

Barcode reader BCL 34 with integrated decoder

Technical Description



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1 General Information

1.1 Explanation of Symbols

The symbols used in this operating manual are explained below.



Attention!

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



Attention Laser!

This symbol warns of possible danger through hazardous laser radiation.



Notice!

This symbol indicates text passages containing important information.

1.2 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.



Notice!

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

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



2 Safety Notices

2.1 Safety Standards

The 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 6.3 "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 has been developed in particular for the following areas of application:

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

2.3 Working Safely



Attention Laser Radiation!

The barcode reader BCL 34 is a laser unit of Laser Protection Class 2.

Do not look directly into the laser beam. Observe the applicable legal and local regulations for the operation of laser units.



Attention!

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

Safety regulations

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

Qualified personnel

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

Electrical work must be carried out by a certified electrician.

3 Description

BCL 34 device construction

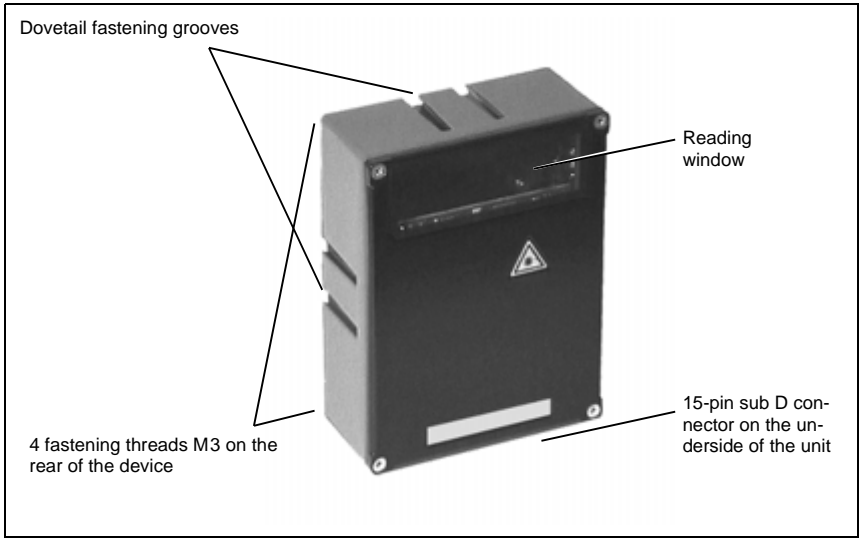


Figure 3.1: BCL 34 device construction

3.1 The Bar Code 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.

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

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 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 read gate is closed.

3.2 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 (DP IN)
- Profibus Out (DP OUT)
- voltage supply (PWR IN)

MS 34 105

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

- for the modular service display (MSD)
- switching inputs and outputs (SW IN/OUT)

Please refer to chapter 5 for further information regarding the modular hoods with integrated connectors.

3.3 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 34 is tapped in this case and is made available at the 9-pin sub D connector of the MSD (for further information see page 17).

To connect to the MS 34 105, an 8-pin cable (M12) with a length of 2m is used (see chapter 5 "Accessories / Order Designation").

Using the service display, new settings for the BCL can be trialled quickly and easily, without having to project these settings via the Profibus. Once the optimal settings have been found, which are to be adopted for the standard operation, these must be included in the project in order for them to become permanently active.



Notice!

The BCL has a parameter memory in which all project settings are stored. When switching back from maintenance mode to standard mode, the settings specified in maintenance mode are overwritten by the settings stored in the parameter memory.

4 Technical Data

4.1 General Specifications BCL 34

Optical Data

Light source	Laser diode 650nm	
Scanning rate	BCL with M optics: 1000scans/s	BCL with F optics: 800scans/s
Resolution	BCL 3x xM 100: m = 0.2mm ... 0.5mm	BCL 3x xF 100: m = 0.3mm ... 0.8mm
Reading distance	see reading curve	

Software

Laser safety class	2
Code types	all common code types
Software features	selectable output format, autoControl, autoRefIAct, 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 conjunction with the devices MS 34 105 and MSD: RS232 with fixed data format, 8 data bits, no parity, 1 stop bit, 9.6kBd
Ports	1 switching output, 1 switching input
Operating voltage	10 ... 30V
Power consumption	5W

Indicators

LED	see chapter 4.2 "LED indicators"
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Mechanical data

Protection class	IP 65	
	BCL 34	MS 34
Weight	405g	160g
Dimensions (W x H x D)	120 x 90 x 43mm	38 x 90x 39mm
Housing	diecast aluminium	diecast zinc

Environmental data

Ambient temp. (operation/storage)	0°C ... +40°C/-20°C ... +60°C
Air humidity	max. 90% rel. humidity, non-condensing
Vibration	IEC 68.2.6 IEC 68.2.27 (shock) IEC 801
Electromagnetic compatibility	acc. to IEC 60947-5-2

Table 4.1: General Specifications

4.2 LED indicators

BCL 34

A BCL 34 internal green LED indicates in the reading window whether or not the supply voltage is present.

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 DP IN and DP Out. It indicates the state of the Profibus connection.

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

Table 4.2: LED states MS 34 103 / MS 34 105

4.3 Device Construction and Components

A modular hood with integrated connectors of the type MS 34 103 or MS 34 105 is always part of a BCL 34. The purpose of both hoods is to connect the BCL 34 to the Profibus. For this, they feature one Profibus IN and one Profibus 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 4.1: BCL 34 with MS 34 105

4.3.1 Dimensioned and Connection Drawings

BCL 34

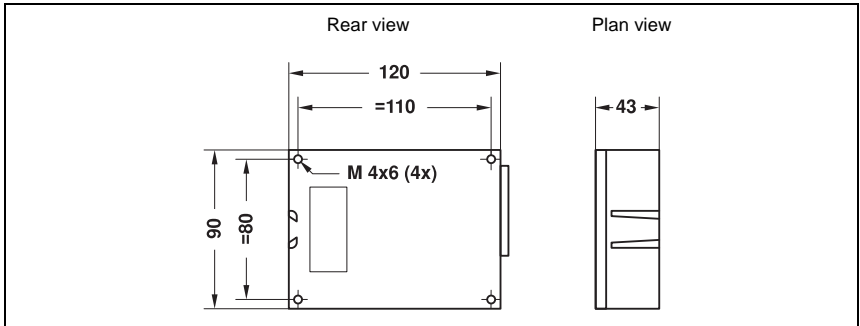


Figure 4.2: Dimensioned drawing BCL 34

MS 34 103 / MS 34 105

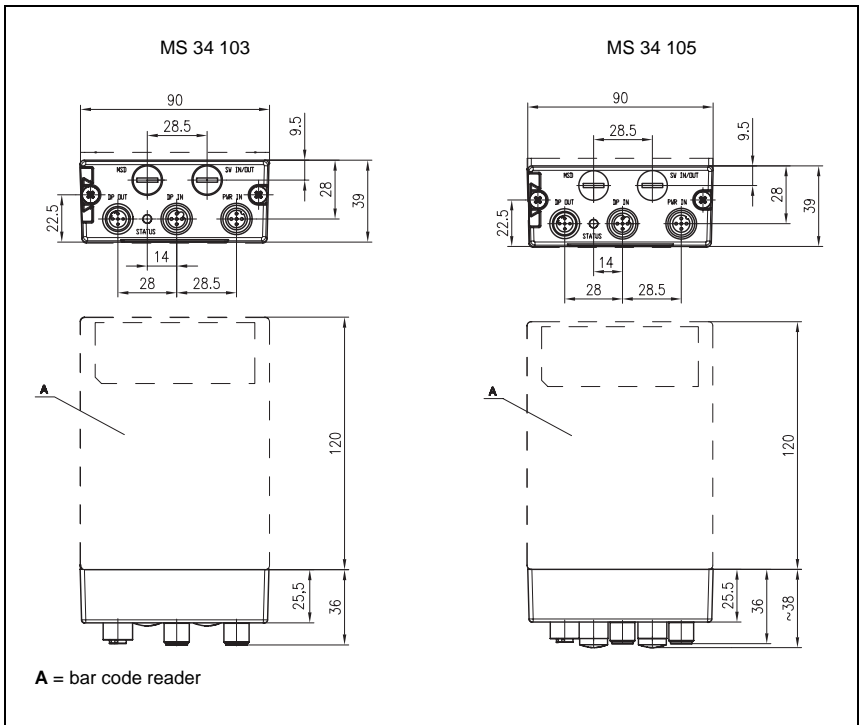


Figure 4.3: Dimensioned drawing MS 34 103 / MS 34 105

4.4 **Optical Data**



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

For different reading tasks, the BCL 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.

