsign16	0 … 65535	**0**	–	
Input data length: 2 bytes consistently							

Output Data

none

8.3.22 Reading gate number Module 36

The module defines input data for the communication of the number of reading gates since system start. This number is not necessarily the same as the number of reading gate activations. In the case of low quality programming, several activation commands may be sent for one reading gate. The modules 35 and 36 are usually used together to recognise programming errors through the deviation of these two values.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Reading gate number**	The BCL transmits the current reading gate number. The reading gate number is initialised with the system start and is then incremented continuously. At 65535, an overflow occurs and the counter starts afresh from 0.	0 … 1	unsign16	0 … 65535	**0**	–	
Input data length: 2 bytes consistently							

Output Data

none

8.3.23 Number of scans per reading gate Module 37

The module defines input data for the total number of scans which were required for the previous reading gate.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Scans in the reading gate**	Number of scans for the reading gate.	0 … 1	unsign16	0 … 65535 If the range is exceeded, the value remains at 65535	**0**	–	
Input data length: 2 bytes consistently							

Output Data

none

8.3.24 Code Position Module 38

The module defines input data for the communication of the relative barcode position in the laser beam.

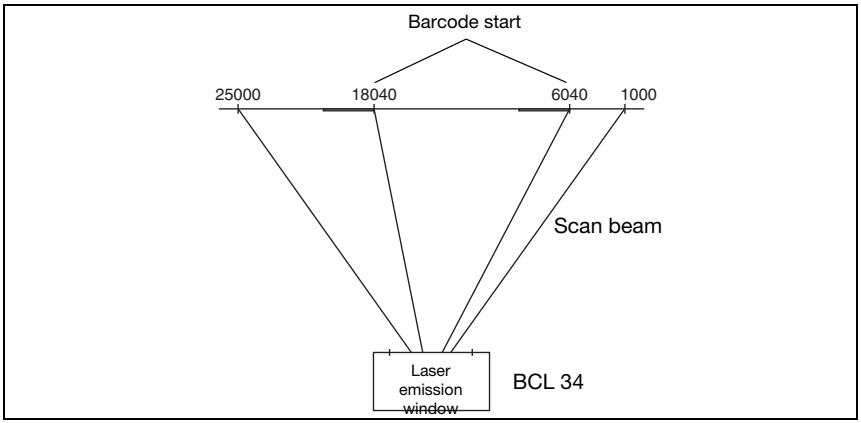


Figure 8.2: Relative position of the barcode in the scanner beam.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Code Position**	Relative position of the barcode in the scanner beam. A value of 6040 means, that the start of the barcode is located at 21% of the beam length. A value of 18040 identifies the start of the barcode to be located at 71%.	0 … 1	unsign16	1000 … 25000	0	–	
Input data length: 2 bytes consistently							

Output Data

none

8.3.25 Reading Security (Equal Scans) Module 39

The module defines the input data for the communication of the calculated reading security. The value refers to the currently output barcode.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Reading Security (Equal Scans)**	Calculated reading security for the transmitted barcode. The specified value determines how often each individual digit of the barcode must be extracted from a scan, before it is declared as valid. Only once this condition is fulfilled for all digits, the barcode decoding is acknowledged as being valid.	0 … 1	unsign16	0 … 65535	**0**	–	
Input data length: 2 bytes consistently							

Output Data

none

8.3.26 Scans per barcode Module 40

The module defines input data for the communication of the calculated number of scans, which are counted from the first to the last detection of the barcode.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Scans per barcode**	Number of scans between the first and last detecting of the barcode	0 … 1	unsign16	0 … 65535	**0**	–	
Input data length: 2 bytes consistently							

Output Data

none

8.3.27 Scans With Information Module 41

The module defines input data for the communication of the calculated number of scans which contain decodable information and thus have contributed to the formation of the result. I.e., all scans of which at least one digit of the barcode could be extracted, are counted.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Scans with information per barcode**	See above	0 … 1	unsign16	0 … 65535	0	–	
Input data length: 2 bytes consistently							

Output Data

none

8.3.28 Decoding quality Module 42

The module defines input data for the communication of the calculated decoding quality of the currently transmitted barcode. To calculate the decoding quality, the values described in the modules 41 (scans with info per barcode) and 40 (scans per barcode), are evaluated. Since module 42 can be used on its own, it is not necessary to include these modules as well. The value calculated here specifies the percentage ratio between the number of scans with information and the scans per barcode.

