

Original operating instructions

## BCL 358*i* Bar code readers



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## 1 General information

### 1.1 Explanation of symbols

The symbols used in this technical description are explained below.

⚠ ATTENTION!	
	This symbol precedes text messages which must strictly be observed. Failure to observe the provided instructions could lead to personal injury or damage to equipment.
⚠ ATTENTION LASER!	
	This symbol warns of possible danger caused by hazardous laser radiation.
NOTE	
	This symbol indicates text passages containing important information.

### 1.2 Declaration of Conformity

The bar code readers of the BCL 300*/*series have been developed and manufactured in accordance with the applicable European standards and directives.

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



## 2 Safety

The bar code readers of the BCL 3xx/i series were developed, manufactured and tested in accordance with the applicable safety standards. They correspond to the state of the art.



### 2.1 Intended use


Bar code readers of the BCL 3xx/i series are conceived as stationary, high-speed scanners with integrated decoder for all current bar codes used for automatic object detection.



#### Areas of application

The bar code readers of the BCL 3xx/i series are especially designed for the following areas of application:

- Storage and conveying technologies, in particular for object identification on fast-moving conveyor belts
- Pallet transport systems
- Automobile sector
- Omnidirectional reading

 <b>CAUTION!</b>	
	<p><b>Observe intended use!</b></p> <p>⚠ Only operate the device in accordance with its intended use. The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not complying with its intended use.</p> <p>Leuze electronic GmbH + Co. KG is not liable for damages caused by improper use.</p> <p>⚠ Read the technical description before commissioning the device. Knowledge of this technical description is an element of proper use.</p>

<b>NOTE</b>	
	<p><b>Comply with conditions and regulations!</b></p> <p>⚠ Observe the locally applicable legal regulations and the rules of the employer's liability insurance association.</p>


 <b>ATTENTION!</b>	
	<p>For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).</p>

### 2.2 Foreseeable misuse

Any use other than that defined under "Intended use" or which goes beyond that use is considered improper use.

In particular, use of the device is not permitted in the following cases:

- in rooms with explosive atmospheres
- as stand-alone safety component in accordance with the machinery directive <sup>1)</sup>
- for medical purposes

<b>NOTE</b>	
	<p><b>Do not modify or otherwise interfere with the device!</b></p> <p>⚠ Do not carry out modifications or otherwise interfere with the device.</p> <p>The device must not be tampered with and must not be changed in any way.</p> <p>The device must not be opened. There are no user-serviceable parts inside.</p> <p>Repairs must only be performed by Leuze electronic GmbH + Co. KG.</p>

<sup>1)</sup> Use as safety-related component within the safety function is possible, if the component combination is designed correspondingly by the machine manufacturer.

### 2.3 Competent persons

Connection, mounting, commissioning and adjustment of the device must only be carried out by competent persons.

Prerequisites for competent persons:

- They have a suitable technical education.
- They are familiar with the rules and regulations for occupational safety and safety at work.
- They are familiar with the technical description of the device.
- They have been instructed by the responsible person on the mounting and operation of the device.

#### Certified electricians

Electrical work must be carried out by a certified electrician.

Due to their technical training, knowledge and experience as well as their familiarity with relevant standards and regulations, certified electricians are able to perform work on electrical systems and independently detect possible dangers.


In Germany, certified electricians must fulfill the requirements of accident-prevention regulations DGUV V3 (e.g. electrician foreman). In other countries, there are respective regulations that must be observed.

### 2.4 Exemption of liability

Leuze electronic GmbH + Co. KG is not liable in the following cases:

- The device is not being used properly.
- Reasonably foreseeable misuse is not taken into account.
- Mounting and electrical connection are not properly performed.
- Changes (e.g., constructional) are made to the device.

### 2.5 Laser safety notices

⚠ ATTENTION, LASER RADIATION – CLASS 1 LASER PRODUCT	
	The device satisfies the requirements of IEC/EN 60825-1:2014 safety regulations for a product of <b>laser class 1</b> and complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
	↪ Observe the applicable statutory and local laser protection regulations.
	↪ The device must not be tampered with and must not be changed in any way.
	There are no user-serviceable parts inside the device.
	Repairs must only be performed by Leuze electronic GmbH + Co. KG.
CAUTION: Opening the device can lead to dangerous exposure to radiation!	

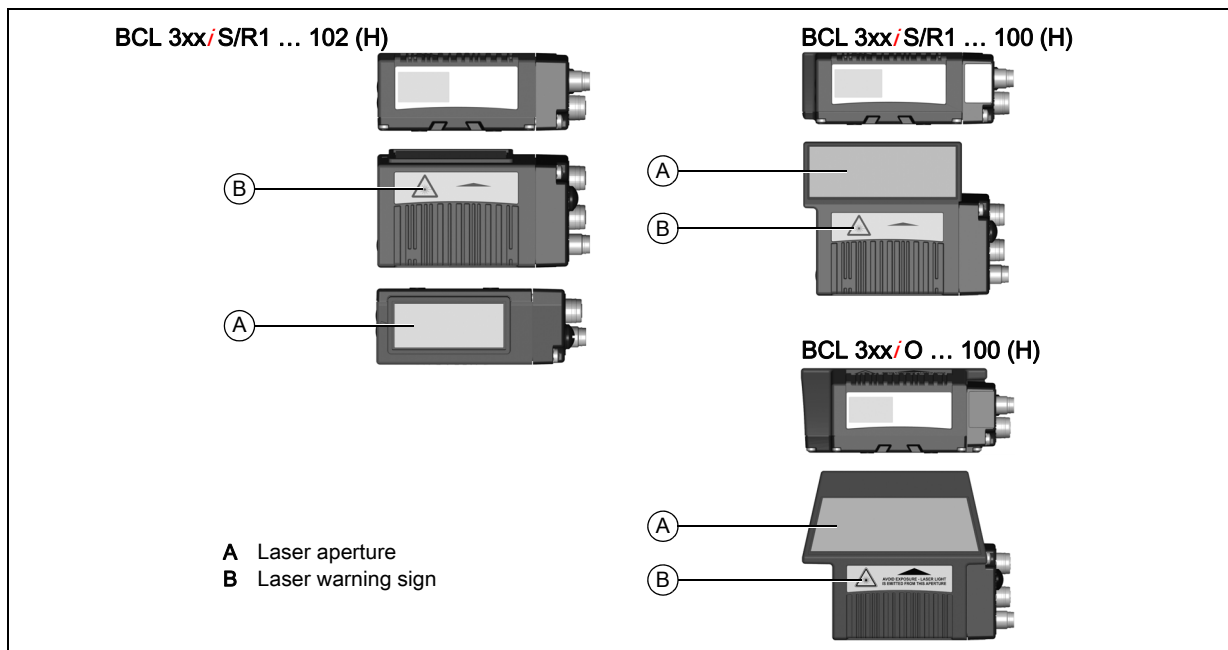


Figure 2.1: Laser apertures, laser warning signs

### 3 Fast commissioning / operating principle

Below you will find a short description for the initial commissioning of the BCL 358/. Detailed explanations for all listed points can be found throughout this technical description.

#### 3.1 Mounting the BCL 358/

The BCL 358/ bar code readers can be mounted in two different ways:


- Via four M4x6 screws on the device bottom.
- Via a BT 56 mounting device in the fastening groove on the housing bottom.

#### 3.2 Device arrangement and selection of the 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 358/ in relation to the bar code module width.
- The resulting minimum and maximum reading distance from the respective reading field.
- The permissible cable lengths between the BCL 358/ and the host system depending on which interface is used.
- The correct time for data output. The BCL 358/ should be positioned in such a way that, taking into consideration the time required for data processing and the conveyor belt speed, there is sufficient time to e.g. initiate sorting operations on the basis of the read data.
- The display and control panel should be very visible and accessible.
- For configuring and commissioning with the webConfig tool, the USB interface should be easily accessible.

For specific information, please refer to Chapter 6 and Chapter 7.

NOTE	
	<p>The beam of the BCL 358/ exits:</p> <ul style="list-style-type: none"> <li>- <b>Parallel</b> to the <b>housing base</b> in the case of the line scanner</li> <li>At <b>105 degrees</b> from the <b>housing base</b> in the case of the deflecting mirror</li> <li>- <b>Perpendicular</b> to the <b>housing base</b> in the case of the oscillating mirror</li> </ul> <p>In each case, the housing base is the black area in Figure 6.2. The best read results are obtained when:</p> <ul style="list-style-type: none"> <li>• The BCL 358/ is mounted in such a way that the scanning beam is incident on the bar code at an angle of inclination greater than <math>\pm 10^\circ \dots 15^\circ</math> to vertical.</li> <li>• The reading distance lies in the middle area of the reading field.</li> <li>• The bar code labels are of good print quality and have good contrast ratios.</li> <li>• You do not use high-gloss labels.</li> <li>• There is no direct sunlight.</li> </ul>

#### 3.3 BCL 358/ electrical connection

For the electrical connection of the BCL 358/, 2 connection variants are available.

The **voltage supply** (18 ... 30VDC) is connected acc. to the connection type selected.

**2 freely programmable switching inputs/outputs** for individual adaptation to the respective application are also available here. Detailed information on this topic can be found in Chapter 7.3.3.

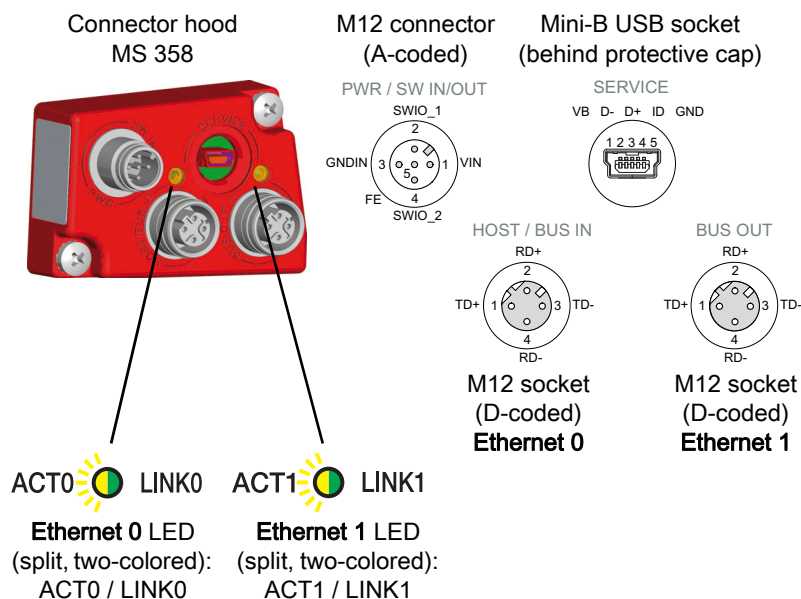
**MS 358 connector hood with 2 integrated M12 connectors**

Figure 3.1: BCL 358/- MS 358 connection hood with M12 connectors

NOTE	
	The shielding connection is done via the M12 connector housing.
NOTE	
	The integrated parameter memory for the simple replacement of the BCL 358/- is located in the MS 358. In the integrated parameter memory, both the settings and the network address are saved and transmitted to a new device.
NOTE	
	In the case of Ethernet linear topology, the network is interrupted when the BCL 301/- is removed from the MS 358.

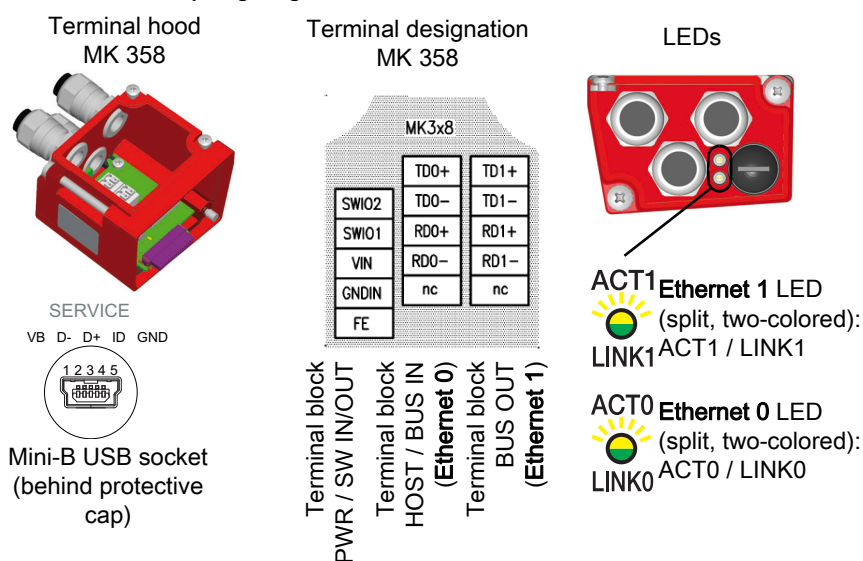
**MK 358 terminal hood with spring-cage terminals**

Figure 3.2: BCL 358/- MK 358 terminal hood with spring-cage terminals

**NOTE**

The integrated parameter memory for the simple replacement of the BCL 358/i is located in the MK 358. In the integrated parameter memory, both the settings and the network address are saved and transmitted to a new device.

**NOTE**

In the case of Ethernet linear topology, the network is interrupted when the BCL 358/i is removed from the MK 358.

**Cable fabrication and shielding connection**

Remove approx. 78 mm of the connection cable sheathing. 15 mm of sheath of the shielded line must be freely accessible.

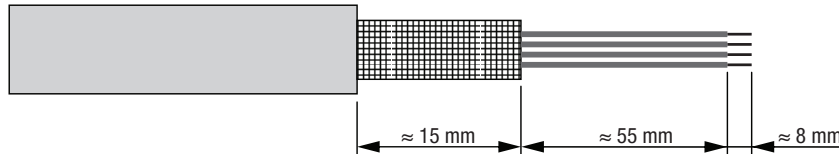


Figure 3.3: Cable fabrication for MK 358 terminal hood

The shield is automatically contacted when the cable is lead into the metal screw fitting and fastened when the cord grip is closed. Then lead the individual wires into the terminals according to the diagram. Wire end sleeves are not necessary.

**3.4 Preparatory settings – EtherNet/IP**

↪ Connect the +18 ... 30VDC supply voltage (typ. +24VDC); the BCL 358/i starts up.

**3.4.1 BCL 358/i to EtherNet/IP**

Commissioning on the EtherNet/IP is performed according to the following scheme:

1. **Address assignment**
  - Automatic via DHCP, BootP or
  - Manual via webConfig (with a USB connection)
2. **Configuration of the participant** depending on the version of the control software:
  - Either with the generic Ethernet module or
  - Installation of the EDS file
3. **Transferring the data** to the control
4. **Adapting the device parameters** via webConfig
5. **Use explicit messaging services**

**NOTE**

On delivery, the automatic address assignment via DHCP server is defined as the standard setting of the BCL 358/i and the IP address is set to 0.0.0.0.

The BCL 358/i can be configured in the planning tool/control using the **EDS file** (Electronic Data Sheet) if the control supports this. PLC software **RSLogix 5000** from **Rockwell** offers EDS support for EtherNet/IP from software version 20.00 and up.

Without PLC support of the EDS integration, the settings are made via the **generic Ethernet module**. In this case, the respective configuration must be entered and adapted manually for each device. The parameter download from the control to the BCL 358/i is performed during every establishment of connection. Since the parameters are stored centrally in the control, this helps during device exchange.

### 3.4.2 Manual configuration of the IP address

If your system does not include a DHCP server or if the IP addresses of the devices are to be set permanently, proceed as follows:

- Have the network administrator specify the data for IP address, net mask and gateway address of the BCL 358/.
- Set the IP address manually via the BootP/DHCP server tool and deactivate the DHCP operation in the BCL 358/. The BCL 358/ automatically adopts these settings. A restart is not required.

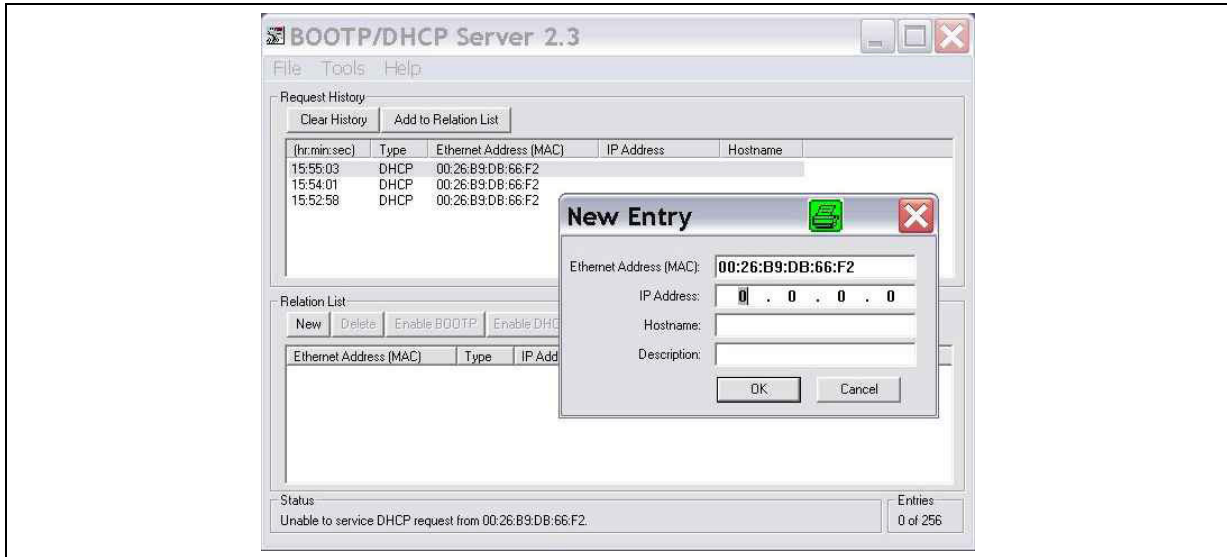


Bild 3.4: Manual configuration of the IP address

Alternatively, you can set the IP address manually via the webConfig tool. Proceed as follows:

- Have the network administrator specify the data for IP address, net mask and gateway address of the BCL 358/.
- Connect the BCL 358/ to your computer using the service cable.
- Set these values on the BCL 358/. Via webConfig:  
Configuration > Communication > Ethernet interface

#### NOTE



If the IP address is set via the webConfig tool, then it becomes active after transfer to the device. A restart is not required.

### 3.4.3 Configuration of the participant

#### Configuration with the generic Ethernet module

In the RSLogix 5000 configuration tool (up to software version 20.00), a so-called **generic Ethernet module** is created under the Communication path for the BCL 358*i*.

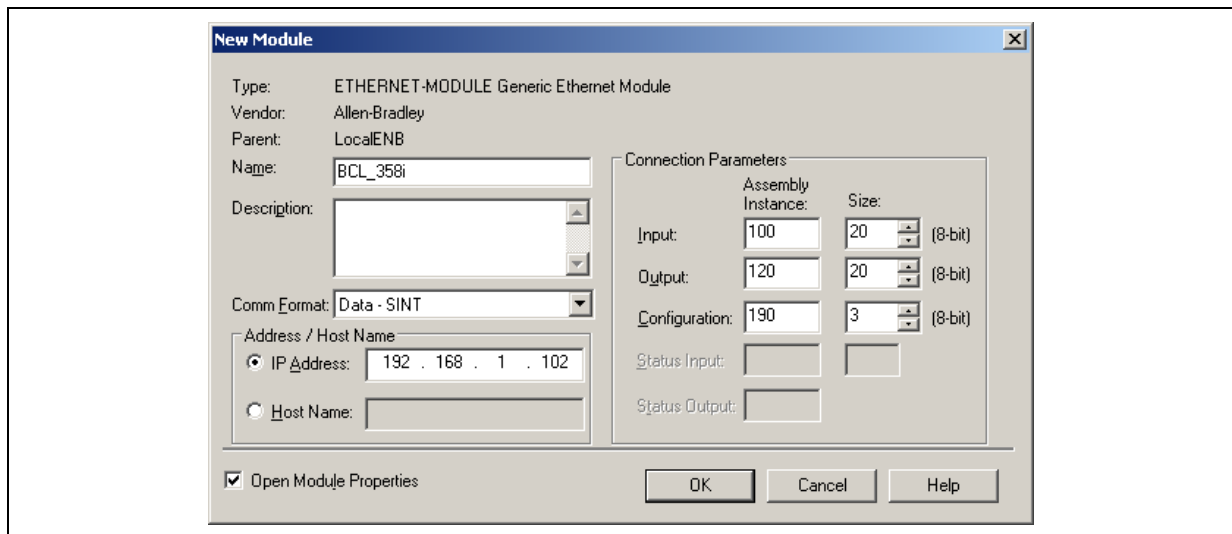


Bild 3.5: Generic Ethernet module

The input mask for the generic module describes the following parameters to be set:

- The name of the participant (can be selected freely; e.g. BCL 358*i*)
- The format of I/O data (data - SINT = 8 bits)
- The IP address of the participant
- The address and length of the input assembly (instance 100, instance 101 or instance 102; min 1 byte - up to max. 266 bytes for the default input assembly of the read results).
- The address and length of the output assembly (instance 120, instance 121 or instance 122; min 1 byte - up to max. 263 bytes for the default output assembly)
- The address and length of the configuration assembly (instance 190; 3 bytes)

For the exact description of the assemblies for input/output and configuration, please refer to Chapter 10.

**Configuration of the participant using the EDS file**

From software version 20.00 and up, proceed as follows in the **RSLogix 5000** configuration tool to create the BCL 358/i as an EtherNet/IP participant in your system:

- First, load the EDS file for the device via EDS wizard into the PLC database.

NOTE	
	You can find the EDS file at: <a href="http://www.leuze.com">www.leuze.com</a> .

- After it has downloaded, select the device from the device list.
- Open the input dialog for setting the address and additional parameters by double-clicking on the device symbol and make the desired entries here.
- Finally, transmit the values to the control via download.

**3.4.4 Transferring the data to the control (RSLogix 5000 specific)**

- Activate the online mode
- Select the Ethernet communication port
- Select the processor onto which the project is to be transferred
- Set the control to PROG
- Start the download
- Set the control to RUN

**3.5 Further settings**

After the basic configuration of the operating mode and the communication parameters, you need to carry out further settings:









- Decoding and processing the read data
  - ↳ Define at least one code type with the desired settings.
    - Via webConfig:  
Configuration -> Decoder
- Control of the decoding
  - ↳ Configure the connected switching inputs according to your requirements. To do this, first set the *I/O mode* to *Input* and then configure the switching behavior:
    - Via webConfig:  
Configuration > Device > Switching inputs/outputs
- Control of the switching outputs
  - ↳ Configure the connected switching outputs according to your requirements. To do this, first set the *I/O mode* to *Output* and then configure the switching behavior:
    - Via webConfig:  
Configuration > Device > Switching inputs/outputs

### 3.6 Starting the device







🔌 Connect the +18 ... 30VDC supply voltage (typ. +24VDC).

The BCL 358/ starts up, the **PWR** and **NET** LEDs display the operating state. If there is a display, the bar code reading window appears in it.

#### PWR LED

PWR 	Off	Device OFF, no supply voltage
PWR 	Green, flashing	Device ok, initialization phase
PWR 	Green, continuous light	Power On, device OK
PWR 	Green, briefly off - on	Good read, successful reading
PWR 	Green, briefly off - briefly red - on	No read, reading not successful
PWR 	Orange, continuous light	Service mode
PWR 	Red, flashing	Warning set
PWR 	Red, continuous light	Error, device error

#### NET LED

NET 	Off	Device OFF, no supply voltage, no IP address assigned
NET 	Green, flashing	LED self test, no EtherNet/IP communication, no master assignment
NET 	Green, continuous light	Bus communication ok
NET 	Red, flashing	LED self test, timeout in bus communication
NET 	Red, continuous light	Double IP address
NET 	Green/red, flashing	Self test

#### ACT0 / LINK0 LED (on the MS 358/MK 358)

ACT0 LINK0 	Green, continuous light	Ethernet connected (LINK)
	Yellow, flashing	Data communication (ACT)

#### ACT1 / LINK1 LED (on the MS 358/MK 358)

ACT1 LINK1 	Green, continuous light	Ethernet connected (LINK)
	Yellow, flashing	Data communication (ACT)

## NOTE



The detailed description of the LED states can be found in Chapter 8.

If a display is available, the following information appears successively during startup:

- Startup
- Device designation e.g. BCL 358i SM 102 D
- Reading Result

If Reading Result is displayed, the device is ready.

**Operation of BCL 358/**

After voltage (18 ... 30VDC) has been connected to the switching input, a read process is activated. In the standard setting, all common code types for decoding are released; only the **2/5 Interleaved** code type is limited to 10 digits of code content.

If a code is moved through the reading field, the code content is decoded and forwarded to the superior system (PLC/PC) via Ethernet.

### 3.7 Bar code reading

To test, you can use the following bar code in the 2/5 Interleaved format. The bar code module here is 0.5:



Provided your BCL 358/i model has a display, the read information appears on this display. The **PWR** LED goes off briefly and then turns green again. Simultaneously, the read information is forwarded to the superior system (PLC/PC) via the Ethernet.

Please check the incoming data of the bar code information there.

Alternatively, you can use a switching input for read activation (switching signal of a photoelectric sensor or 24VDC switching signal).

## 4 Device description

### 4.1 About the bar code readers of the BCL 300*i* series

Bar code readers of the BCL 300*i* series are high-speed scanners with integrated decoder for all commonly used bar codes, e.g. 2/5 Interleaved, Code 39, Code 128, EAN 8/13 etc., as well as codes from the GS1 DataBar family.

Bar code readers of the BCL 300*i* series are available in various optics models as well as line scanners, line scanners with deflecting mirrors and also optionally as heated models.

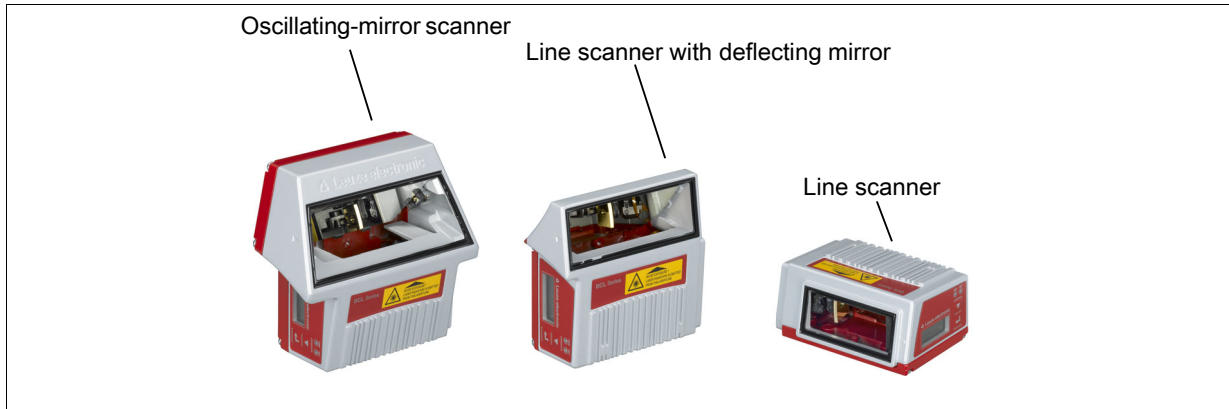


Figure 4.1: Line scanner, line scanner with deflecting mirror and oscillating-mirror scanner

The many possible configurations of the device allow it to be adapted to a multitude of reading tasks. Due to the large reading distance combined with the great depth of field, a large opening angle and a very compact construction, the device is ideally suited for the conveyor and storage technology market.

The interfaces (**RS 232**, **RS 485** and **RS 422**) integrated in the various device models and the fieldbus systems (**PROFIBUS DP**, **PROFINET-IO**, **Ethernet TCP/IP UDP**, **Ethernet/IP** and **EtherCAT**) offer optimum connection to the superior host system.

### 4.2 Characteristics of the bar code readers of the BCL 300*i* series

Performance characteristics:

- Integrated fieldbus connectivity = *i* -> Plug-and-Play fieldbus coupling and easy networking
- Numerous interface variants facilitate connection to the superior systems
  - RS 232, RS 422
  - RS 485 and multiNet plus slave

Alternatively, various fieldbus systems, such as

- PROFIBUS DP
- PROFINET-IO
- Ethernet TCP/IP UDP
- EtherNet/IP
- EtherCAT

- Integrated code reconstruction technology (**CRT**) enables the identification of soiled or damaged bar codes
- Maximum depth of field and reading distances from 30 mm to 700 mm
- Large optical opening angle and, thus, large reading field width
- High scanning rate with 1000 scans/s for fast reading tasks
- On request with display to easily detect and activate functions and status messages.
- Integrated USB service interface, Mini-B type
- Easy alignment and diagnostics functions
- Up to four possible connection technologies
- Two freely programmable switching inputs/outputs for the activation or signaling of states
- Automatic monitoring of the read quality with **autoControl**
- Automatic recognition and setting of the bar code type using **autoConfig**
- Reference code comparison
- Optional heating models to -35°C
- Heavy-duty housing of degree of protection IP 65

**NOTE**

For information on technical data and characteristics, refer to Chapter 5.

**General information**

The integrated fieldbus connectivity = / contained in the bar code readers of the BCL 300 / series facilitates the use of identification systems which function without connection unit or gateways. The integrated fieldbus interface considerably simplifies handling. The Plug-and-Play concept enables easy networking and very simple commissioning: Directly connect the respective fieldbus and all configuration is performed with no additional software.

For decoding bar codes, the bar code readers of the BCL 300 / series make available the proven **CRT decoder** with code reconstruction technology:

The proven code reconstruction technology (**CRT**) enables bar code readers of the BCL 300 / series to read bar codes with a small bar height, as well as bar codes with a damaged or soiled print image.

With the aid of the **CRT decoder**, bar codes can also be read without problem in other demanding situations, such as with a large tilt angle (azimuth angle or even twist angle).

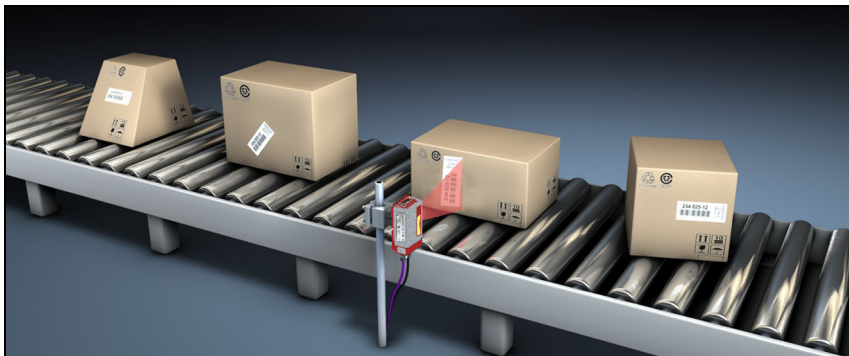


Figure 4.2: Possible bar code orientation

The BCL 358 / can be operated and configured using the integrated webConfig tool via the USB service interface; alternatively, the bar code readers can be adjusted using configuration commands via the host / service interface.

The BCL 358 / needs a suitable activation to start a read process as soon as an object is in the reading field. This opens a time window ("reading gate") in the BCL 358 / for the read process during which the bar code reader has time to detect and decode a bar code.

In the basic setting, triggering takes place through an external reading cycle signal. Alternative activation options include online commands via the host interface and the **autoReflAct** function.

Through the read operation, the BCL 358 / collects additional useful pieces of data for diagnostics which can also be transmitted to the host. The quality of the read operation can be inspected using the **alignment mode** which is integrated in the webConfig tool.

An optional, multi-language display with buttons is used to operate the BCL 358/i as well as for visualization purposes. Two LEDs provide additional optical information on the current operating state of the device. The two freely configurable switching inputs/outputs **SWIO1** and **SWIO2** can be assigned various functions and control e.g. activation of the BCL 358/i or external devices, such as a PLC. System, warning and error messages provide assistance in setup/troubleshooting during commissioning and read operation.

### 4.3 Device construction

#### BCL 358/i Bar code reader

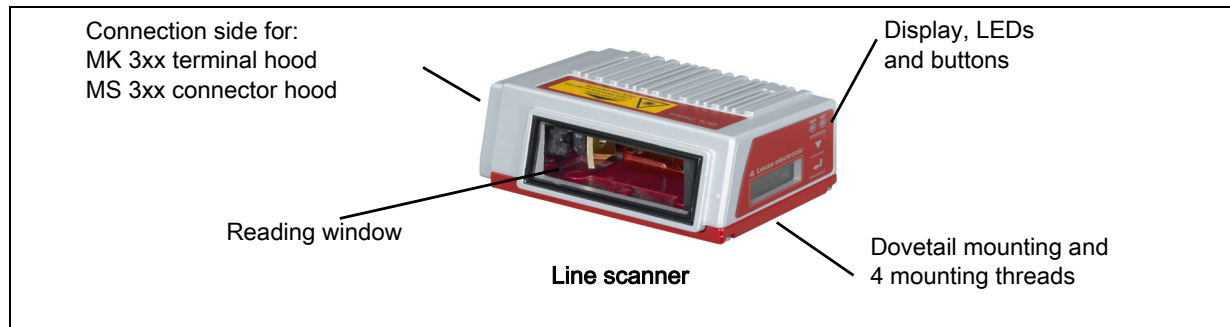


Figure 4.3: BCL 358/i device construction - line scanner

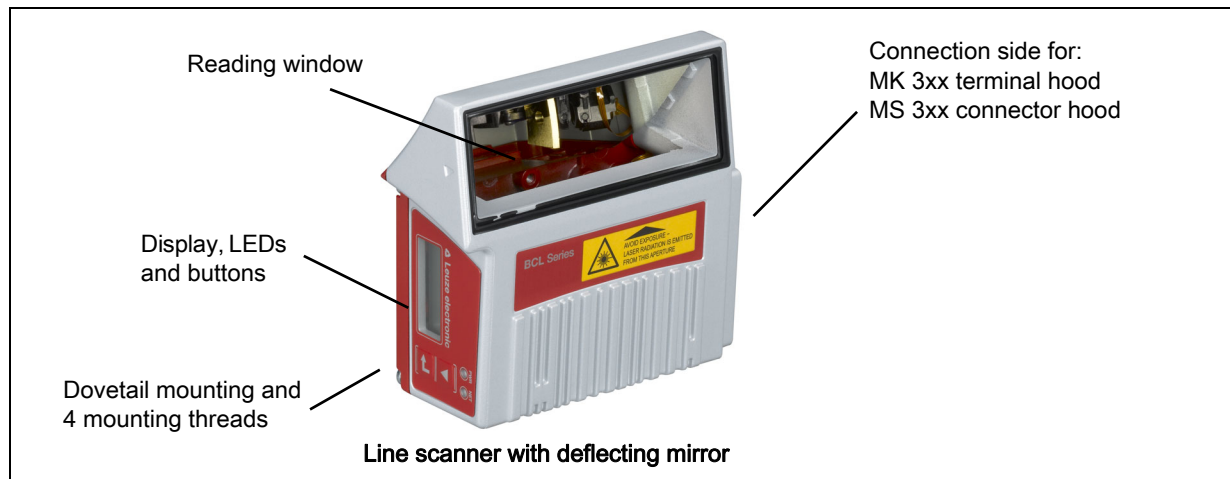


Figure 4.4: Device construction BCL 358/i - Line scanner with deflecting mirror

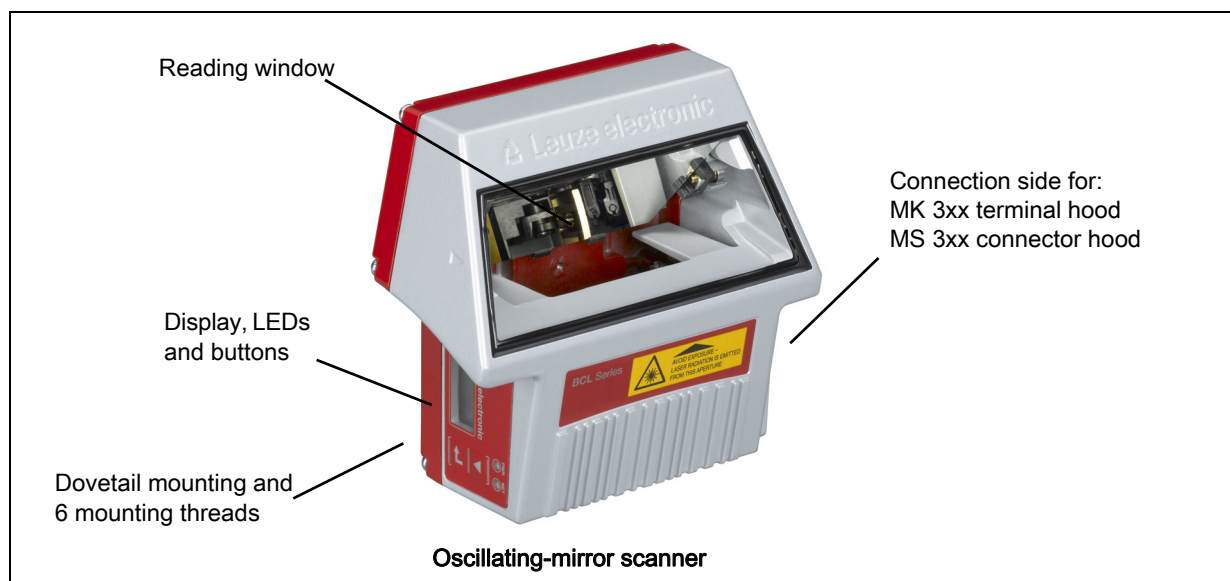


Figure 4.5: BCL 358/i device construction - oscillating-mirror scanner

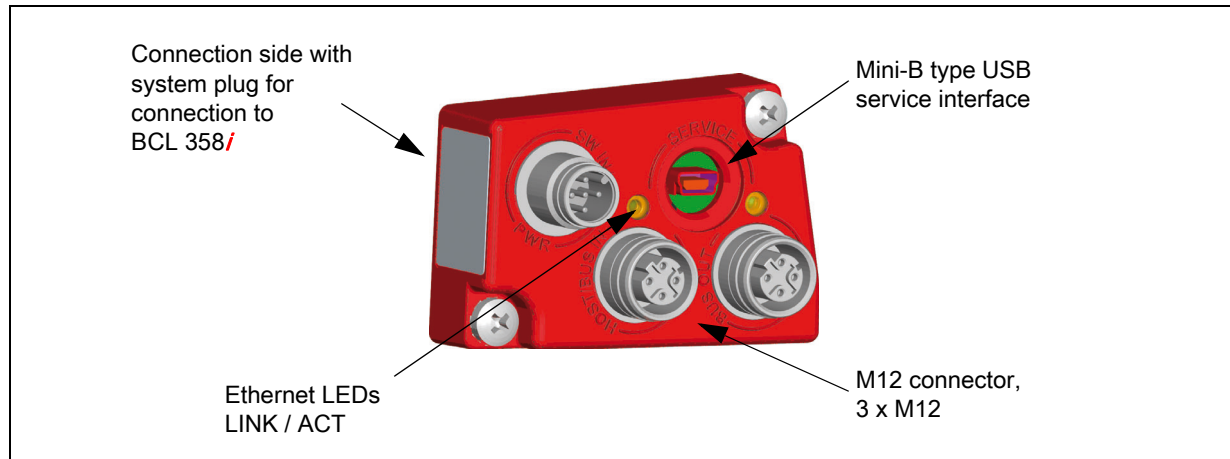
**MS 358 connector hood**

Figure 4.6: Device construction - MS 358 connector hood

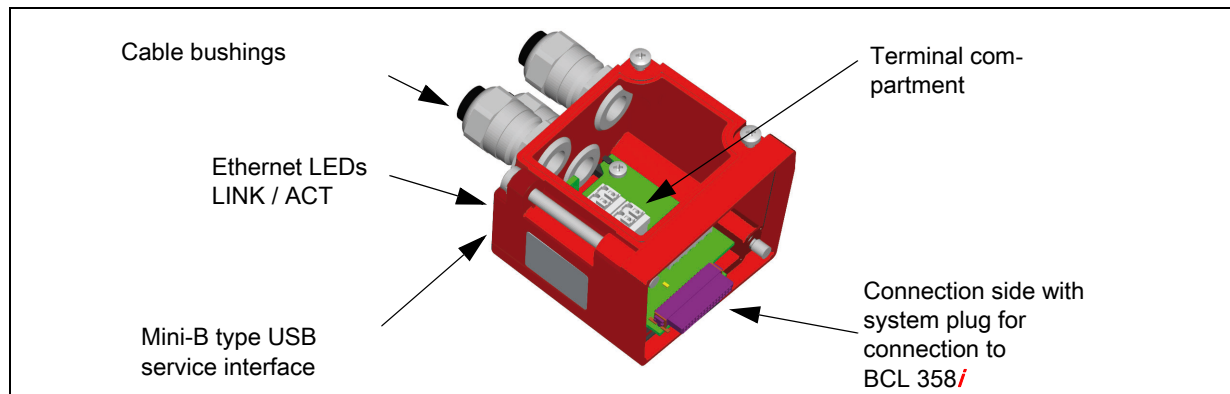
**MK 358 terminal hood**

Figure 4.7: Device construction - MK 358 terminal hood

**4.4 Reading techniques****4.4.1 Line scanner (single line)**

A line (scan line) scans the label. Due to the opt. opening angle, the reading field width is dependent on the read distance. Through the movement of the object, the entire bar code is automatically transported through the scan line.