4.4.1 **Type overview**

Model	Range	Module/ resolution (mm)	Scanning rate (scan/s)	Scanner type	Order No.
BCL 34 SM 100	up to 220mm	0.2 ... 0.5	1000	Single line	500 37229
BCL 34 R1M 100				Raster	500 37227
BCL 34 SF 100	up to 450mm	0.3 ... 0.8	800	Single line	500 37228
BCL 34 R1F 100				Raster	500 37226

Table 4.3: Overview of the BCL 34 types

4.4.2 **Optics variants and reading fields**

The BCL 34 is available with two different optics. The optics differ in range and resolution (see chapter 4.4.1).

- M optics: for small to medium modules
- F optics: for small to medium modules

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.

Scanning curves BCL 34 with M optics

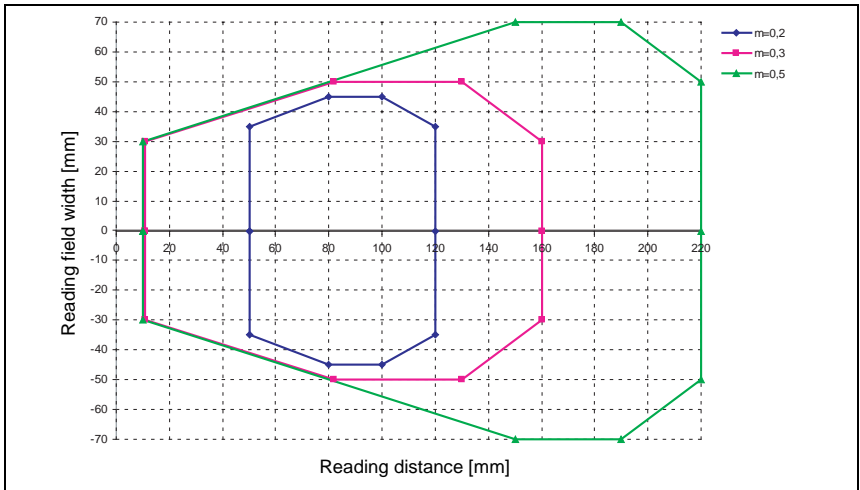


Figure 4.4: Reading field, M optics (medium density, normal range)

Scanning curves BCL 34 with F optics

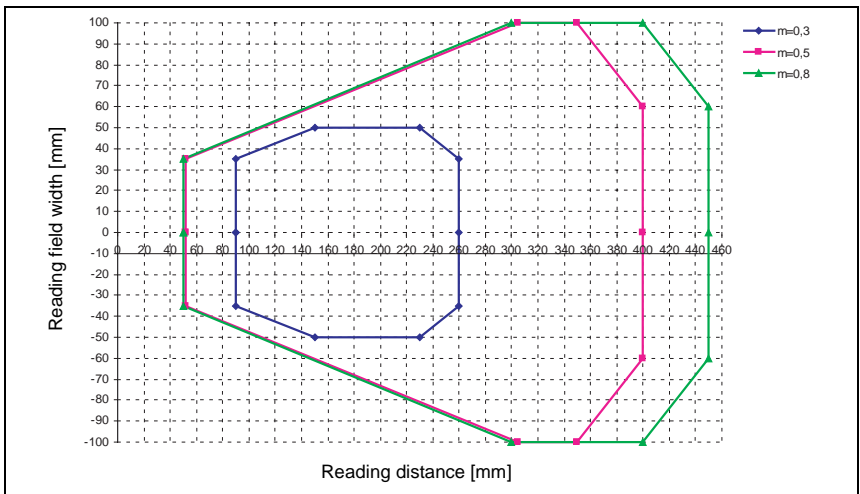


Figure 4.5: Reading field, F optics (low density, long range)

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5 Accessories / Order Designation

5.1 Accessories



Notice!

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

Symbol	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

Table 5.1: Accessories / Order Designation

5.1.1 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=Rx/D, 3=Tx/D, 5=GND).
Transmission in the standard Leuze format 9600/8/Non/1 frame STX/.../CR/LF.
- Connection to the PC via null modem cable
- One can access **all** parameters of the BCL 34 via the service interface.
- Operating mode switch: service operation/standard operation
- Display



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, then they must be set in the Profibus project.

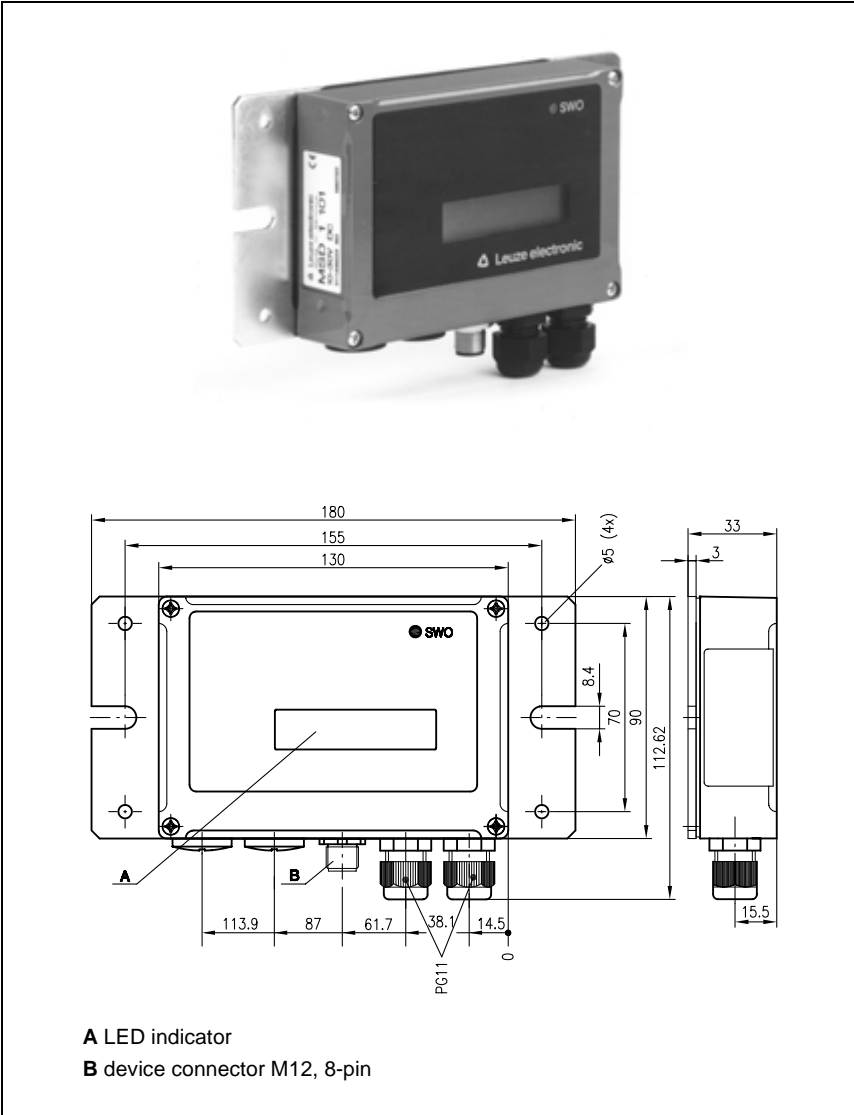


Figure 5.1: Modular Service Display MSD 1 101

5.1.2 Fastening Accessories

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

Mounting device BT 56

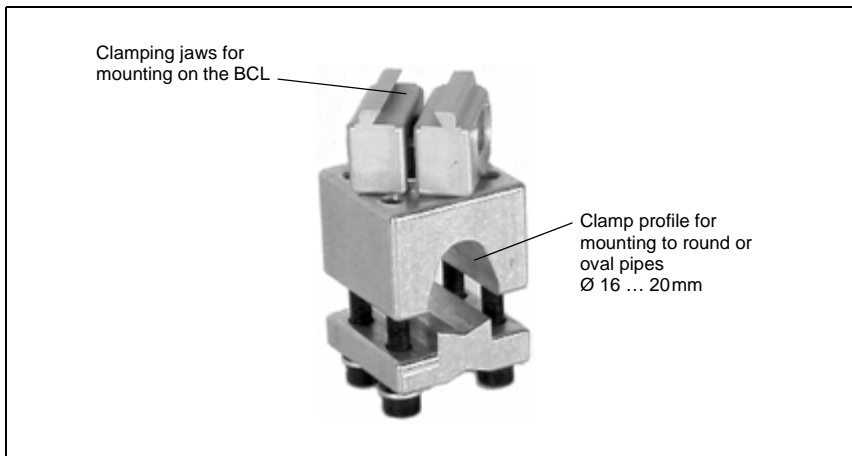


Figure 5.2: Mounting device BT 56

5.1.3 Connection cable KB 034 2000

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

6 Installation

6.1 Storage, Transportation

**Attention!**

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

Unpacking

↪ *Check the packaging for any damage. If damage is found, notify the post office or shipping agent as well as the supplier.*