The equation for this is: $\text{Decoding quality} = \frac{\text{Scans with info}}{\text{Scans per barcode}} \times 100$

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Decoding quality**	The decoding quality of the transmitted barcode	0	unsign8	0 … 100	0	%	
Input data length: 1 byte							

Output Data

none

8.3.29 Code Direction Module 43

The module defines input data for the communication of the detected code direction of the currently transmitted barcode.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Code Direction**	Code direction of the transmitted barcode	0	unsign8	0: Normal 1: Inverse	**0**	–	
Input data length: 1 byte							

Output Data

none

8.3.30 Number Of Digits Module 44

The module defines input data for the communication of the number of digits of the currently transmitted barcode.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Number Of Digits**	Number of digits of the transmitted barcode	0	unsign8	0 … 48	0	–	
Input data length: 1 byte							

Output Data

none

8.3.31 Code type Module 45

The module defines the input data for the communication of the code type of the currently transmitted barcode.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Code type**	Code type of the transmitted barcode	0	unsign8	0: No code 1: 2/5 Interleaved 2: Code39 6: UPCA, UPCE 7: EAN8, EAN13 8: Code128, EAN128 9: Pharmacode 10: EAN Addendum 11: Codabar 12: Code93	**0**	–	
Input data length: 1 byte							

Output Data

none

8.3.32 Alignment mode 1 Module 46

The module defines input and output data for the alignment mode of the BCL. The alignment function is used for easy positioning of the BCL.

Notice!

*The alignment mode should not be used **in connection with module 15*** (AutoReflAct) as this may lead to erroneous functionality.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Scans per barcode**	Number of scans between the first and last detecting of the barcode	0	unsign16	0 … 65535	**0**	–	
b **Scans with information per barcode**	Number of scans between the first and last detecting of the barcode, which have contributed information for the formation of the result	2	unsign16	0 … 65535	**0**	–	46c
Input data length: 4 bytes consistently							

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
c **Alignment mode**	Signal, activates the alignment mode	0.0	Bit	0 -> 1: On 1 -> 0: Off	**0**	–	
Output data length: 4 byte consistently							

8.3.33 Service Module 47

The **service** function permits the parameter set of the BCL 34 to be reset to factory settings, corresponding to the command "PC20" via the service interface.

However, parameters are only reset permanently if they have been altered via BCL-Config, or if the device is connected to a hood with integrated connectors using the wrong parameter set.

After the reset function has been activated, the device carries out a reset and is freshly configured on the PROFIBUS. Potentially incorrect parameter settings via PROFIBUS continue to be active.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Status byte**	Shows the state of the reset to factory settings	0	unsign8	**0x00: Not active or successfully concluded** 0xFF: reset is currently being carried out 0xF1: EEPROM access error	**0x00**	–	47b
Input data length: 1 byte							

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
b **PC20_Over_Profibus**	Reset of parameters to factory settings	0.0	Bit	0 -> 1: reset the parameters 1 -> 0: standard operation	**0**	–	47a
Output data length: 1 byte							

8.3.34 Alignment mode 2 Module 48

The module defines input and output data for the alignment mode of the BCL. The alignment mode is used for easy alignment of the BCL with the barcode. Using the transmitted decoding quality as a percentage, the optimum alignment can be easily selected.

Notice!

The alignment mode 2 should not be used ***in connection with module 15*** (AutoReflAct) as this may lead to erroneous functionality.

Parameters

none

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Decoding quality**	Transmits the current decoding quality of the barcode located in the scanning beam	0	Byte	0 … 100	**0**	%	
Input data length: 1 byte							

Output Data

Output Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
b **Alignment Mode**	Signal activates and deactivates the alignment mode for optimum alignment of the BCL with the barcode	0.0	Bit	0 -> 1: On 1 -> 0: Off	**0**	–	
Output data length: 1 byte							

8.3.35 Switching output expansion Module 49

This module defines additional parameters for the switching output (Module 14) and should only be used in conjunction with this module. The parameters permit the new event counter function for the switch-on function [EF] of the switching output to be used.