The integrated code reconstruction technology permits twisting of the bar code (tilt angle) within certain limits. These are dependent on the transport speed, the scanning rate of the scanner and the bar code properties.

**Areas of application of the line scanner**

The line scanner is used:

- when the bars of the bar code are printed in the conveying direction ('ladder arrangement').
- with bar codes having very short bar lengths.
- when the ladder code is turned out of the vertical position (tilt angle).
- when the reading distance is large.



Figure 4.8: Deflection principle for the line scanner

#### 4.4.2 Line scanner with oscillating mirror

The oscillating mirror deflects the scan line additionally to both sides across the scan direction at a randomly adjustable oscillation frequency. In this way, the BCL 358/i can also scan larger areas or spaces for bar codes. The reading field height (and the scan line length useful for evaluation) depends on the reading distance due to the optical opening angle of the oscillating mirror.

##### Areas of application of the line scanner with oscillating mirror

For line scanners with oscillating mirror, oscillation frequency, start/stop position etc. are adjustable. It is used:

- when the position of the label is not fixed, e.g. on pallets – various labels can, thus, be detected at various positions.
- when the bars of the bar code are printed perpendicular to the conveying direction ("picket fence arrangement").
- when reading stationary objects.
- when a large reading field (reading window) has to be covered.

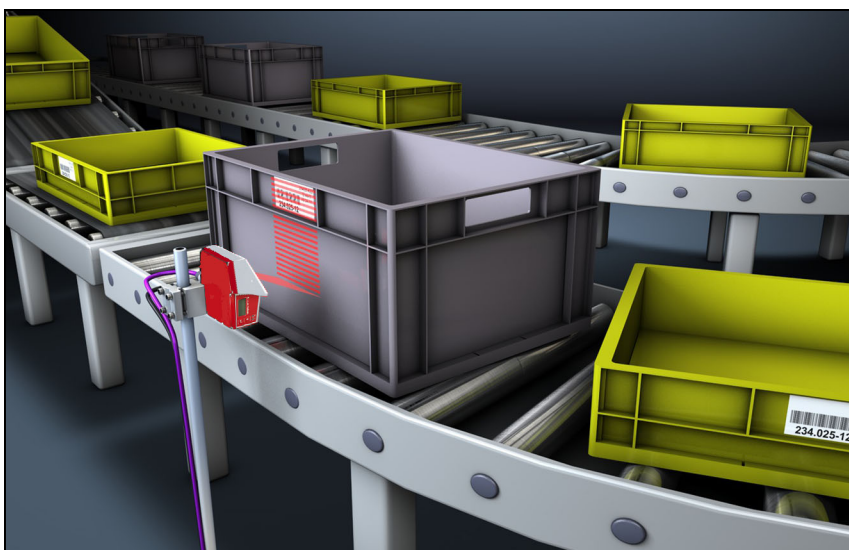


Figure 4.9: Deflection principle for the line scanner with oscillating mirror add-on

#### 4.4.3 Raster scanner (raster line)

Multiple scan lines scan the label. Due to the optical opening angle, the reading field width is dependent on the read distance. Provided the code is located in the reading field, it can be read during standstill. If the code moves through the reading field, it is scanned by multiple scan lines.

The integrated code reconstruction technology permits twisting of the bar code (tilt angle) within certain limits. These are dependent on the transport speed, the scanning rate of the scanner and the bar code properties. In most cases, everywhere a line scanner is used, a raster scanner can be used.

##### Areas of application of the raster scanner:

The raster scanner is used:

- When the bars of the bar code are perpendicular to the conveying direction (picket fence arrangement)
- With bar codes with low height displacement
- With very glossy bar codes

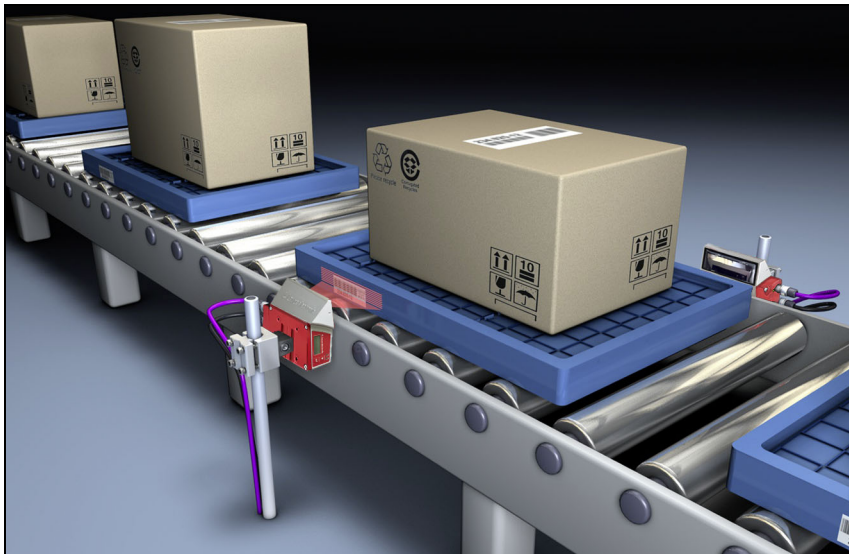


Figure 4.10: Deflection principle for the raster scanner

##### NOTE



With the raster scanner, there may not be two or more bar codes in the raster area of the BCL at the same time.

## 4.5 Fieldbus systems

Various product variants of the BCL 300/series are available for connecting to different fieldbus systems such as PROFIBUS DP, PROFINET, Ethernet, EtherNet/IP and EtherCAT.

### 4.5.1 EtherNet/IP

The BCL 358/ is designed as an EtherNet/IP device (acc. to IEEE 802.3) with a standard baud rate of 10/100 Mbit. EtherNet/IP makes use of the Common Industrial Protocol (**CIP**) as an application layer for the user. The functionality of the device is defined via parameter sets which are clustered in objects, classes and instances. These are contained in an **EDS** file which, depending on the version of the control software, can be used to configure and integrate the BCL 358/ into the system. A fixed MAC ID is assigned to each BCL 358/ by the manufacturer; this address cannot be changed.

The BCL 358/ automatically supports the transmission rates of 10 Mbit/s (10Base T) and 100 Mbit/s (100Base TX), as well as auto-negotiation and auto-crossover.

The BCL 358/ features optionally an MS 358 connector hood or MK 358 terminal hood for the electrical connection of the supply voltage, the interface and the switching inputs and outputs.

Additional information on the electrical connection can be found in Chapter 7.

The BCL 358*i* supports the following protocols and services:

- EtherNet/IP
- DHCP
- HTTP
- ARP
- PING
- Telnet
- BootP

#### NOTE



The BCL 358*i* communicates via the Common Industrial Protocol (CIP).  
CIP Safety, CIP Sync and CIP Motion are not supported by the BCL 358*i*.

Further information on commissioning can be found in Chapter 10.

### 4.5.2 Ethernet – star topology

The BCL 358*i* can be operated as a single device (stand-alone) in an Ethernet star topology with individual IP address.

The IP address can either be set manually and permanently via BootP/webConfig tool or assigned dynamically via a DHCP server.

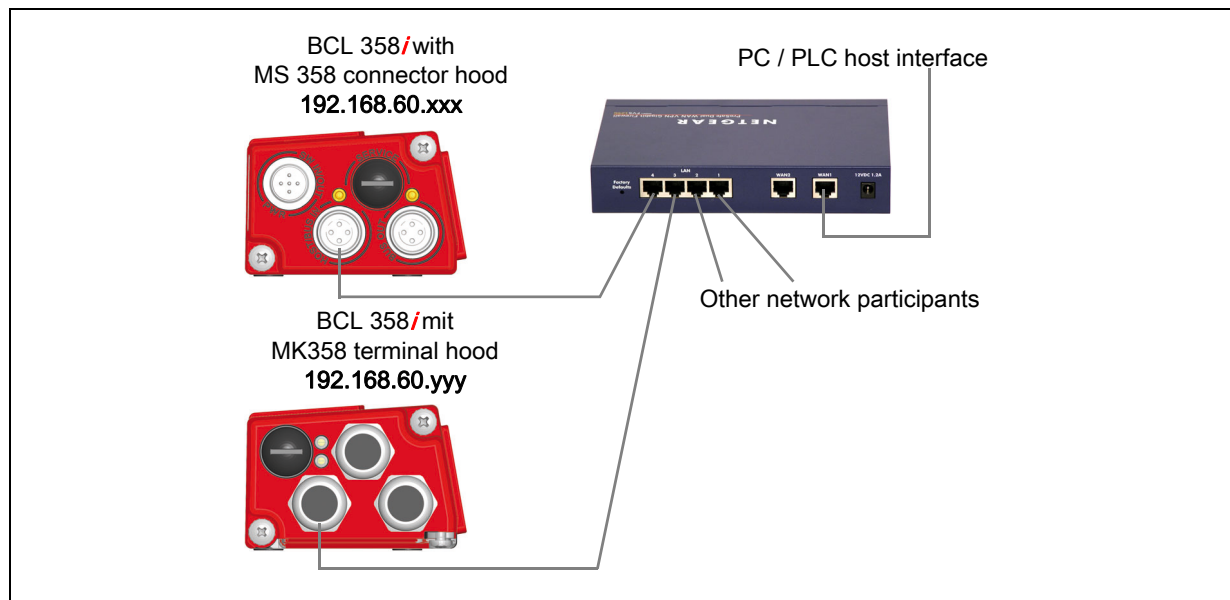


Figure 4.11: Ethernet in a star topology

#### NOTE



The BCL 358*i* does **not** support the DLR (Device Level Ring) ring structure determined by the ODVA.

### 4.5.3 Ethernet – linear topology

The innovative further development of the BCL 358*i* with integrated switch functionality offers the option of connecting multiple bar code readers of type BCL 358*i* to one another without direct connection to a switch. In addition to the classic "star topology", a "linear topology" is thus also possible.

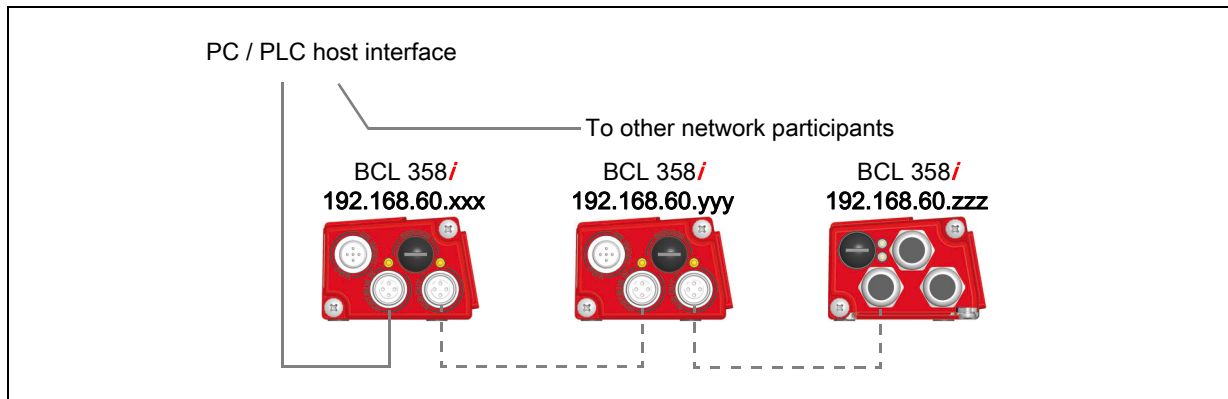


Figure 4.12: Ethernet in a linear topology

Each participant in this network requires its own unique IP address which is assigned to it via the DHCP process. Alternatively, the address can be permanently assigned to it manually via BootP or webConfig tool.

The maximum length of a segment (connection from the hub to the last participant) is limited to 100m.

#### NOTE



The BCL 358/i does **not** support the DLR (Device Level Ring) ring structure determined by the ODVA.

## 4.6 Heating

For low-temperature applications to min. -35°C (e.g. in cold storage), the bar code readers of the BCL 358/i series can optionally be permanently fitted with a built-in heating and these bar code readers purchased as separate device models.

## 4.7 External parameter memory in the MS 358 / MK 358

The parameter memory available in the MS 358 or MK 358 simplifies and speeds up the process of exchanging a BCL 358/i on-site by providing a copy of the current parameter set of the BCL 358/i and by storing the address as well. This eliminates the need to configure the exchanged device manually and, in particular, a reassignment of the address – the control can immediately access the exchanged BCL 358/i.

## 4.8 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.

#### NOTE



Compatible reflectors are available on request.

As long as the scanner is targeted at the reflector, the reading 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.

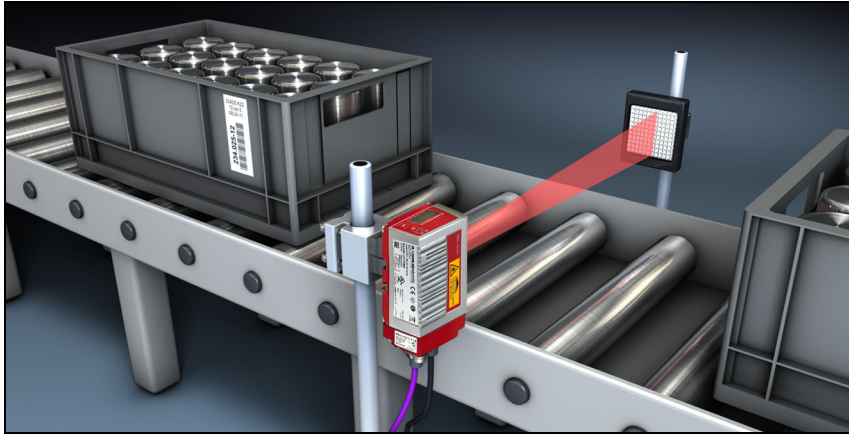


Figure 4.13: Reflector arrangement for autoReflAct

The **autoReflAct** function uses the scanning beam to simulate a photoelectric sensor and thus permits an activation without additional sensors.

#### 4.9 Reference codes

The BCL 358/i offers the possibility of storing one or two reference codes.

It is possible to store the reference codes via the webConfig tool or via online commands.

The BCL 358/i can compare read bar codes with one and/or both reference codes and execute user-configurable functions depending on the comparison result.

#### 4.10 autoConfig

With the autoConfig function, the BCL 358/i offers an extremely simple and convenient configuration option to users who only want to read one code type (symbology) with one number of digits at a time.

After starting the autoConfig function via the switching input or from a superior control, it is sufficient to position a bar code label with the desired code type and number of digits in the reading field of the BCL 358/i.

Afterward, bar codes with the same code type and number of digits are recognized and decoded.

## 5 Technical data

### 5.1 General specifications of the bar code readers

#### 5.1.1 Line scanner / raster scanner


Type	BCL 358/ EtherNet/IP
Design	Line scanner without heating
<b>Optical data</b>	
Light source	Laser diode $\lambda = 655\text{nm}$ (red light)
Max. output power (peak)	$\leq 1.8\text{mW}$
Impulse duration	$\leq 150\mu\text{s}$
Beam exit	At the front
Scanning rate	1000 scans/s
Beam deflection	Via rotating polygon wheel
Useful opening angle	Max. $60^\circ$
Optics models / resolution	High Density (N): 0.127 ... 0.20 mm Medium Density (M): 0.20 ... 0.5 mm Low Density (F): 0.30 ... 0.5 mm Ultra Low Density (L): 0.35 ... 0.8 mm Ink Jet (J): 0.50 ... 0.8 mm
Reading distance	See reading field curves
Laser class	1 acc. to IEC/EN 60825-1:2014 and 21 CFR 1040.10 with Laser Notice No. 56
<b>Bar code data</b>	
Code types	2/5 Interleaved, Code 39, Code 128, EAN 128, EAN / UPC, Codabar, Code 93, GS1 DataBar, EAN Addendum
Bar code contrast (PCS)	$\geq 60\%$
Ambient light tolerance	2000 lx (on the bar code)
Number of bar codes per scan	3
<b>Electrical data</b>	
Interface type	2x Ethernet on 2x M12 (D-coded)
Protocols	EtherNet/IP
Baud rate	10/100MBaud
Data formats	
Service interface	USB 2.0 Mini-B type socket
Switching input / switching output	2 switching inputs/outputs, freely programmable functions - Switching input: 18 ... 30 V DC depending on supply voltage, I max. = 8 mA - Switching output: 18 ... 30VDC depending on supply voltage, I max. = 60 mA (short-circuit proof) Switching inputs/outputs protected against polarity reversal!
Operating voltage	18 ... 30VDC (Class 2, protection class III)
Power consumption	Max. 4.5W
<b>Operating and display elements</b>	
Display	Monochromatic graphical display, 128 x 32 pixel, with background lighting
Keyboard	2 keys
LEDs	2 LEDs for power (PWR) and bus state (NET), two-colored (red/green)
<b>Mechanical data</b>	
Degree of protection	IP 65 1)
Weight	270 g (without connection hood)
Dimensions (H x W x D)	44 x 95 x 68 mm (without connection hood)
Housing	Diecast aluminum

Table 5.1: Technical data of the BCL 358/line/raster scanners without heating

Type	BCL 358/ EtherNet/IP
Design	Line scanner without heating
<b>Environmental data</b>	
Operating temperature range	0 °C ... -40 °C
Storage temperature range	-20 °C ... +70 °C
Air humidity	Max. 90 % rel. humidity, non-condensing
Vibration	IEC 60068-2-6, test Fc
Shock	IEC 60068-2-27, test Ea
Continuous shock	IEC 60068-2-29, test Eb
Electromagnetic compatibility	EN 55022; IEC 61000-6-2 (contains IEC 61000-4-2, -3, -4, -5 and -6) <sup>2)</sup>

Table 5.1: Technical data of the BCL 358/*line*/raster scanners without heating

- 1) Only with the MS 358 or MK 358 connection hood and screwed-on M12 connectors or cable bushings and mounted caps. Minimum tightening torque of the housing connecting screw of the connection hood is 1.4Nm!
- 2) This is a Class A product. In a domestic environment this product may cause radio interference, in which case the operator may be required to take adequate measures.

<b>⚠ ATTENTION!</b>	
	For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).



The BCL 358/*bar* code readers are designed in accordance with protection class III for supply by PELV (protective extra-low voltage with reliable disconnection).

### 5.1.2 Oscillating-mirror scanner

Technical data same as for line scanner without heating, however with the following differences:

Type	BCL 358/ EtherNet/IP
Design	Oscillating-mirror scanner without heating
<b>Optical data</b>	
Beam exit	Lateral zero position at an angle of 90°
Beam deflection	Via rotating polygon wheel (horizontal) and stepping motor with mirror (vertical)
Oscillation frequency	0 ... 10 Hz (adjustable, max. frequency is dependent on set swivel angle)
Max. swivel angle	±20° (adjustable)
Reading field height	See reading field curves
<b>Electrical data</b>	
Power consumption	Max. 9.0W
<b>Mechanical data</b>	
Weight	580 g (without connection hood)
Dimensions (H x W x D)	58 x 125 x 110 mm (without connection hood)

Table 5.2: Technical data of the BCL 358/*oscillating-mirror* scanners with heating

### 5.1.3 Line / raster scanner with deflecting mirror

Technical data same as for line scanner without heating, however with the following differences:

Type	BCL 358/ EtherNet/IP
Design	Line scanner with deflecting mirror without heating
<b>Optical data</b>	
Beam exit	Lateral zero position at an angle of 105°
Beam deflection	Via rotating polygon wheel (horizontal) and deflecting mirror (vertical)
<b>Electrical data</b>	
Power consumption	Max. 4.5W
<b>Mechanical data</b>	
Weight	350 g (without connection hood)
Dimensions (H x W x D)	44 x 103 x 96 mm (without connection hood)

Table 5.3: Technical data of the BCL 358/deflecting mirror scanners without heating

## 5.2 Heating models of the bar code readers

The BCL 358/bar code readers are optionally available as models with integrated heating. In this case, heating is permanently installed ex works. Self-installation on-site by the user is not possible!

### Features

- Integrated heating (permanently installed)
- Extends the application range of the BCL 358/to -35 °C
- Supply voltage 24VDC  $\pm 20\%$
- Enabling the BCL 358/through an internal temperature switch (switch-on delay about 30 min for 24 V DC and minimum ambient temperature of -35 °C)
- Necessary conductor cross-section for the voltage supply: at least 0.75 mm<sup>2</sup>; the use of ready-made cables is, thus, not possible

### Structure

The heating consists of two parts:


- The front cover heater
- The housing heater

### Function

When the 24 V DC supply voltage is applied to the BCL 358/, a temperature switch initially only connects the heating to electrical power (front cover heater and housing heater). During the heating phase (around 30 min), when the inside temperature rises above 15 °C, the temperature switch connects the BCL 358/ to the supply voltage. This is followed by the self test and the changeover to read operation. The **PWR** LED lights up, showing overall readiness for operation.


When the inside temperature reaches approx. 18 °C, another temperature switch turns the housing heater off and, if necessary, back on again (if the inside temperature drops below 15 °C). This does not interrupt the read operation. The front cover heater remains activated until an inside temperature of 25 °C is reached. At temperatures above this, the front cover heater switches off and, with a switching hysteresis of 3 °C, back on again at an inside temperature below 22 °C.

### Mounting location

NOTE	
	The mounting location is to be selected such that it does not expose the BCL 358/with heating directly to a cold air stream. To achieve an optimal heating effect, the BCL 358/should be mounted so that it is thermally isolated.

### Electrical connection

The required wire cross section of the connection cable for the voltage supply must be at least 0.75 mm<sup>2</sup>.

⚠ ATTENTION!	
	The voltage supply must not be looped through from one device to the next.

### Power consumption

The energy requirement depends on the model:

- the line/raster scanner with heating consumes a maximum of 27W power.
- the line scanner with oscillating mirror and heating consumes a maximum of 45W.
- the line/raster scanner with deflecting mirror and heating consumes a maximum of 27W power.

These values are based on operation with unconnected switching outputs.

### 5.2.1 Line scanner / raster scanner with heating

Technical data same as for line scanner without heating, however with the following differences:

Type	BCL 358/ EtherNet/IP
Design	Line scanner with heater
<b>Electrical data</b>	
Operating voltage	24VDC $\pm$ 20%
Power consumption	Max. 27.0W
Structure of the heating	Housing heating and separate heating of the optics glass
Warmup time	Min. 30 min at +24 V DC and an ambient temperature of -35 °C
Min. conductor cross section	Conductor cross section of at least 0.75 mm <sup>2</sup> for the supply-voltage line. Wiring through of the voltage supply to multiple heating devices is <b>not</b> permissible. Standard, M12 ready-made cable <b>not</b> usable (insufficient cable cross-section)
<b>Environmental data</b>	
Operating temperature range	-35 °C ... +40 °C
Storage temperature range	-20 °C ... +70 °C

Table 5.4: Technical data of the BCL 358/line / raster scanners with heating

### 5.2.2 Oscillating-mirror scanner with heating

Technical data same as for line scanner without heating, however with the following differences:

Type	BCL 358/ EtherNet/IP
Design	Oscillating-mirror scanner with heating
<b>Optical data</b>	
Useful opening angle	Max. 60°
Max. swivel angle	$\pm$ 20° (adjustable)
<b>Electrical data</b>	
Operating voltage	24VDC $\pm$ 20%
Power consumption	Max. 45.0W
Structure of the heating	Housing heating and separate heating of the optics glass
Warmup time	Min. 30 min at +24 V DC and an ambient temperature of -35 °C
Min. conductor cross section	Conductor cross section of at least 0.75 mm <sup>2</sup> for the supply-voltage line. Wiring through of the voltage supply to multiple heating devices is <b>not</b> permissible. Standard, M12 ready-made cable <b>not</b> usable (insufficient cable cross-section)
<b>Environmental data</b>	
Operating temperature range	-35 °C ... +40 °C
Storage temperature range	-20 °C ... +70 °C

Table 5.5: Specifications of the BCL 358/oscillating-mirror scanners with heating

### 5.2.3 Line scanner / raster scanner with deflecting mirror and heating

Technical data same as for line scanner without heating, however with the following differences:

Type	BCL 358/ EtherNet/IP
Design	Deflecting mirror scanner with heating
<b>Optical data</b>	
Useful opening angle	Max. 60°
<b>Electrical data</b>	
Operating voltage	24VDC $\pm$ 20%
Power consumption	Max. 27.0W
Structure of the heating	Housing heating and separate heating of the optics glass
Warmup time	Min. 30 min at +24 V DC and an ambient temperature of -35 °C
Min. conductor cross section	Conductor cross section of at least 0.75 mm <sup>2</sup> for the supply-voltage line. Wiring through of the voltage supply to multiple heating devices is <b>not</b> permissible. Standard, M12 ready-made cable <b>not</b> usable (insufficient cable cross-section)
<b>Environmental data</b>	
Operating temperature range	-35°C ... +40°C
Storage temperature range	-20°C ... +70°C

Table 5.6: Technical data of the BCL 358/deflecting mirror scanners with heating

## 5.3 Dimensioned drawings

### 5.3.1 Dimensioned drawing of complete overview of the BCL 358/with MS 3xx / MK 3xx

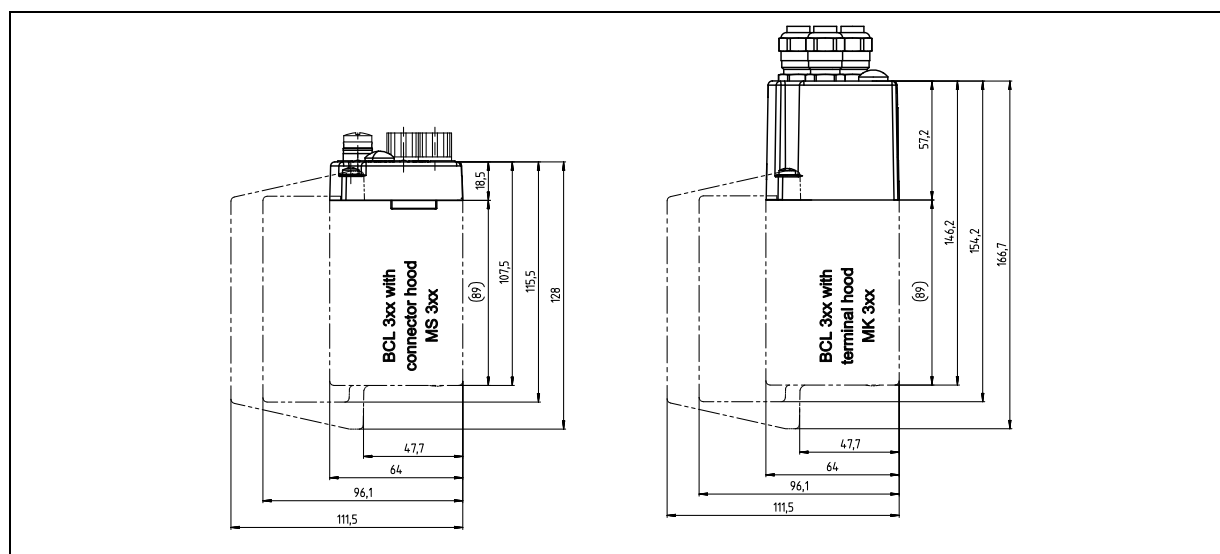


Figure 5.1: Dimensioned drawing of complete overview of the BCL 358/with MS 3xx / MK 3xx