↪ *Check the delivery contents using your order and the delivery papers:*

- delivered quantity
- device type and model as indicated on the nameplate
- accessories
- operation manual with GSD file

↪ *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.

6.2 Mounting

Accessories

The mounting system BT 56 is available for installation. It may be ordered separately from Leuze electronic. For order numbers, see table 5 "Accessories / Order Designation" on page 17.

Mounting the BCL 34

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

- using the dovetail groove and the corresponding mounting accessories (see figure 5.1)
- using the fastening threads on the backside of the devices (chapter 4.3)

Mounting example BCL 34

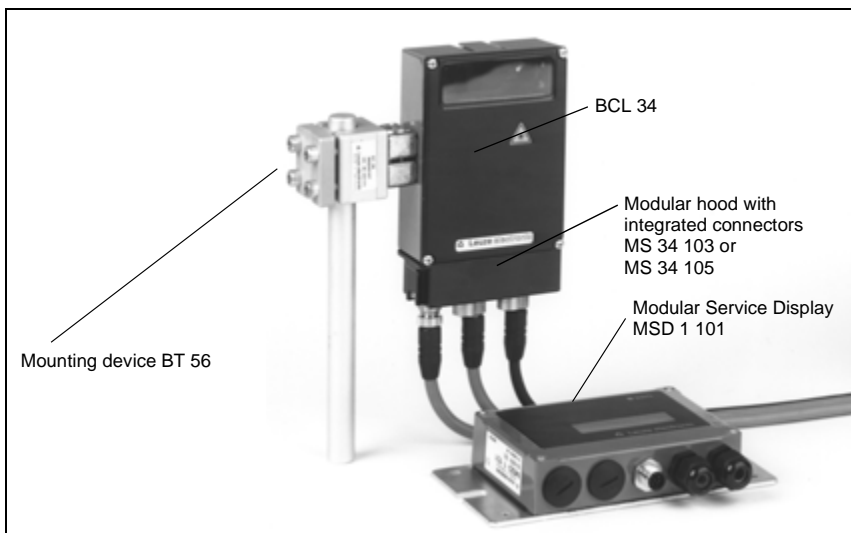


Figure 6.1: Mounting example BCL 34

Mounting the MSD 1 101

You can mount the modular service display individually through the holes located on the mounting plate (see figure 5.1).

Subsequently, connect the MSD to the MS 34 which is part of the BCL 34 via the respective cable (see chapter 5.1.3).

6.2.1 Device Arrangement

Selecting a mounting location

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

- size, orientation, and position tolerance of the bar codes on the objects to be scanned
- the reading field of the BCL 34 in relation to the bar-code module width
- the resulting minimum and maximum reading distance from the respective reading field

For specific information, please refer to chapter 4.4.



Notice!

The best reading results are obtained when

- the bar code is moved in a plane that is parallel to the reading window
- the reading distance lies in the middle area of the reading field
- you do not use high-gloss labels.



Notice!

On the BPS 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.

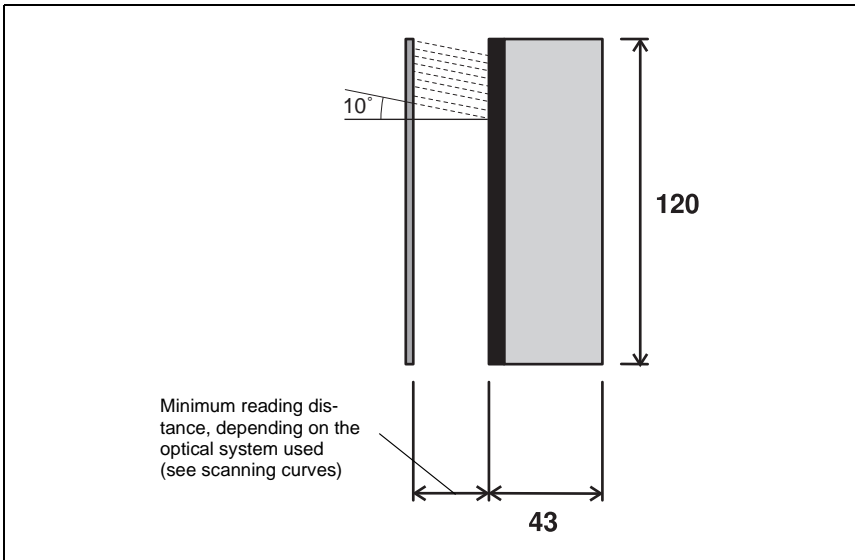


Figure 6.2: Beam outlet on the BCL 34

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.

Application example

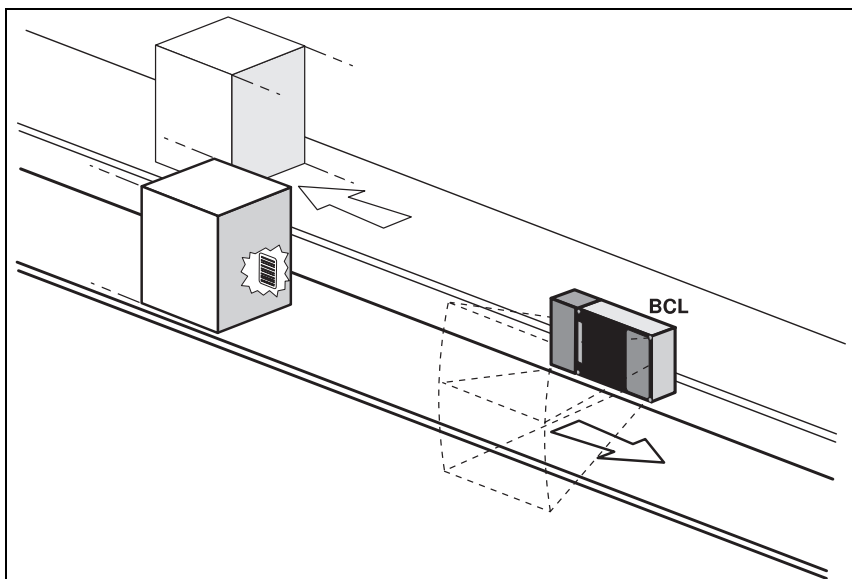


Figure 6.3: Application example "conveyor chain"

6.3 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.

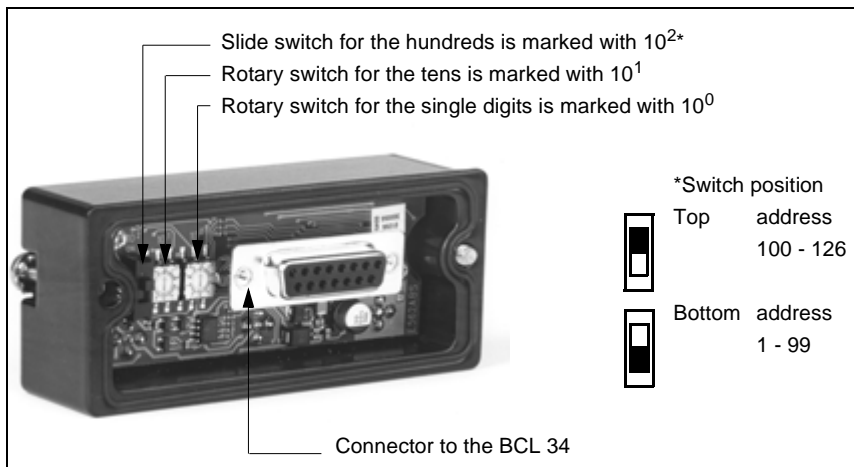


Figure 6.4: View of the inside of the MS 34

6.4 Connection



Attention!