If, for example, the switching output is to be activated after four invalid read results, the "comparative value" is set to 4; in Module 14, the respective switch-on function must be configured as "invalid read result".

The comparison mode parameter can be used to define whether the switching output is activated only once in the case that the event counter and comparative value fulfil the "parity" condition, or if it is activated multiple times, on each successive event after the "parity" condition is met.

The event counter can always be reset by using bit 1 in the output data of Module 14. In addition, the parameter "reset mode" permits an automatic reset once the "comparative value" is reached. Automatic resetting upon reaching the comparative value always results in the switching output being switched once independent of the comparison mode parameter.

The standard switch-off function [AF] at "reading gate start" is unsuited for this application since it causes the event counter to be reset on each reading gate start. It is recommended that all switch-off functions be deactivated.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Comparative value (event cnt.)**	If the number of activation events of the selected switch-on function reaches this comparative value, the switching output is activated. A deactivation event of the selected switch-off function resets the counter.			0 … 65535	**0**	–	
b **Comparative mode (event counter)**	Specifies whether the switching output switches only on parity (once) or also in the event of greater or equal to (multiple times) after the comparative value is reached.			0: SWOUT switches once 1: SWOUT switches several times	**0**	–	
c **Reset mode (event counter)**	Specifies whether the counter (Event Counter) is reset only by the reset bit and the selected switch-off function, or if the counter should be automatically reset after the comparative value is reached.			0: reset bit and [AF] in module 14 1: Comparative value reached	**0**	–	
Parameter length: 8 bytes							

Input Data

Input Data	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
d **Comparative value (event counter)**	Indicates whether the event counter has exceeded the set comparative value. The bit is reset to the init. value by resetting the event counter.	0.0	Bit	0: Not exceeded 1: Exceeded	**0**	–	
e **Comparative value-toggle bit (event counter)**	If "SWOUT switches several times" was configured as comparison mode, this bit is toggled each time the event counter is exceeded. The bit is reset to the init. value by resetting the event counter.	0.1	Bit	0 -> 1: Event counter exceeded 1 -> 0: Event counter exceeded again	**0**	–	
Input data length: 1 byte							

Output Data

none

8.3.36 RS 232 Module 50

If this module is not configured, the decoding result is also output in the ASCII framing protocol on the serial interface (RS 232). The baud rate, data format, and prefix and postfix characters can be configured. In the standard configuration, the Leuze framing protocol is used. Its structure is <STX><Data><CR><LF> with data format 8 data bits, no parity and 1 stop bit (8N1) and a transmission speed of 9600 Baud.

Parameters

Parameter	Description	Rel. addr.	Data type	Value Range	Default	Unit	CR to module
a **Baud rate**	Transmission speed of the serial interface.			**7: 9600 baud** 8: 19200 baud 9: 38400 baud 10: 57600 baud 11: 115200 baud	**7**	–	
b **Data format**	Data format of the serial interface. Consists of number of data bits, parity, and number of stop bits. The code 8,n,1, for example, means 8 data bits, no parity and 1 stop bit. The parity can be n=none, e=even, o=odd.			1: 7,n,2 2: 7,e,1 3: 7,e,2 4: 7,o,1 5: 7,o,2 **6: 8, n, 1** 7: 8,n,2 8: 8,e,1 9: 8,e,2 10: 8,o,1 11: 8,o,2	**6**	–	
c **Prefix character 1**	First framing character that precedes the data part. ASCII character as decimal number, see ASCII table.			0 … 127	**2 (STX)**	–	
d **Prefix character 2**	Second framing character that precedes the data part. ASCII character as decimal number, see ASCII table.			0 … 127	**0 (deacti-vated)**	–	
e **Prefix character 3**	Third framing character that precedes the data part. ASCII character as decimal number, see ASCII table.			0 … 127	**0 (deacti-vated)**	–	
f **Postfix character 1**	First framing character that is appended to the data part. ASCII character as decimal number, see ASCII table.			0 … 127	**13 (CR)**	–	
g **Postfix character 2**	Second framing character that is appended to the data part. ASCII character as decimal number, see ASCII table.			0 … 127	**10 (LF)**	–	
h **Postfix character 3**	Third framing character that is appended to the data part. ASCII character as decimal number, see ASCII table.			0 … 127	**0 (deacti-vated)**	–	
Parameter length: 8 bytes							

Input Data

none

Output Data

none

9 Example configurations

This chapter uses configuration examples to show how the BCL 34 can be adapted easily to a wide range of applications by using the appropriate modules.