### 5.3.2 Dimensioned drawing of line scanner with / without heating

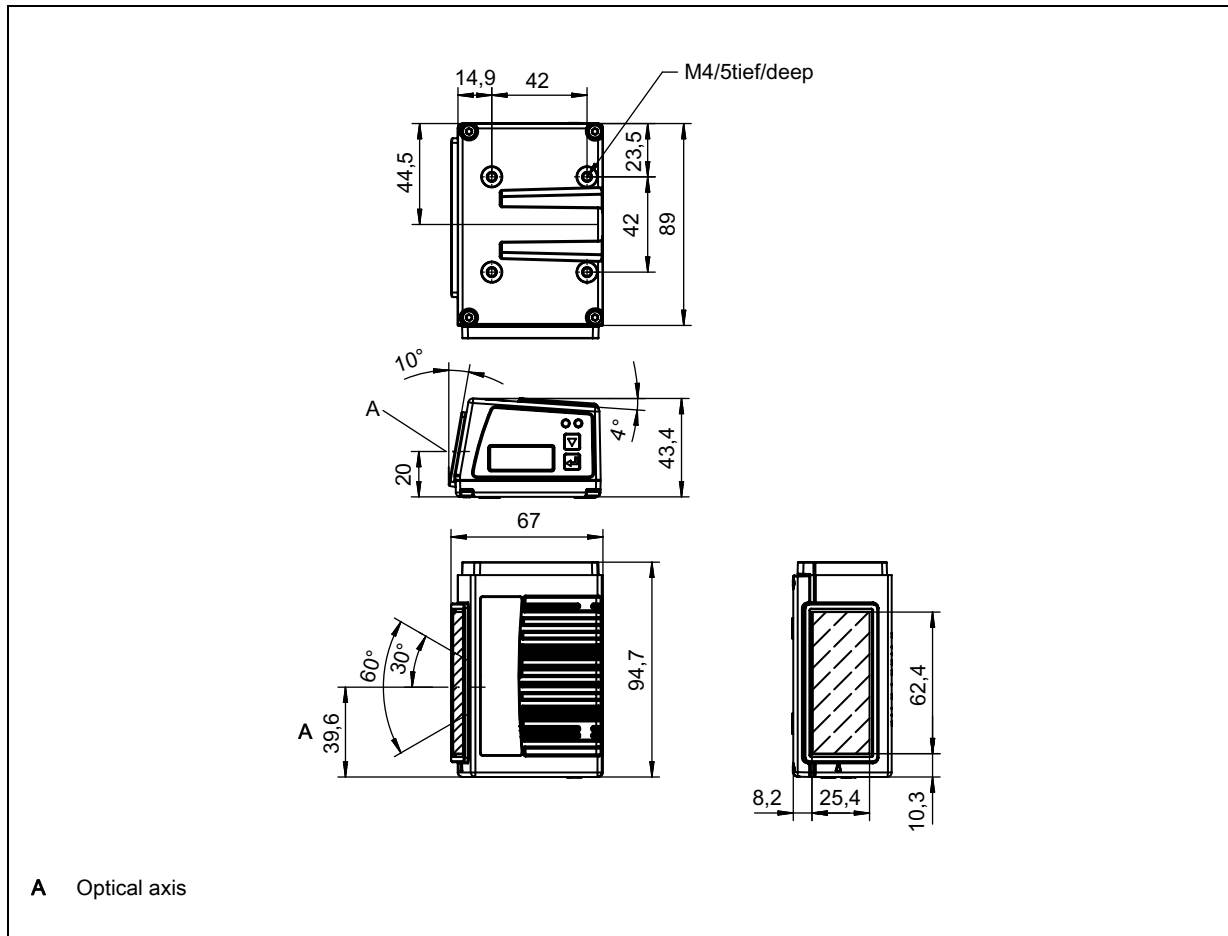


Figure 5.2: Dimensioned drawing of BCL 358/S...102 line scanner

### 5.3.3 Dimensioned drawing of deflecting mirror scanner with / without heating

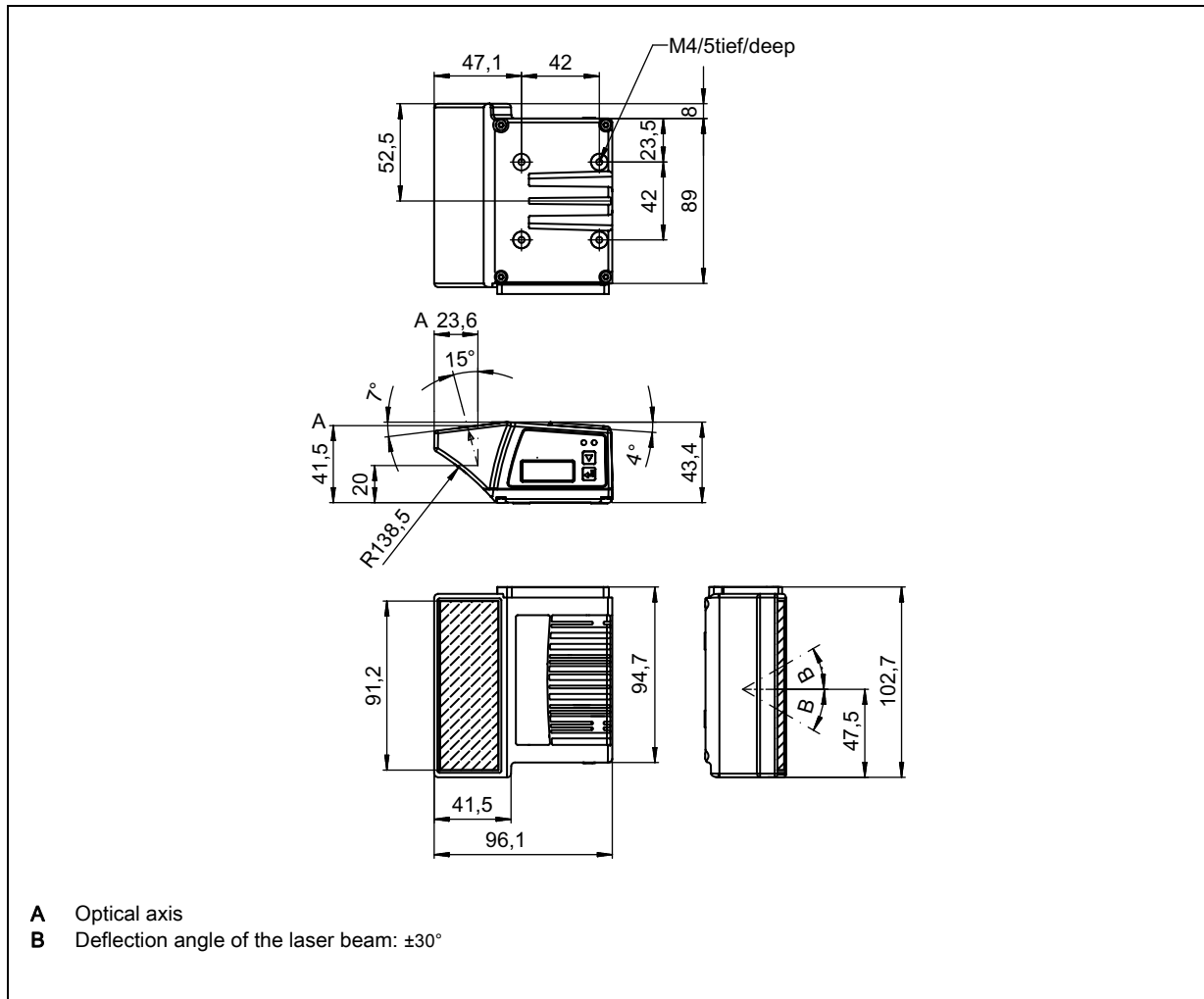


Figure 5.3: Dimensioned drawing of BCL 358/S...100 with deflecting mirror

### 5.3.4 Dimensioned drawing of oscillating-mirror scanner with / without heating

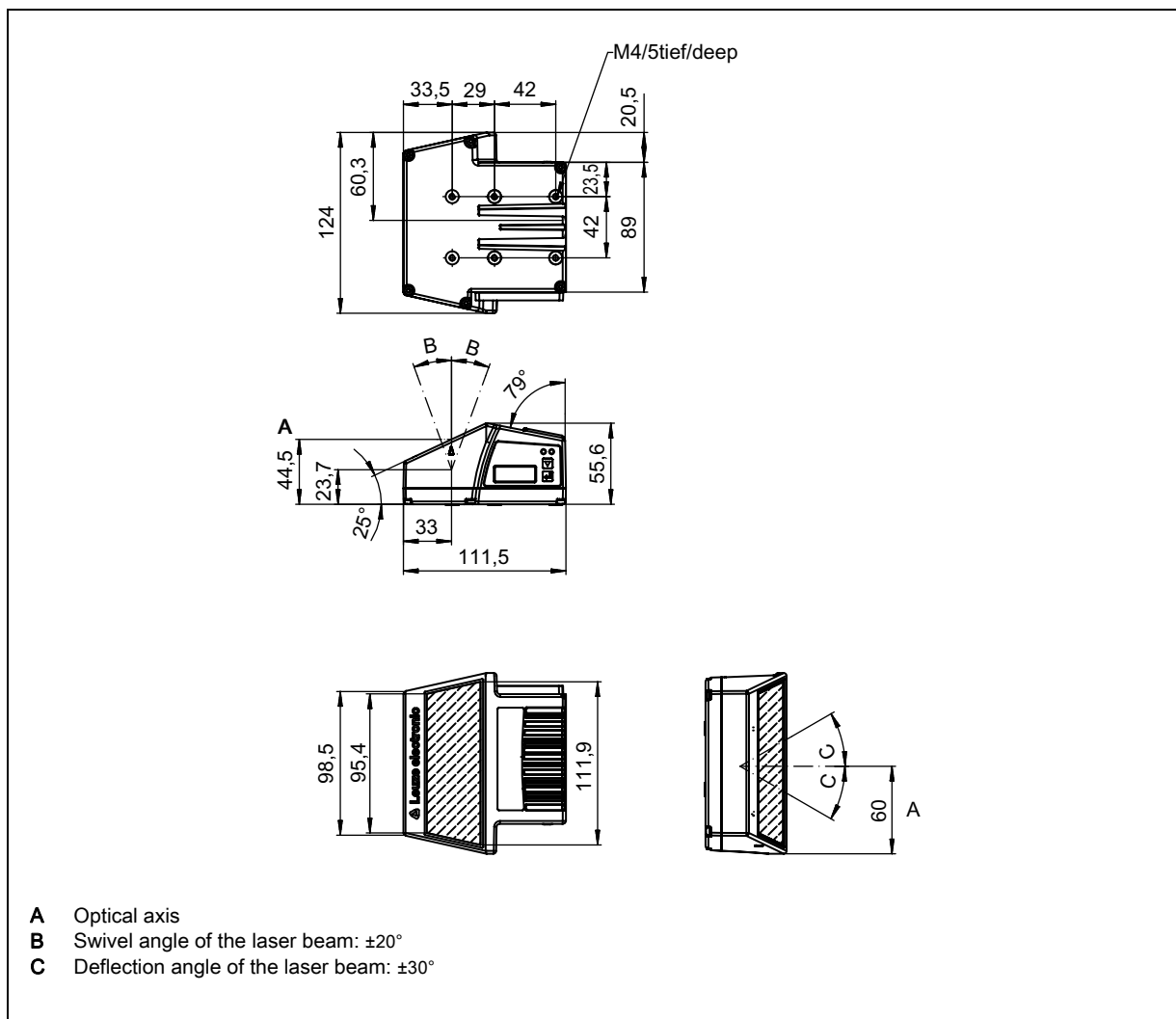


Figure 5.4: Dimensioned drawing of BCL 358/O...100 oscillating-mirror scanner

### 5.3.5 Dimensioned drawings of MS 3xx / MK 3xx connection hoods

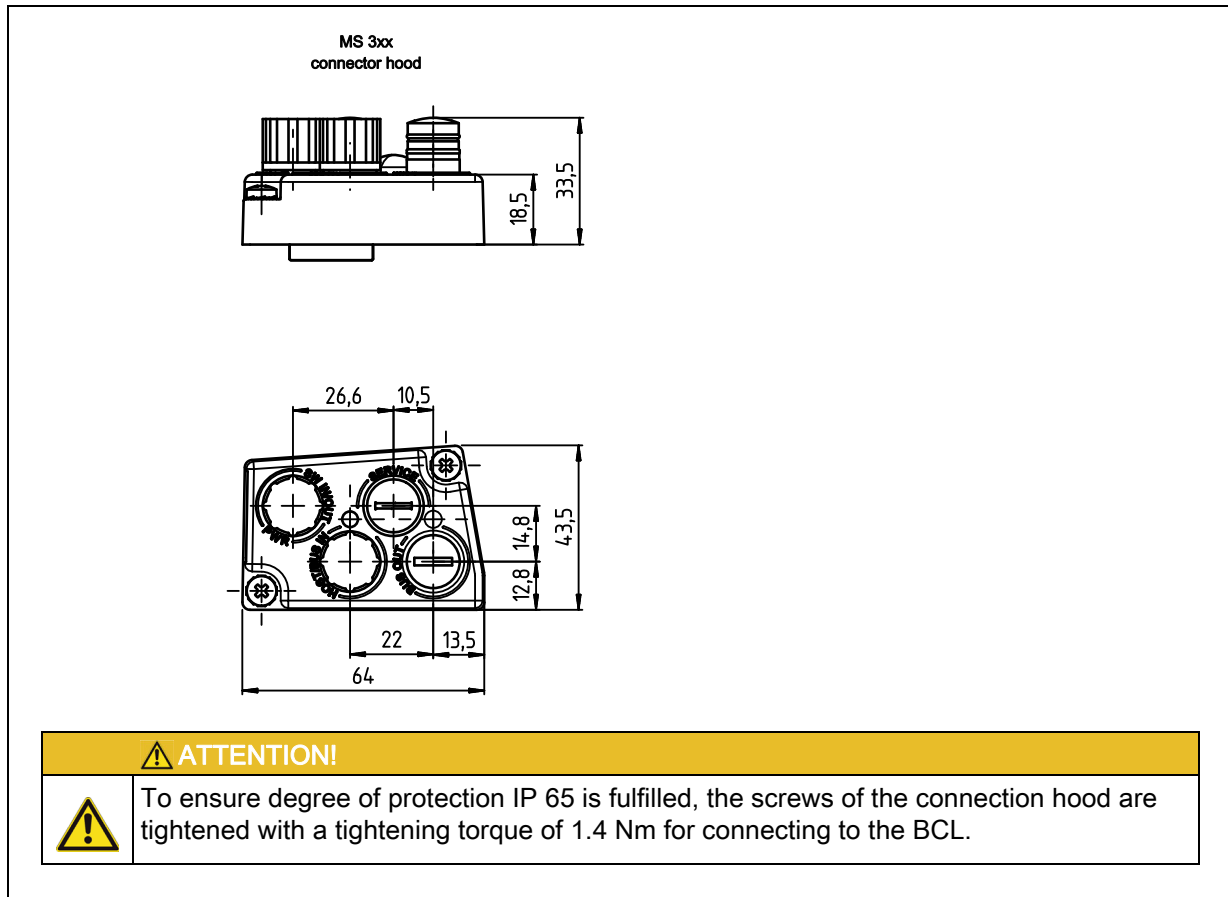


Figure 5.5: Dimensioned drawing of MS 3xx connector hood

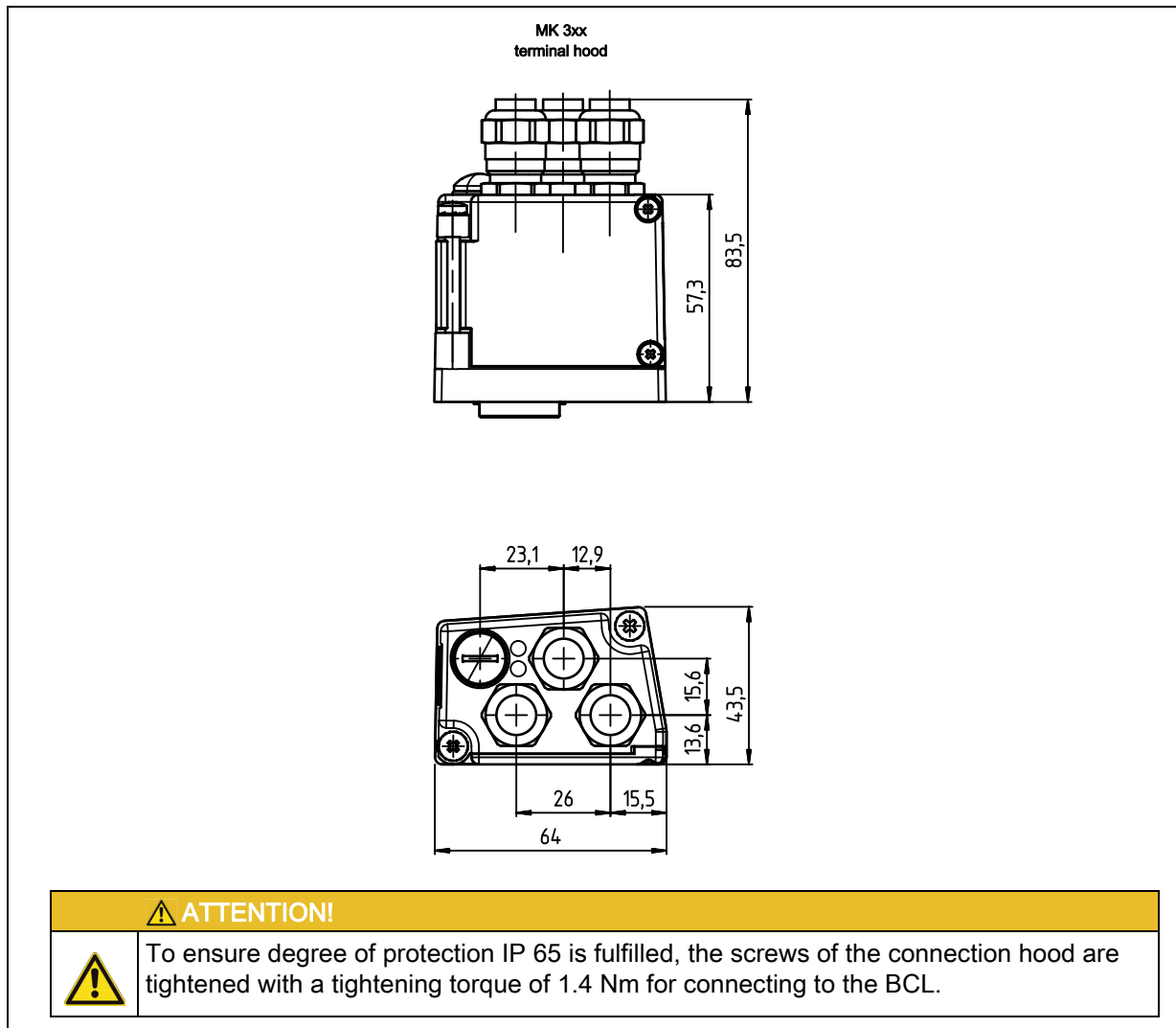


Figure 5.6: Dimensioned drawing of MK 3xx terminal hood

## 5.4 Reading field curves / optical data

### 5.4.1 Bar code characteristics

NOTE	
	<p>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.</p>

	<p>M = Module: The narrowest line or space of a bar code in mm</p> <p>Z<sub>B</sub> = Wide character: Wide bars and gaps are a multiple (ratio) of the module. Module x Ratio = Z<sub>B</sub> (Normal Ratio 1 : 2.5)</p> <p>B<sub>Z</sub> = Quiet zone: The quiet zone should be at least 10 times the module, but not less than 2.5mm.</p> <p>L = Code length: The length of the bar code in mm including the start and stop characters. The quiet zone is included depending on the code definition.</p> <p>S<sub>L</sub> = Bar length: height of the elements in mm</p>
--	--

Figure 5.7: The most important characteristics of a bar code

The range in which the bar code can be read by the BCL 358/ (the so-called reading field) depends on the quality of the printed bar code and its dimensions.

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

## NOTE



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

#### 5.4.2 Raster scanner

A raster variant is also available in the BCL 300/series. The BCL 300/ as a raster scanner projects 8 scan lines which vary depending on the reading distance from the raster aperture.

		Distance [mm] starting at the zero position						
		50	100	200	300	400	450	700
Raster line cover [mm] all raster lines	Front scanner	8	14	24	35	45	50	77
	Deflecting mirror scanner	12	17	27	38	48	54	80

Table 5.7: Raster line cover dependent on the distance

## NOTE



With the raster scanner, there may not be two or more bar codes in the raster area at the same time.

## 5.5 Reading field curves

### NOTE



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

The reading field curves also apply for the device models with heating.

The zero position of the reading distance always refers to the front edge of the housing of the beam exit and is shown for the three housing types of the BCL 358/i in Figure 5.8.

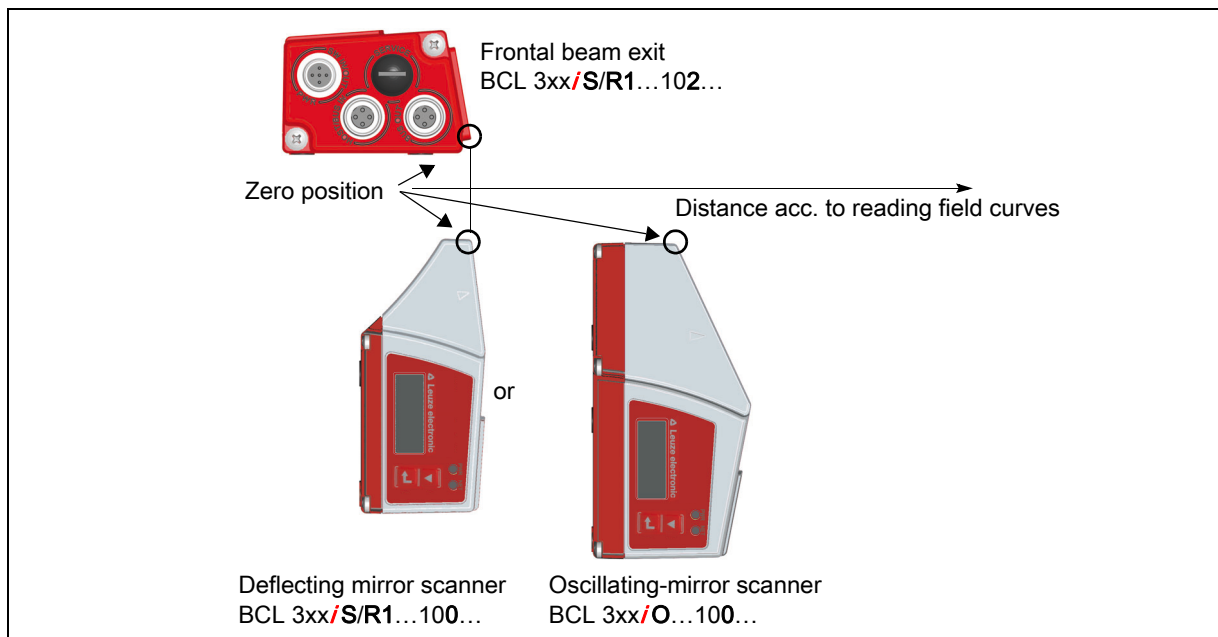


Figure 5.8: Zero position of the reading distance

### Reading conditions for the reading field curves

Bar code type	2/5 Interleaved
Ratio	1:2.5
ANSI specification	Class A
Reading rate	> 75%

Table 5.8: Reading conditions

### 5.5.1 High Density (N) - optics: BCL 358/S/R1 N 102 (H)

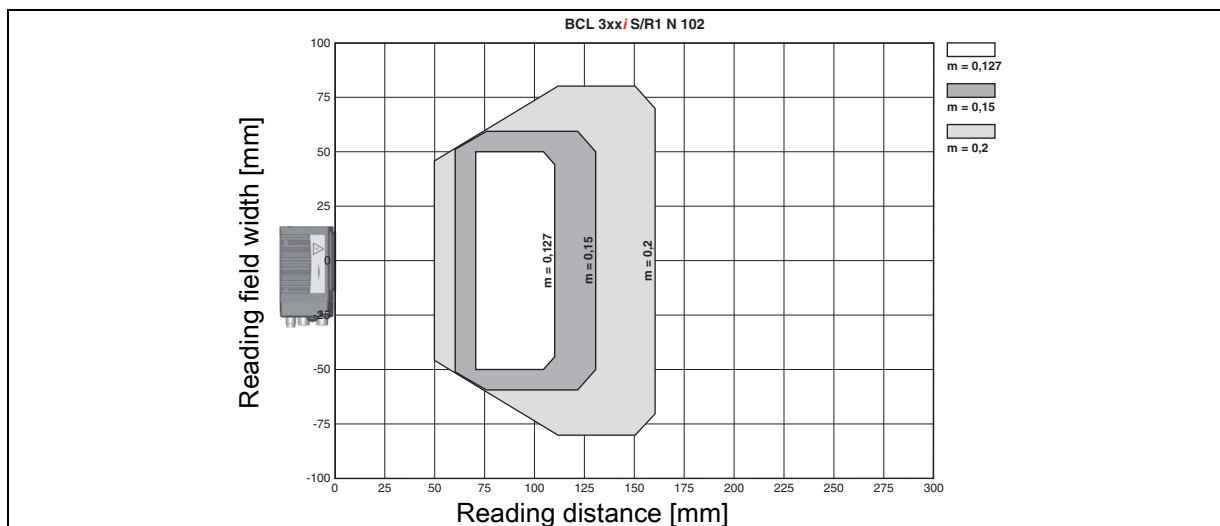


Figure 5.9: "High Density" reading field curve for line scanner without deflecting mirror

### 5.5.2 High Density (N) - optics: BCL 358/S/R1 N 100 (H)

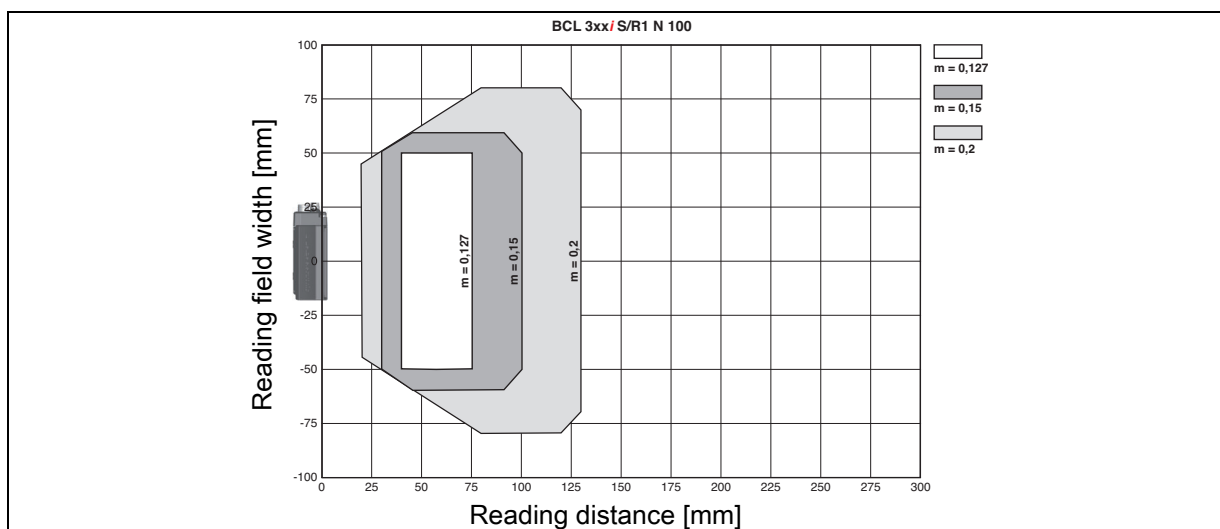


Figure 5.10: "High Density" reading field curve for line scanner with deflecting mirror

The reading field curve applies for the reading conditions stated in Table 5.8.

### 5.5.3 Medium Density (M) - optics: BCL 358/S/R1 M 102 (H)

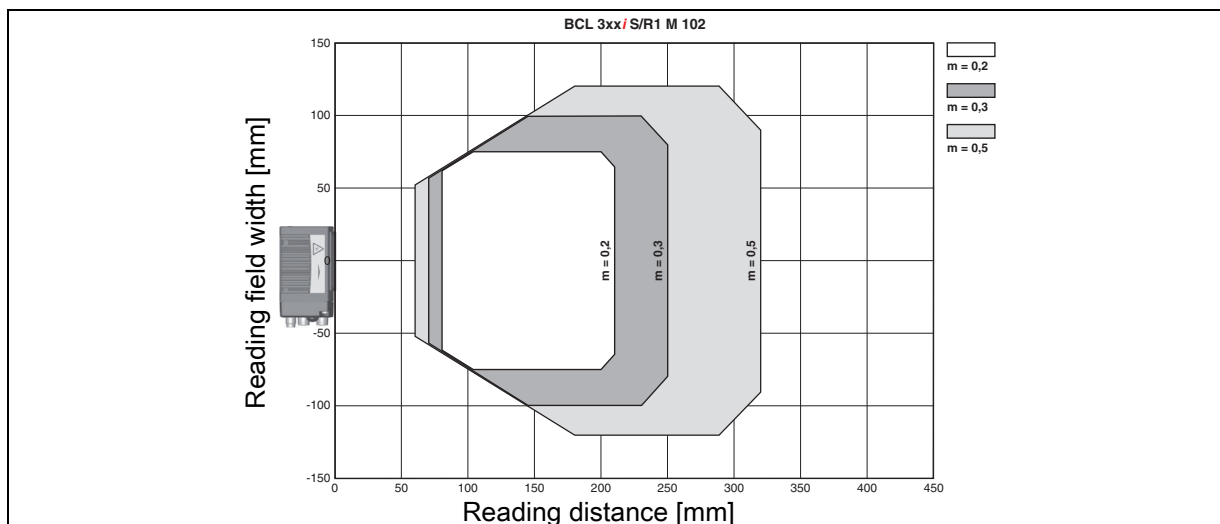


Figure 5.11: "Medium Density" reading field curve for line scanner without deflecting mirror

### 5.5.4 Medium Density (M) - optics: BCL 358/S/R1 M 100 (H)

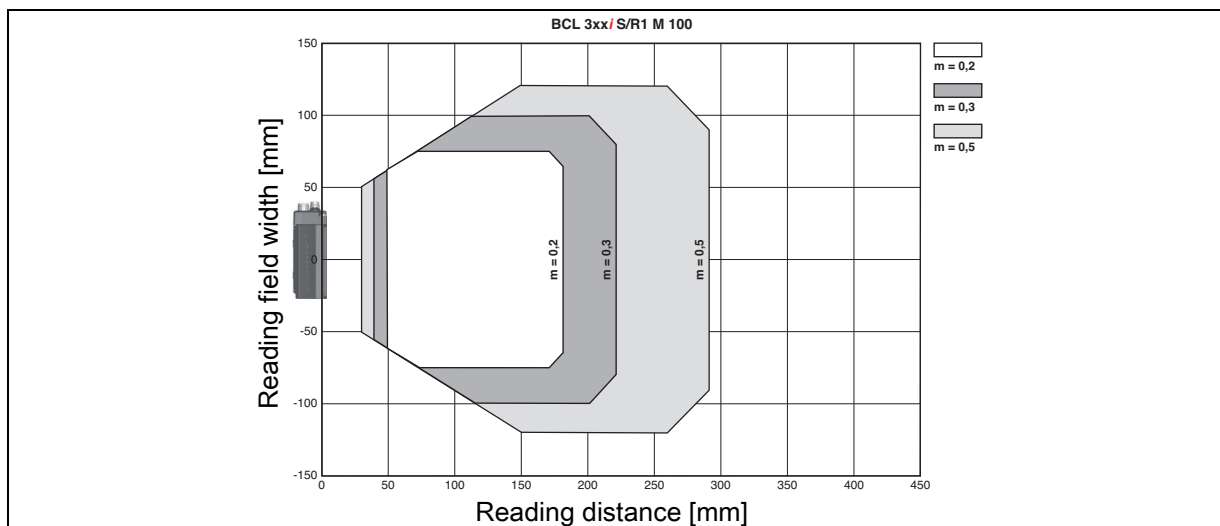


Figure 5.12: "Medium Density" reading field curve for line scanner with deflecting mirror

The reading field curves apply for the reading conditions stated in Table 5.8.

### 5.5.5 Medium Density (M) - optics: BCL 358/O M 100 (H)

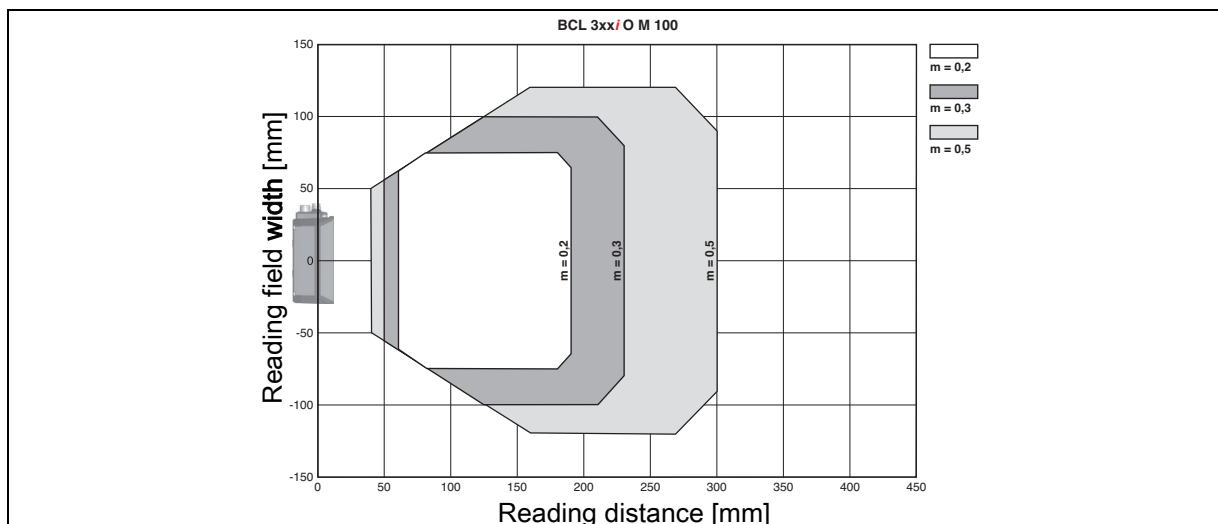


Figure 5.13: "Medium Density" reading field curve for oscillating-mirror scanners

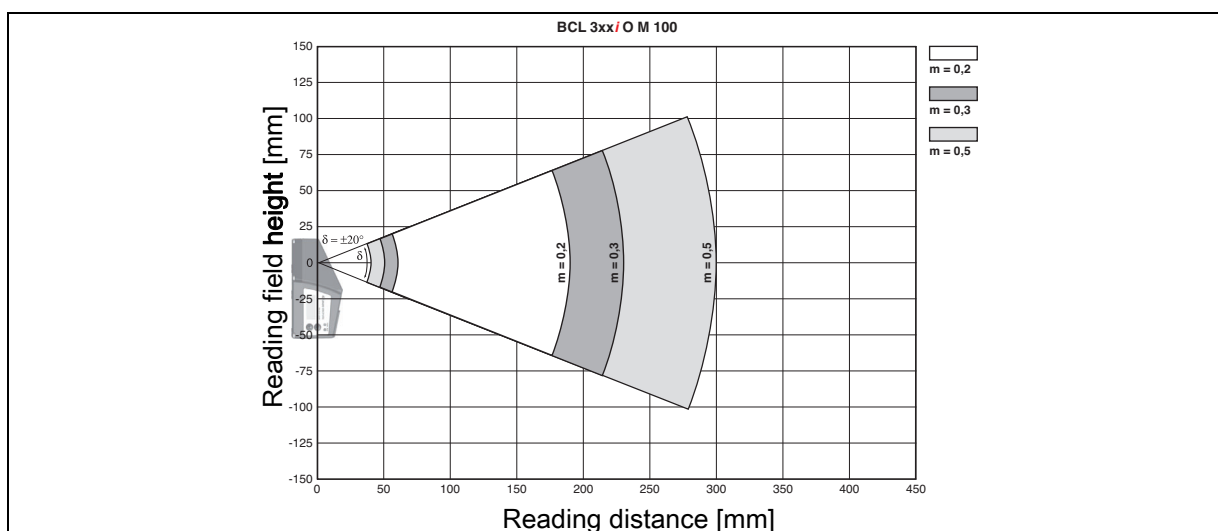


Figure 5.14: Lateral "Medium Density" reading field curve for oscillating-mirror scanners

The reading field curves apply for the reading conditions stated in Table 5.8.

### 5.5.6 Low Density (F) - optics: BCL 358/S/R1 F 102 (H)

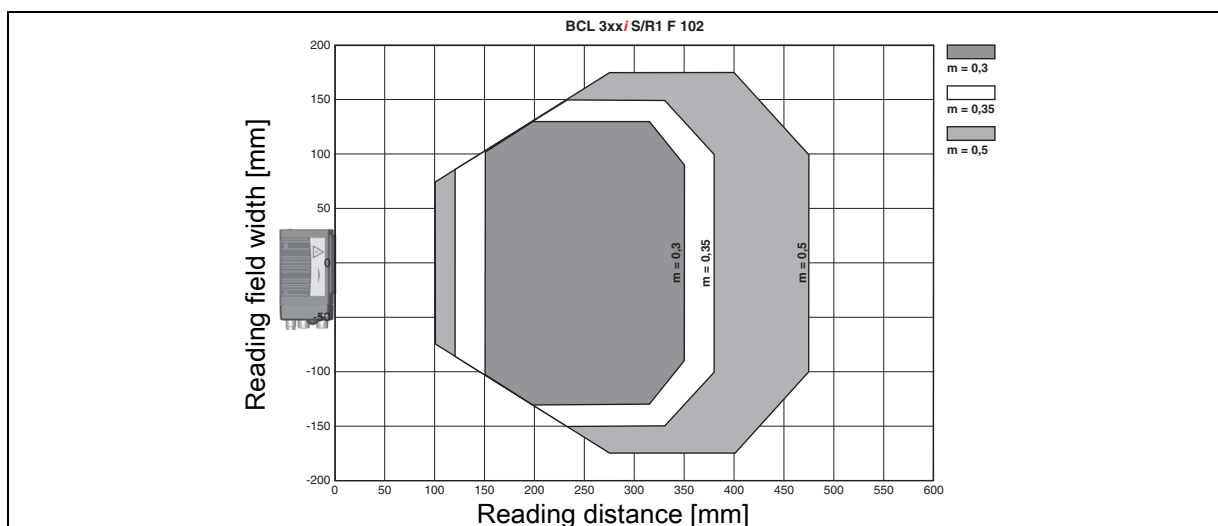


Figure 5.15: "Low Density" reading field curve for line scanner without deflecting mirror

### 5.5.7 Low Density (F) - optics: BCL 358/i/S/R1 F 100 (H)

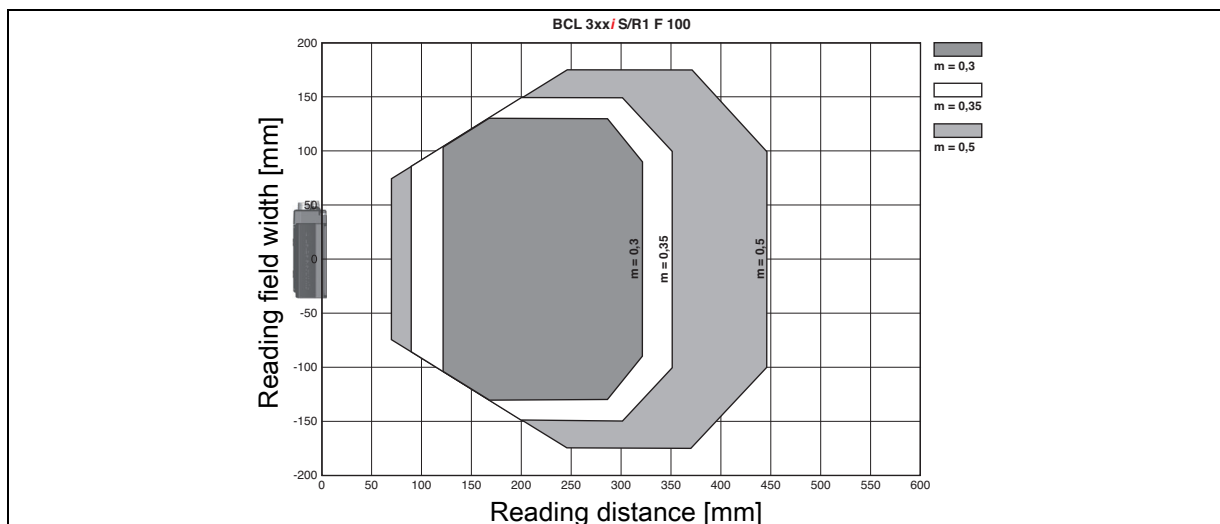


Figure 5.16: "Low Density" reading field curve for line scanner with deflecting mirror  
The reading field curves apply for the reading conditions stated in Table 5.8.

### 5.5.8 Low Density (F) - optics: BCL 358/i/O F 100 (H)

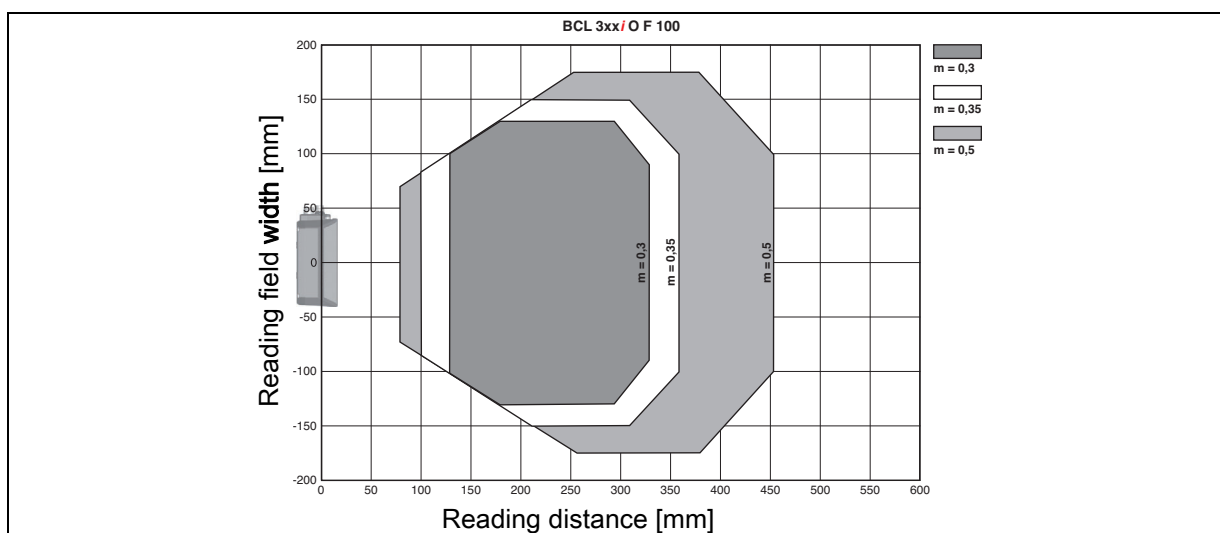


Figure 5.17: "Low Density" reading field curve for oscillating-mirror scanners

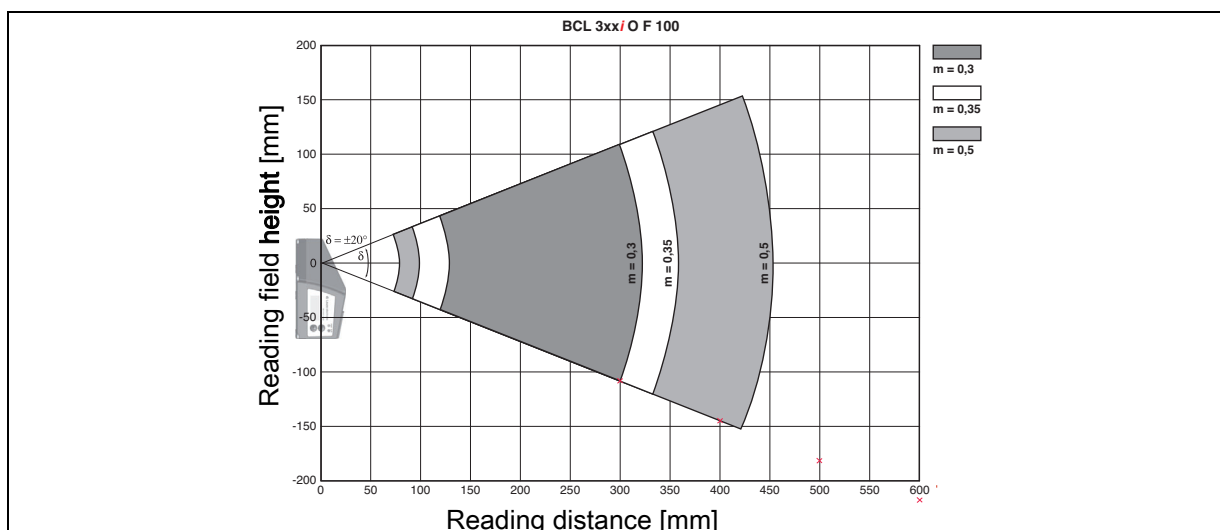


Figure 5.18: Lateral "Low Density" reading field curve for oscillating-mirror scanners

The reading field curves apply for the reading conditions stated in Table 5.8.