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

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

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

6.4.1 Connecting the BCL 34

Connections MS 34 103 / MS 34 105

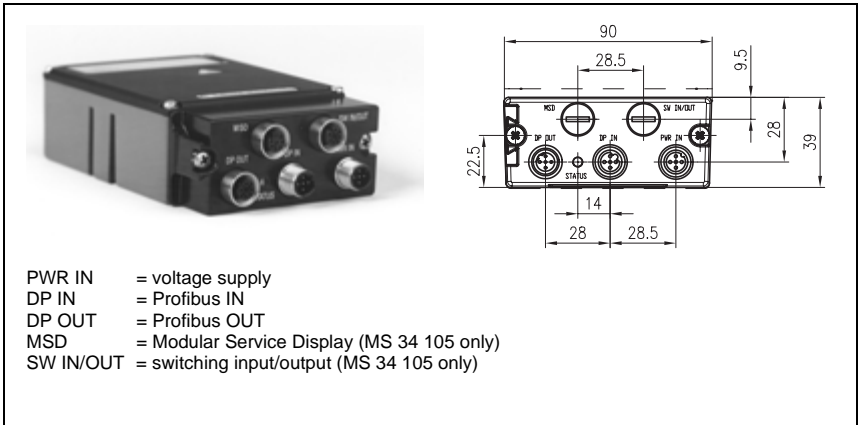


Figure 6.5: Connection assignment of the BCL 34 with MS 34 103 / MS 34 105

Wiring description PWR IN (voltage supply)

Pin 1	VIN	10 ... 30VDC voltage supply
Pin 2	SW OUT	Switching output
Pin 3	GNDIN	GND for voltage supply
Pin 4	SW IN	Switching input
Pin 5	PE	Protected Earth

Table 6.1: Pin assignment PWR IN

Connection description MSD 1 101

The connection between the MSD 1 101 and the MS 34 is established via the pre-configured cable KB 034 2000. The service interface for connecting a PC is located inside the MSD and is designed as a 9-pin sub-D connector. The pin configuration of the 9-pin sub-D connector corresponds to a standard RS232 interface: 2 = Rx/D, 3 = Tx/D, 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	PE	Protected Earth

Table 6.2: Pin assignment SW IN/OUT

You can configure the switching input and output according to your requirements. Please refer to figure 6.6. 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 Profibus IN/OUT

Pin 1	VCC	5V for bus termination
Pin 2	N	N or A line of the Profibus
Pin 3	GND	Ground for bus termination
Pin 4	P	P or B line of the Profibus
Pin 5	PE	protective conductor

Table 6.3: Pin assignment DP IN/OUT

6.4.2 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 6.6:

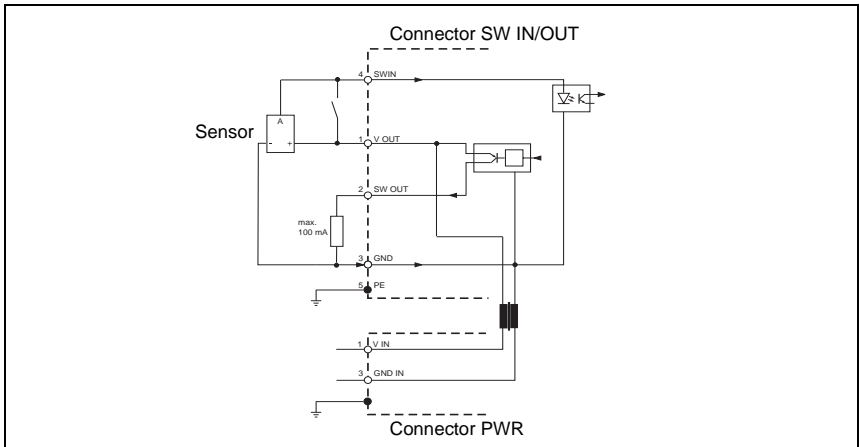


Figure 6.6: Connection diagram switching inputs and outputs BCL 34

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](#)).

6.5 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.

7 Profibus

7.1 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.

7.1.1 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.

7.1.2 Permanently defined parameters (device parameters)

In 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
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		-
Number-of-digits mode	Specifies how the subsequent digit numbers are to be interpreted.	0: Enumeration 1: Range	see table 7.2 "Code type and code length, Tables 1-4" on page 30	dec
digits 1	Decodable number of digits; in the case of a range, this number defines the lower limit	0 ... 48		
digits 2	Decodable number of digits; in the case of a range, this number defines the upper limit	0 ... 48		
digits 3	Decodable number of digits in the 'enumeration' mode	0 ... 48		

Table 7.1: "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

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

Table 7.2: Code type and code length, Tables 1-4

7.2 Structure of the project modules

In the current version, a total of 41 modules are available for use. A "Device Module" (see "Permanently defined parameters (device parameters)" on page 28) is used for basic scanner configuration and is permanently integrated into the project. A further 40 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.

7.2.1 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 7.1 on page 29)	X		
2	Code table extension	Extension of the permanently defined code table (see table 7.1 on page 29)	X		
3	Code table extension	Extension of the permanently defined code table (see table 7.1 on page 29)	X		
4	Code table extension	Extension of the permanently defined code table (see table 7.1 on page 29)	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 identifier	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 as well as the line-gap-ratios	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	AutoRefIAct	Automatic reading activation	X	X	X
16	AutoControl	Automatic monitoring of the reading properties	X		
17	Reference Code Comparison	Activation of reference code comparison and specification of the mode of operation	X	X	X
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
28-33		Reserved			
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

Table 7.3: Overview of the project modules

Module No.	Module	Description	Parameter	Output data	Input data
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	Function for device positioning		X	X

Table 7.3: Overview of the project modules

7.3 Description of the individual project modules

7.3.1 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
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	0	-
Number-of-digits mode	Specifies how the subsequent digit numbers are to be interpreted.	0: Enumeration 1: Range	0	-
digits 1	Decodable number of digits, first option in mode 0 (enumeration), in mode 1 (range) this number defines the lower limit	0 ... 48	0	dec
digits 2	Decodable number of digits, second option in mode 0 (enumeration), in mode 1 (range) this number defines the upper limit	0 ... 48	0	
digits 3	Decodable number of digits, third option in mode 0 (enumeration), in mode 1 (range) an entry in "digits 3" is without effect	0 ... 48	0	

Table 7.4: Parameters for Modules 1-4

Parameter length: 16 bytes

Input Data

none

Output Data

none

**7.3.2 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. The first barcode is transmitted automatically. The second and third one are temporarily stored in the BCL. The input byte is set to 2 by the scanner. To acknowledge (read acknowledge) that the first barcode has been processed by the controller, the toggle bit 0.0 is toggled in the output byte (toggle bits act via the positive and negative edge). By toggling, the transmission of the second barcode is released. Once the barcode has been transmitted, the input byte is reduced by one from 2 to 1. I.e., the controller is told via the input byte how many barcodes are left in the BCL's memory.