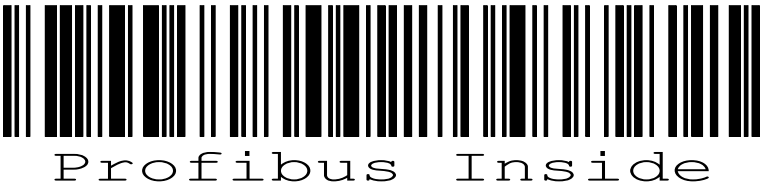
9.1 Indirect Activation via the PLC

9.1.1 Task

- Reading of a 15-digit code 128
- Indirect activation of the BCL 34 via the PLC

Code sample

Code 128, 15 digits



9.1.2 Procedure

Hardware, Connections

The following connections must have been established:

- Voltage supply (PWR)
- PROFIBUS In
- PROFIBUS termination

Modules Required

Include the following modules into your project:

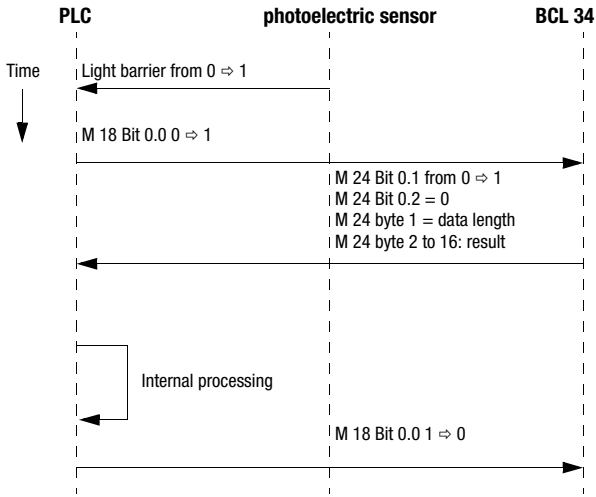
- Activations (Module 18)
- Decoding Result 16 bytes (Module 24)

Parameter Settings

No parameters need to be set especially. The standard parameter set provides all required functions.

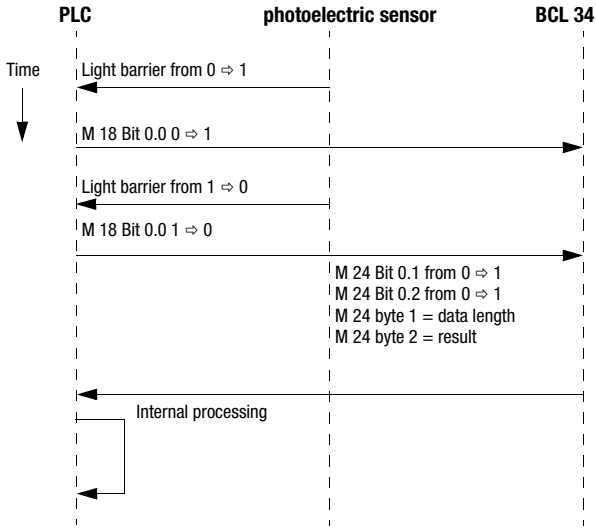
Flow Diagrams

Successful reading:



Description
The light barrier is interrupted
The activation bit 0.0 is set to 1, such that the reading gate is activated.
The barcodes that have been read, are processed and transmitted by the module 24: Reading concluded bit 0.1 = 1 and barcode not decoded bit 0.2 = 0. The data length is entered into byte 1, in this case 15 decimal. The decoding result is transmitted in the following 15 bytes.
Internal data processing
The activation bit 0.0 is reset to 0

Unsuccessful reading:



Description
The light barrier is interrupted
The activation bit 0.0 is reset to 1.
The reading gate elapses without reading result
The activation bit 0.0 is reset to 0
The module decoding state signals: Reading concluded bit 0.1 = 1 and barcode **not** decoded bit 0.2 = 1. The data length is entered into byte 1. The result Hex 3F ("?" = no read) is transmitted
Internal processing of the data and signalling of the non-reading

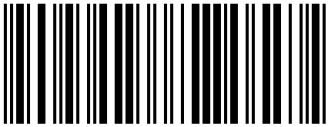
9.2 Direct Activation via the Switching Input

9.2.1 Task

- Reading of a 12-digit barcode in the 2/5 Interleaved format
- Direct activation of the BCL 34 via a photoelectric sensor

Code sample

Code 2/5 Interleaved 12 digits with check digit



561234765436

9.2.2 Procedure

Hardware, Connections

The following connections must have been established:

- Voltage supply (PWR)
- PROFIBUS In
- PROFIBUS termination
- Light barrier to SW IN

Modules Required

Include the following modules into your project:

- Decoding Result 12 byte (Module 23)

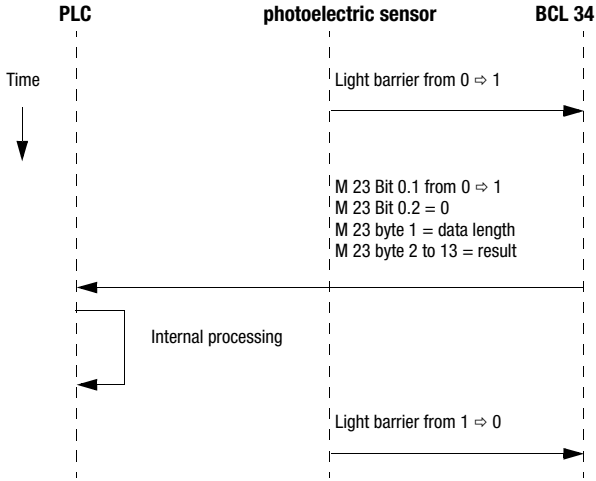
Parameter Settings

Byte	Description	Init value	Change value to:
2	[T1] digits 1	10	12
5	[T2] code type	Code 39	0 (no code)
9	[T3] code type	EAN8, EAN13	0 (no code)
13	[T4] code type	Code 128	0 (no code)

Table 9.1: Device parameters for example configuration 2

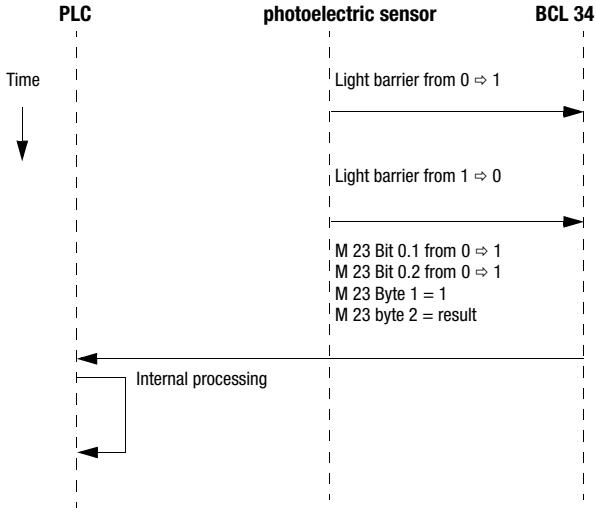
Flow Diagrams

Successful reading:



Description
The light barrier is interrupted. The signal of the switching output of the photoelectric sensor is present at the switching input of the BCL 34 and activates the scanner.
The barcodes that have been read, are processed and transmitted by the module 24: Reading concluded bit 0.1 = 1 and barcode not decoded bit 0.2 = 0. The data length is entered into byte 1, in this case 12 decimal. The decoding result is transmitted in the following 12 bytes.
Internal data processing
The beam of the light barrier is cleared and sets the switching input of the BCL to 0. This deactivates the scanner.