### 5.5.9 Ultra Low Density (L) - optics: BCL 358/S L 102 (H)

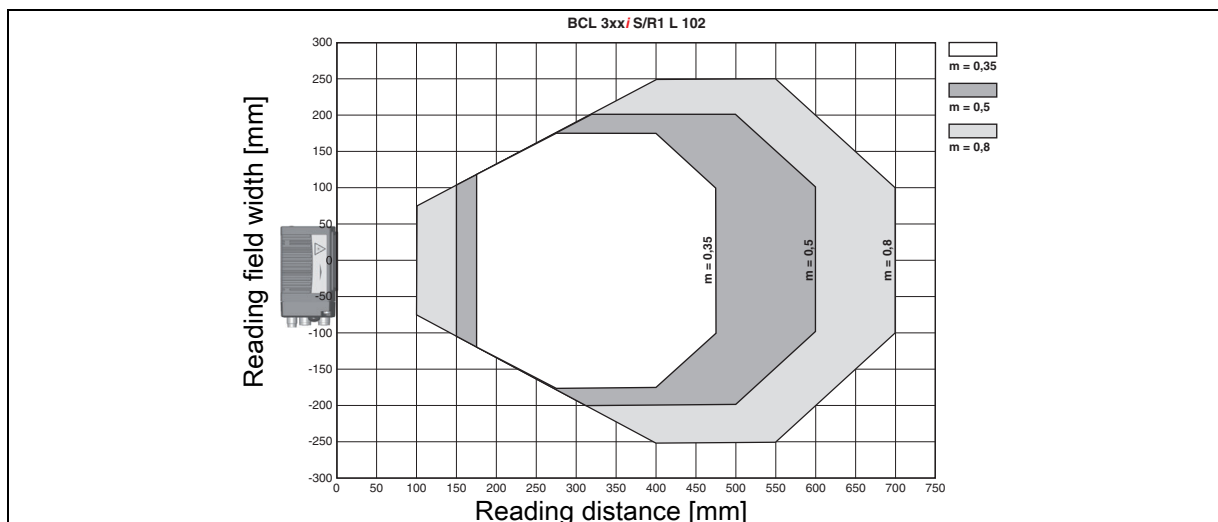


Figure 5.19: "Ultra Low Density" reading field curve for line scanner without deflecting mirror

### 5.5.10 Ultra Low Density (L) - optics: BCL 358/S L 100 (H)

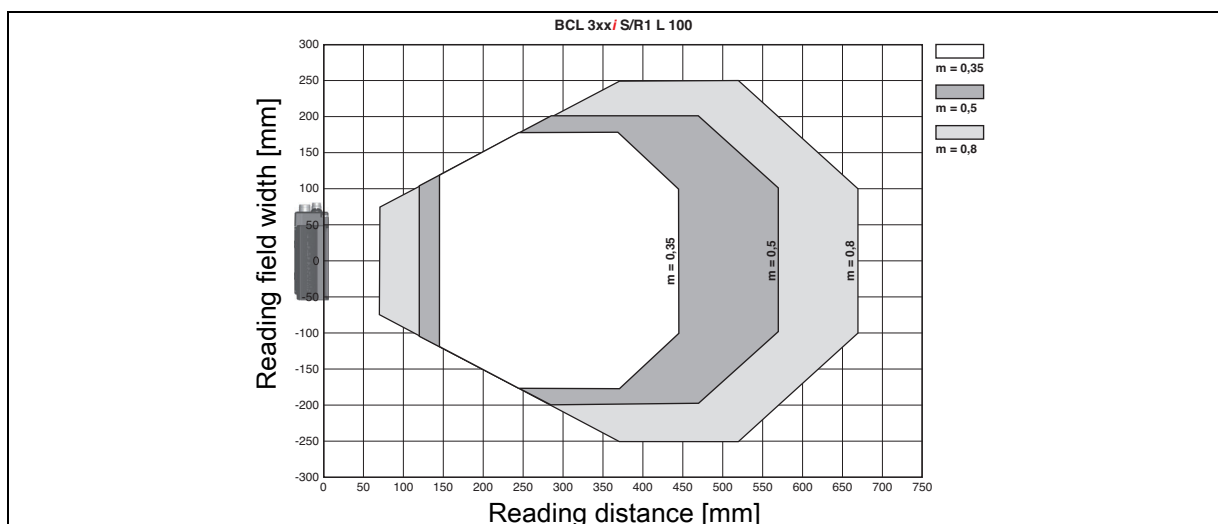


Figure 5.20: "Ultra Low Density" reading field curve for line scanner with deflecting mirror

The reading field curves apply for the reading conditions stated in Table 5.8.

### 5.5.11 Ultra Low Density (L) - optics: BCL 358/i O L 100 (H)

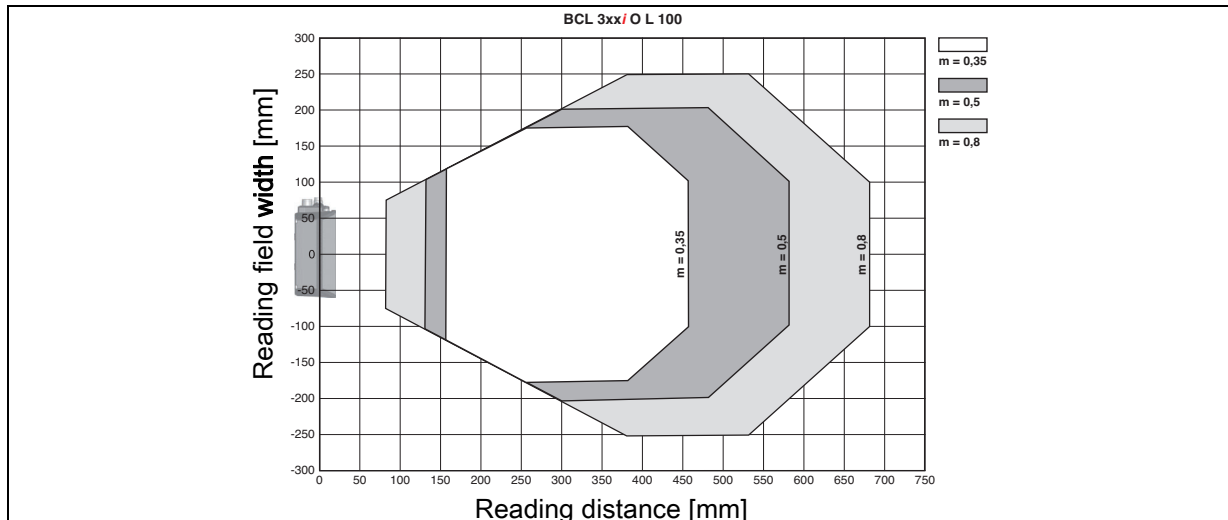


Figure 5.21: "Ultra Low Density" reading field curve for oscillating-mirror scanners

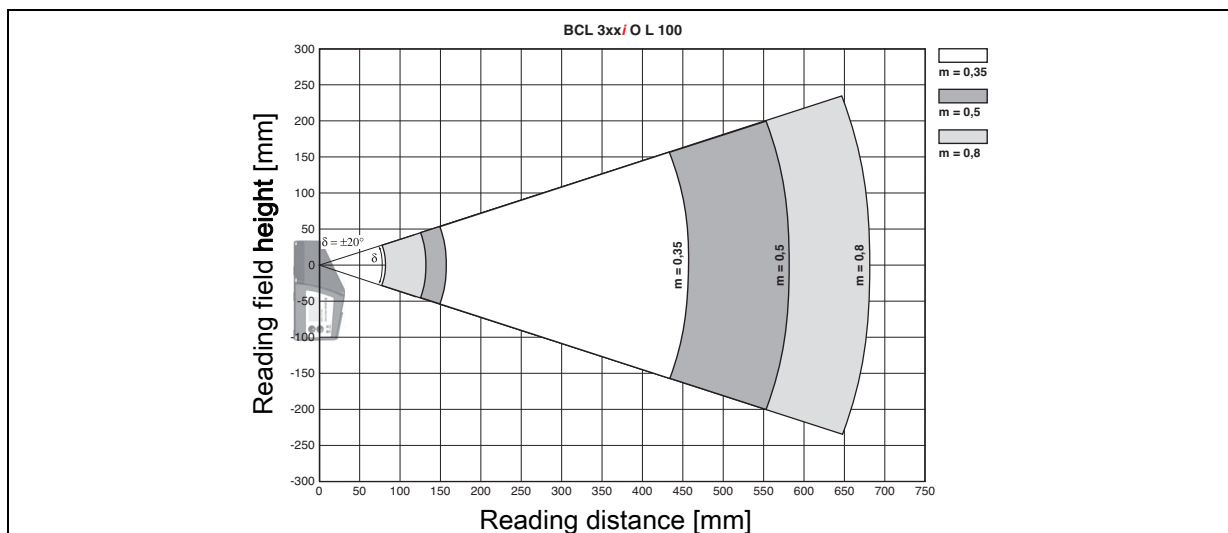


Figure 5.22: Lateral "Ultra Low Density" reading field curve for oscillating-mirror scanners

The reading field curves apply for the reading conditions stated in Table 5.8.

### 5.5.12 Ink Jet (J) - optics: BCL 358/R1 J 100

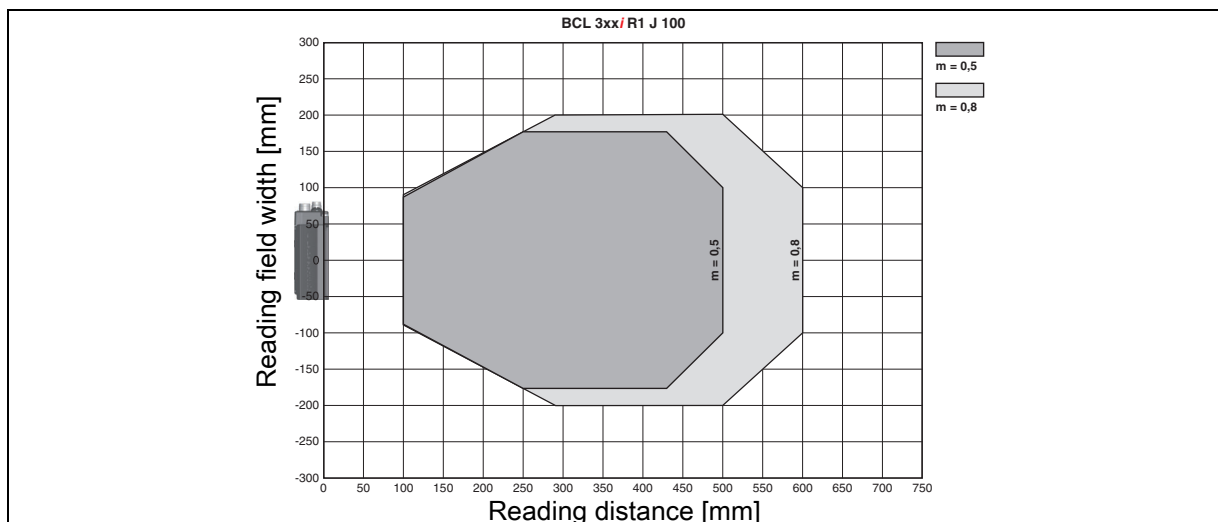


Figure 5.23: "Ink Jet" reading field curve for line scanner with deflecting mirror

#### NOTE




Please note that the real reading distances are also influenced by factors such as labeling material, printing quality, scanning angle, printing contrast, etc., and may thus deviate from the reading distances specified here.

Due to the shape of the optical laser spot, the CRT function may exhibit limitations (max. permissible tilt angle of  $\pm 15^\circ$ ).

Low-contrast bar codes that are printed with inkjet should be sent to Leuze for examination.

## 6 Installation and mounting

### 6.1 Storage, transportation

⚠ ATTENTION!	
	<p>Package the device for transport and storage in such a way that is protected against shock and humidity. Optimum protection is achieved when using the original packaging. Ensure compliance with the approved environmental conditions listed in the specifications.</p>

#### Unpacking

✎ Check the packaging content 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
- Brief manual

The name plate provides information as to what BCL type your device is. For specific information, please refer to Chapter 5.

#### Name plates of the bar code readers of the BCL 358/series

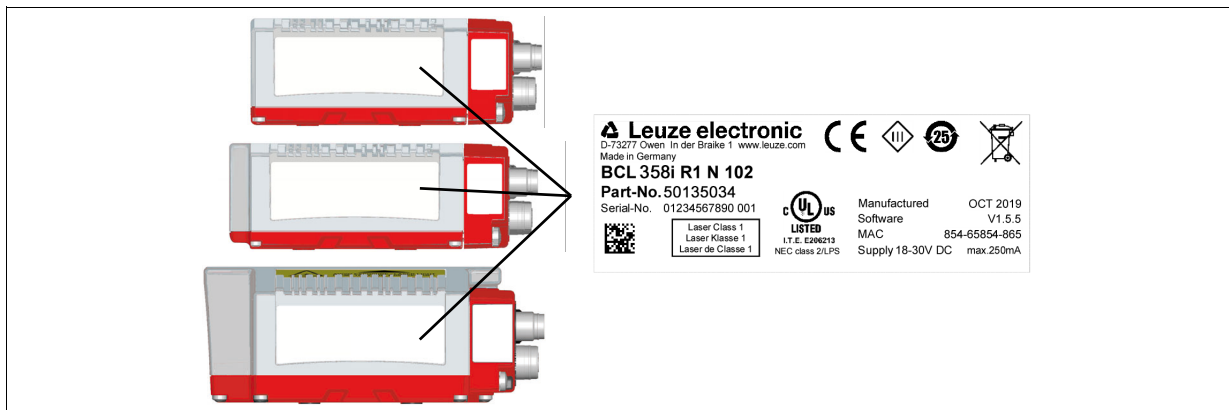


Figure 6.1: Device name plate BCL 358/

✎ Save the original packaging for later storage or shipping.

NOTE	
	<p>All BCL 358/ are delivered with a protective cover on the connection side which must be removed before attaching a connection hood.</p>


If you have any questions concerning your shipment, please contact your supplier or your local Leuze sales office.

✎ Observe the applicable local regulations when disposing of the packaging materials.

### 6.2 Mounting the BCL 358/

The BCL 358/ bar code readers can be mounted in different ways:

- Via four or six M4x5 screws on the device bottom.
- Via a BT 56/BT 59 mounting device in the two fastening grooves on the device bottom.

⚠ ATTENTION!	
	<p>The BCL 358/ does not fulfill degree of protection IP 65 until the connection hood has been screwed on. Minimum tightening torque of the housing connecting screw of the connection hood is 1.4 Nm!</p>

### 6.2.1 Mounting via M4 x 5 screws

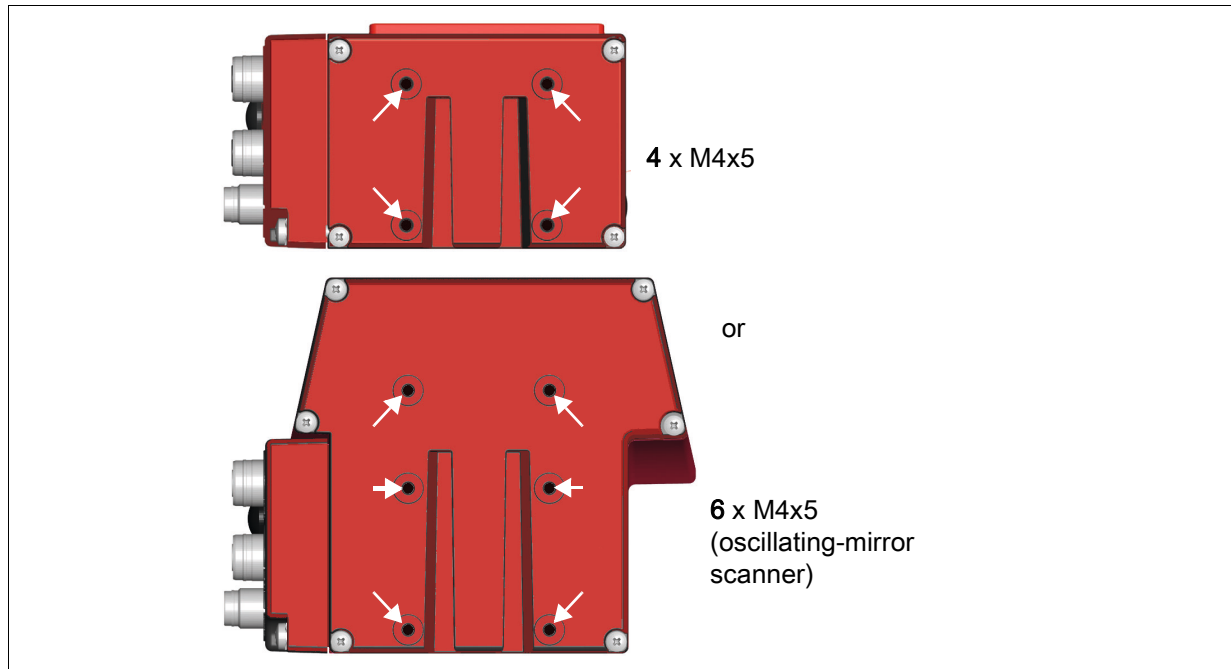


Figure 6.2: Fastening options using M4x5 threaded holes

### 6.2.2 Mounting devices BT 56 and BT 56-1

The BT 56 or BT 56-1 mounting device is available for mounting the BCL 358/ using the fastening grooves. It is designed for rod mounting (Ø16 mm to 20 mm), the BT 56-1 for rods from Ø12 mm to 16 mm. For order guide, please refer to chapter "Type overview and accessories" on page 126.

#### Mounting devices BT 56 and BT 56-1

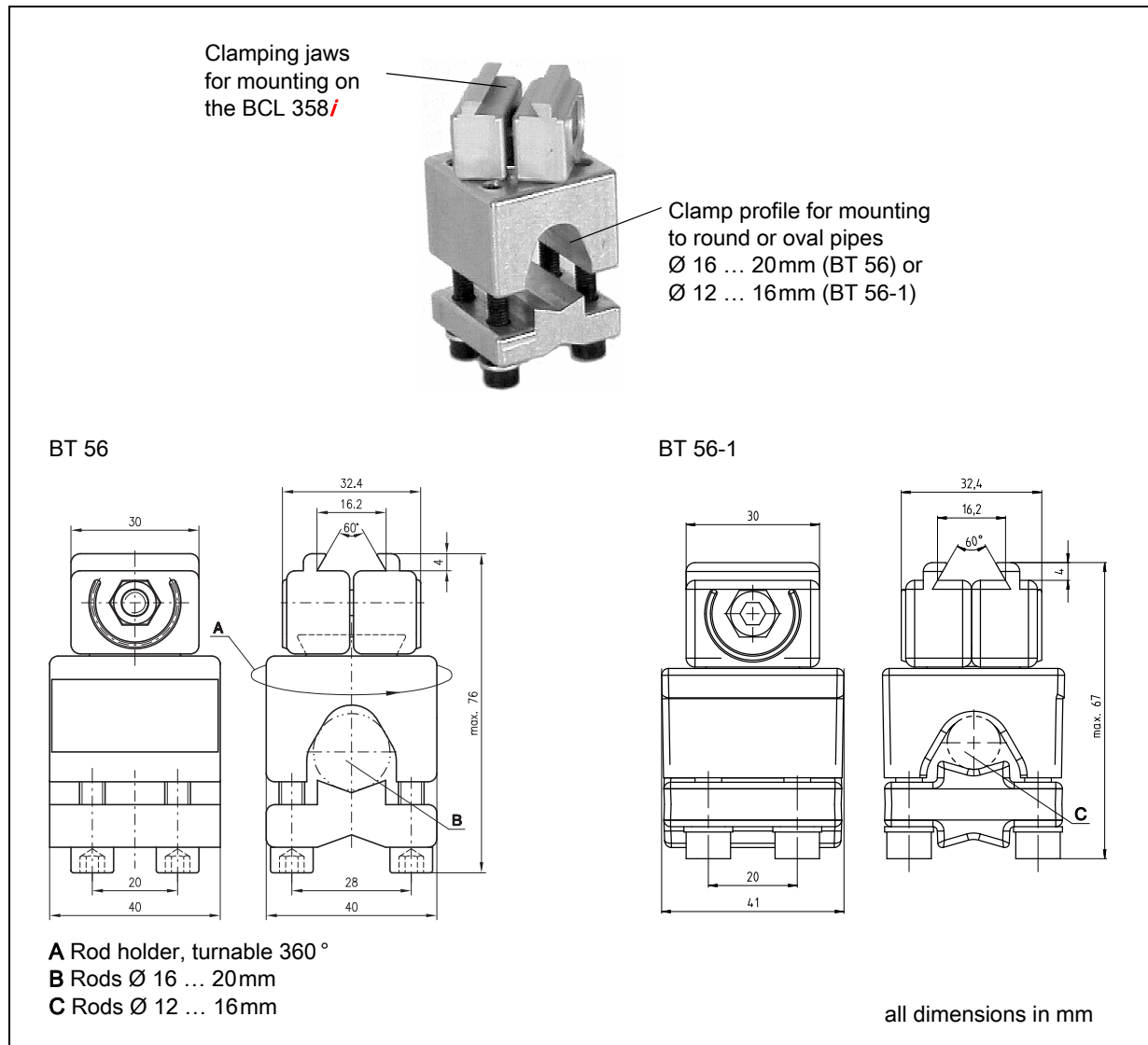


Figure 6.3: Mounting devices BT 56 and BT 56-1

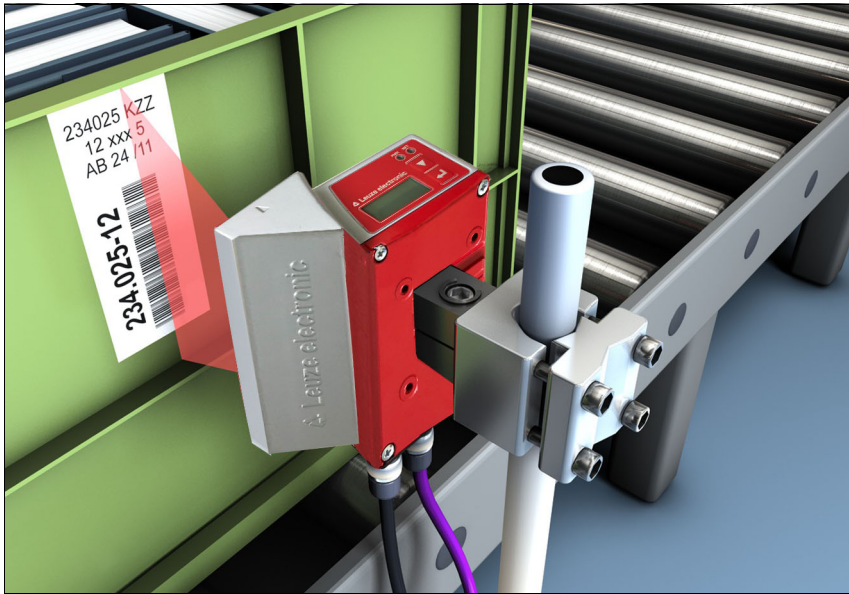


Figure 6.4: Mounting example of BCL 358/i with BT 56

### 6.2.3 BT 59 mounting device

The BT 59 mounting device offers you an additional fastening option. For order guide, please refer to chapter "Type overview and accessories" on page 126.

#### BT 59 mounting device

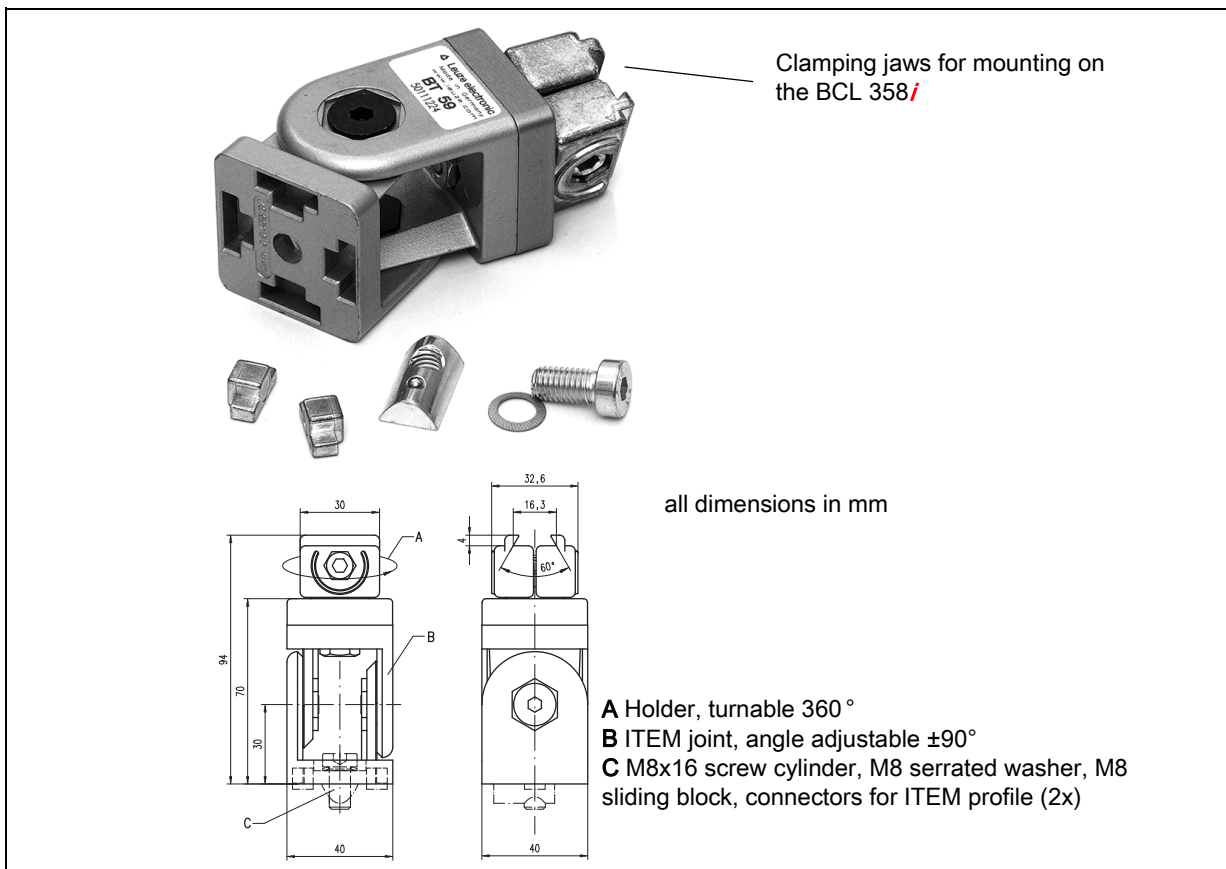


Figure 6.5: BT 59 mounting device

#### NOTE



When mounting, ensure that the scanning beam is not reflected directly back to the scanner by the label which is being read. For further information, see the notices in Chapter 6.3! Please refer to Chapter 5.4 for the permissible minimum and maximum distances between the BCL 358/i and the labels to be read.

#### 6.2.4 BT 300 - 1, BT 300 W mounting devices

Mounting brackets BT 300 W and BT 300 - 1 offer you an additional mounting option. For ordering instructions, please refer to chapter "Type overview and accessories" on page 126.

##### BT 300 - 1, BT 300 W mounting devices

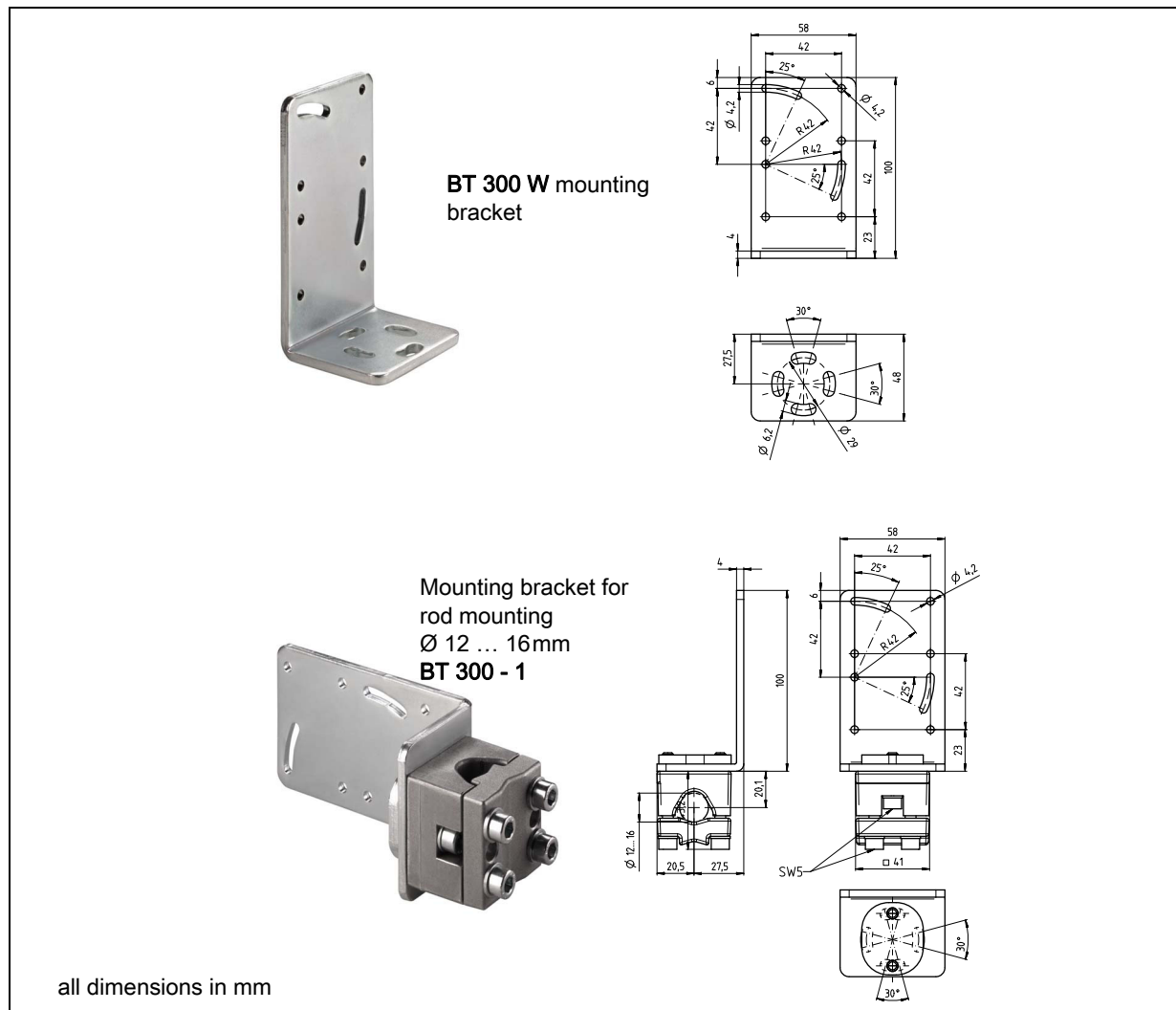


Figure 6.6: BT 300 - 1, BT 300 W mounting devices

#### NOTE



When mounting, ensure that the scanning beam is not reflected directly back to the scanner by the label which is being read. For further information, see the notices in Chapter 6.3! Please refer to Chapter 5.4 for the permissible minimum and maximum distances between the BCL 358/i and the labels to be read.


## 6.3 Device arrangement

### 6.3.1 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 358/i in relation to the bar code module width.
- The resulting minimum and maximum reading distance from the respective reading field (see chapter 5.4 "Reading field curves / optical data").
- The permissible cable lengths between the BCL 358/i and the host system depending on which interface is used.
- The correct time for data output. The BCL 358/i should be positioned in such a way that, taking into consideration the time required for data processing and the conveyor belt speed, there is sufficient time to e.g. initiate sorting operations on the basis of the read data.
- The display elements such as LEDs or the display should be highly visible.
- For configuring and commissioning with the webConfig tool, the USB interface should be easily accessible.

For specific information, please refer to Chapter 6 and Chapter 7.

NOTE	
	<p>The beam of the BCL 358/i exits:</p> <ul style="list-style-type: none"> <li>• <b>Parallel</b> to the <b>housing base</b> in the case of the line scanner</li> <li>• <b>At 105 degrees</b> from the <b>housing base</b> in the case of the deflecting mirror</li> <li>• <b>Perpendicular</b> to the <b>housing base</b> in the case of the oscillating mirror</li> </ul> <p>In each case, the housing base is the black area in Figure 6.2. The best read results are obtained when:</p> <ul style="list-style-type: none"> <li>• The BCL 358/i is mounted in such a way that the scanning beam is incident on the bar code at an angle of inclination greater than <math>\pm 10^\circ \dots 15^\circ</math> to vertical.</li> <li>• The reading distance lies in the middle area of the reading field.</li> <li>• The bar code labels are of good print quality and have good contrast ratios.</li> <li>• You do not use high-gloss labels.</li> <li>• There is no direct sunlight.</li> </ul>

### 6.3.2 Avoiding total reflection – Line scanner

The bar code label must be positioned at an angle of inclination greater than  $\pm 10^\circ \dots 15^\circ$  from vertical in order to avoid total reflection of the laser beam (see Figure 6.7)!

Total reflection occurs whenever the laser light of the bar code reader is directly incident on the surface of the bar code at an angle of  $90^\circ$ . The light directly reflected by the bar code may overload the bar code reader and thereby cause non-readings!

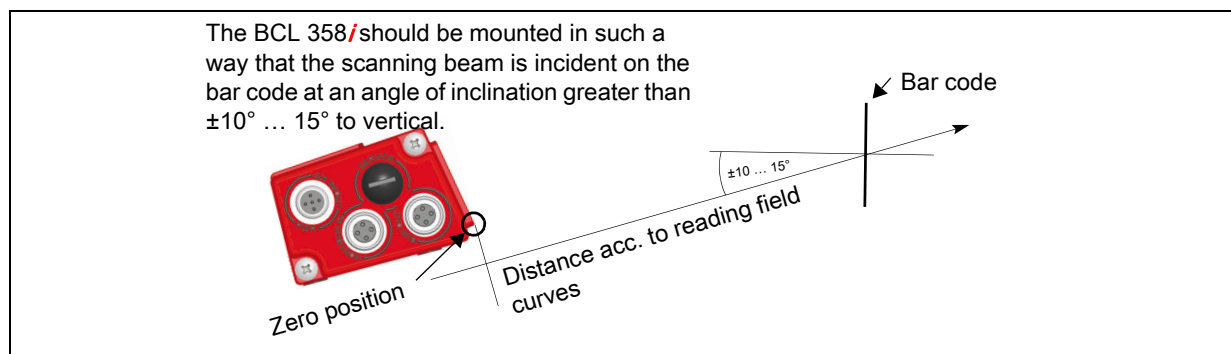


Figure 6.7: Total reflection – line scanner

### 6.3.3 Avoiding total reflection – deflecting mirror scanner

For the BCL 358/i with **deflecting mirror**, the laser beam exits at an angle of  $105^\circ$  to the rear housing wall. An angle of incidence of  $15^\circ$  of the laser to the label has already been integrated in the deflecting mirror so that the BCL 358/i can be installed parallel to the bar code (rear housing wall).