Parameter

Parameter	Description	Value Range	Standard	Unit
Number of bar-codes	Number of different barcode types scanned for per reading gate. Only if this number of bar-codes has been reached, the reading gate is terminated prematurely.	1 ... 20	1	-

Table 7.5: Parameters for Module 5

Parameter length: 1 byte

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Number of decoding results	Number of decoding results which have not been fetched.	0	UNSIGNED 8	0 ... 255	0	-

Table 7.6: Input data for Module 5

Input data length: 1 byte

Output Data

Output Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Acknowledge	Control bit signals that the data have been processed by the master.	0.0	Bit	1 -> 0: Data have been processed by the master 0 -> 1: Data have been processed by the master	0	-

Table 7.7: Output data module 5

Output data length: 1 byte

7.3.3 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
Automatic reading gate repeat	The parameter defines the automatic repeat of reading gates	0 : No 1: Yes	0	-
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/Module 39) 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	-
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
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
Reading gate end 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 ... 65.535	0	-

Table 7.8: Parameters for Module 6

Parameter length: 8 bytes

Input Data

none

Output Data

none

7.3.4 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
Check digit evaluation Pharmacode	The parameter controls the verification of the check digit for the code type Pharmacode	0: No 1: Yes	0	-
Check digit evaluation Codabar	The parameter controls the verification of the check digit for the code type Codabar	0: No 1: Yes	0	-
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	-
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	-
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	-
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	-
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	-
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	-
Check digit output CODE128	The parameter controls the output of the check digit in the barcode result for the code type CODE128	0: No 1: Yes	0	-
Check digit output UPC	The parameter controls the output of the check digit in the barcode result for the code type UPC	0: No 1: Yes	0	-
Check digit output EAN	The parameter controls the output of the check digit in the barcode result for the code type EAN	0: No 1: Yes	0	-
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	-
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 11, weighting 2 - 9	0	-

Table 7.9: Parameters for Module 7

Parameter length: 5 bytes

Input Data

none

Output Data

none

7.3.5 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
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	-

Table 7.10: Parameters for Module 8

Parameter length: 2 bytes

Input Data

none

Output Data

none

7.3.6 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 14.

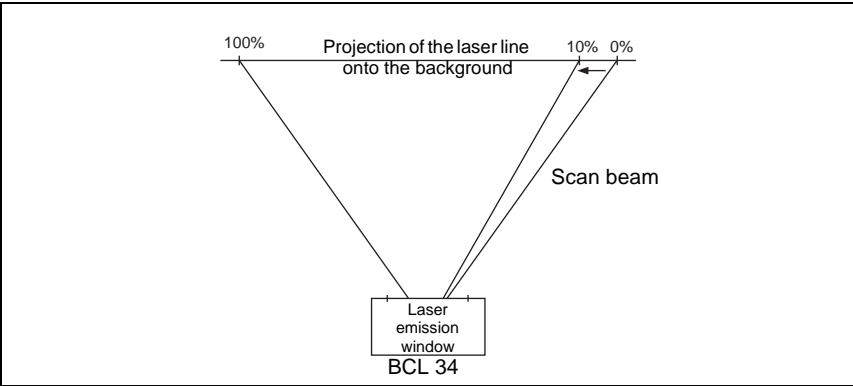


Figure 7.1: Specifying switch-on and switch-off positions of the laser

Parameter

Parameter	Description	Value Range	Standard	Unit
Laser start position	The parameter specifies the switch-on position of the laser.	0 ... 99	0	1 %
Laser stop position	The parameter specifies the switch-off position of the laser.	0 ... 100	100	1 %

Table 7.11: Parameters for Module 10

Parameter length: 2 bytes

Input Data

none

Output Data

none

7.3.7 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
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
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
Bar width distance	The parameter 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
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
Reading direction	The parameter specifies the reading direction for the decoding	0 : Normal 1 : Inverse	0	-

Table 7.12: Parameters for Module 10

Parameter length: 5 bytes

Input Data

none

Output Data

none

7.3.8 Code Type Properties
Module 11

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

Parameter

Parameter	Description	Value Range	Standard	Unit
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	-
Quiet zone	The parameter defines the minimum quiet zone in front of a barcode.	3 ... 10	7	module widths
Element ratio	The parameter defines the maximum ratio between narrow and wide elements.	2 ... 12	8	-

Table 7.13: Parameters for Module 11

Parameter length: 2 bytes

Input Data

none

Output Data

none

7.3.9 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
Text in the case of misreading	The parameter defines the output characters if no barcode could be read.	1 ... 255	Hex 63 ("?")	-
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	-
Data alignment	The parameter defines the alignment of the data in the result field	0: Left-justified 1: Right-justified	0	-
Fill mode	The parameter defines the fill mode for the unoccupied data ranges	0: No alignment 1: Fill up to the length of the longest barcode in the reading gate 2: Fill up to the maximum length of the code table 3: Fill up to the transmission length	0	-
Fill character	The parameter defines the character which is used for filling up the data areas.	0 ... FFh	0	-

Table 7.14: Parameters for Module 12

Parameter length: 23 bytes

Input Data

none

Output Data

none

**7.3.10 Switching input
Module 13**

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

Parameter

Parameter	Description	Value Range	Standard	Unit
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	-
Mode	The parameter can be used to control the processing of the switching input	0: Off 1: On	1	-
De-bouncing time	The parameter defines a de-bouncing time which is implemented in software.	0 ... 255	5	ms
Start-up delay	The parameter influences the timing during switch-on	0 ... 65.535	0	ms
Minimum switch-on time	The parameter defines a minimum time period before the signal is reset.	0 ... 65.535	0	ms
Switch-off delay	The parameter defines a time delay for the signal during switch-off.	0 ... 65.535	0	ms
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	-

Table 7.15: Parameters for Module 13

Parameter length: 23 bytes

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
State	State of the signal of the switching input	0.0	Bit	0.1	0	-

Table 7.16: Input data for Module 13

Input data length: 1 byte

Output Data

none

7.3.11 Switching output Module 14

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

Parameter

Parameter	Description	Value Range	Standard	Unit
DC bias level	The parameter defines the DC bias level of the switching output.	0: LOW (0V) 1: HIGH (+Ub)	0	-
Start-up delay	With this parameter, the output pulse may be delayed by a set number of reading gates.	0 ... 63	0	-
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
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 - Negative reference code comparison 1 - Valid reading result - Invalid reading result - Positive reference code comparison 2 - Negative reference code comparison 2 - AutoControl bad - AutoControl good - PROFIBUS pos. edge - PROFIBUS neg. edge	0: Off 1: On	0020 h 0 0 0 0 0 1 0 0 0 0 0 0	
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 - Negative reference code comparison 1 - Valid reading result - Invalid reading result - Positive reference code comparison 2 - Negative reference code comparison 2 - AutoControl bad - AutoControl good - 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 0	-

Table 7.17: Parameters for Module 14

Parameter length: 8 bytes

Input Data

none

Output Data

Output Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
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	-

Table 7.18: Output data for Module 14

Output data length: 1 byte

7.3.12 AutoRefIAct Module 15

The module defines the mode of operation of the laser scanner for controlling the reading gate.

Parameter

Parameter	Description	Value Range	Standard	Unit
Mode	This parameter activates the function of the laser scanner.	1: Normal (autoRefIAct 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	-
De-bouncing time	The parameter defines a de-bouncing time which is implemented in software.	0 ... 255	5	ms
Start-up delay	The parameter influences the timing during switch-on	0 ... 65.535	0	ms
Minimum switch-on time	The parameter defines a minimum time period before the signal is reset.	0 ... 65.535	0	ms
Switch-off delay	The parameter defines a time delay for the signal during switch-off.	0 ... 65.535	0	ms

Table 7.19: Parameters for Module 15

Parameter length: 8 bytes

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
State	Signal state of the Auto-Refl-Act module	0.0	Bit	0: Reflector is recognised 1: Reflector is hidden	0	-

Table 7.20: Input data for Module 15

Input data length: 1 byte

Output Data

Output Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Alignment function	Switches the alignment mode on or off.	0.0	Bit	0: Alignment mode on 1: Alignment mode off	0	-
Saving	Stores the value defined in the alignment in the parameter set.	0.1	Bit	0 -> 1: Value is stored	0	-

Table 7.21: Output data for Module 15

Output data length: 1 byte

**7.3.13 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
Mode	<p>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.</p> $\text{Label quality} = \frac{\text{Scans with information per barcode}}{\text{Scans per barcode}}$ <p>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.</p> $\text{Decoding quality} = \frac{\text{Identical scans}}{\text{Scans per barcode}}$	0: Off 1: Label quality 2: Decoding quality	0	-
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	1 %
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	-

Table 7.22: Parameters for Module 16

Parameter length: 3 bytes

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Scan quality	This value is the current average of the scan quality.	0.0	UNSIGNED8	0-100	0	-

Table 7.23: Input data for Module 15

Input data length: 1 byte

Output Data

none

7.3.14 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 address 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.