Unsuccessful reading:



Description
The light barrier is interrupted. The signal of the switching output of the photoelectric sensor is present at the switching input of the BCL 34 and activates the scanner.
The beam of the light barrier is cleared before a reading result is present. The light barrier sets the switching input of the BCL to 0 and deactivates the scanner.
The module decoding state signals: Reading concluded bit 0.1 = 1 and barcode **not** decoded bit 0.2 = 1. The data length is entered into byte 1. The result Hex 3F ("?" = no read) is transmitted.
Internal data processing

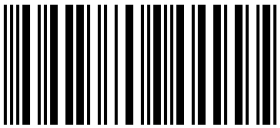
9.3 Direct Activation via the Switching Input

9.3.1 Task

- Reading of 10-digit barcodes in the 2/5 Interleaved format only
- Indirect activation of the BCL 34 via PLC and light barrier
- Setting and transmission of a check digit
- The information "Number of scans with information" is required in the PLC
- Data transmission after the reading gate has ended

Code sample

Code 2/5 Interleaved 10 digits with check digit



2234234459

9.3.2 Procedure

Hardware, Connections

The following connections must have been established:

- Voltage supply (PWR)
- PROFIBUS In
- PROFIBUS termination
- Light barrier to SW IN

Modules Required

Include the following modules into your project:

- Activations (Module 18)
- Decoding Result 12 byte (Module 23)
- Scans With Information (Module 41)
- Check Digit (Module 7)
- Switching input (Module 13)
- Reading Gate Control (Module 6)

Parameter Settings

Byte	Description	Init value	Change value to:
5	[T2] code type	Code 39	0 (no code)
9	[T3] code type	EAN8, EAN13	0 (no code)
13	[T4] code type	Code 128	0 (no code)

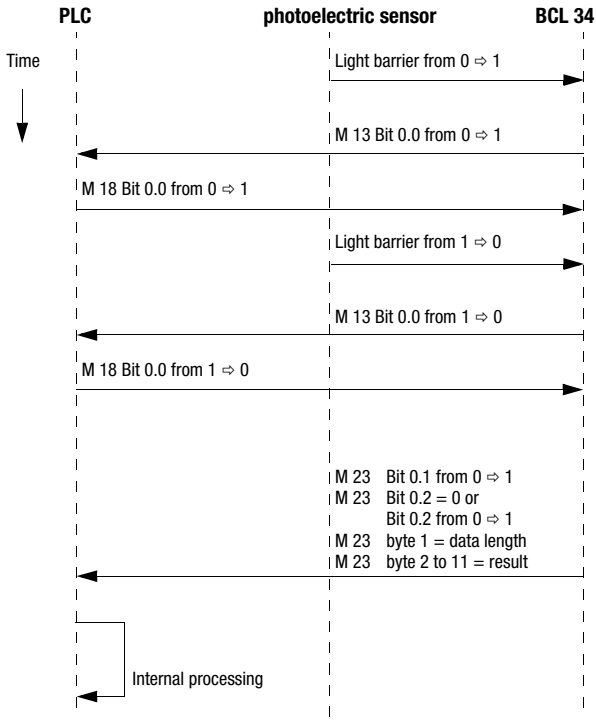
Table 9.2: Device parameters for example configuration 3

Module	Byte	Description	Init value	Change value to:
Module 6	2	Reading gate termination mode	1 (dependent on decoding)	0 (independent of decoding)
Module 7	2	Check digit evaluation 2/5 Interleaved	0 (no evaluation)	1 (evaluation)
Module 7	4	Check digit output 2/5 Interleaved	0 (no output)	1 (output)
Module 13	10	Function	1 (reading gate activation)	0 (no function)

Table 9.3: Module parameters for example configuration 3

Flow Diagrams

Successful/unsuccessful reading:



Description
The light barrier is interrupted. The state is present at the switching input of the BCL 34 and **does not** activate the scanner
The BCL 34 signals to the controller, that the light barrier has been triggered.
The controller activates the reading gate of the BCL 34.
At the switching input of the BCL 34, the light barrier signals that the light beam is no longer interrupted.
The BCL 34 signals to the controller that the light barrier has been deactivated.
The controller closes the reading gate of the BCL 34.
After the reading gate has been closed, the module decoding state signals the result to the PLC: Reading concluded bit 0.1 = 1 and barcode decoded bit 0.2 = 0 (barcode decoded) or 1 (barcode not decoded). The data length is entered into byte 1 (10 decimal if reading has been successful, 1 if barcode could not be recognised) The decoding result is transmitted in the following 10 bytes.
Internal data processing

10 Commissioning

10.1 Measures to be performed prior to the initial 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.*

Loading and Configuration of Modules

Gather the required modules for the BCL 34 in your PLC software and configure them as necessary. Further information regarding the individual modules is provided in chapter "PROFIBUS" on page 44.