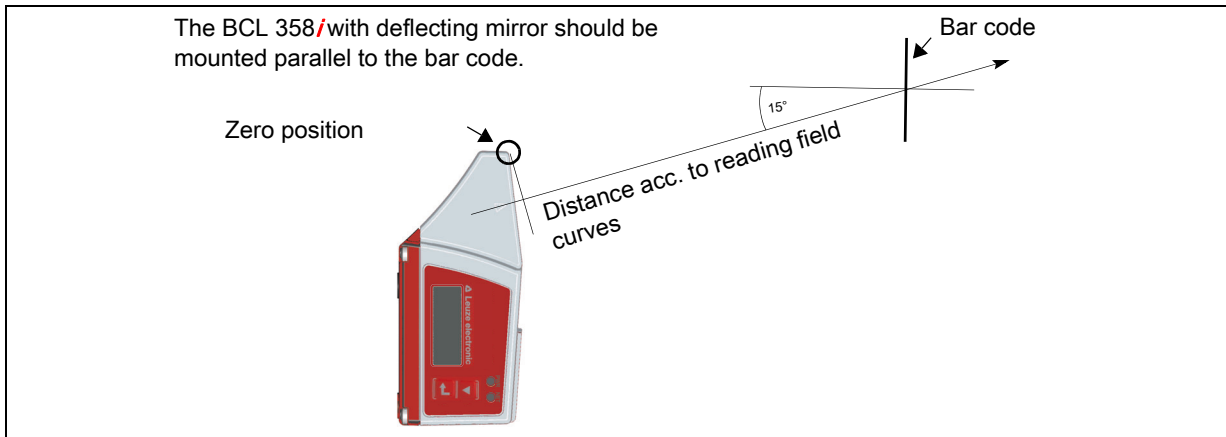



Figure 6.8: Total reflection – line scanner

### 6.3.4 Avoiding total reflection – oscillating-mirror scanner

For the BCL 358/i with **oscillating mirror**, the laser beam exits at an angle of  $90^\circ$  to vertical.

For the BCL 358/i with **oscillating mirror**, the **swivel range of  $\pm 20^\circ$**  ( $\pm 12^\circ$  for devices with heating) **is to be taken into account**.

This means that in order to be on the safe side and to avoid total reflection, the BCL 358/i with oscillating mirror must be inclined upward or downward  $20^\circ \dots 30^\circ$ !

NOTE	
	Mount the BCL 358/i with oscillating mirror in such a way that the exit window of the bar code reader is parallel to the object. This will result in an angle of inclination of approx. $25^\circ$ .

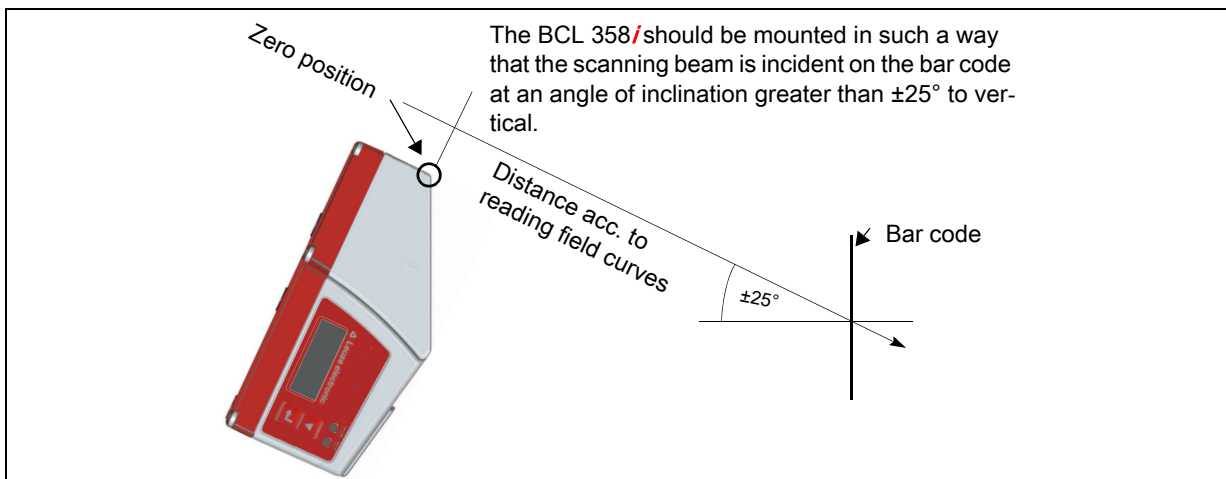


Figure 6.9: Total reflection – BCL 358/i with oscillating-mirror scanner

### 6.3.5 Mounting location

When choosing the mounting location, observe the following:

- Maintaining the required environmental conditions (temperature, humidity).
- Possible soiling of the reading window due to liquids, abrasion by boxes, or packaging material residues.
- Lowest possible chance of damage to the BCL 358/i by mechanical collision or jammed parts.
- Possible extraneous light (no direct sunlight or sunlight reflected by the bar code).

### 6.3.6 Devices with integrated heating

↳ When mounting devices with integrated heating, also observe the following points:

- Mount the BCL 358/i in a way which provides maximum thermal isolation, e.g. using rubber-bonded metal.
- Mount in such a way that the device is protected from draft and wind; mount additional shields if necessary.

#### NOTE



When installing the BCL 358/i in a protective housing, it must be ensured that the scanning beam can exit the protective housing without obstruction.

### 6.3.7 Possible read angles between BCL 358/i and bar code

The optimum alignment of the BCL 358/i is accomplished when the scan line scans the bar code bars almost at a right angle (90°). All reading angles that are possible between the scan line and bar code must be taken account (Figure 6.10).

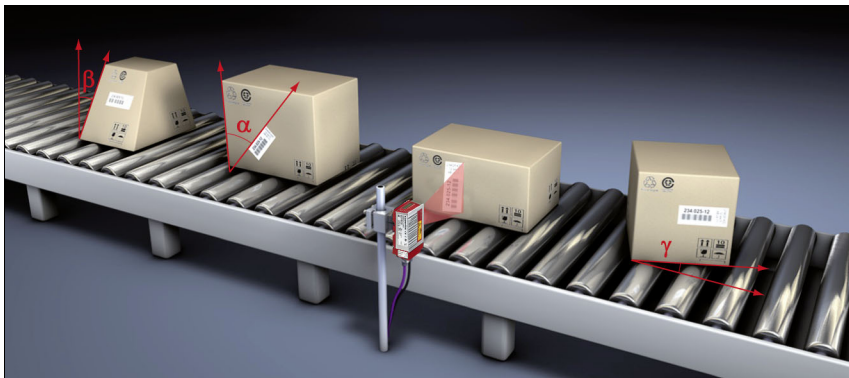


Figure 6.10: Reading angle for the line scanner

- $\alpha$  Azimuth angle (tilt)  
 $\beta$  Inclination angle (pitch)  
 $\gamma$  Angle of rotation (skew)

In order to avoid total reflection, the angle of rotation  $\gamma$  should be greater than 10°

### 6.4 Cleaning

↳ Clean the glass window of the BCL 358/i with a soft cloth after mounting. Remove all packaging remains, e.g. carton fibers or styrofoam balls. In doing so, avoid leaving fingerprints on the front screen of the BCL 358/i.

#### ⚠ ATTENTION!





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

## 7 Electrical connection

The bar code readers of the BCL 300/series feature a modular connection concept with interchangeable connection hoods.

The additional Mini-B type USB interface is used for configuring the device.

NOTE	
	On delivery, the products are provided with a plastic protective cap on the side of the system plug or the system socket. Additional connection accessories can be found in Chapter 13

⚠ ATTENTION!	
	The BCL 358/ does not fulfill degree of protection IP 65 until the connection hood has been screwed on. Minimum tightening torque of the housing connecting screw of the connection hood is 1.4 Nm!

### Location of the electrical connections

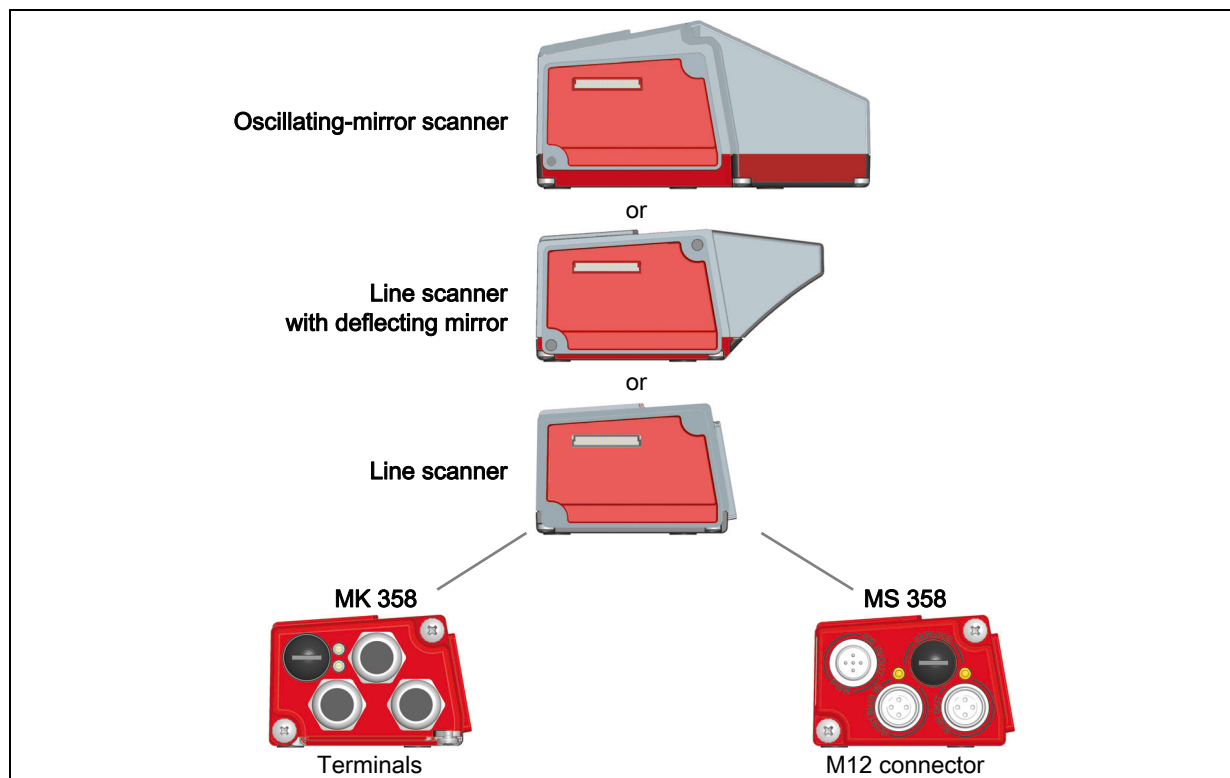



Figure 7.1: Location of the electrical connections

### 7.1 Safety notices for the electrical connection

⚠ ATTENTION!	
	<p>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 358/ contains no parts that need to be adjusted or maintained by the user.</p> <p>Before connecting the device, be sure that the supply voltage agrees with the value printed on the name plate.</p> <p>Connection of the device and cleaning must only be carried out by a qualified electrician.</p> <p>Ensure that the functional earth (FE) is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly.</p> <p>If faults cannot be cleared, the device should be switched off and protected against accidental use.</p>

**⚠ ATTENTION!**

For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).



*The bar code readers of the BCL 300*i* series are designed in accordance with protection class III for supply by PELV (protective extra-low voltage with reliable disconnection).*

**NOTE**

Degree of protection IP 65 is not fulfilled until connectors or cable bushings are screwed on and caps are installed!

**⚠ ATTENTION!**

To ensure degree of protection IP 65 is fulfilled, the screws of the connection hood are tightened with a tightening torque of 1.4 Nm for connecting to the BCL.

## 7.2 BCL 358/i electrical connection

For the electrical connection of the BCL 358/i, 2 connection variants are available.

The **voltage supply** (18 ... 30VDC) is connected acc. to the connection type selected.

**2 freely programmable switching inputs/outputs** for individual adaptation to the respective application are also available here. Detailed information on this topic can be found in Chapter 7.3.1.

### 7.2.1 MS 358 connector hood with 3 integrated M12 connectors

The MS 358 connector hood features three M12 connector plugs and a Mini-B type USB socket as a service interface. Parameter memory is integrated into the MS 358 which temporarily stores the settings of the BCL 358/i in the case of replacement and transmits them to a new device.

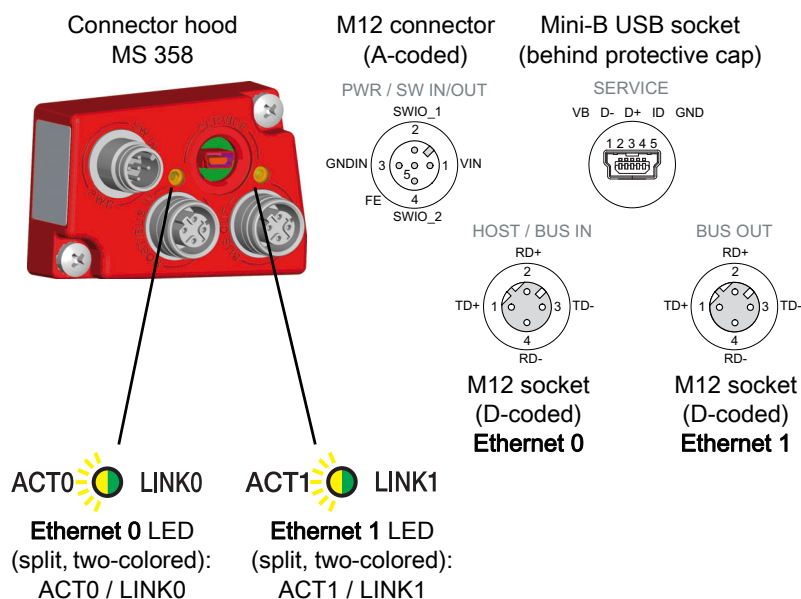






Figure 7.2: BCL 358/i - MS 358 connection hood with M12 connectors

NOTE	
	The shielding connection is done via the M12 connector housing.
NOTE	
	The integrated parameter memory for the simple replacement of the BCL 358/i is located in the MS 358. In the integrated parameter memory, both the settings and the network address are saved and transmitted to a new device.
NOTE	
	In the case of Ethernet linear topology, the network is interrupted when the BCL 301/i is removed from the MS 358.
NOTE	
	Dimensioned drawing on see chapter 5.3.5 "Dimensioned drawings of MS 3xx / MK 3xx connection hoods" on Page 38.

### 7.2.2 MK 358 terminal hood with spring-cage terminals

The MK 358 terminal hood makes it possible to connect the BCL 358/i directly and without additional connectors. The MK 358 features three cable lead-throughs in which the shielding connection for the interface cable is also located. The BCL 358/i is also to be configured when the MK 358 is in a closed state via a Mini-B type USB socket functioning as the service interface. Parameter memory is integrated into the MK 358 which temporarily stores the settings of the BCL 358/i in the case of replacement and transmits them to a new device.

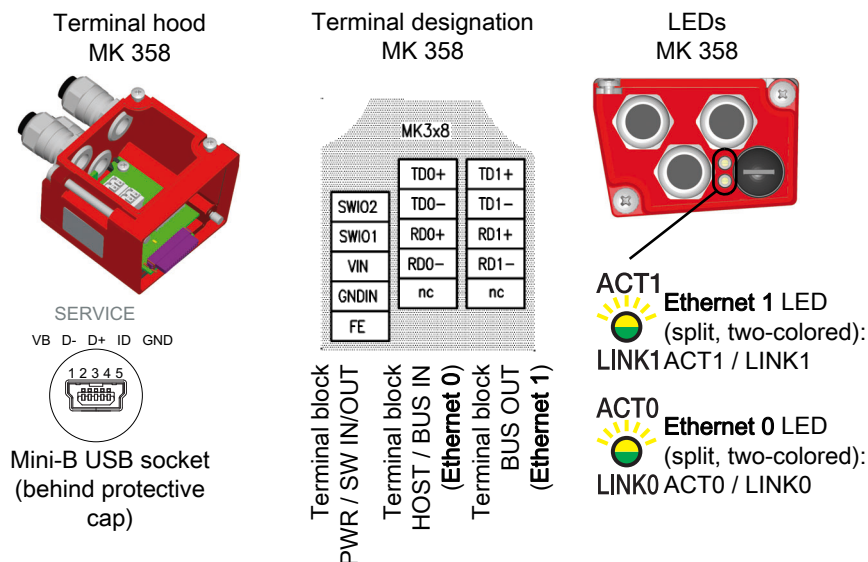




Figure 7.3: BCL 358/- MK 358 terminal hood with spring-cage terminals

NOTE	
	The integrated parameter memory for the simple replacement of the BCL 358/- is located in the MK 358. In the integrated parameter memory, both the settings and the network address are saved and transmitted to a new device.

NOTE	
	In the case of Ethernet linear topology, the network is interrupted when the BCL 301/- is removed from the MK 358.

**Cable fabrication and shielding connection**

Remove approx. 78 mm of the connection cable sheathing. 15 mm of sheath of the shielded line must be freely accessible.

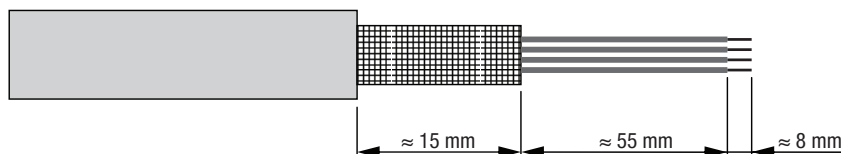



Figure 7.4: Cable fabrication for MK 358 terminal hood

The shield is automatically contacted when the cable is lead into the metal screw fitting and fastened when the cord grip is closed. Then lead the individual wires into the terminals according to the diagram. Wire end sleeves are not necessary.

NOTE	
	Dimensioned drawing on see chapter 5.4 "Reading field curves / optical data" on Page 39.

## 7.3 Detailed description of the connections

Described in detail in the following are the individual connections and pin assignments.

### 7.3.1 PWR / SW IN/OUT - Voltage supply and switching input/output 1 and 2

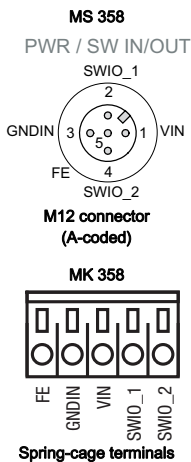

PWR / SW IN/OUT			
	Pin (M12)	Name (terminal)	Comment
	1	VIN	Positive supply voltage +18 ... +30VDC
	2	SWIO_1	Configurable switching input/output 1
	3	GNDIN	Negative supply voltage 0VDC
	4	SWIO_2	Configurable switching input/output 2
	5	FE	Functional earth
	Thread	FE	Functional earth (housing)

Table 7.1: PWR / SW IN/OUT pin assignment

#### Supply voltage

⚠ ATTENTION!	
	For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).



The bar code readers of the BCL 300*i* ... series are designed in accordance with protection class III for supply by PELV (protective extra-low voltage with reliable disconnection).

#### Connecting the functional earth FE

- ⚡ Ensure that the functional earth (FE) is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly. All electrical disturbances (EMC couplings) are discharged via the functional earth connection.

### Switching input/output

The bar code readers of the BCL 300/series are equipped with two freely programmable, opto-decoupled switching inputs and outputs, **SWIO\_1** and **SWIO\_2**.

The switching inputs can be used to activate various internal functions of the BCL 358/ (decoding, auto-Config, ...). The switching outputs can be used to signal the state of the BCL 358/ and to implement external functions independent of the superior control.

#### NOTE



The respective function as input or output can be set with the aid of the webConfig configuration tool!

Described in the following is the external wiring for use as a switching input or output; the respective function assignments to the switching inputs/outputs can be found in Chapter 10.

#### Function as switching input

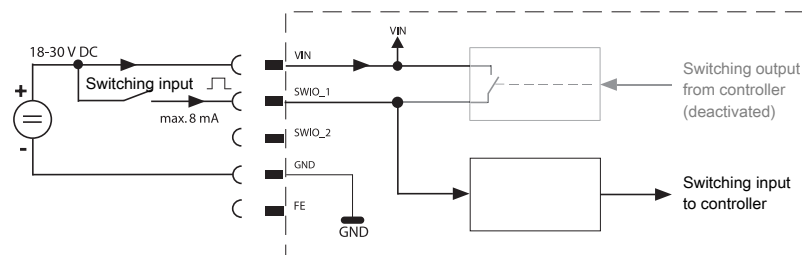


Figure 7.5: Switching input connection diagram SWIO\_1 and SWIO\_2

⚠ If you use a sensor with a standard M12 connector, please note the following:

- Pins 2 and 4 must not be operated as switching outputs if sensors which function as inputs are also connected to these pins.

If, for example, the inverted sensor output is connected to pin 2, and pin 2 of the bar code reader is, at the same time, configured as an output (and not as an input), the switching output malfunctions.

#### ⚠ ATTENTION!



*The maximum input current must not exceed 8 mA!*

#### Function as switching output

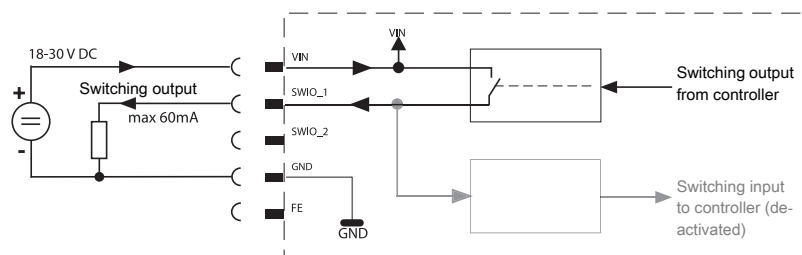


Figure 7.6: Switching output connection diagram SWIO\_1 / SWIO\_2

#### ⚠ ATTENTION!



Each configured switching output is short-circuit proof! Do not load the respective switching output of the BCL 358/ with more than 60 mA at +18 ... +30 VDC in normal operation!

#### NOTE



Both switching inputs/outputs SWIO\_1 and SWIO\_2 are configured by default in such a way that:

- Switching input SWIO\_1 activates the reading gate.
- Switching output SWIO\_2 switches by default on "No Read".

## 7.3.2 SERVICE – USB interface (Mini-B type)

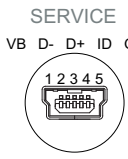

SERVICE – USB interface (Mini-B type)			
	Pin (USB Mini-B)	Name	Comment
	1	VB	Sense input
	2	D-	Data -
	3	D+	Data +
	4	ID	Not connected
	5	GND	Ground

Table 7.2: SERVICE pin assignment – Mini-B type USB interface

⚡ Ensure adequate shielding.

The entire interconnection cable must absolutely be shielded acc. to the USB specifications. Cable length must not exceed 3 m.

⚡ Use the Leuze specific **USB service cable** (see chapter 13 "Type overview and accessories") for the connection and use a service PC to configure.

NOTE	
	IP 65 is achieved only if the connectors and caps are screwed into place.

7.3.3 HOST / BUS IN for BCL 358/

The BCL 358/ makes either the Ethernet interface available as host interface.

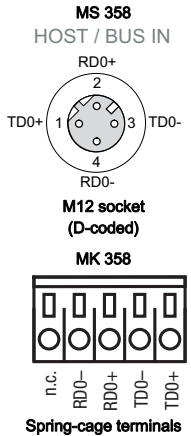
HOST / BUS IN Ethernet_0 (4-pin socket, D-coded)			
	Pin (M12)	Name (terminal)	Comment
	1	TD0+	Transmit Data +
	2	RD0+	Receive Data +
	3	TD0-	Transmit Data -
	4	RD0-	Receive Data -
	FE via thread	FE via screw fitting	Functional earth (housing)

Table 7.3: Pin assignment HOST / BUS IN for BCL 358/

Ethernet cable assignment

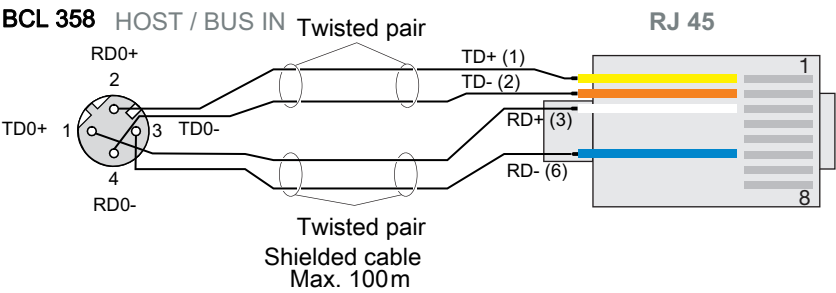



Figure 7.7: HOST / BUS IN cable assignments on RJ-45

NOTE	
	<b>Notice for connecting the Ethernet interface!</b> Ensure adequate shielding. The entire interconnection cable must be shielded and earthed. The RD+/RD- and TD+/TD- wires must be stranded in pairs. Use CAT 5 cable for the connection.

7.3.4 BUS OUT for the BCL 358/

To set up an Ethernet network with other participants with linear topology, the BCL 358/ makes available another Ethernet interface. The use of this interface drastically reduces the cabling requirements, as only the first BCL 358/ requires a direct connection to the switch, via which it can communicate with the host. All other BCL 358/ are connected in series to the first BCL 358/, see Figure 7.9.

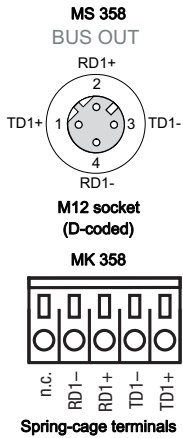


BUS OUT Ethernet_1 (4-pin socket, D-coded)			
	Pin (M12)	Name (terminal)	Comment
	1	TD1+	Transmit Data +
	2	RD1+	Receive Data +
	3	TD1-	Transmit Data -
	4	RD1-	Receive Data -
	FE via thread	FE via screw fitting	Functional earth (housing)

Table 7.4: Pin assignment BUS OUT for BCL 358/

If you use ready-made cables, note the following:

NOTE	
	Ensure adequate shielding. The entire interconnection cable must be shielded and earthed. The signal lines must be stranded in pairs. Use CAT 5 cables for the connection.
NOTE	
	For the BCL 358/ as stand-alone device or as the last participant in a linear topology, termination on the BUS OUT socket is not mandatory!

## 7.4 Ethernet topologies

The BCL 358/i can be operated as a single device (stand-alone) in an Ethernet star topology with individual IP address.

The IP address can either be set manually and permanently via BootP/webConfig tool or assigned dynamically via a DHCP server.

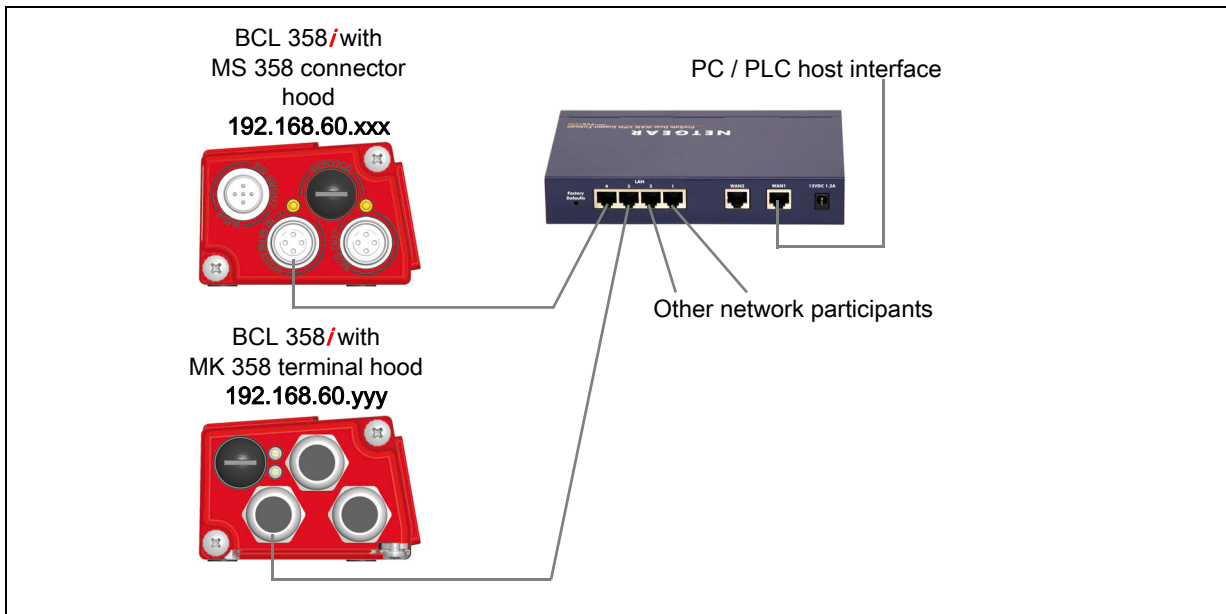


Figure 7.8: Ethernet in a star topology

The innovative further development of the BCL 358/i with integrated switch functionality offers the option of networking multiple bar code readers of type BCL 358/i with one another. In addition to the classic "star topology", a "linear topology" is thus also possible.

This makes wiring the network easy and inexpensive as slaves are looped through to one another in parallel.

The maximum length of a segment (connection between two switches/BCL 358/i) is limited to 100 m.

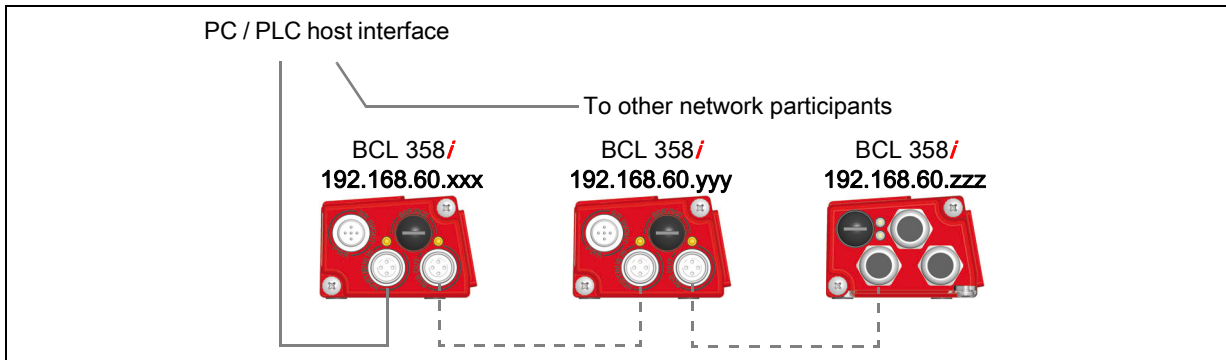


Figure 7.9: Ethernet in a linear topology

Each participating BCL 358/i is automatically assigned its address by a DHCP server. Alternatively, each BCL 358/i can be assigned the respective network address via the webConfig tool. This address must be specified by the network administrator.

Information on the necessary configuration steps can be found in Chapter 10.

### 7.4.1 Ethernet wiring

A cat. 5 Ethernet cable should be used for wiring.

For the connection on the BCL 358/i, a "KDS ET M12 / RJ 45 W - 4P" adapter is available into which the standard network cable can be plugged.

If no standard network cables are to be used (e.g. due to lacking IP... degree of protection), you can use the user-configurable cables on the BCL 358/i (depending on the connection hood used).

## 7.5 Cable lengths and shielding

↳ Observe the following maximum cable lengths and shielding types:

Connection	Interface	Max. cable length	Shielding
BCL – service	USB	3m	Shielding absolutely necessary acc. to USB specifications
BCL – host	Ethernet	100m	Shielding absolutely required
Network from the first BCL to the last BCL	Ethernet	The maximum segment length must not exceed 100 m for 10Base-T Twisted Pair (min. Cat. 3) and 100Base-TX Twisted Pair (min. Cat. 5)	Shielding absolutely required
BCL – power supply unit		30m	Not necessary
Switching input		10 m	Not necessary
Switching output		10 m	Not necessary

Table 7.5: Cable lengths and shielding

## 8 Display elements and display

The BCL 358/i is available optionally with display, 2 control buttons and LEDs or with only 2 LEDs as display elements.

### 8.1 BCL 358/i LED indicators



Figure 8.1: BCL 358/i - LED indicators

2 multicolor LEDs are used as the primary display instrument.

#### LED functions:

##### PWR LED



**Off**

##### Device OFF

- No supply voltage



**Green, flashing**

##### Device ok, initialization phase

- No bar code reading possible
- Voltage connected
- Self test runs for 0.25s after power up
- Initialization running



**Green, continuous light**

##### Device ok

- Bar code reading possible
- Self test successfully finished
- Device monitoring active



**Green, briefly off - on**

##### Good read, successful reading

- Bar code(s) successfully read



**Green, briefly off -  
briefly red - on**

##### No read, reading not successful

- Bar code(s) not read



**Orange, continuous light**

##### Service mode








- Bar code reading possible
- Configuration via the USB service interface
- No data on the host interface



**Red, flashing**

##### Warning set

- Bar code reading possible
- Self test runs for 0.25s after power up
- Temporary operating fault

PWR 	<b>Red, continuous light</b>	<b>Device error</b> - No bar code reading possible
<b>NET LED</b>		
NET 	<b>Off</b>	<b>NET LED off</b> - No voltage supply - No IP address assigned
NET 	<b>Flashing green</b>	<b>NET LED flashes green</b> - LED autotest for 0.25 s after power up - No EtherNet/IP communication present - BCL 358/i is not assigned to a master
NET 	<b>Green, continuous light</b>	<b>NET LED green</b> - BCL 358/i Bus communication ok
NET 	<b>Flashing red</b>	<b>NET LED flashes red</b> - LED function test for 0.25 s after power up - Timeout in the bus communication
NET 	<b>Continuous red light</b>	<b>NET LED red</b> - Double IP address
NET 	<b>Flashing green/red</b>	<b>NET LED flashes green/red</b> - Self test

## 8.2 MS 358/MK358 LED indicators

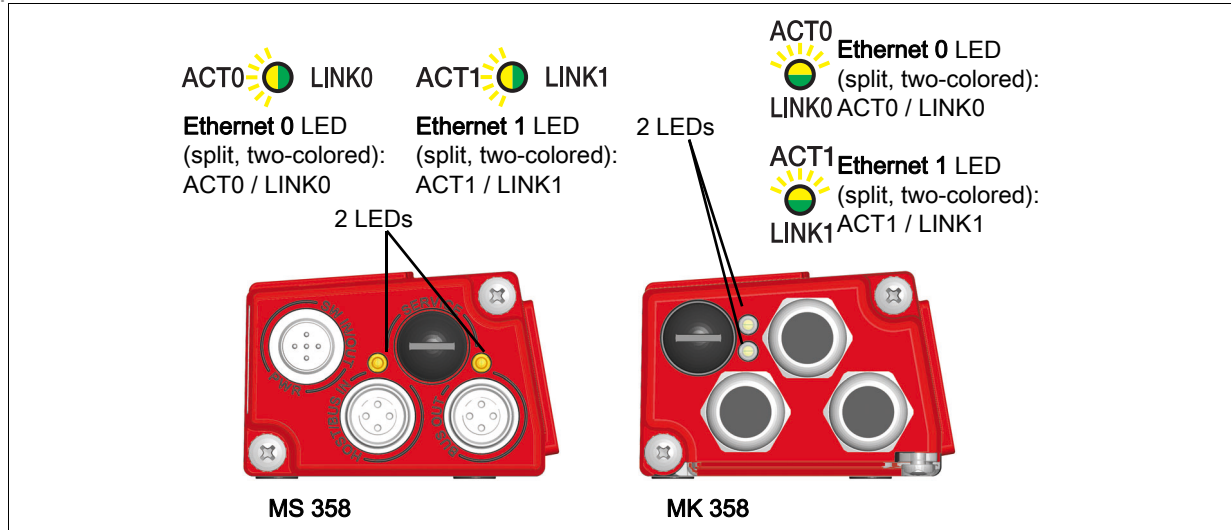


Figure 8.2: MS 358/MK 358 - LED indicators

As a status display for the two Ethernet connections, **Ethernet\_0** and **Ethernet\_1**, there are two split two-colored LEDs each in the MS 358 and MK 358:

### LED ACT0 / LINK0 (on the MS 358/MK 358)

ACT0 	<b>Green, continuous light</b>	<b>Ethernet connected (LINK)</b>
LINK0 	<b>Yellow, flashing</b>	<b>Data communication (ACT)</b>

### LED ACT1 / LINK1 (on the MS 358/MK 358)

ACT1 	<b>Green, continuous light</b>	<b>Ethernet connected (LINK)</b>
LINK1 	<b>Yellow, flashing</b>	<b>Data communication (ACT)</b>

### 8.3 BCL 358/-display



Figure 8.3: BCL 358/- Display

#### NOTE



The function of the LEDs is identical for the devices with and without display.

The optional display of the BCL 358/- has the following features:

- Monochromatic with background lighting (blue/white)
- Double line, 128 x 32 pixels
- Display language: English

The display is only used as a **display element**. Two buttons can control which values are displayed. In doing so, the upper line displays the selected function and the lower line displays the result.

The background lighting is activated by the push of any button and automatically deactivated after a defined point in time:

#### Display functions

The following functions can be displayed and activated:

- Reading result = result of reading process
- Decodequality = quality of decoding process
- BCL Info = device status/error code
- I/O Status = status of the inputs/outputs
- BCL Address = IP address of the BCL 358/-
- Adjustmode = alignment mode
- Version = software and hardware version

After the voltage is switched off/on, the reading result is always displayed.

The display is controlled via the two control buttons:



**ENTER**

**Activation/deactivation of the display change function**








**Down**

**Scroll through functions (downwards)**

#### Example:

Representation of the BUS status on the display:

1. Press button  : Display flashes
2. Press button  : Display changes from read result to decoding quality
3. Press button  : Display changes from decoding quality to device status
4. Press button  : Display changes from device status to BUS status
5. Press button  : Bus status displayed, display stops flashing.

#### Description of the display functions

Reading result  
88776655

- 1st line: **read result** display function
- 2nd line: code content of the bar code, e.g. **88776655**

Decoding quality  
84

- 1st line: **decoding quality** display function
- 2nd line: decoding quality in percent, e.g. **84%**

BCL info  
Error code 3201

- 1st line: **device status** display function
- 2nd line: error code, e.g. **Error code 3201**

I/O status  
In = 0 Out = 1

- 1st line: input/output **status** display function
- 2nd line: state: 0 = inactive, 1 = active, e.g. **In=0, Out=1**

BCL address  
192.168.060.0

- 1st line: **IP address** display function
- 2nd line: set address, e.g. **192.168.060.0**

Adjust mode  
73

- 1st line: **alignment mode** display function
- 2nd line: decoding quality in percent, e.g. **73%**


Version  
SW: xxxxx HW: xxx

- 1st line: **version** display function
- 2nd line: software and hardware version of the device

## 9 Leuze webConfig tool

With the **Leuze webConfig tool**, an operating-system independent, web-technology based, graphical user interface is available for configuring bar code readers of the BCL 300*i* series.