In the following, the abbreviation RBC is used for "Reference Bar Code".

Parameter

Input Data	Description	Addr.	Data Type	Value Range	Standard	Unit
Reserved		0				
Dont_Care character	The character is not taken into account in a comparison	1	UNSIGNED8	0 ... 7F h	2Ah [*]	-
Event control	The parameter specifies the associated output function after a reference barcode comparison.	2	UNSIGNED8	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	-
Settings (comparison function 1)	The parameter defines the components and the logic for code comparison for the comparison function 1.	3	UNSIGNED8	0 ... FFh see "Explanations regarding the parameter "Settings" on page 49.	0Ah	-
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	UNSIGNED8	1 ... 4, 11 ... 19, 22 ... 24 see "Explanations regarding the parameter "Sequence" on page 50.	1	-
Barcode comparison type (comparison function 1)	The parameter defines under which conditions a positive result for an ASCII character comparison between decoded barcode and RBC occurs.	5	UNSIGNED8	01h ... 80h see "Explanations regarding the parameter "Barcode comparison type" on page 51.	02h	-

Table 7.24: Parameters for Module 17

Input Data	Description	Addr.	Data Type	Value Range	Standard	Unit
Settings (comparison function 2)	The parameter defines the components and the logic for code comparison for comparison function 2.	6	UNSIGNED8	0 ... FFh see "Explanations regarding the parameter "Settings" on page 49.	0Ah	-
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	UNSIGNED8	1 ... 24 see "Explanations regarding the parameter "Sequence" on page 50.	1	-
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	UNSIGNED8	01h ... 80h see "Explanations regarding the parameter "Barcode comparison type" on page 51.	02h	-
Maximum comparison pattern length	The parameter defines the reserved storage place per RBC. The RBC's themselves are deposited in the following parameter (addr. 10). If 0 is entered here, the individual RBC's 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 RBC's can be defined.	9	UNSIGNED8	0 ... 64 =0: Dynamic arrangement >0: storage size for one comparison pattern	20	-
Comparison pattern	In this parameter, the individual RBC's 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 * UNSIGNED8	0 ... 7Fh	00h	-

Table 7.24: Parameters for Module 17

Parameter length: 74 bytes

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Processing state	The signal indicates whether the reference code comparison is activated or not.	0.0	Bit	0 : Off 1 : On	0	-
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	-
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	-

Table 7.25: Input data for Module 17

Input data length: 1 byte

Output Data

none

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 type
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 type not equal to barcode type
mtc = 1	Comparison positive if RBC type equal to barcode type

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 RBC's (starting with the first).
- Comparison in the sequence of the activated RBC's:
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 activated RBCs – The comparison result is positive if at least one barcode corresponds to one RBC.

Value	Meaning
4	Comparison in the sequence of activated RBCs – The comparison result is positive if each decoded barcode corresponds to the RBC it was compared with.
11	First decoded barcode with RSC1
12	First decoded barcode with RSC2
13	First decoded barcode with RSC3
14	First decoded barcode with RSC4
15	First decoded barcode with RSC5
16	First decoded barcode with RSC6
17	First decoded barcode with RSC7
18	First decoded barcode with RSC8
19	First decoded barcode with RSC9
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 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 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 "Settings" 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

7.3.15 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.

Parameter

none

Input Data

none

Output Data

Output Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Reading gate	Signal, activates the reading gate	0.0	Bit	1 -> 0: Reading gate off 0 -> 1: Reading gate active	0	-
	Free	0.1	Bit		0	-
	Free	0.2	Bit		0	-
	Free	0.3	Bit		0	-
	Free	0.4	Bit		0	-
Input state	Signal, resets the input data of the BCL back to quiet mode.	0.5	Bit	0 -> 1: Data reset	0	-
System reset	Signal, triggers a system reset if the level changes from 0 to 1.	0.6	Bit	0 -> 1: Reset	0	-
	Free	0.7	Bit		0	-

Table 7.26: Output data for Module 18

Output data length: 1 byte

7.3.16 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.

Parameter

none

Input Data

none

Output Data

Output Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Reading gate	Signal, activates the reading gate	0.0	Bit	1 -> 0: Reading gate off 0 -> 1: Reading gate active	0	-
Acknowledge	The toggle bit signals via positive and negative edge that data has been processed by the master.	0.4	Bit	0 -> 1: Data have been processed by the master 1 -> 0: Data have been processed by the master	0	-
Input state	Signal, resets the input data of the BCL back to quiet mode.	0.5	Bit	0: Off 1: Data reset	0	-
System reset	Signal, triggers a system reset if the level changes from 0 to 1	0.6	Bit	0: Run 0 -> 1: Reset	0	-
Standby	Signal, activates the standby function	0.7	Bit	0: Standby off 1: Standby on	0	-

Table 7.27: Output data for Module 19

Output data length: 1 byte

**7.3.17 Decoding State
Module 20**

The module indicates the state of the decoding and of the automatic decoder configuration.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Reading gate state	Signal, indicates the state of the reading gate.	0.0	Bit	0 : Off 1 : On	0	-
New result	Signal, indicates whether a new decoding result is present.	0.1	Bit	0 : No 1 : Yes	0	-
Result state	Signal, indicates whether the barcode has been read successfully.	0.2	Bit	0 : Successful reading 1 : NOREAD	0	-
Further results in the buffer	Signal, indicates whether further results are in the buffer.	0.3	Bit	0 : No 1 : Yes	0	-
Buffer overflow	Signal, indicates that result buffers are occupied and the decoder rejects data.	0.4	Bit	0 : No 1 : Yes	0	-
AutoControl status	Signal, indicates the state of the AutoControl function	0.5	Bit	0 : Off 1 : On	0	-
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.	0.6	Bit	0 : Quality good 1 : Quality bad	0	-
Standby state	Signal, indicates the current state of the standby function	0.7	Bit	0 : Off 1 : On	0	-

Table 7.28: Input data for Module 20

Input data length: 1 byte

Output Data

none

**7.3.18 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.

Parameter

none

Input Data

Module No.	Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
21-27	Reading gate state	Signal, indicates the state of the reading gate.	0.0	Bit	0 : Off 1 : On	0	-
21-27	New result	Signal, indicates whether a new decoding result is present.	0.1	Bit	0 : No 1 : Yes	0	-
21-27	Result state	Signal, indicates whether the barcode has been read successfully.	0.2	Bit	0 : Successful reading 1 : NOREAD	0	-
21-27	Further results in the buffer	Signal, indicates whether further results are in the buffer.	0.3	Bit	0 : No 1 : Yes	0	-
21-27	Buffer overflow	Signal, indicates that result buffers are occupied and the decoder rejects data.	0.4	Bit	0 : No 1 : Yes	0	-
21-27	Actual data length	Data length of the actual barcode information.	1	UNSIGNED8	0 ... 48	0	-
21	Data	Barcode information with a length of consistently 4 bytes.	2	4 x UNSIGNED8	0 ... FFh	0	-
22	Data	Barcode information with a length of consistently 8 bytes.	2	8 x UNSIGNED8	0 ... FFh	0	-
23	Data	Barcode information with a length of consistently 12 bytes.	2	12 x UNSIGNED8	0 ... FFh	0	-
24	Data	Barcode information with a length of consistently 16 bytes.	2	16 x UNSIGNED8	0 ... FFh	0	-
25	Data	Barcode information with a length of consistently 20 bytes.	2	20 x UNSIGNED8	0 ... FFh	0	-
26	Data	Barcode information with a length of consistently 24 bytes.	2	24 x UNSIGNED8	0 ... FFh	0	-
27	Data	Barcode information with a length of consistently 28 bytes.	2	28 x UNSIGNED8	0 ... FFh	0	-

Table 7.29: Input data modules 21 - 27

Input data length: 2 bytes consistently + 4 ... 28 bytes of barcode information depending on the module

Output Data

none

**7.3.19 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.

Parameter

Parameter	Description	Value Range	Standard	Unit
Fragment length	The parameter defines the maximum length of the barcode information per fragment.	1 ... 28	0	Byte