Configuration examples together with the required modules and flow diagrams may be found in chapter "Example configurations" on page 88.

Setting the device address

The device address is set via switches in the modular hood. For setting instructions refer to chapter 7.3.

- *Set the device address according to the address previously selected in the configuration.*

10.2 Function Test

"Power On" test

After connecting the operating voltage, the BCL 34 performs an automatic "Power On" function test. Subsequently, the green LED lights up in the optics window of the BCL 34.

Interface

A red/green LED for checking the interface function is located on the underside of the modular hood. The significance of the individual LED states may be found in table 5.2 on page 18.

Problems

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).

10.2.1 Service Operating Mode

If the BCL 34 is operated with a modular service display, its functioning can be checked with the help of the operating mode Service. The following operational parameters are made available on a separately wired RS232 interface via the 9-pin sub-D connector of the MSD – independent of 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 switch in the modular service display or via Module 50 (RS 232).

Connection

To test the functioning of the BCL 34 with the user software "BCL-Config (V4.0)" (V3.22), connect the device to a PC or terminal via the serial interface. 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.

11 Maintenance

11.1 General Maintenance Information

Usually, the barcode reader BCL 34 does not require any maintenance by the operator.

Cleaning

Should it become soiled, clean the glass window of the BCL 34 with a soft cloth.

Notice!

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

11.2 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.*

12 Appendix

12.1 EU Declaration of Conformity

Leuze electronic

EG-Konformitätserklärung
EC-Declaration of conformity

Hersteller:
Manufacturer:

Leuze electronic GmbH + Co KG
In der Braike 1
73277 Owen / Teck
Deutschland

erklärt, unter alleiniger Verantwortung, dass die folgenden Produkte:
declares under its sole responsibility, that the following products:

Gerätebeschreibung:
Description of Product:

BCL 3x

folgende Richtlinien und Normen entsprechen.
are in conformity with the standards an directives:

Zutreffende EG-Richtlinien:
Applied EC-Directive:

89/336/EWG	EMV-Richtlinie
73/23/EWG	Niederspannungs-Richtlinie

Angewandte harmonisierte Normen:
Applied harmonized standards:

EN 61000-6-2:2001	EMV Fachgrundnormen Störfestigkeit Industrie
EN 61000-6-3:2001	EMV-Fachgrundnormen Störaussendung Mischgebiete
EN 55022:1998 + A1:2000 + A2:2003	EMV-Funkstöreigenschaften ITE-Produkte
EN 55024:1998 + A1:2001 + A2:2003	EMV-Störfestigkeit, ITE-Produkte
EN 61000-4-2:1995 + A1:1998 + A2:2001	Entladung statischer Elektrizität (ESD)
EN 61000-4-3:2002 + A1:2002	Hochfrequente elektromagnetischer Felder
EN 61000-4-4:2004	Schnelle transiente elektr. Störgrößen (Brust)
EN 61000-4-6:1996 + A1:2001	Leitungsgeführte Störgrößen
EN 60825-1:1994 + A1:2002 + A2:2001	Sicherheit von Lasereinrichtungen

Leuze electronic GmbH + Co KG
Postfach 11 11
In der Braike 1
73277 Owen / Teck
Deutschland

Owen, den 31.1.06

Michael Heyne (Geschäftsführer)
(managing director)

Leuze electronic GmbH + Co KG
In der Braike 1
D-73277 Owen-Teck
Telefon (0 70 21) 57 30
Telefax (0 70 21) 57 31 99
http://www.leuze.de
info@leuze.de

Symbols

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W