Through the use of HTTP as communication protocol and by using only standard technologies on the client side (HTML, JavaScript and AJAX), which are supported by all commonly used, modern browsers (e.g. **Mozilla Firefox** beginning with Version 4.0 or **Internet Explorer** beginning with Version 8.0 or Microsoft **Edge**), it is possible to operate the **Leuze webConfig tool** on any internet-ready PC.

NOTE	
	<p>The webConfig tool is offered in 6 languages:</p> <ul style="list-style-type: none"><li>• German</li><li>• English</li><li>• French</li><li>• Italian</li><li>• Spanish</li><li>• Chinese</li></ul>

### 9.1 Connecting the SERVICE USB interface

The connection to the SERVICE USB interface of the BCL 358*i* is established via the PC-side USB interface using a standard USB cable with 1 type A connector and a Mini-B type connector.

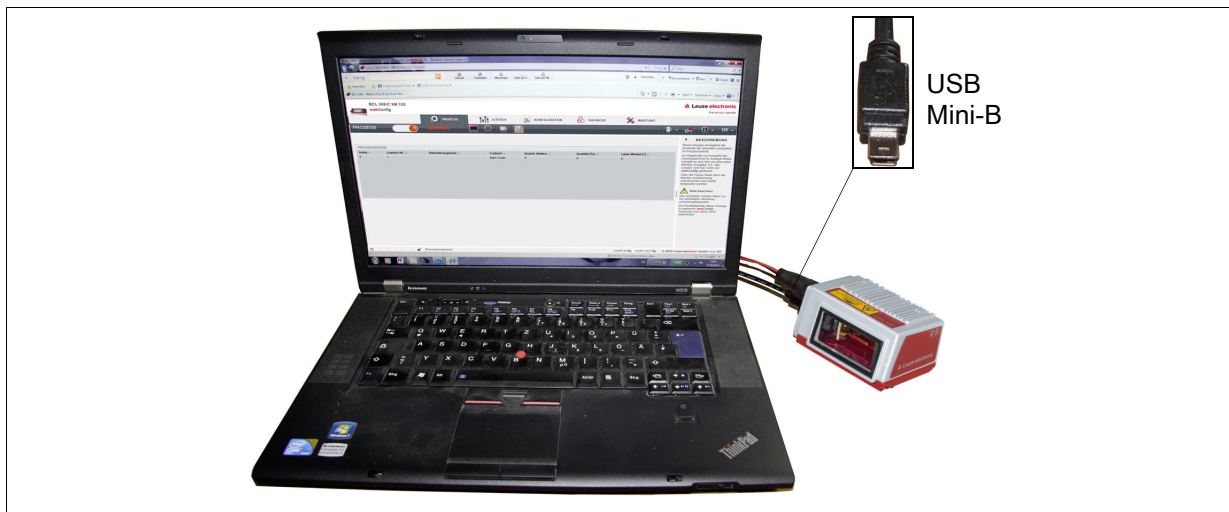


Figure 9.1: Connecting the SERVICE USB interface

## 9.2 Installing the required software

### 9.2.1 System requirements

Operating system:	Windows 2000 Windows XP (Home Edition, Professional) Windows Vista Windows 7 Windows 8/8.1 Windows 10
Computer:	PC with USB interface version 1.1 or higher
Graphics card:	Min. 1024 x 768 pixels or higher resolution
Required hard drive capacity:	Approx. 10MB

#### NOTE



It is recommended to update the operating system and the browser regularly and to install the current Windows service packs.

### 9.2.2 Installing the USB driver

#### NOTE



If you have already installed a USB driver for a BCL 5xx*i* on your computer, you don't have to install the USB driver for the BCL 358*/i*. In this case, you can also start the webConfig tool of the BCL 358*/i* by double-clicking on the BCL 5xx*i* icon.

In order for the BCL 358*/i* to be automatically detected by the connected PC, the **USB driver** must be installed **once** on your PC. To do this, you must have **administrator privileges**.

Please proceed according to the following steps:

- ↳ Start your PC with administrator privileges and log on.
- ↳ Load the CD included in the delivery contents of your BCL 358*/i* in the CD drive and start the setup.exe program.
- ↳ Alternatively, you can also download the setup program from the internet at [www.leuze.com](http://www.leuze.com).
- ↳ Follow the instructions provided by the setup program.


Upon successful installation of the USB driver, an icon  with the name **Leuze Web Config** automatically appears on the desktop.

#### NOTE



If the installation failed, contact your network administrator: The settings of the firewall used may need to be adjusted.

## 9.3 Starting the webConfig tool

To start the **webConfig tool**, click the icon  with the name **Leuze Web Config** located on the desktop. Make certain that the BCL 358*/i* is connected to the PC via the USB interface and that voltage is connected. Alternatively, the **webConfig tool** can also be directly started via the Ethernet connection.

#### NOTE



If you have already installed a USB driver for a BCL 5xx*i* on your computer, you can also start the webConfig tool of the BCL 358*/i* by double-clicking on the BCL 5xx*i* icon.

Alternatively, you can start the webConfig tool by starting the browser installed on your PC and entering the following IP address: **192.168.61.100**

This is the default Leuze service address for communication with bar code readers of the BCL 300/ and BCL 500/ series.

In both cases, the following start page appears on your PC.

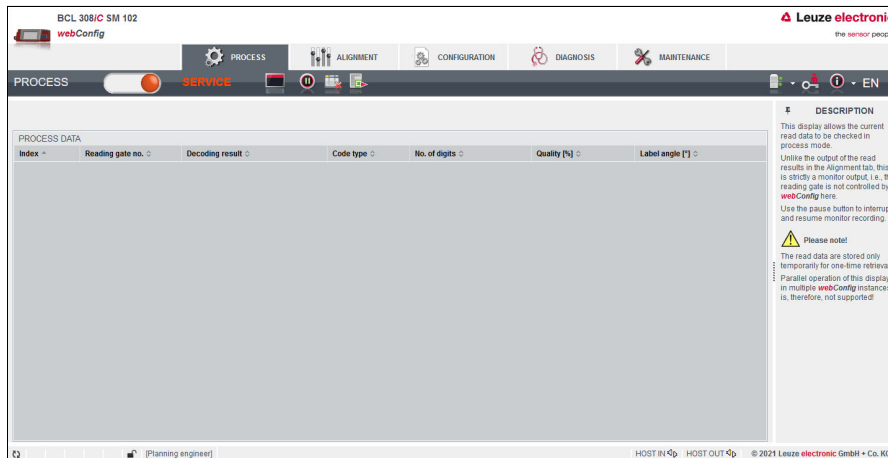



Figure 9.2: The start page of the webConfig tool

NOTE	
	<p>The webConfig tool is completely contained in the firmware of the BCL 358/. Depending on firmware version, the start page may vary from that shown above.</p>

The individual parameters are – where useful – graphically displayed in order to better illustrate the meaning of the what are often perceived as abstract parameters.

The result is an easy-to-use and practically-oriented user interface!

## 9.4 Short description of the webConfig tool

The webConfig tool has 5 main menus:

- **Process**  
with read information of the host interface of the connected BCL 358/.
- **Alignment**  
for manually starting read processes and for aligning the bar code reader. The results of the read processes are displayed immediately. As a result, this menu item can be used to determine the optimum installation location.
- **Configuration**  
for adjusting decoding, for data formatting and output, switching inputs/outputs, communication parameters and interfaces, etc. ...
- **Diagnostics**  
for event logging of warnings and errors
- **Maintenance**  
for updating the firmware.

The user interface of the webConfig tool is largely self-explanatory.

### 9.4.1 Module overview in the Configuration menu

The adjustable parameters of the BCL 358/ are clustered in modules in the Configuration menu.

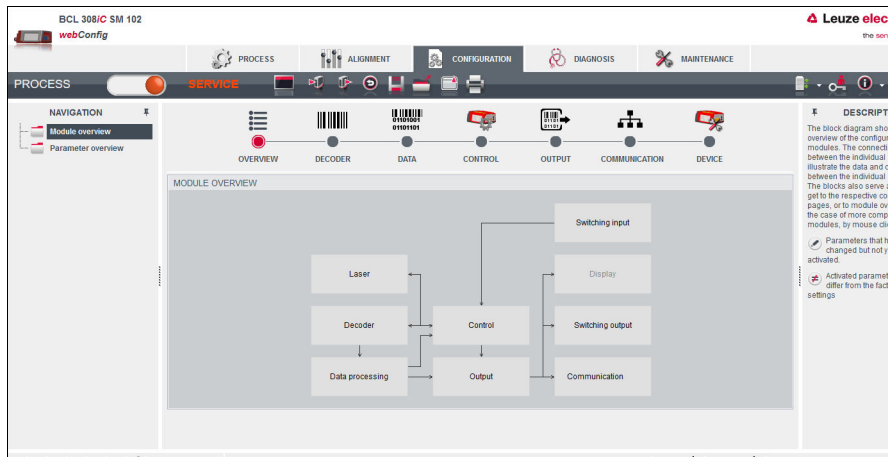


Figure 9.3: Module overview in the webConfig tool

#### NOTE



The webConfig tool is completely contained in the firmware of the BCL 358/. Depending on firmware version, the module overview may vary from that shown above.

The individual modules and their relationships to one another are graphically displayed in the module overview. The display is context sensitive, i.e. click a module to directly access the corresponding submenu.

#### Overview of the configurable modules


- Device:  
Configuration of the **switching inputs and outputs**
- Decoder:  
Configuration of the decoder table, such as **code type**, **number of digits**, etc.
- Control:  
Configuration of **activation** and **deactivation**, e.g. **auto-activation**, **AutoReflAct**, etc.
- Data:  
Configuration of **code content**, such as **filtering**, **segmentation of bar code data**, etc.
- Output:  
Configuration of **data output**, **header**, **trailer**, **reference code**, etc.
- Communication:  
Configuration of the **host interface** and the **service interface**, e.g. **IP address**, etc.
- Oscillating mirror:  
Configuration of the **oscillating mirror settings**

#### NOTE



On the right side of the user interface of the webConfig tool, you will find a description of the individual modules and functions as a help text in the **Information** area.


## 10 Commissioning and configuration

⚠ Attention Laser!	
	Observe the safety notices in Chapter 2!

This chapter describes basic configuration steps which you can carry out via the webConfig tool or Rockwell control.

### Via the webConfig tool

The most convenient way to configure the BCL 358/i is via the webConfig tool. To use the webConfig tool, you need to establish a USB connection between the BCL 358/i and a PC/laptop.

NOTE	
	Notes on the use of the webConfig tool can be found in Chapter 9 "Leuze webConfig tool" on page 72.


### 10.1 Measures to be performed prior to the initial commissioning

- ↳ Before commissioning, familiarize yourself with the operation and configuration of the BCL 358/i.
- ↳ Before connecting the supply voltage, recheck all connections and ensure that they have been properly made.

The description of the electrical connections can be found in Chapter 7.

## 10.2 Starting the device

- Connect the +18 ... 30VDC supply voltage (typ. +24VDC); the BCL 358*i* starts up and the bar code reading window appears on the display.

NOTE	
	<i>The BCL 358<i>i</i> can decode the following code types in the standard setting:</i>
	• <b>Code 128</b> <i>Number of digits 4 ... 63</i>
	• <b>2/5 Interleaved</b> <i>Number of digits 10</i>
	• <b>Code 39</b> <i>Number of digits 4 ... 30</i>
	• <b>EAN 8 / 13</b> <i>Number of digits 8 and 13</i>
	• <b>UPC</b> <i>Number of digits 8</i>
	• <b>Codabar</b> <i>Number of digits 4 ... 63</i>
	• <b>Code 93</b> <i>Number of digits 4 ... 63</i>
	• <b>Code GS1 Data Bar OMNIDIRECTIONAL</b>
	• <b>Code GS1 Data Bar LIMITED</b>
	• <b>Code GS1 Data Bar EXPANDED</b>

Deviations from these settings must be set via the webConfig tool. See "Leuze webConfig tool" on page 72.

As a first step, you need to set the communication parameters of the BCL 358*i*.

## 10.3 Setting the communication parameters

With the communication parameters, you determine how data is exchanged between BCL 358*i* and host system. The communication parameters are independent of the topology in which the BCL 358*i* is operated. See "Ethernet topologies" on page 66.

On delivery, the automatic address assignment via DHCP server is defined as the standard setting of the BCL 358*i*.

### 10.3.1 Manual configuration of the IP address

There are two ways to set the IP address manually. Either via **BootP/DHCP server tool** or via the **webConfig tool** using the USB connection. For this purpose, the DHCP operation in the BCL 358/i must be deactivated.

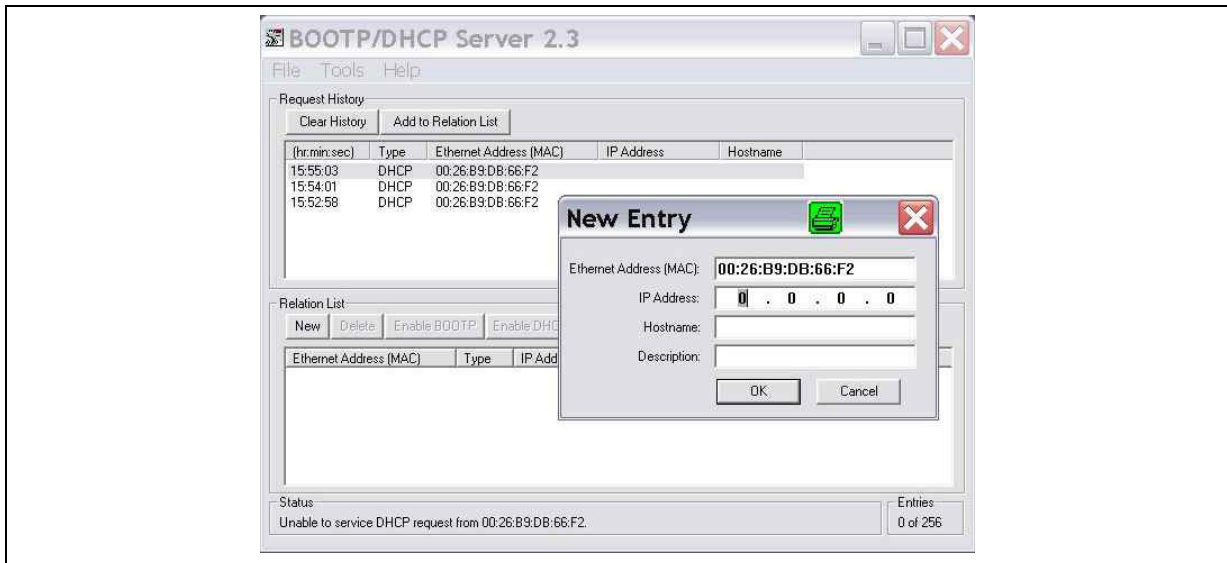


Figure 10.1: Manual configuration of the IP address

If no DHCP server is present in your system, you must permanently set the IP addresses of the BCL 358/i. Proceed as follows:

- Have the network administrator specify the data for IP address, net mask and gateway address of the BCL 358/i.
- Connect the BCL 358/i to your computer using the service cable.
- Set these values on the BCL 358/i:  
**In the webConfig tool**
  - In the main menu, select Configuration, submenu Communication -> Ethernet interface.
  - Deactivate the DHCP operation and enter the IP address.

#### NOTE



If the IP address is set via the webConfig tool, then it becomes active after transfer to the device. A restart is not required.

## 10.4 Configuration steps for a Rockwell control without EDS support

### 10.4.1 Integrating the hardware into the PLC using the generic Ethernet module

In the **RSLogix 5000** configuration tool (up to software version **20.00**), a so-called **generic Ethernet module** is created under the Communication path for the BCL 358*i*.

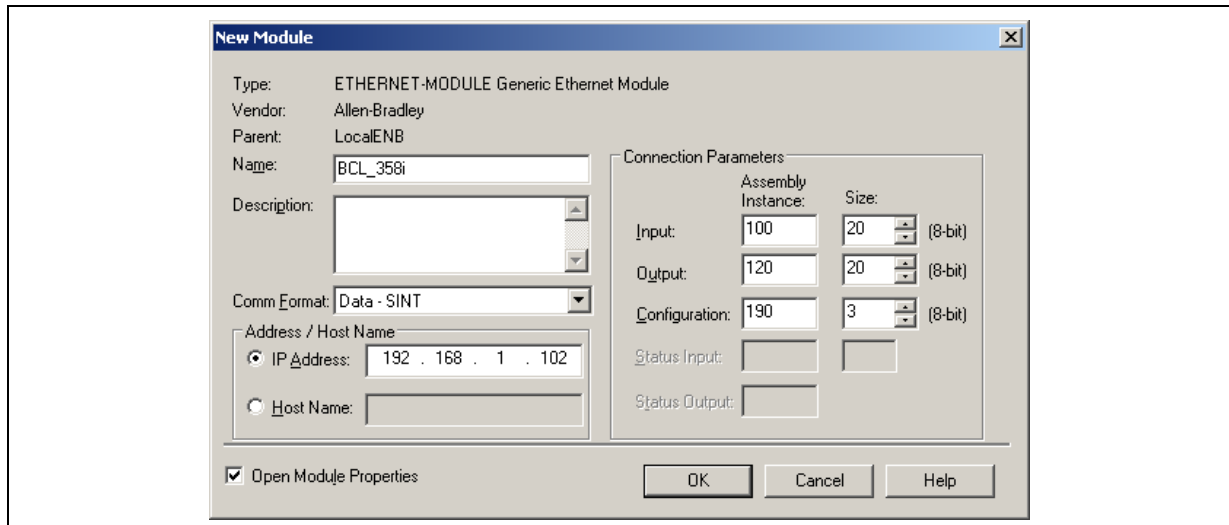


Figure 10.2: Generic Ethernet module

The input mask for the generic module describes the following parameters to be set:

- The name of the participant (can be selected freely; e.g. BCL 358*i*)
- The format of I/O data (data - SINT = 8 bits)
- The IP address of the participant
- The address and length of the input assembly (instance 100, instance 101 or instance 102; min 1 byte - up to max. 266 bytes for the default input assembly of the read results).
- The address and length of the output assembly (instance 120, instance 121 or instance 122; min 1 byte - up to max. 263 bytes for the default output assembly)
- The address and length of the configuration assembly (instance 190; 3 bytes)

## 10.5 Configuration steps for a Rockwell control with EDS support

The following steps are necessary for commissioning with a Rockwell control:

- Creation of the EtherNet/IP participants in PLC software **RSLogix 5000** from **version 20.00** and up (with EDS support).
- Installation of the EDS file using the EDS wizard.
- Setting the parameters of the BCL 358/i via the configuration assembly or webConfig.

### 10.5.1 Integrating the hardware into the PLC and installing the EDS file

To integrate the device and to establish a connection between the PLC and the device BCL 358/i, proceed as follows:

- First, load the EDS file for the device **via EDS wizard** into the PLC database.

NOTE	
	You can find the EDS file at: <a href="http://www.leuze.com">www.leuze.com</a>

- After it has downloaded, select the device from the device list.
- Open the input dialog for setting the address and additional parameters by double-clicking on the device symbol and make the desired entries here. Under **Change**, define the combination of input and output assemblies.

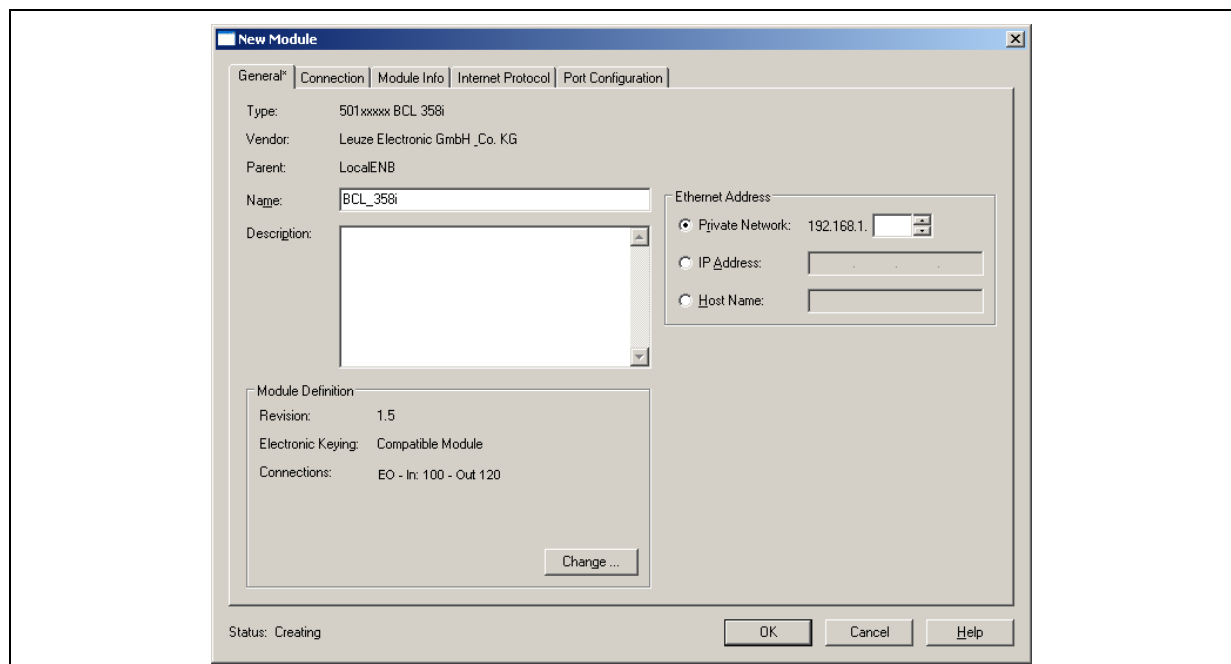


Figure 10.3: New module

- Finally, transmit the values to the control via download.

## 10.6 EDS file - general info

The EDS file contains all identification and communication parameters of the device, as well as the available objects. PLC software **RSLogix 5000** from Rockwell offers **EDS support for EtherNet/IP from software version 20.00 and up**.

The BCL 358/i is uniquely classified via a class 1 identity object (component of the **BCL358i.eds** file) for the EtherNet/IP scanner. The identity object contains, among other things, a manufacturer-specific vendor ID, as well as an ID that describes the principle function of the participant.

If accepting the objects without change, all parameters are set to default values. The default settings are shown in the objects described in detail in the **Default** column.

## NOTE



In the following tables, all attributes marked in the **Access** column with **Get** in the individual objects are to be understood as inputs of the control. *Attributes marked in the **Access** column with **Set** represent outputs or parameters.*

## 10.7 Detailed EDS description

### 10.7.1 Class 1 - Identity object

Object class 1 = 0x01

Services:

- Get Attribute Single 0x0E
- Reset type 0x05

Cl.	Path		Designation	Size in bit	Data type	Default (dec)	Min. (dec)	Max. (dec)	Access
	Inst.	Attr.							
1	1	1	Vendor ID	16	UINT	524	-	-	Get
		2	Device type	16	UINT	43	-	-	Get
		3	Product Code	16	UINT	5	-	-	Get
		4	Revision (Major, Minor)	16	Struct{ USINT major, USINT minor};	Major = 1, Minor = 1	Major = 1, Minor = 1	Major = 127, Minor = 999	Get
		5	Status	16	WORD	See CIP specification (5-2.2.1.5 status)			Get
		6	Serial Number	32	UDINT	Manufacturer specific			Get
		7	Product Name	(max. 32) x 8	SHORT_STRING	"BCL 358i"			Get

In the network configuration (e.g., **RSLogix 5000, generic module**), it is possible to specify when entering the individual participants which attributes of the scanner are to be monitored from the identity object.

#### Vendor ID

The vendor ID assigned by ODVA for **Leuze electronic GmbH + Co. KG** is 524<sub>D</sub>.

#### Device type

The BCL 358/i is defined as a **generic device (keyable)** by Leuze. According to ODVA, the BCL 358/i is assigned number 43<sub>D</sub> = 0x2B.

#### Product Code

The **product code** is an ID assigned by Leuze that has no further impact on other objects.

#### Revision

Version number of the identity object.

#### Status

The device status is displayed in the status byte, the first part of the telegram.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Ext. device state				Reserved	Configured	Reserved	Owned
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved							

#### Serial number

For use in EtherNet/IP, the serial number receives a serial number converted according to CIP. CIP describes a special format for the serial number. After conversion to a CIP code, the serial number is, as before, unique, but no longer corresponds in its resolution to the serial number on the name plate.

#### Product Name

This attribute contains a short designation of the product. Devices with the same product code may have different **product names**.

## 10.7.2 Class 4 - Assembly

The following assemblies are supported by the profile. A distinction is made between input and output assembly. The input assembly groups the data from the BCL 358/ for the control. The data from the control is transmitted to the BCL 358/ via the output assembly.

### 10.7.2.1 Input assembly

The input assembly is the cyclical data from the BCL 358/ to the control. The following three input assemblies are supported.

#### Input assembly instance 100

Instance 100, attribute 3

Input assembly, length                      min. 1 byte  
    max. 260 bytes

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
100	0	Device status							
	1	Number of results							
	2	Reserved		Waiting for acknowledgment	New result (toggle bit)	Buffer over-flow	Further results in the buffer	User data or command	Status activation
	3	Result data length (low byte)							
	4	Result data length (high byte)							
	5	Data Byte 0							
	6	Data Byte 1							
	...	...							
	259	Data Byte 254							

The number of data starting at byte 5 is defined in the control while configuring the BCL 358/. This makes it possible to use the assembly with any length.

#### NOTE



The use of the assembly is illustrated with examples at the end of this chapter.

#### NOTE



Formula for calculating the assembly length:

**Length of the assembly = 5 + length of the result/bar code**

For results/bar codes with length 10, the assembly must be configured with a length of  $5 + 10 = 15$ .

**Input assembly instance 101**

Instance 101, attribute 3

Input assembly, length            min. 1 byte  
max. 264 bytes

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
101	0	Device status							
	1	Reserved	Error code			Reserved		Data rejection (toggle bit)	Data acceptance (toggle bit)
	2	Fragment number (see chapter 10.7.5 "Class 107 - Result data")							
	3	Remaining fragments (see chapter 10.7.5 "Class 107 - Result data")							
	4	Fragment size (see chapter 10.7.5 "Class 107 - Result data")							
	5	Number of results							
	6	Reserved		Waiting for acknowledgment	New result (toggle bit)	Buffer overflow	Further results in the buffer	User data or command	Status activation
	7	Result data length (low byte)							
	8	Result data length (high byte)							
	9	Data Byte 0							
	10	Data Byte 1							
	...	...							
	263	Data Byte 254							

The number of data starting at byte 9 is defined in the control while configuring the BCL 358/. This makes it possible to use the assembly with any length.

**NOTE**

The use of the assembly is illustrated with examples at the end of this chapter.

**NOTE**

Formula for calculating the assembly length:

**Length of the assembly = 9 + length of the result/bar code**

For results/bar codes with length 10, the assembly must be configured with a length of **9 + 10 = 19**.

**Input assembly instance 102**

Instance 102, attribute 3

Input assembly, length            min. 1 byte  
max. 265 bytes

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
102	0	Device status							
	1	Reserved	Switching output comparison state 2 (toggle bit)	Switching output comparison state 2	Status input/output I/O 2	Reserved	Switching output comparison state 1 (toggle bit)	Switching output comparison state 1	Status input/output I/O 1
	2	Reserved	Error code			Reserved		Data rejection (toggle bit)	Data acceptance (toggle bit)
	3	Fragment number (see chapter 10.7.5 "Class 107 - Result data")							
	4	Remaining fragments (see chapter 10.7.5 "Class 107 - Result data")							
	5	Fragment size (see chapter 10.7.5 "Class 107 - Result data")							
	6	Number of results							
	7	Reserved		Waiting for acknowledgment	New result (toggle bit)	Buffer over-flow	Further results in the buffer	User data or command	Status activation
	8	Result data length (low byte)							
	9	Result data length (high byte)							
	10	Data Byte 0							
	11	Data Byte 1							
	...	...							
	264	Data Byte 254							

The number of data starting at byte 10 is defined in the control while configuring the BCL 358/. This makes it possible to use the assembly with any length.

**NOTE**

The use of the assembly is illustrated with examples at the end of this chapter.

**NOTE**

Formula for calculating the assembly length:

**Length of the assembly = 10 + length of the result/bar code**

For results/bar codes with length 10, the assembly must be configured with a length of **10 + 10 = 20**.

### 10.7.2.2 Output assembly

The output assembly is the cyclical data from the control to the BCL 358/. The following output assemblies are supported.

#### Output assembly instance 120

Instance 120, attribute 3

Output assembly, length            min. 1 byte  
max. 263 bytes

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
120	0	Reserved			Standby	Error acknowl- edge	Data reset	Data acknowledg- ment	Activation signal
	1	Reserved				Reset Event Counter 2	Activation switching output 2 <sup>1)</sup>	Reset Event Counter 1	Activation switching output 1 <sup>1)</sup>
	2	Fragment number (see chapter 10.7.6 "Class 108 - Entry data")							
	3	Remaining fragments (see chapter 10.7.6 "Class 108 - Entry data")							
	4	Fragment size (see chapter 10.7.6 "Class 108 - Entry data")							
	5	Reserved						New entry (toggle bit)	New data
	6	Entry data length (low byte)							
	7	Entry data length (high byte)							
	8	Data Byte 0							
	9	Data Byte 1							
	...	...							
	262	Data Byte 254							

- 1) To be able to use the **Activation switching output** function, the output function must be set to **External event** in webCon-fig.

The number of data starting at byte 8 is defined in the control while configuring the BCL 358/. This makes it possible to use the assembly with any length.

It is also possible to specify the length of the assembly with one byte and thereby only use the control bits. With a length of 2 bytes, the I/O monitoring control bits can be used in addition to the control bits.

#### NOTE



The use of the assembly is illustrated with examples at the end of this chapter.

#### NOTE



Formula for calculating the assembly length:

**Length of the assembly = 8 + length of the entry data**

For entry data with length 10, the assembly must be configured with a length of **8 + 10 = 18**.

**Output assembly instance 121**

Instance 121, attribute 3

Output assembly, length      min. 1 byte  
max. 262 bytes

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
121	0	Reserved			Standby	Error acknowl- edge	Data reset	Data acknowledg- ment	Activation signal
	1	Fragment number (see chapter 10.7.6 "Class 108 - Entry data")							
	2	Remaining fragments (see chapter 10.7.6 "Class 108 - Entry data")							
	3	Fragment size (see chapter 10.7.6 "Class 108 - Entry data")							
	4	Reserved						New entry (toggle bit)	New data
	5	Entry data length (low byte)							
	6	Entry data length (high byte)							
	7	Data Byte 0							
	8	Data Byte 1							
	...	...							
	261	Data Byte 254							

The number of data starting at byte 7 is defined in the control while configuring the BCL 358/. This makes it possible to use the assembly with any length.

It is also possible to specify the length of the assembly with one byte and thereby only use the control bits.

**NOTE**

The use of the assembly is illustrated with examples at the end of this chapter.

**NOTE**

Formula for calculating the assembly length:

**Length of the assembly = 7 + length of the entry data**

For entry data with length 10, the assembly must be configured with a length of 7 + 10 = 17.

**Output assembly instance 122**

Instance 122, attribute 3

Output assembly, length      min. 1 byte  
max. 261 bytes

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
122	0	Fragment number (see chapter 10.7.6 "Class 108 - Entry data")							
	1	Remaining fragments (see chapter 10.7.6 "Class 108 - Entry data")							
	2	Fragment size (see chapter 10.7.6 "Class 108 - Entry data")							
	3	Reserved						New entry (toggle bit)	New data
	4	Entry data length (low byte)							
	5	Entry data length (high byte)							
	6	Data Byte 0							
	7	Data Byte 1							
	...	...							
	260	Data Byte 254							

The number of data starting at byte 6 is defined in the control while configuring the BCL 358/i. This makes it possible to use the assembly with any length.

**NOTE**

The use of the assembly is illustrated with examples at the end of this chapter.

**NOTE**

Formula for calculating the assembly length:

**Length of the assembly = 6 + length of the entry data**

For entry data with length 10, the assembly must be configured with a length of **6 + 10 = 16**.

### 10.7.2.3 Configuration assembly

The configuration assembly is the data from the control to the BCL 358/i which is transferred as the configuration during the establishment of communication. The following configuration assembly is supported.

#### Configuration assembly instance 190

Instance 190, attribute 3

Configuration assembly, length 3 bytes

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
190	0	Reserved							Mode 0 = Without ACK 1 = With ACK
	1	Reserved							Activate result fragmentation 0 = Fragmentation inactive 1 = Fragmentation active
	2	Reserved							Activate input fragmentation 0 = Fragmentation inactive 1 = Fragmentation active

Byte	Cross reference address	Bit assignment (default)								Default
		7	6	5	4	3	2	1	0	
0	106 / 1 / 1	–	–	–	–	–	–	–	0	0x00
1	107 / 1 / 9	–	–	–	–	–	–	–	0	0x00
2	108 / 1 / 8	–	–	–	–	–	–	–	0	0x00

#### NOTE



In the configuration assembly, all parameters have the value **0**. Changing the individual default values is possible at any time. The participant is thereby defined in off-line mode; the data must subsequently be transferred to the control.

### 10.7.3 Class 103 – I/O status and control

This class is for handling switching input and switching output signals.

Object class 103 = 0x67

Services:

- Get Attribute Single 0x0E
- Set Attribute Single 0x10

Cl.	Path Inst.	Attr.	Designation	Size in bit	Data type	Default (dec)	Min. (dec)	Max. (dec)	Access
103	1	1-4	Reserved						
SWIO_1		5	Status (input/output)	8	U8	0	0	1	Get
		6	Output activation	8	U8	0	0	1	Set
		7	Reset Event Counter	8	U8	0	0	1	Set
		8	Switching output comparison state (event counter)	8	U8	0	0	1	Get
		9	Switching output comparison state toggle bit (event counter)	8	U8	0	0	1	Get
103	2	1-4	Reserved						
SWIO_2		5	Status (input/output)	8	U8	0	0	1	Get
		6	Output activation	8	U8	0	0	1	Set
		7	Reset Event Counter	8	U8	0	0	1	Set
		8	Switching output comparison state (event counter)	8	U8	0	0	1	Get
		9	Switching output comparison state toggle bit (event counter)	8	U8	0	0	1	Get

#### NOTE



Toggle bits are control and monitoring control flags which are not level-sensitive, but rather triggered by edges.

#### Attributes 1-4

Attributes 1-4 are not supported in this profile.

#### Status (input/output)

Signal state of the switching input or switching output.

#### Output activation

Sets the state of the switching output.

- 0 Switching output 0 - low - inactive
- 1 Switching output 1- high - active

#### Reset Event Counter

Resets the event counter of the activation function back to zero.

- 0 → 1 Execute reset
- 1 → 0 No function

#### Switching output comparison state (event counter)

Indicates whether the event counter has exceeded the set comparative value.

The bit is reset to the initial value by resetting the event counter.

- 0 Not exceeded
- 1 Exceeded

#### Switching output comparison state 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 initial value by resetting the event counter.

- 0 → 1 Event counter exceeded
- 1 → 0 Event counter exceeded again

#### 10.7.4 Class 106 - Activation

This class defines the control signals for activating the BCL 358/i as well as the signals for the control of the result output. It is possible to select between standard data output operation and handshake operation. In handshake operation, the control must acknowledge the data reception via the ACK bit before the new data is written into the input area. After acknowledging the last result, the input data is reset (filled with zeros).

Object class 106 = 0x6A

Services:

- Get Attribute Single 0x0E
- Set Attribute Single 0x10

Path			Designation	Size in bit	Data type	Default (dec)	Min. (dec)	Max. (dec)	Access	
Cl.	Inst.	Attr.								
106	1	1	Mode <sup>1)</sup>	8	U8	0	0	1	Set	
			2	Number of results	8	U8	0	0	255	Get
			3	Activation signal	8	U8	0	0	1	Set
			4	Data acknowledgment	8	U8	0	0	1	Set
			5	Data reset	8	U8	0	0	1	Set

1) This attribute is a parameter. The value of the parameter can be set via the configuration assembly.

##### Mode

The parameter defines the mode in which the communication is operated.

- 0 Without ACK
- 1 With ACK

##### Number of results

This value specifies how many messages are ready to be picked up in the BCL 358/i.

##### Activation signal

Signal for activating the BCL 358/i. This action opens or closes the reading gate of the BCL 358/i. This attribute is edge-triggered, not level-controlled.

- 0 → 1 Activation (open reading gate)
- 1 → 0 Deactivation (close reading gate)

##### Data acknowledgment

This control bit signals that the transmitted data have been processed by the master. Only relevant with handshake mode (with ACK), see **Mode**.

- 0 → 1 Data has been processed by the master
- 1 → 0 Data has been processed by the master

##### Data reset


Deletes results that may have been stored and resets the input data.

- 0 → 1 Data reset

If the data reset control bit is activated, the following actions are carried out:

1. Deletion of results that may still be stored.
2. Resetting of the attributes of **Class 107 - Result data**

## 10.7.5 Class 107 - Result data

NOTE	
	The result is the data from the BCL 358/i to the control.