Table 7.30: Parameters for Module 34

Parameter length: 3 bytes

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Fragment number	Current fragment number	0.0 ... 0.3	Bitarea	0 ... 16	0	-
Remaining fragments	Number of fragments which still have to be read for a complete result.	0.4 ... 0.7	Bitarea	0 ... 16	0	-
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	UNSIGN ED8	0 ... 48	0	-

Table 7.31: Input data for Module 34

Input data length: 2 bytes consistently

Output Data

Output Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
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	-

Table 7.32: Output data for Module 34

Output data length: 2 bytes consistently

7.3.20 Reading Gate Activations Module 35

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

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Reading Gate Activations	Reading gate activations since system start.	0	UNSIGNED16	0 ... 65535	0	-

Table 7.33: Input data for Module 35

Input data length: 2 bytes consistently

Output Data

none

7.3.21 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.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
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	UNSIGNED16	0 ... 65535	0	-

Table 7.34: Input data for Module 36

Input data length: 2 bytes consistently

Output Data

none

7.3.22 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.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Scans in the reading gate	Number of scans for the reading gate.	0	UNSIGNED16	0 ... 65535 If the range is exceeded, the value remains at 65535	0	-

Table 7.35: Input data for Module 37

Input data length: 2 bytes consistently

Output Data

none

7.3.23 Code Position
Module 38

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

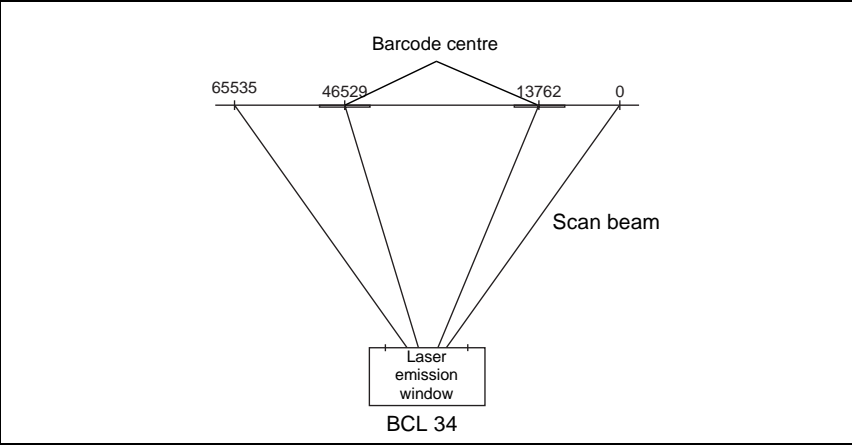


Figure 7.2: Relative position of the barcode in the scanner beam.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Code Position	Relative position of the barcode in the scanner beam. The position is standardised to the beam length. A value of 13762 means, that the middle of the barcode is located at 21% of the beam length. A value of 46529 identifies the middle of the barcode to be located at 71%.	0	UNSIGNED16	0 ... 65535	0	

Table 7.36: Input data for Module 38

Input data length: 2 bytes consistently

Output Data

none

7.3.24 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.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
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	UNSIGNED16	0 ... 65535	0	-

Table 7.37: Input data for Module 39

Input data length: 2 bytes consistently

Output Data

none

7.3.25 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.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Scans per barcode	Number of scans between the first and the last detection of the barcode.	0	UNSIGNED16	0 ... 65535	0	-

Table 7.38: Input data for Module 40

Input data length: 2 bytes consistently

Output Data

none

7.3.26 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.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Scans with information per barcode	See above	0	UNSIGNED16	0 ... 65535	0	-

Table 7.39: Input data for Module 41

Input data length: 2 bytes consistently

Output Data

none

7.3.27 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: $\text{Decoding quality} = \frac{\text{Scans with info}}{\text{Scans per barcode}} \times 100$

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Decoding quality	The decoding quality of the transmitted barcode	0	UNSIGNED8	0 ... 100	0	1 %

Table 7.40: Input data for Module 42

Input data length: 1 byte

Output Data

none

**7.3.28 Code Direction
Module 43**

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

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Code Direction	Code direction of the transmitted barcode	0	UNSIGNED8	0: Normal 1: Inverse	0	-

Table 7.41: Input data for Module 43

Input data length: 1 byte

Output Data

none

**7.3.29 Number Of Digits
Module 44**

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

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Number Of Digits	Number of digits of the transmitted barcode	0	UNSIGNED8	0 ... 48	0	-

Table 7.42: Input data for Module 44

Input data length: 1 byte

Output Data

none

7.3.30 Code type Module 45

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

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Code type	Code type of the transmitted barcode	0	UNSIGNED8	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	0	-

Table 7.43: Input data for Module 45

Input data length: 1 byte

Output Data

none

7.3.31 Alignment Mode
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.

Parameter

none

Input Data

Input Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Scans per barcode	Number of scans between the first and last detecting of the barcode	0	UNSIGNED16	0 ... 65535	0	-
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	UNSIGNED16	0 ... 65535	0	-

Table 7.44: Input data for Module 46

Input data length: 4 bytes consistently

Output Data

Output Data	Description	Addr.	Data Type	Value Range	Init Value	Unit
Alignment mode	Signal, activates the alignment mode	0.0	Bit	1 -> 0: On 0 -> 1: Off	0	-

Table 7.45: Output data for Module 46

Output data length: 4 byte consistently

8 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.

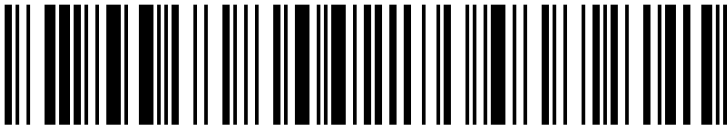
8.1 Indirect Activation via the PLC

8.1.1 Task

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

Code sample

Code 128, 15 digits



Profibus Inside

8.1.2 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:

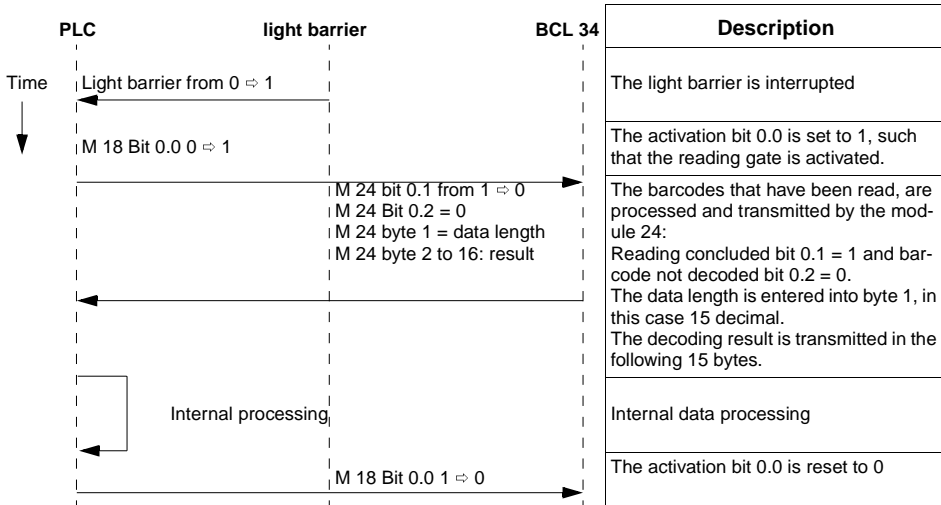
- [Activations \(Module 18\)](#)
- [Decoding Result](#) 16 bytes (Module 24)

Parameter Settings

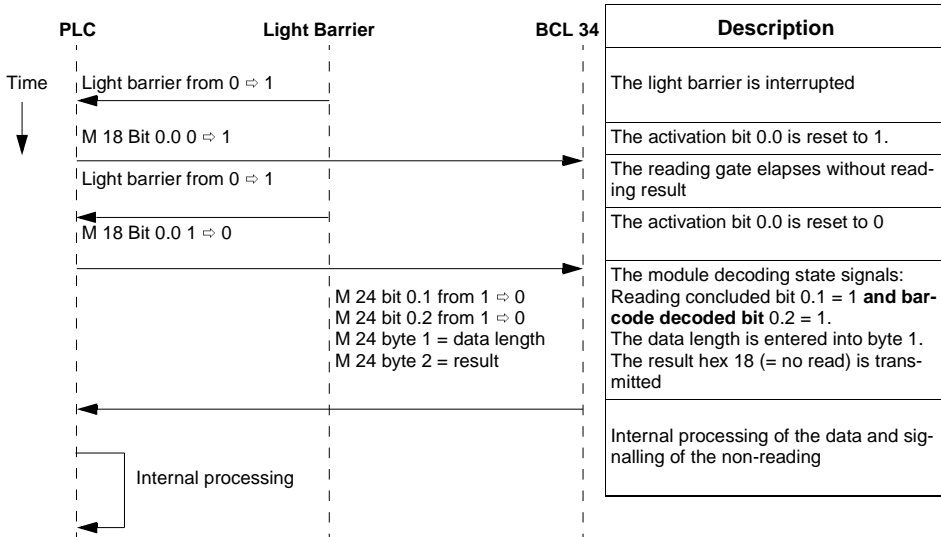
No parameters need to be set especially. The standard parameter set provides all required functions.

Flow Diagrams

Successful Reading:



Unsuccessful reading:



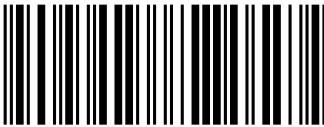
8.2 Direct Activation via the Switching Input

8.2.1 Task

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

Code sample

Code 2/5 Interleaved 12 digits with check digit



561234765436

8.2.2 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)

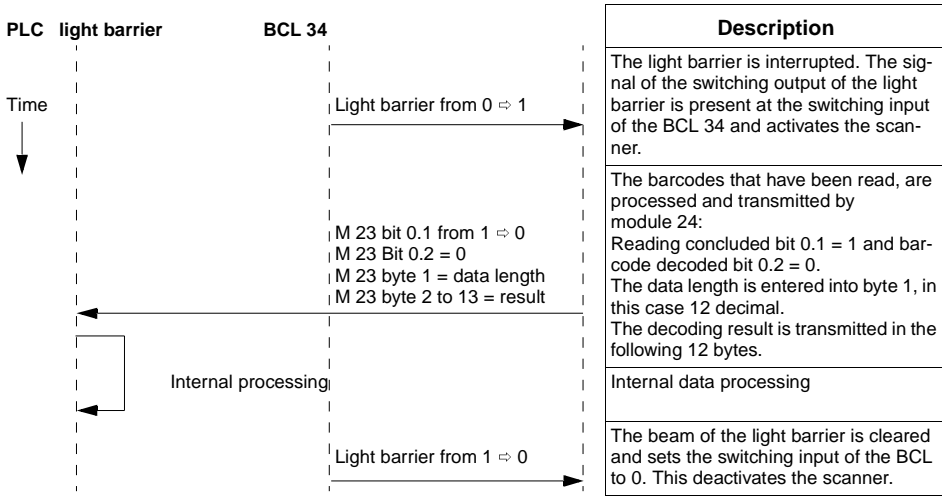
Parameter Settings

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)

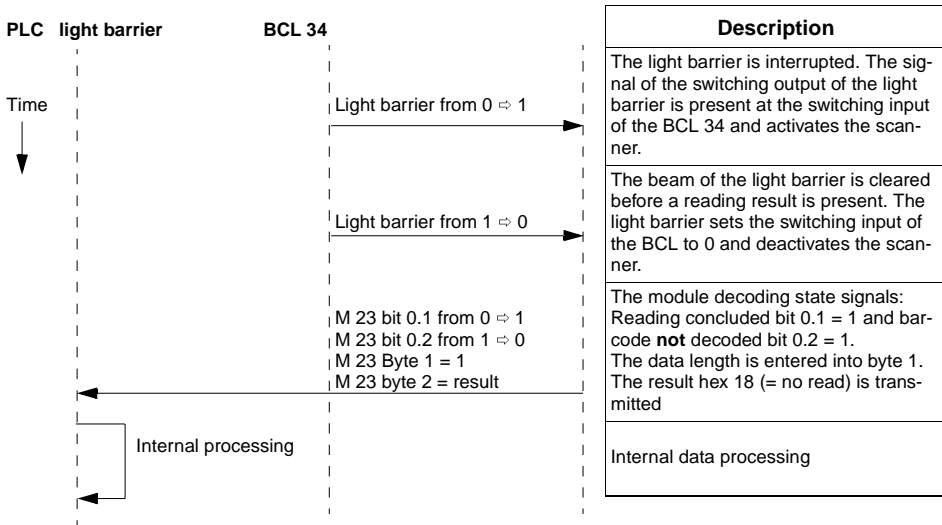
Table 8.1: Device parameters for example configuration 2

Flow Diagrams

Successful reading:



Unsuccessful reading:



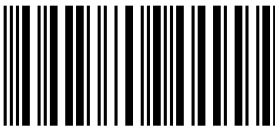
8.3 Direct Activation via the Switching Input

8.3.1 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

8.3.2 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 bytes (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)

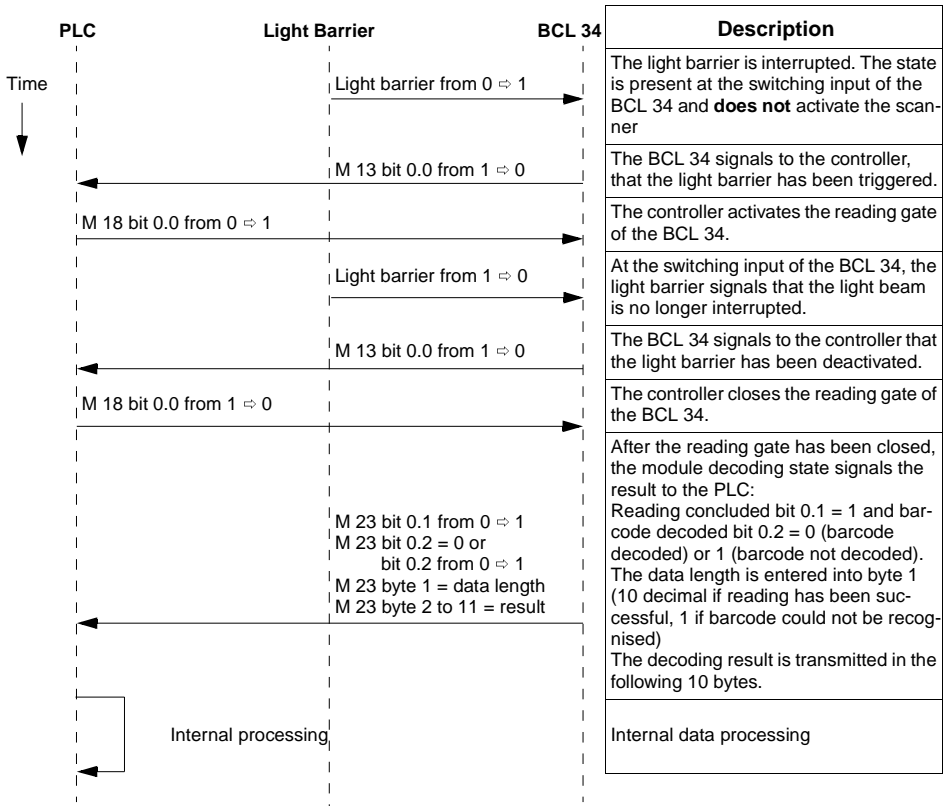
Table 8.2: Device parameters for example configuration 3

Module	Byte	Description	Init value	change value to:
Module 6	2	Reading gate termination mode	1 (dependent on deco- ding)	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 8.3: Module parameters for example configuration 3

Flow Diagrams

Successful/unsuccessful reading:



9 Commissioning

9.1 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 28.

Configuration examples together with the required modules and flow diagrams may be found in chapter "Example configurations" on page 65.

Setting the device address

The device address is set via switches in the modular hood. For setting instructions refer to chapter 6.3.

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

9.2 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 4.2 on page 12.

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).

9.2.1 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 activation of the service interface takes place via a switch in the modular service display.

Connection

To test the functioning of the BCL 34 with the user software "BCLConfig 3.0" (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.

10 Maintenance

10.1 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.

10.2 Repairs, Servicing

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

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



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