This class defines the transfer of the result data. The result data comes from the Formatter currently selected. This can be selected and configured in WebConfig. This class also defines the output of fragmented results. To occupy few I/O data, the results may be split into several fragments with this class. The fragments can then be transmitted one after another with a handshake.

Object class 107 = 0x6B

Services:

- Get Attribute Single 0x0E
- Set Attribute Single 0x10

Cl.	Path		Designation	Size in bit	Data type	Default (dec)	Min. (dec)	Max. (dec)	Access
	Inst.	Attr.							
107	1	1	Activation status	8	U8	0	0	1	Get
		2	User data or command	8	U8	0	0	1	Get
		3	Further results in the buffer	8	U8	0	0	1	Get
		4	Buffer overflow	8	U8	0	0	1	Get
		5	New result (toggle bit)	8	U8	0	0	1	Get
		6	Waiting for acknowledgment	8	U8	0	0	1	Get
		7	Result data length	16	U16	0	0	65,535	Get
		8	Data	2048	U8 [256]	0	0	255	Get
		9	Activate result fragmentation <sup>1)</sup>	8	U8	0	0	1	Set
		10	Fragment number	8	U8	0	0	255	Get
		11	Remaining fragments	8	U8	0	0	255	Get
		12	Fragment size	8	U8	32	0	255	Get

1) This attribute is a parameter. The value of the parameter can be set via the configuration assembly.

**Activation status**

Displays the current activation status.

- 0 Deactivated
- 1 Activated

**User data or command**

Distinction between result from the Formatter and answer from the command interpreter. Makes the distinction easy for the user.

- 0 User data
- 1 Response from command interpreter

**Further results in the buffer**

This signal indicates whether further results are in the buffer.

- 0 No
- 1 Yes

**Buffer overflow**

This signal indicates that all result buffers are occupied and that the BCL 358/i rejects data.

- 0 No
- 1 Yes

**New result (toggle bit)**

The toggle bit indicates whether a new result is present.

- 0 → 1 New result
- 1 → 0 New result

**Waiting for acknowledgment**

This signal represents the internal state of the control.

- 0 Base state
- 1 Control waiting for acknowledgment from the master

**Result data length**

Data length of the actual result information. If the result information fits in the selected assembly length, this value reflects the length of the transmitted data. A value larger than the assembly length indicates a loss of information caused by an assembly length which has been selected too small.

**Data**

Result information with a length of max. 256 bytes.

**Activate result fragmentation**

This attribute specifies whether the messages from the BCL 358/ to the control should be transferred in fragments.

- 0 Fragmentation inactive
- 1 Fragmentation active

**Fragment number**

Current fragment number.


**Remaining fragments**

Number of fragments which still have to be read for a complete result.

**Fragment size**

Fragment size always corresponds to the projected fragment length, except for the last fragment.

## 10.7.6 Class 108 - Entry data

NOTE	
	The entry is the data from the control to the BCL 358/i.

This class defines the transfer of entry data to a command interpreter in the BCL 358/i. This class also defines the transfer of fragmented entry data.

To occupy few I/O data, the entry data may be split into several fragments with this class. The fragments can then be transmitted one after another with a handshake.

Object class 108 = 0x6C

Services:

- Get Attribute Single 0x0E
- Set Attribute Single 0x10

Cl.	Path Inst.	Attr.	Designation	Size in bit	Data type	Default (dec)	Min. (dec)	Max. (dec)	Access
108	1	1	Data acceptance (toggle bit)	8	U8	0	0	1	Get
		2	Data rejection (toggle bit)	8	U8	0	0	1	Get
		3	Error code	8	U8	0	0	8	Get
		5	New entry (toggle bit)	8	U8	0	0	1	Set
		6	Entry data length	16	U16	0	0	65,535	Set
		7	Data	2048	U8 [256]	0	0	255	Set
		8	Activate input fragmenta- tion <sup>1)</sup>	8	U8	0	0	1	Set
		9	Fragment number	8	U8	0	0	255	Set
		10	Remaining fragments	8	U8	0	0	255	Set
		11	Fragment size	8	U8	0	0	255	Set

1) This attribute is a parameter. The value of the parameter can be set via the configuration assembly.

**Data acceptance (toggle bit)**

The signal shows that the BCL 358/i has accepted the data or the data fragment (see also Toggle bit **data rejection**).

- 0 → 1 Data has been accepted
- 1 → 0 Data has been accepted

**Data rejection (toggle bit)**


The BCL 358/i has rejected the acceptance of the data or the data fragment (see also Toggle bit **data acceptance**).

- 0 → 1 Data has been rejected
- 1 → 0 Data has been rejected

**Error code**

Cause of error if a message is rejected.

- 0 No error
- 1 Receive buffer overflow
- 2 Sequence error, i.e. an error was detected with the fragment number transferred from the control, the number of remaining fragments or the fragment size.

NOTE	
	The following sequence diagram shows with examples how the <b>Data acceptance</b> , <b>Data rejection</b> and <b>Error code</b> attributes are connected.

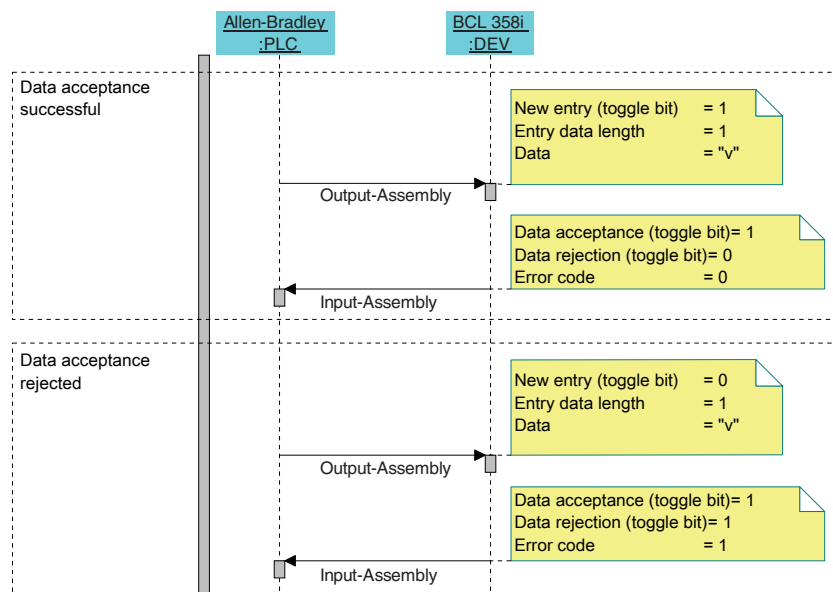


Figure 10.4: Connection between Data acceptance/Data rejection/Error code attributes

#### New entry (toggle bit)

The toggle bit shows whether new entry data is present.

0 → 1 New result

1 → 0 New result

**Entry data length**

Data length of the actual information.

**Data**

Information with a length of max. 256 bytes.

**Activate input fragmentation**

This attribute specifies whether the messages from the control to the BCL 358/ should be transferred in fragments.

- 0 Fragmentation inactive
- 1 Fragmentation active

**Fragment number**

Current fragment number.

**Remaining fragments**

Number of fragments which still have to be transmitted for a complete entry.

**Fragment size**

The fragment size should always be identical, except for the last fragment to be transferred. A fragment size of 0 means that the fragmentation is not used.

### 10.7.7 Class 109 - Device status and device control

This class contains the display of the device status as well as control bits for deleting an error or putting the BCL 358/i into standby mode.

Object class 109 = 0x6D

Services:

- Get Attribute Single 0x0E
- Set Attribute Single 0x10

Path			Designation	Size in bit	Data type	Default (dec)	Min. (dec)	Max. (dec)	Access	
Cl.	Inst.	Attr.								
109	1	1	Device status	8	U8	15	0	129	Get	
			2	Error acknowledge	8	U8	0	0	1	Set
			3	Standby	8	U8	0	0	1	Set

#### Device status

This byte represents the device status:

- 10 Standby
- 15 Device is ready
- 128 Error
- 129 Warning

#### Error acknowledge

This control bit confirms and deletes errors or warnings that may be present in the system. It acts like a toggle bit.

- 0 → 1 Error acknowledge
- 1 → 0 Error acknowledge

#### StandBy

Activates the standby function.

- 0 Standby off
- 1 Standby on

## 10.8 Example configuration

In the following sections, various examples show how the profile previously described can be used to solve different scenarios.

The following scenarios are illustrated with examples:

- **Example 1** - Activation & result  
In: 33 bytes  
Out: 1 byte  
Config: 0 bytes
- **Example 2** - Activation & result & I/Os  
In: 20 bytes  
Out: 2 bytes  
Config: 0 bytes
- **Example 3** - Activation & fragmented result  
In: 13 bytes  
Out: 1 byte  
Config: 3 bytes
- **Example 4** - Entry data & result  
In: 33 bytes  
Out: 10 bytes  
Config: 0 bytes

### 10.8.1 Example 1 - Activation & result

The following screenshot shows the configuration of the device in the **RSLogix 5000** control software.

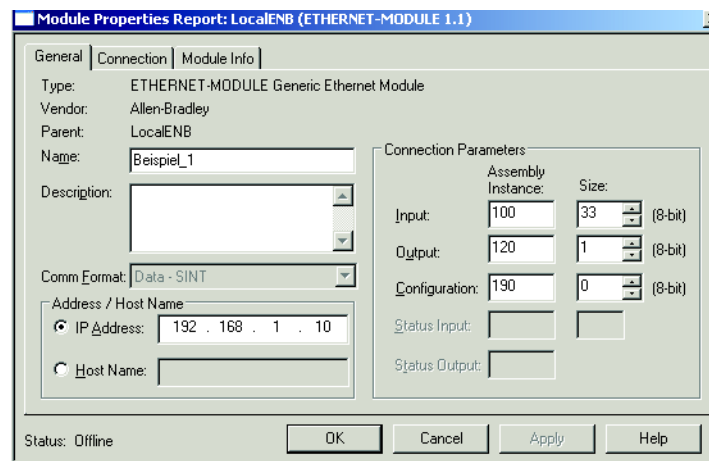


Figure 10.5: Configuration of example 1 - module definition with generic module

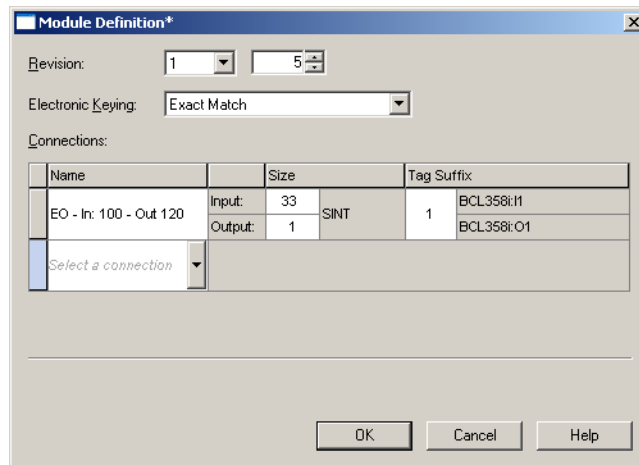


Figure 10.6: Configuration of example 1 - module definition with the EDS file

#### Structure of input assembly 100

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
100	0	Device status							
	1	Number of results							
	2	Reserved		Waiting for acknowledgment	New result (toggle bit)	Buffer over-flow	Further results in the buffer	User data or command	Status activation
	3	Result data length (low byte)							
	4	Result data length (high byte)							
	5	Data Byte 0							
	6	Data Byte 1							
	...	...							
	32	Data Byte 27							

#### Structure of output assembly 120

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
120	0	Reserved			Standby	Error acknowledge	Data reset	Data acknowledgment	Activation signal

#### Structure of configuration assembly 190

Since the configuration is not used, the length of the configuration assembly is specified as 0. The device then operates with the default values. In this case, the acknowledge mode is not used.

Below, examples of what data exchange looks like during two subsequent activations are shown.

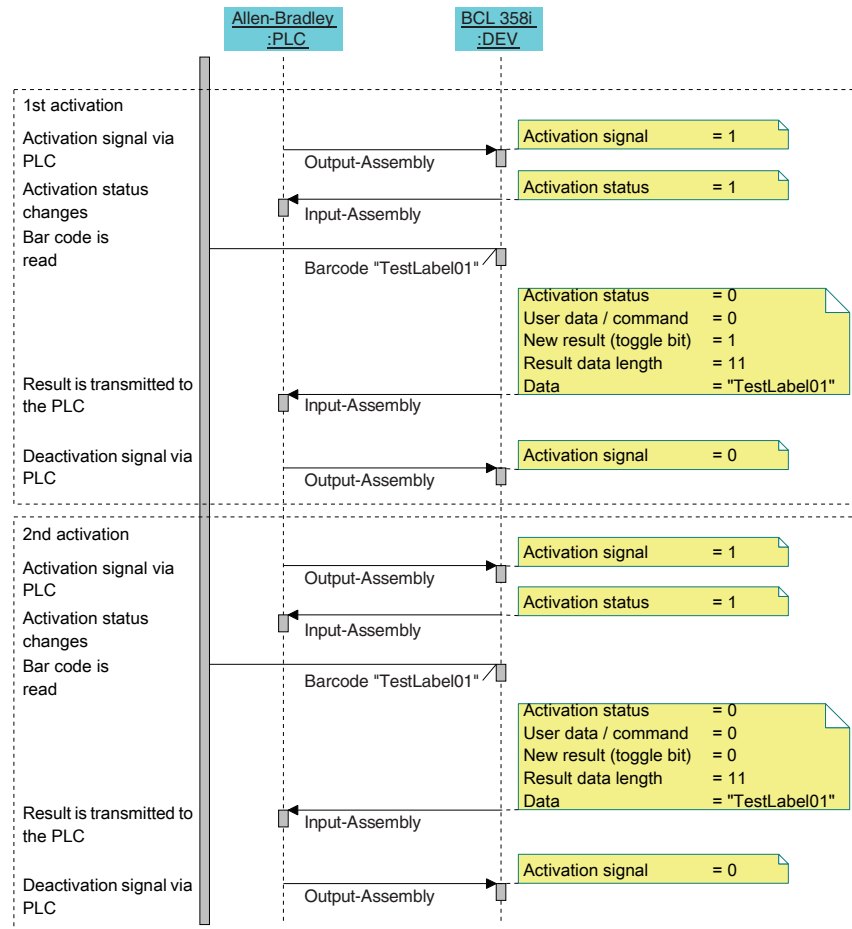


Figure 10.7: Data exchange sequence diagram - example 1

10.8.2 Example 2 - Activation & result & I/Os

The following screenshot shows the configuration of the device in the RSLogix 5000 control software.

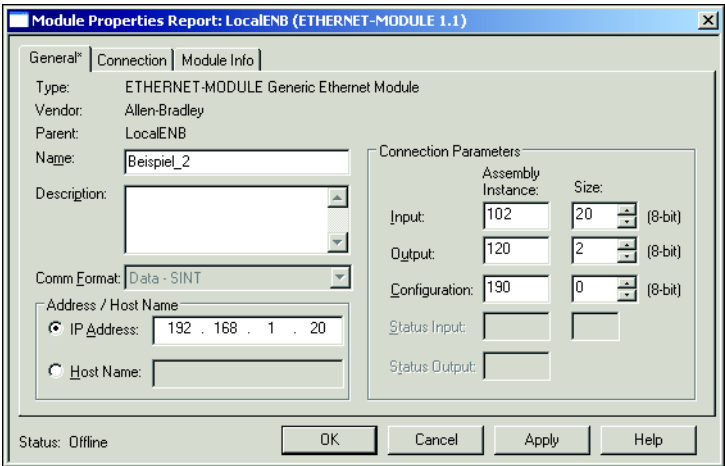


Figure 10.8: Configuration of example 2 - module definition with generic module

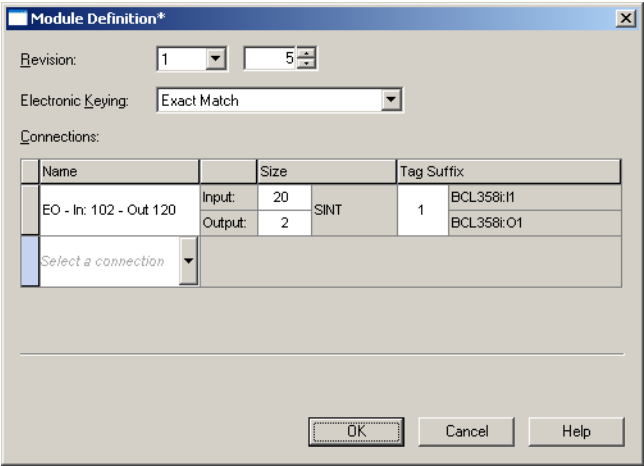


Figure 10.9: Configuration of example 2 - module definition with the EDS file

## Structure of input assembly 102

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
102	0	Device status							
	1	Reserved	Switching output comparison state 2 (toggle bit)	Switching output comparison state 2	Status input/output I/O 2	Reserved	Switching output comparison state 1 (toggle bit)	Switching output comparison state 1	Status input/output I/O 1
	2	Reserved	Error code			Reserved		Data rejection (toggle bit)	Data acceptance (toggle bit)
	3	Fragment number (see chapter 10.7.5 "Class 107 - Result data")							
	4	Remaining fragments (see chapter 10.7.5 "Class 107 - Result data")							
	5	Fragment size (see chapter 10.7.5 "Class 107 - Result data")							
	6	Number of results							
	7	Reserved		Waiting for acknowledgment	New result (toggle bit)	Buffer overflow	Further results in the buffer	User data or command	Status activation
	8	Result data length (low byte)							
	9	Result data length (high byte)							
	10	Data Byte 0							
	11	Data Byte 1							
	...	...							
	19	Data Byte 9							

## Structure of output assembly 120

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
120	0	Reserved			Standby	Error acknowledge	Data reset	Data acknowledgment	Activation signal
	1	Reserved				Reset Event Counter 2	Activation switching output 2 <sup>1)</sup>	Reset Event Counter 1	Activation switching output 1 <sup>1)</sup>

- 1) To be able to use the **Activation switching output** function, the output function must be set to **External event** in webConfig.

## Structure of configuration assembly 190

Since the configuration is not used, the length of the configuration assembly is specified as 0. The device then operates with the default values. In this case, the acknowledge mode is not used.

Below, examples of what data exchange looks like during two subsequent activations are shown.

Switching output 1 reflects the activation signal. Switching output 2 displays whether the result is valid (status input/output I/O 2 = 1) or whether a NoRead has taken place (status input/output I/O 2 = 0).

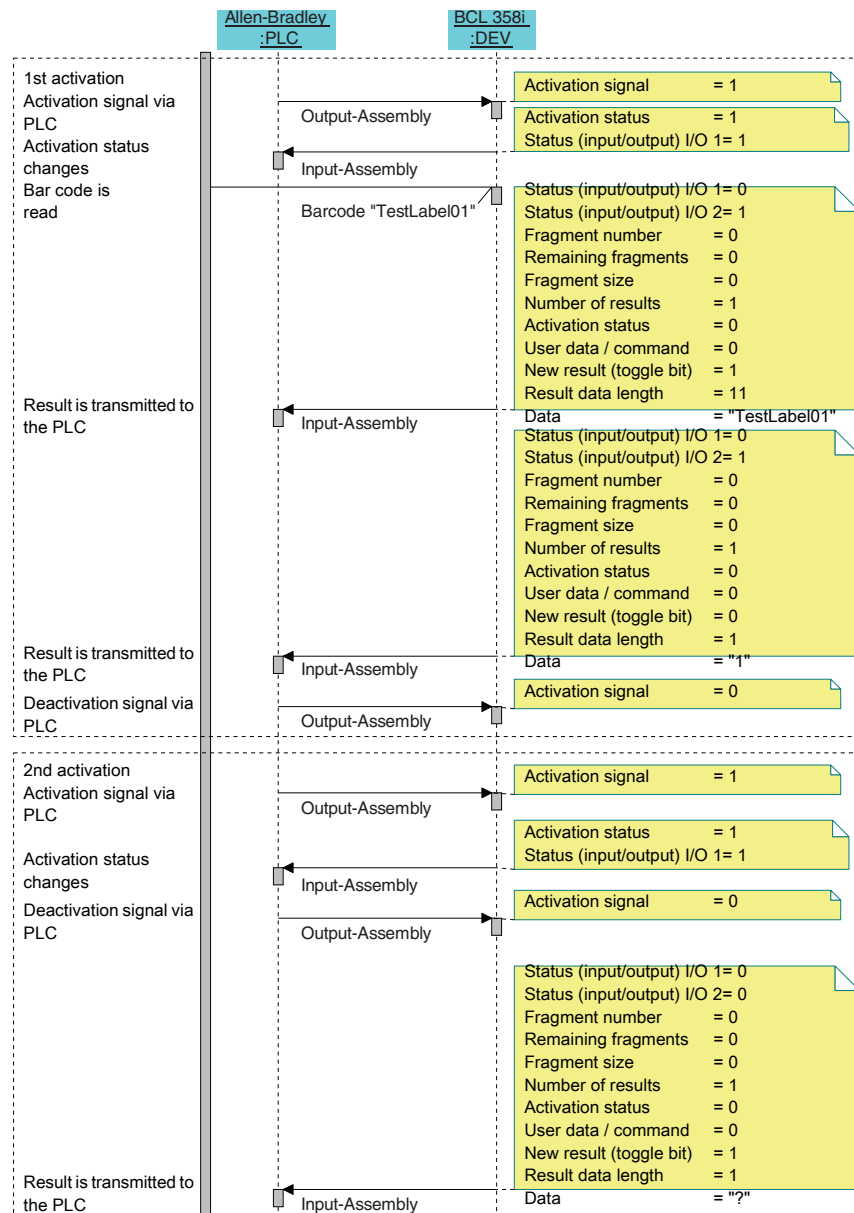


Figure 10.10: Data exchange sequence diagram - example 2

### 10.8.3 Example 3 - Activation & fragmented result

The following screenshot shows the configuration of the device in the **RSLogix 5000** control software.

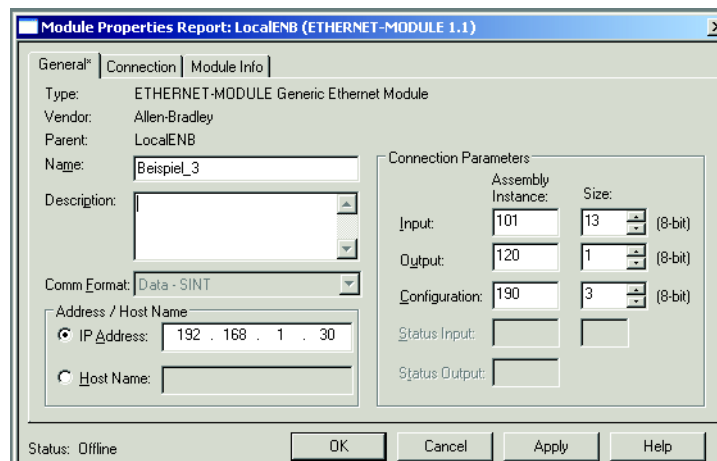


Figure 10.11: Configuration of example 3 - module definition with generic module

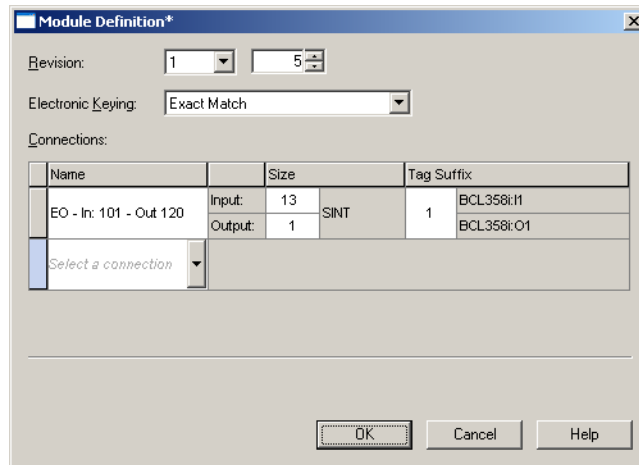


Figure 10.12: Configuration of example 3 - module definition with the EDS file

**Structure of input assembly 101**

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
101	0	Device status							
	1	Reserved	Error code			Reserved		Data rejection (toggle bit)	Data acceptance (toggle bit)
	2	Fragment number (see chapter 10.7.5 "Class 107 - Result data")							
	3	Remaining fragments (see chapter 10.7.5 "Class 107 - Result data")							
	4	Fragment size (see chapter 10.7.5 "Class 107 - Result data")							
	5	Number of results							
	6	Reserved		Waiting for acknowledgment	New result (toggle bit)	Buffer overflow	Further results in the buffer	User data or command	Status activation
	7	Result data length (low byte)							
	8	Result data length (high byte)							
	9	Data Byte 0							
	10	Data Byte 1							
	11	Data Byte 2							
	12	Data Byte 3							

**Structure of output assembly 120**

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
120	0	Reserved			Standby	Error acknowledgment	Data reset	Data acknowledgment	Activation signal

**Structure of configuration assembly 190**

Byte	Cross reference address	Bit assignment (default)								Default
		7	6	5	4	3	2	1	0	
0	106 / 1 / 1	–	–	–	–	–	–	–	1	0x00
1	107 / 1 / 9	–	–	–	–	–	–	–	1	0x00
2	108 / 1 / 8	–	–	–	–	–	–	–	0	0x00

Below, examples of what data exchange looks like when the result is transferred in fragments are shown.

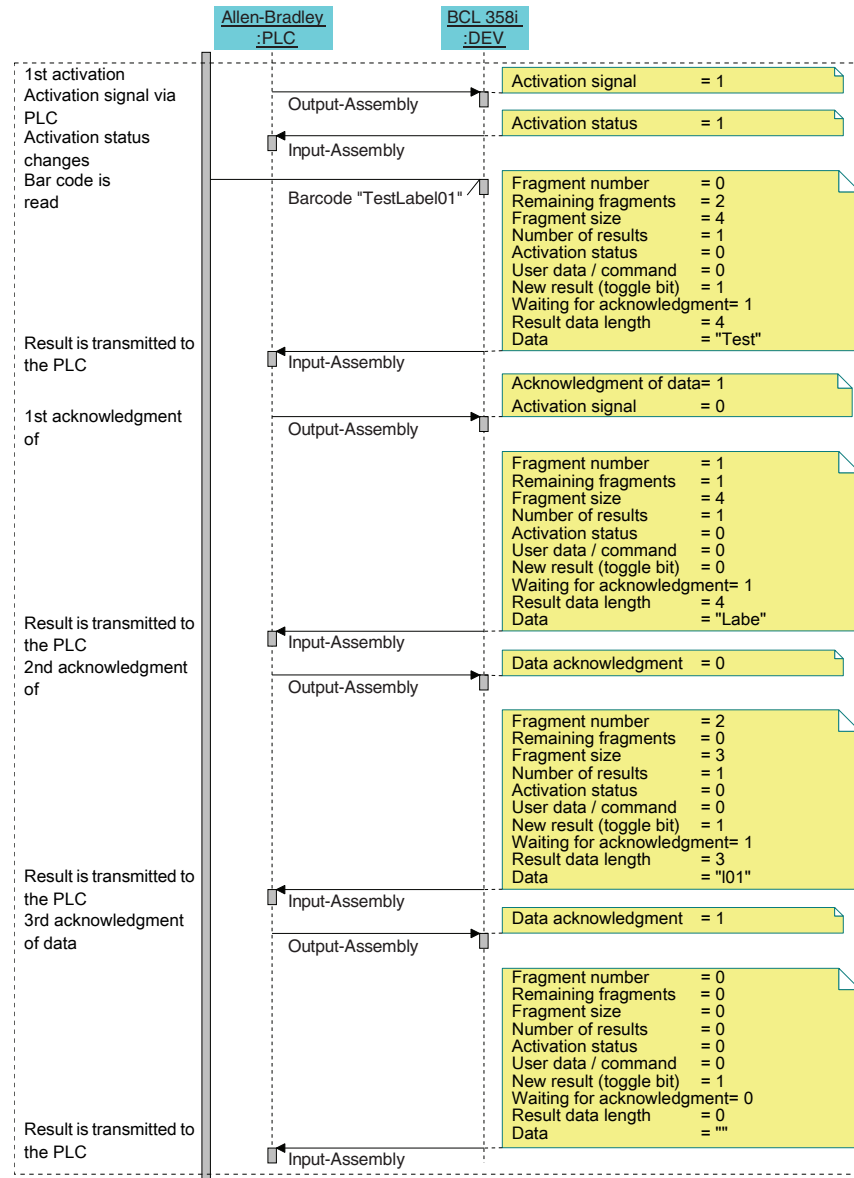


Figure 10.13: Data exchange sequence diagram - example 3

#### 10.8.4 Example 4 - Entry data & result

The following screenshot shows the configuration of the device in the RSLogix 5000 control software.

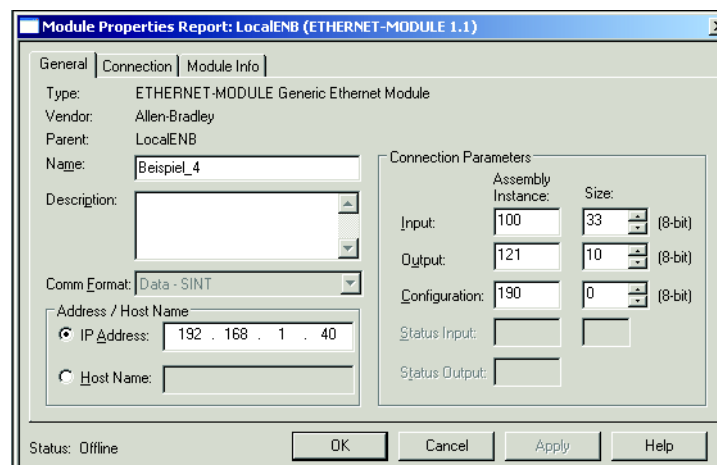


Figure 10.14: Configuration of example 4 - module definition with generic module

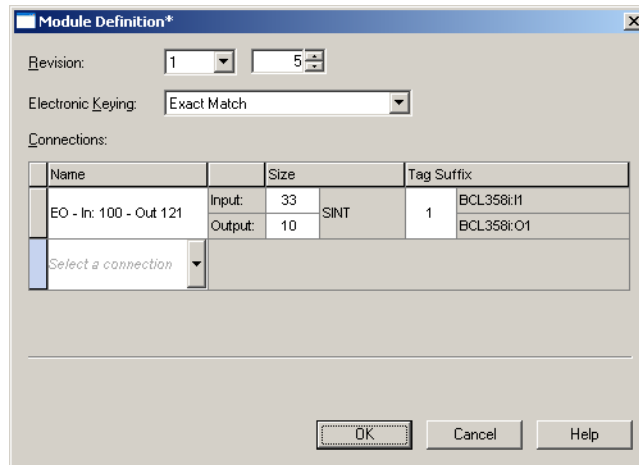


Figure 10.15: Configuration of example 4 - module definition with the EDS file

**Structure of input assembly 100**

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
100	0	Device status							
	1	Number of results							
	2	Reserved		Waiting for acknowledg- ment	New result (toggle bit)	Buffer over- flow	Further results in the buffer	User data or command	Status activation
	3	Result data length (low byte)							
	4	Result data length (high byte)							
	5	Data Byte 0							
	6	Data Byte 1							
	...	...							
	32	Data Byte 27							

**Structure of output assembly 121**

Inst.	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
121	0	Reserved			Standby	Error acknowl- edge	Data reset	Data acknowledg- ment	Activation signal
	1	Fragment number (see chapter 10.7.6 "Class 108 - Entry data")							
	2	Remaining fragments (see chapter 10.7.6 "Class 108 - Entry data")							
	3	Fragment size (see chapter 10.7.6 "Class 108 - Entry data")							
	4	Reserved						New entry (toggle bit)	New data
	5	Entry data length (low byte)							
	6	Entry data length (high byte)							
	7	Data Byte 0							
	8	Data Byte 1							
	9	Data Byte 2							

**Structure of configuration assembly 190**

Since the configuration is not used, the length of the configuration assembly is specified as 0. The device then operates with the default values. In this case, the acknowledge mode is not used.

Below, examples of what data exchange looks like when the entry function is used are shown.

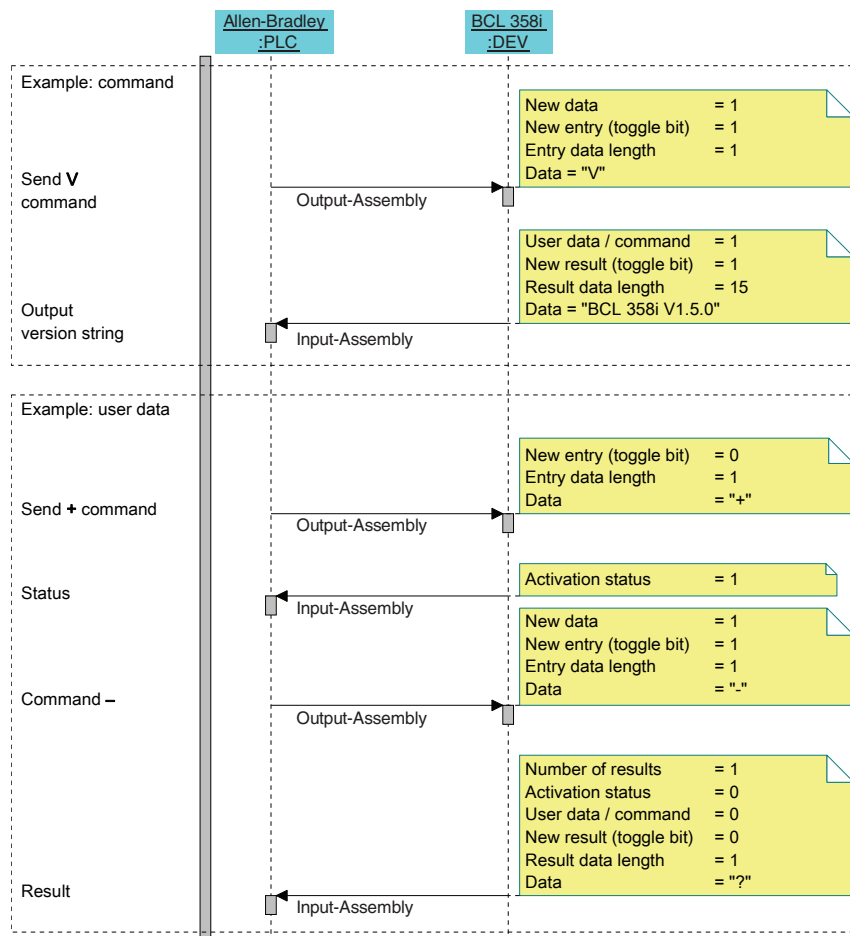


Figure 10.16: Data exchange sequence diagram - example 4

## 10.9 Additional settings for the BCL 358/

After the basic configuration of the operating mode and the communication parameters, you need to carry out further settings via the webConfig tool:

- Decoding and processing the read data
- Control of the decoding
- Control of the switching outputs

### 10.9.1 Decoding and processing the read data

The BCL 358/ offers the following options:

- Setting the number of labels to be decoded for each reading gate (0 ... 64). This is done via the Max. no. of labels parameter.
- Definition of up to 8 different code types. Labels that match one of the defined code types are decoded. Further parameters can be set for each code type:
  - The code type (symbology)
  - The Number of digits: either up to 5 different numbers of digits (e.g., 10, 12, 16, 20, 24), or a range (Interval mode) and up to three additional numbers of digits (e.g., 2 ... 10, 12, 16, 26)
  - The Reading reliability: the set value specifies how many times a label must be read and decoded with the same result before the result is accepted as valid.
  - Additional code type specific settings (in the webConfig tool only)
  - Check digit method used for decoding as well as the type of check digit transmission for the output of the read result. The two possibilities for the latter are Standard (corresponds to the standard for the selected code type/symbology) and not Standard.

👉 Define at least one code type with the desired settings.

- Via webConfig:  
Configuration -> Decoder

#### Data processing via the webConfig tool

In the Data and Output submenus of the Configuration main menu, the webConfig tool provides extensive data processing options to adapt the functionality of the BCL 358/ to the specific reading task:

- Data filtering and segmentation in the Data submenu:
  - Data filtering according to characteristics for handling identical bar code information
  - Data segmentation for differentiating between identifier and content of the read data
  - Data filtering according to content and/or identifier in order to suppress the output of bar codes with specific content/identifiers
  - Completeness inspection of the read data
- Sorting and formatting the output data in the Output submenu:
  - Configuration of up to 3 different sorting criteria. Sorting by physical data and content of the read bar codes.
  - Formatting of the data output for the HOST.
  - Formatting of the data output for the display.

### 10.9.2 Control of the decoding

In general, decoding is controlled via one or more of the configurable switching inputs/outputs. For this purpose, the respective connection to the SW IN/OUT and POWER interfaces must be configured as a switching input.

Via a switching input, you can:

- Start decoding
- Stop decoding
- Start decoding and then stop decoding after a configurable time period
- Read a reference code
- Start the automatic code type configuration (AutoConfig)

✚ Connect the required control devices (photoelectric sensor, proximity switch, etc.) as described in Chapter 7 to the BCL 358/.

✚ Configure the connected switching inputs according to your requirements. To do this, first set the *I/O mode* to *Input* and then configure the switching behavior:

- Via webConfig:  
Configuration > Device > Switching inputs/outputs

#### NOTE



Alternatively, one can also activate decoding via the online command '+' and deactivate it via the online command '-'. Further information on the online commands can be found in Chapter 11.

#### Advanced decoder control via the webConfig tool

The webConfig tool provides advanced functions, in particular for deactivating decoding. These may be accessed via the *Control* submenu of the *Configuration* main menu. You can:

- Activate decoding automatically (delayed)
- Stop decoding after a maximum reading gate time
- Stop decoding via the completeness mode, if:
  - The maximum number of bar codes to be decoded has been decoded
  - A positive reference code comparison has taken place.

### 10.9.3 Control of the switching outputs

By using the switching inputs/outputs of the BCL 358/i, external event-controlled functions can be implemented without assistance from the superior process control. For this purpose, the respective connection at the SW IN/OUT and POWER interfaces must be configured as a switching output.

A switching output can be activated:

- At the start/end of the reading gate
- Depending on the read result:
  - Reference code comparison positive/negative
  - Read result valid/invalid
- Depending on the state of the device:
  - Ready/not ready
  - Data transmission active/not active
  - Active/standby
  - Error/no error
- etc.

↳ As described in Chapter 7 of the manual, connect the required switching outputs.

↳ Configure the connected switching outputs according to your requirements. To do this, first set the *I/O mode* to *Output* and then configure the switching behavior:

- Via webConfig:  
Configuration > Device > Switching inputs/outputs

## 10.10 Transmitting configuration data

Instead of going through the tedious task of configuring every parameter of the BCL 358/i individually, you can also conveniently transfer configuration data.

Configuration data can be transferred between two bar code readers BCL 358/i as follows

- Storage in a file and transfer using the webConfig tool

### 10.10.1 Via the webConfig tool

With the webConfig tool, you can store entire configurations of the BCL 358/i on data carriers and transfer them from these to the BCL 358/i.

This storage of configuration data is especially useful if you want to store basic configurations which will require only minor changes.

In the webConfig tool, you store the configuration data via the buttons in the upper part of the middle window of all submenus of the Configuration main menu.

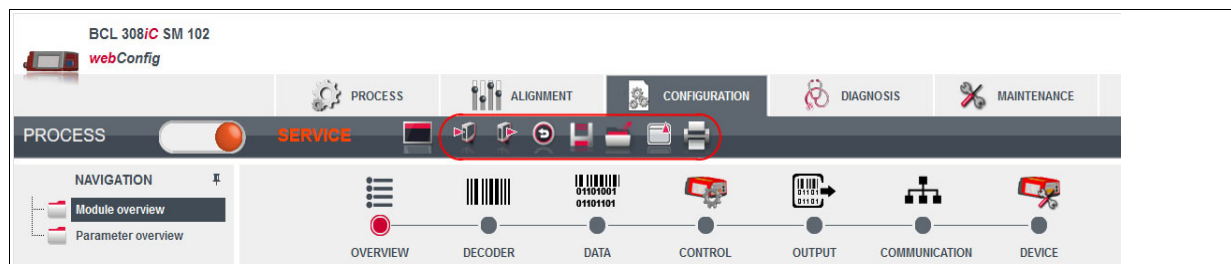


Figure 10.17: Storing configuration data in the webConfig tool

### 10.10.2 Replacing a defective BCL 358/i

The MS 358 connector hood and the MK 358 terminal hood feature an integrated parameter memory in which the configuration data is saved as a backup. If a defective BCL 358/i has to be replaced, proceed as follows:

- Disconnect the defective BCL 358/i from the voltage supply.
- Dismount the defective BCL 358/i and disconnect it from the hoods with integrated connectors/terminal hoods.
- Connect the new BCL 358/i to the connection hood and remount the unit.
- Recommission the new BCL 358/i (reconnect the voltage supply).

The configuration is now imported from the external parameter memory of the connection hood and the BCL 358/i is immediately operational without any further configuration.

## 11 Online commands

### 11.1 Overview of commands and parameters

Online commands can be used to send commands directly to the device for control and configuration. For this purpose, the BCL 358*i* must be connected to a host or service computer via the interface. The commands described can be sent either via the host or the service interface.

#### Online commands

With the commands, you can:

- control/decode.
- read/write/copy parameters.
- carry out an automatic configuration.
- teach-in/set reference codes.
- call up error messages.
- call up statistical device information.
- carry out a software reset in order to reinitialize the device.

#### Syntax

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

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

Example:

Command '**CA**': autoConfig function

Parameter '**+**': Activation

Transmitted is: '**CA+**'

#### Notation


Commands, command parameters and returned data are enclosed between single quotation marks '' in the text of this manual.

Most online commands are acknowledged by the BCL 358*i* and any requested data returned. For commands that are not acknowledged, command execution can be observed or monitored directly on the device.

#### 11.1.1 General online commands

##### Software version number

Command	'v'
Description	Requests device version information
Parameter	No
Acknowledgment	'BCL 358i SM 100 V 1.1.0 2017-01-15' The first line contains the device type of the BCL 358 <i>i</i> , followed by the device version number and version date. (The data which is actually displayed may vary from the values given here.)

NOTE	
	This command returns the major release number of the software packet. This major release number also appears on the display during start-up. This command can be used to check whether the connected host or service computer is properly connected and configured. If you do not receive an acknowledgment, please check interface connections, protocol and service switches.

## Software reset

<b>Command</b>	<b>'H'</b>
<b>Description</b>	Carries out a software reset. The device is restarted and reinitialized, leaving it in the same state as when the supply voltage is switched on.
<b>Parameter</b>	No
<b>Acknowledgment</b>	'S' (start signal)

## Code recognition

<b>Command</b>	<b>'CC'</b>
<b>Description</b>	Detects an unknown bar code and outputs number of digits, code type, and code information to the interface, without storing the bar code in the parameter memory.
<b>Parameter</b>	No
<b>Acknowledgment</b>	<p><b>'xx yy zzzzzz'</b></p> <p><b>xx:</b> Code type of the read code</p> <p>'01' 2/5 Interleaved</p> <p>'02' Code 39</p> <p>'03' Code 32</p> <p>'06' UPC (A, E)</p> <p>'07' EAN</p> <p>'08' Code 128, EAN 128</p> <p>'10' EAN Addendum</p> <p>'11' Codabar</p> <p>'12' Code 93</p> <p>'13' GS1 DataBar OMNIDIRECTIONAL</p> <p>'14' GS1 DataBar LIMITED</p> <p>'15' GS1 DataBar EXPANDED</p> <p><b>yy:</b> Number of digits of the read code</p> <p><b>zzzzzz:</b> Contents of the decoded label. A – appears if the label was not correctly read.</p>

## autoConfig

Command	'CA'
Description	Activates or deactivates the 'autoConfig' function. Certain label reading parameters are programmed automatically in the setup by the labels which the BCL 358/ reads while the 'autoConfig' function is active.
Parameter	'+' Activates 'autoConfig' '/' Rejects the last code read '-' Deactivates 'autoConfig' and stores the decoded data in the current parameter set
Acknowledgment	'CSx' x Status '0' Valid 'CA' command '1' Invalid command '2' autoConfig could not be activated '3' autoConfig could not be deactivated '4' Result could not be deleted
Description	'xx yy zzzzzz' xx Number of digits of the read code yy Code type of the read code '01' 2/5 Interleaved '02' Code 39 '03' Code 32 '06' UPC (A, E) '07' EAN '08' Code 128, EAN 128 '10' EAN Addendum '11' Codabar '12' Code 93 '13' GS1 DataBar OMNIDIRECTIONAL '14' GS1 DataBar LIMITED '15' GS1 DataBar EXPANDED zzzzzz: Contents of the decoded label. A – appears if the label was not correctly read.

## Alignment mode


Command	'JP'
Description	<p>This command simplifies mounting and alignment of the BCL 358/. After activating the function with 'JP+', the BCL 358/ continuously supplies status information to the serial interfaces.</p> <p>With this online command, the scanner is set to terminate the decoding after 100 successfully decoded labels and output the status information. Subsequently, the read process is reactivated automatically.</p> <p>In addition to the output of the status information, the laser beam is used to display the reading quality. Depending on how many read results could be extracted, the duration of the laser's "OFF" time increases.</p> <p>If the reading quality is high, the laser beam flashes in brief, regular intervals. The worse the decoder decodes, the longer the pauses become during which the laser is switched off. The flashing intervals become more and more irregular because the laser may, in total, be active for longer to extract more labels. The duration of the pauses has been stepped in such a way that they can be distinguished by the eye.</p>
Parameter	<p>'+' : Starts the alignment mode.</p> <p>'-' : Ends the alignment mode.</p>
Acknowledgment	<p>'yyy_zzzzzz'</p> <p>yyy: Reading quality in %. A high process availability is ensured at read qualities &gt; 75 %.</p> <p>zzzzzz: Bar code information.</p>

## Manual definition of the reference code

Command	'RS'
<b>Description</b>	This command can be used to define a new reference code in the BCL 358/ by means of direct input via the serial interface. The data is saved in the parameter set according to your input under reference code 1 through 2 and stored in the working buffer for direct further processing.
<b>Parameter</b>	<b>'RSyvxzzzzzzz'</b> y, v, x and z are placeholders (variables) for the actual input. y        Defined reference code no. '1'        (Code 1) '2'        (Code 2) v        Storage location for reference code: '0'        RAM+EEPROM, '3'        RAM only xx        Defined code type (see command 'CA') z        Defined code information (1 ... 63 characters)
<b>Acknowledgment</b>	<b>'RSx'</b> x        Status '0'        Valid 'Rx' command '1'        Invalid command '2'        Insufficient memory for reference code '3'        Reference code has not been saved '4'        Reference code invalid
<b>Example</b>	Entry = 'RS130678654331' (Code 1 (1), RAM only (3), UPC (06), code information)

## Reference code teach-in

Command	'RT'
<b>Description</b>	This command enables a reference code to be defined quickly by reading an example label.
<b>Parameter</b>	<b>'RTy'</b> y        Function '1'        Defines reference code 1 '2'        Defines reference code 2 '+'        Activates the definition of reference code 1 up to the value of Parameter no_of_labels '-'        Ends the teach event
<b>Acknowledgment</b>	The BCL 358/ first responds with the command 'RS' and corresponding status (see command 'RS'). After a bar code has been read, it sends the result in the following format: <b>'RCyvxzzzzzz'</b> y, v, x and z are placeholders (variables) for the actual input. y        Defined reference code no. '1'        (Code 1) '2'        (Code 2) v        Storage location for reference code '0'        RAM+EEPROM, '3'        RAM only xx        Defined code type (see command 'CA') z        Defined code information (1 ... 63 characters)

NOTE	
	<p>With this function, only code types are recognized that are identified using the 'autoConfig' function or which were set in the set-up.</p> <p>↳ After each reading via an 'RTy' command, explicitly switch off the function again since failure to do so will interfere with other commands as well as prevent execution of a new 'RTx' command.</p>

### Reading a reference code

Command	'RR'
<b>Description</b>	The command reads out the reference code defined in the BCL 358/. If no parameters are specified, all defined codes are output.
<b>Parameter</b>	<p>&lt;Reference code number&gt;            '1' ... '2' value range of reference codes 1 to 2</p>
<b>Acknowledgment</b>	<p>If no reference codes are defined, the BCL 358/ responds with the 'RS' command and corresponding status (see command RS). For valid codes, the output corresponds to the following format:</p> <p><b>RCyvxzzzzz</b></p> <p>y, v, x and z are placeholders (variables) for the actual input.</p> <p><b>y</b> Defined reference code no.            '1' (Code 1)            '2' (Code 2)</p> <p><b>v</b> Storage location for reference code            '0' RAM+EEPROM,            '3' RAM only</p> <p><b>xx</b> Defined code type (see command 'CA')</p> <p><b>z</b> Defined code information (1 ... 63 characters)</p>

## 11.1.2 Online commands for system control

## Activating sensor input

Command	'+'
Description	<p>The command activates decoding. This command is used to activate the reading gate. It remains active until it is deactivated by one of the following criteria:</p> <ul style="list-style-type: none"> <li>• Deactivation by a manual command</li> <li>• Deactivation by a switching input</li> <li>• Deactivation upon reaching the specified read quality (equal scans)</li> <li>• Deactivation by timeout</li> <li>• Deactivation upon reaching a preset number of scans without information.</li> </ul>
Parameter	No
Acknowledgment	None

## Deactivating sensor input

Command	'-'
Description	<p>The command activates decoding. This command can be used to deactivate the reading gate. Following deactivation, the read result is output. Because the reading gate was manually deactivated and, thus, no GoodRead criterion was met, a NoRead is output.</p>
Parameter	No
Acknowledgment	None

## 11.1.3 Online commands for configuring the switching inputs/outputs

## Activate switching output

Command	'OA'
Description	<p>The switching outputs 1 and 2 can be activated with this command. The respective port must have been configured as a switching output. The logic state is output, i.e., an inverted logic is taken into account (e.g., inverted logic and a state of High corresponds to a voltage of 0V at the switching output).</p>
Parameter	<p>'OA&lt;a&gt; &lt;a&gt;      Selected switching output [1, 2], unit (dimensionless)</p>
Acknowledgment	None

## Query the state of the switching outputs

Command	'OA'
<b>Description</b>	This command may be used to query the states of the switching inputs and outputs that are configured as a switching output and that have been set via commands. The logic state is output, i.e., an inverted logic is taken into account (e.g., inverted logic and a state of High corresponds to a voltage of 0V at the switching output).
<b>Parameter</b>	'OA?'
<b>Acknowledgment</b>	'OA S1=<a>;S2=<a>' <a>      State of the switching outputs '0'      Low '1'      High 'I'      Configuration as switching input 'P'      Passive configuration

## Set the state of the switching outputs

Command	'OA'
<b>Description</b>	This command is used to set the states of the switching inputs/outputs that are configured as a switching output. The logic state is specified, i.e., an inverted logic is taken into account (e.g., inverted logic and a state of High corresponds to a voltage of 0V at the switching output). The values of the switching inputs/outputs that are not configured as switching outputs are ignored. You may also use only a selection of the existing switching inputs/outputs as long as these are listed in ascending order.
<b>Parameter</b>	'OA [S1=<a>];S2=<a>' <a>      State of the switching output '0'      Low '1'      High
<b>Acknowledgment</b>	'OA=<aa>' <aa>    Status acknowledgment, unit (dimensionless) '00'    Ok '01'    Syntax error '02'    Parameter error '03'    Other error

## Deactivate switching output

Command	'OD'
<b>Description</b>	The switching outputs 1 and 2 can be deactivated with this command. The respective port must have been configured as a switching output. The logic state is output, i.e., an inverted logic is taken into account (e.g., inverted logic and a state of High corresponds to a voltage of 0V at the switching output).
<b>Parameter</b>	'OD<a>' <a>      Selected switching output [1, 2], unit (dimensionless)
<b>Acknowledgment</b>	None

## Query the configuration of the switching inputs/outputs

Command	'OF'
Description	This command may be used to query the configuration of the switching inputs/outputs 1 and 2.
Parameter	'OF?'
Acknowledgment	'OF S1=<a>;S2=<a>' <a>      Function of the switching input/ output, unit [dimensionless] 'I'      Switching input 'O'      Switching output 'P'      Passive

## Configure the switching inputs/ outputs

Command	'OF'
Description	This command may be used to configure the function of the switching inputs/outputs 1 and 2. You may also use only a selection of the existing switching inputs/outputs as long as these are listed in ascending order.
Parameter	'OF [S1=<a>];S2=<a>' <a>      Function of the switching input/ output, unit [dimensionless] 'I'      Switching input 'O'      Switching output 'P'      Passive
Acknowledgment	'OF=<bb>' <bb>      Status acknowledgment '00'      Ok '01'      Syntax error '02'      Parameter error '03'      Other error

## 11.1.4 Online commands for the parameter set operations

## NOTE



You can obtain detailed information on the parameter set of the bar code reader from Leuze on request.

## Copying parameter set

Command	'PC'
<b>Description</b>	This command can only be used to copy parameter sets in their entirety. This can be used to replicate the three parameter sets <b>default</b> , <b>permanent</b> and <b>operating parameters</b> on the basis of one another. In addition, this command can also be used to restore the factory settings.
<b>Parameter</b>	<p>'PC&lt;Source type&gt;&lt;Target type&gt;'</p> <p>&lt;Source type&gt; Parameter data set that is to be copied, unit [dimensionless]</p> <p>'0' Parameter data set in permanent memory</p> <p>'2' Default or factory parameter set</p> <p>'3' Operating parameter data set in volatile memory</p> <p>&lt;Target type&gt; Parameter set into which the data is to be copied, unit [dimensionless]</p> <p>'0' Parameter data set in permanent memory</p> <p>'3' Operating parameter data set in volatile memory</p> <p>Permissible combinations here include:</p> <p>'03' Copying the data set from the permanent memory to the operating parameter data set</p> <p>'30' Copying the operating parameter data set to the permanent parameter set memory</p> <p>'20' Copying the default parameters to the permanent memory and to the main memory</p>
<b>Acknowledgment</b>	<p>'PS=&lt;aa&gt;'</p> <p>&lt;aa&gt; Status acknowledgment, unit [dimensionless]</p> <p>'00' Ok</p> <p>'01' Syntax error</p> <p>'02' Impermissible command length</p> <p>'03' Reserved</p> <p>'04' Reserved</p> <p>'05' Reserved</p> <p>'06' Impermissible combination, source type - target type</p>

## Requesting parameter data set from BCL 358/

Command	'PR'
<b>Description</b>	The parameters of the BCL 358/ are grouped together in a parameter set and permanently stored in memory. There is one parameter set in permanent memory and one operating parameter set in volatile memory; in addition, there is a default parameter set (factory parameter set) for initialization. This command can be used to edit the first two parameter sets (in permanent and volatile memory). A check sum can be used for reliable parameter transfer.
<b>Parameter</b>	<p>'PR&lt;BCC type&gt;&lt;PS type&gt;&lt;Address&gt;&lt;Data length&gt;[&lt;BCC&gt;]'</p> <p>&lt;BCC type&gt; Check-digit function during transmission, unit [dimensionless] '0' Not used '3' BCC mode 3</p> <p>&lt;PS type&gt; Memory from which the values are to be read, unit [dimensionless] '0' Parameter values stored in the flash memory '1' Reserved '2' Default values '3' Operating values in RAM</p> <p>&lt;Address&gt; Relative address of the data within the data set 'aaaa' Four-digit, unit [dimensionless]</p> <p>&lt;Data length&gt; Length of the parameter data to be transferred 'bbbb' Four-digit, unit [length in bytes]</p> <p>&lt;BCC&gt; Check sum calculated as specified under BCC type</p>
<b>Acknowledgment positive</b>	<p>PT&lt;BCC type&gt;&lt;PS type&gt;&lt;Status&gt;&lt;Start&gt; &lt;Address parameter value&gt;&lt;Address+1 parameter value&gt;... [;&lt;Address&gt;&lt;Address parameter value&gt;][&lt;BCC&gt;]</p> <p>&lt;BCC type&gt; Check-digit function during transmission, unit [dimensionless] '0' Not used '3' BCC mode 3</p> <p>&lt;PS type&gt; Memory from which the values are to be read, unit [dimensionless] '0' Parameter values stored in the flash memory '2' Default values '3' Operating values in RAM</p> <p>&lt;Status&gt; Mode of parameter processing, unit [dimensionless] '0' No further parameters '1' Additional parameters follow</p> <p>&lt;Start&gt; Relative address of the data within the data set, 'aaaa' Four-digit, unit [dimensionless]</p> <p>&lt;P.value A.&gt; Parameter value of the parameter stored at this address; the parameter set data 'bb' is converted from HEX format to a 2-byte ASCII-format for transfer.</p> <p>&lt;BCC&gt; Check sum calculated as specified under BCC type,</p>
<b>Acknowledgment negative</b>	<p>'PS=&lt;aa&gt;'</p> <p>Parameter reply:</p> <p>&lt;aa&gt; Status acknowledgment, unit [dimensionless] '01' Syntax error '02' Impermissible command length '03' Impermissible value for checksum type '04' Invalid check sum received '05' Impermissible number of data requested '06' Requested data does not (any longer) fit in the transmission buffer '07' Impermissible address value '08' Read access after end of data set '09' Impermissible QPF data set type</p>

## Determining parameter set difference to default parameters

Command	'PD'
<b>Description</b>	<p>This command outputs the difference between the default parameter set and the operating parameter set or the difference between the default parameter set and the permanent parameter set.</p> <p><b>Comment:</b> The reply supplied by this command can e.g. be directly used for programming a device with factory settings, whereby this device receives the same configuration as the device on which the PD-sequence was executed.</p>
<b>Parameter</b>	<p>'PD&lt;P.set1&gt;&lt;P.set2&gt;'</p> <p>&lt;P.set1&gt; Parameter data set which is to be copied, unit [dimensionless]              '0' Parameter data set in permanent memory              '2' Default or factory parameter set</p> <p>&lt;P.set2&gt; Parameter set to which the data is to be copied, unit [dimensionless]              '0' Parameter data set in permanent memory              '3' Operating parameter data set in volatile memory</p> <p>Permissible combinations here include:              '20' Output of the parameter differences between the default and the permanently saved parameter set              '23' Output of the parameter differences between the default parameter set and the operating parameter set saved in volatile memory              '03' Output of the parameter differences between the permanent parameter set and the operating parameter set saved in volatile memory</p>
<b>Acknowledgment positive</b>	<p>PT&lt;BCC&gt;&lt;PS type&gt;&lt;Status&gt;&lt;Adr.&gt;&lt;P.value adr.&gt;&lt;P.valueAdr.+1&gt;...          [;&lt;Adr.&gt;&lt;P.value adr.&gt;]          &lt;BCC&gt;              '0' No check digit              '3' BCC mode 3          &lt;PS type&gt;              '0' Values stored in flash memory              '3' Operating values stored in RAM          &lt;Status&gt;              '0' No further parameters              '1' Additional parameters follow          &lt;Adr.&gt; Relative address of the data within the data set              'aaaa' Four-digit, unit [dimensionless]          &lt;P.value&gt; Parameter value of the -bb- parameter stored at this address. The parameter set data is converted from HEX format to a 2-byte-ASCII format for transfer.</p>
<b>Acknowledgment Negative</b>	<p>'PS=&lt;aa&gt;'</p> <p>&lt;aa&gt; Status acknowledgment, unit [dimensionless]              '0' No difference              '1' Syntax error              '2' Impermissible command length              '6' Impermissible combination, parameter set 1 and parameter set 2              '8' Invalid parameter set</p>

## Writing parameter set

Command	'PT'
Description	<p>The parameters of the BCL 358/ are grouped together in a parameter set and permanently stored in memory. There is one parameter set in permanent memory and one operating parameter set in volatile memory; in addition, there is a default parameter set (factory parameter set) for initialization. This command can be used to edit the first two parameter sets (in permanent and volatile memory). A check sum can be used for reliable parameter transfer.</p>
Parameter	<p><b>PT&lt;BCC type&gt;&lt;PS type&gt;&lt;Status&gt;&lt;Adr.&gt;&lt;P.value adr.&gt; &lt;P.value adr+1&gt;...[;&lt;Adr.&gt;&lt;P.value adr.&gt;][&lt;BCC&gt;]</b></p> <p><b>&lt;BCC type&gt;</b> Check-digit function during transfer, unit [dimensionless]  'b0' No check digit  'b3' BCC mode 3</p> <p><b>&lt;PS type&gt;</b> Memory from which the values are to be read, unit [dimensionless]  'b0' Parameter values stored in the flash memory  'b3' Operating values stored in RAM</p> <p><b>&lt;Status&gt;</b> Mode of parameter processing, without function here, unit [dimensionless]  'b0' No reset after parameter change, no further parameters  'b1' No reset after parameter change, additional parameters follow  'b2' With reset after parameter change, no further parameters  'b6' Set parameters to factory settings, no further parameters  'b7' Set parameters to factory settings, lock all code types; the code-type setting must follow in the command!</p> <p><b>&lt;Adr.&gt;</b> Relative address of the data within the data set,  'aaaa' Four-digit, unit [dimensionless]</p> <p><b>&lt;P.value&gt;</b> Parameter value of the -bb- parameter stored at this address. The parameter set data is converted from HEX format to a 2-byte-ASCII format for transfer.</p> <p><b>&lt;BCC&gt;</b> Check sum calculated as specified under BCC type</p>
Acknowledgment	<p>'PS=&lt;aa&gt;'  Parameter reply:</p> <p><b>&lt;aa&gt;</b> Status acknowledgment, unit [dimensionless]  'b01' Syntax error  'b02' Impermissible command length  'b03' Impermissible value for checksum type  'b04' Invalid check sum received  'b05' Impermissible data length  'b06' Invalid data (parameter limits violated)  'b07' Invalid start address  'b08' Invalid parameter set  'b09' Invalid parameter set type</p>

## 12 Diagnostics and troubleshooting

### 12.1 General causes of errors

Error	Possible error cause	Measures
<b>Status LED PWR</b>		
Off	<ul style="list-style-type: none"> <li>No supply voltage connected to the device</li> <li>Hardware error</li> </ul>	<input type="checkbox"/> Check supply voltage <input type="checkbox"/> Send device to customer service
Red, flashing	<ul style="list-style-type: none"> <li>Warning</li> </ul>	<input type="checkbox"/> Query diagnostic data and carry out the resulting measures
Red, continuous light	<ul style="list-style-type: none"> <li>Error: no function possible</li> </ul>	<input type="checkbox"/> Internal device error, send in device
Orange, continuous light	<ul style="list-style-type: none"> <li>Device in service mode</li> </ul>	<input type="checkbox"/> Reset service mode with webConfig tool
<b>Status LED NET</b>		
Off	<ul style="list-style-type: none"> <li>No supply voltage connected to the device</li> <li>No IP address assigned</li> <li>Hardware error</li> </ul>	<input type="checkbox"/> Check supply voltage <input type="checkbox"/> IP address assigned <input type="checkbox"/> Send device to customer service
Red, flashing	<ul style="list-style-type: none"> <li>Communication error</li> </ul>	<input type="checkbox"/> Check interface
Red, continuous light	<ul style="list-style-type: none"> <li>Double IP address</li> </ul>	<input type="checkbox"/> Check network configuration

Table 12.1: General causes of errors

### 12.2 Interface errors

Error	Possible error cause	Measures
No communication via USB service interface	<ul style="list-style-type: none"> <li>Incorrect interconnection cable</li> <li>Connected BCL 358/i is not recognized</li> </ul>	<input type="checkbox"/> Check interconnection cable <input type="checkbox"/> Install USB driver
Sporadic errors at the Ethernet/IP interface	<ul style="list-style-type: none"> <li>Incorrect wiring</li> <li>Effects due to EMC</li> <li>Overall network expansion exceeded</li> </ul>	<input type="checkbox"/> Check wiring <ul style="list-style-type: none"> <li>In particular, check wire shielding</li> <li>Check the cable used</li> </ul> <input type="checkbox"/> Check shielding (shield covering in place up to the clamping point) <input type="checkbox"/> Check grounding concept and connection to functional earth (FE) <input type="checkbox"/> Avoid EMC coupling caused by power cables laid parallel to device lines. <input type="checkbox"/> Check max. network expansion as a function of the max. cable lengths

Table 12.2: Interface error

## 12.3 Service and support

### Service hotline

You can find the contact information for the hotline in your country on our website [www.leuze.com](http://www.leuze.com) under **Contact & Support**.

### Repair service and returns


Defective devices are repaired in our service centers competently and quickly. We offer you an extensive service packet to keep any system downtimes to a minimum. Our service center requires the following information:

- Your customer number
- Product description or part description
- Serial number and batch number
- Reason for requesting support together with a description

Please register the merchandise concerned. Simply register return of the merchandise on our website [www.leuze.com](http://www.leuze.com) under **Contact & Support > Repair Service & Returns**.

To ensure quick and easy processing of your request, we will send you a returns order with the returns address in digital form.

### What to do should servicing be required?

NOTE	
	<p><b>Please use this chapter as a master copy should servicing be required.</b></p> <p>✍ Enter the contact information and fax this form together with your service order to the fax number given below.</p>

### Customer data (please complete)

Device type:	
Serial number:	
Firmware:	
Display messages	
Status of LEDs:	
Error description	
Company:	
Contact person/department:	
Phone (direct dial):	
Fax:	
Street / no.:	
ZIP code / City:	
Country:	

### Leuze Service fax number:

+49 7021 573 - 199

## 13 Type overview and accessories

### 13.1 Part number code

BCL	300	/	C	S	M	102	D	H	F	
									Customer-specific	P Plastic exit window
									Fxxx	Cloud - feature with 3-digit number only in combination with with Industry 4.0/IoT (iC)
									Heating option	H With heating
									Display option	D With display, buttons and LEDs
									Beam exit	0 Perpendicular beam exit
										2 Front beam exit
									Optics	N High Density (N = Near)
										M Medium Density (M = Medium)
										F Low Density (F = Far)
										L Ultra Low Density (L = Long Range)
										J Inkjet Optics
									Scanning principle	S Single-line polygon wheel
										R1 Raster polygon wheel
										O Oscillating mirror
									/	Integrated networks (basic netX)
									C	IoT / Industry 4.0 - connection
									Interface	00 RS232/422 interface
										01 RS485 interface
										04 PROFIBUS DP interface
										08 Ethernet interface
										38 EtherCAT interface
										48 PROFINET interface
										58 Ethernet/IP interface
BCL	BarCodeLeser (bar code reader)									

Table 13.1: BCL 358/part number code

## 13.2 BCL 358/type overview

Network participants with 2x EtherNet/IP interface:

Type designation	Description	Part no.
<b>Single line scanner with frontal beam exit</b>		
BCL 358/S N 102	With N optics	50120793
BCL 358/S M 102	With M optics	50120787
BCL 358/S F 102	With F optics	50120775
BCL 358/S L 102	With L optics	50120781
BCL 358/S N 102 D	With N optics and display	50120794
BCL 358/S M 102 D	With M optics and display	50120788
BCL 358/S F 102 D	With F optics and display	50120776
BCL 358/S L 102 D	With L optics and display	50120782
BCL 358/S N 102 D H	With N optics, display and heating	50120795
BCL 358/S M 102 D H	With M optics, display and heating	50120789
BCL 358/S F 102 D H	With F optics, display and heating	50120777
BCL 358/S L 102 D H	With L optics, display and heating	50120783
<b>Raster scanner with frontal beam exit</b>		
BCL 358/R1 N 102	With N optics	50120770
BCL 358/R1 M 102	With M optics	50120766
BCL 358/R1 F 102	With F optics	50120762
BCL 358/R1 N 102 D	With N optics and display	50120771
BCL 358/R1 M 102 D	With M optics and display	50120767
BCL 358/R1 F 102 D	With F optics and display	50120763
<b>Single line scanner with deflecting mirror</b>		
BCL 358/S N 100	With N optics	50120790
BCL 358/S M 100	With M optics	50120784
BCL 358/S F 100	With F optics	50120772
BCL 358/S L 100	With L optics	50120778
BCL 358/S N 100 D	With N optics and display	50120791
BCL 358/S M 100 D	With M optics and display	50120785
BCL 358/S F 100 D	With F optics and display	50120773
BCL 358/S L 100 D	With L optics and display	50120779
BCL 358/S N 100 D H	With N optics, display and heating	50120792
BCL 358/S M 100 D H	With M optics, display and heating	50120786
BCL 358/S F 100 D H	With F optics, display and heating	50120774
BCL 358/S L 100 D H	With L optics, display and heating	50120780
<b>Raster scanner with deflecting mirror</b>		
BCL 358/R1 N 100	With N optics	50120768
BCL 358/R1 M 100	With M optics	50120764
BCL 358/R1 F 100	With F optics	50120760
BCL 358/R1 J 100	With J optics	50123503
BCL 358/R1 N 100 D	With N optics and display	50120769
BCL 358/R1 M 100 D	With M optics and display	50120765
BCL 358/R1 F 100 D	With F optics and display	50120761
<b>Oscillating-mirror scanner</b>		
BCL 358/O M 100	With M optics	50120754
BCL 358/O F 100	With F optics	50120748
BCL 358/O L 100	With L optics	50120751
BCL 358/O M 100 D	With M optics and display	50120755
BCL 358/O F 100 D	With F optics and display	50120749
BCL 358/O L 100 D	With L optics and display	50120752
BCL 358/O M 100 D H	With M optics, display and heating	50120756
BCL 358/O F 100 D H	With F optics, display and heating	50120750
BCL 358/O L 100 D H	With L optics, display and heating	50120753

Table 13.2: BCL 358/type overview

### 13.3 Accessories – Connection hoods

Type designation	Description	Part no.
MS 358	Connector hood for BCL 358/	50120797
MK 358	Terminal hood for BCL 358/	50120796

Table 13.3: Connection hoods for the BCL 358/

### 13.4 Accessories – Connectors

Type designation	Description	Part no.
KD 095-5A	M12 axial socket for voltage supply, shielded	50020501
D-ET1	RJ45 connector for user-configuration	50108991
S-M12A-ET	M12 connector, axial, D-coded, for user-configuration	50112155
KDS ET M12 / RJ 45 W - 4P	Converter from M12, D-coded, to RJ 45 socket	50109832

Table 13.4: Connectors for the BCL 358/

### 13.5 Accessories – USB cable

Type designation	Description	Part no.
KB USBA-USBminiB	USB service cable, 2 Type A and Mini-B type connector, length 1 m	50117011

Table 13.5: Service cable for the BCL 358/

### 13.6 Accessories – Mounting device

Type designation	Description	Part no.
BT 56	Mounting device for rod Ø 16 ... 20 mm	50027375
BT 56-1	Mounting device for rod Ø 12 ... 16 mm	50121435
BT 59	Mounting device for ITEM	50111224
BT 300 W	Mounting bracket	50121433
BT 300 - 1	Mounting bracket for rod	50121434

Table 13.6: Mounting devices for the BCL 358/

### 13.7 Accessory - Reflector for AutoReflAct

Type designation	Description	Part no.
Reflective tape no. 4 / 100 x 100 mm	Reflective tape as reflector for AutoReflAct operation	50106119

Table 13.7: Reflector for autoReflAct operation

## 14 Maintenance

### 14.1 General maintenance information

Usually, the BCL 358/*i* bar code reader does not require any maintenance by the operator.

#### Cleaning

Clean glass surface with a damp sponge soaked in commercial cleaning detergent. Then rub it with a soft, clean, dry cloth.

#### NOTE



Do not use aggressive cleaning agents such as thinner or acetone for cleaning the device. Use of improper cleaning agents can damage the optical window.

### 14.2 Repairs, servicing

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

🔧 Contact your Leuze distributor or service organization should repairs be required.

The addresses can be found on the inside of the cover and on the back.

#### NOTE



When sending devices to Leuze for repair, please provide an accurate description of the error.

### 14.3 Disassembling, packing, disposing

#### Repacking

For later reuse, the device is to be packed so that it is protected.

#### NOTE



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

## 15 Appendix

### 15.1 ASCII character set

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

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

ASCII	Dec.	Hex.	Oct.	Designation	Meaning
A	65	41	101	A	Capital letter
B	66	42	102	B	Capital letter
C	67	43	103	C	Capital letter
D	68	44	104	D	Capital letter
E	69	45	105	E	Capital letter
F	70	46	106	F	Capital letter
G	71	47	107	G	Capital letter
H	72	48	110	H	Capital letter
I	73	49	111	I	Capital letter
J	74	4A	112	J	Capital letter
K	75	4B	113	K	Capital letter
L	76	4C	114	L	Capital letter
M	77	4D	115	M	Capital letter
N	78	4E	116	N	Capital letter
O	79	4F	117	O	Capital letter
P	80	50	120	P	Capital letter
Q	81	51	121	Q	Capital letter
R	82	52	122	R	Capital letter
S	83	53	123	S	Capital letter
T	84	54	124	T	Capital letter
U	85	55	125	U	Capital letter
V	86	56	126	V	Capital letter
W	87	57	127	W	Capital letter
X	88	58	130	X	Capital letter
Y	89	59	131	Y	Capital letter
Z	90	5A	132	Z	Capital letter
[	91	5B	133	OPENING BRACKET	Opening bracket
\	92	5C	134	REVERSE SLANT	Reverse slant
]	93	5D	135	CLOSING BRACKET	Closing bracket
^	94	5E	136	CIRCUMFLEX	Circumflex
_	95	5F	137	UNDERSCORE	Underscore
`	96	60	140	GRAVE ACCENT	Grave accent
a	97	61	141	a	Lower case letter
b	98	62	142	b	Lower case letter
c	99	63	143	c	Lower case letter
d	100	64	144	d	Lower case letter
e	101	65	145	e	Lower case letter
f	102	66	146	f	Lower case letter
g	103	67	147	g	Lower case letter
h	104	68	150	h	Lower case letter
i	105	69	151	i	Lower case letter
j	106	6A	152	j	Lower case letter
k	107	6B	153	k	Lower case letter
l	108	6C	154	l	Lower case letter
m	109	6D	155	m	Lower case letter
n	110	6E	156	n	Lower case letter
o	111	6F	157	o	Lower case letter

ASCII	Dec.	Hex.	Oct.	Designation	Meaning
p	112	70	160	p	Lower case letter
q	113	71	161	q	Lower case letter
r	114	72	162	r	Lower case letter
s	115	73	163	s	Lower case letter
t	116	74	164	t	Lower case letter
u	117	75	165	u	Lower case letter
v	118	76	166	v	Lower case letter
w	119	77	167	w	Lower case letter
x	120	78	170	x	Lower case letter
y	121	79	171	y	Lower case letter
z	122	7A	172	z	Lower case letter
{	123	7B	173	OPENING BRACE	Opening brace
	124	7C	174	VERTICAL LINE	Vertical line
}	125	7D	175	CLOSING BRACE	Closing brace
~	126	7E	176	TILDE	Tilde
DEL	127	7F	177	DELETE (RUBOUT)	Delete

## 15.2 Bar code samples

### 15.2.1 Module 0.3

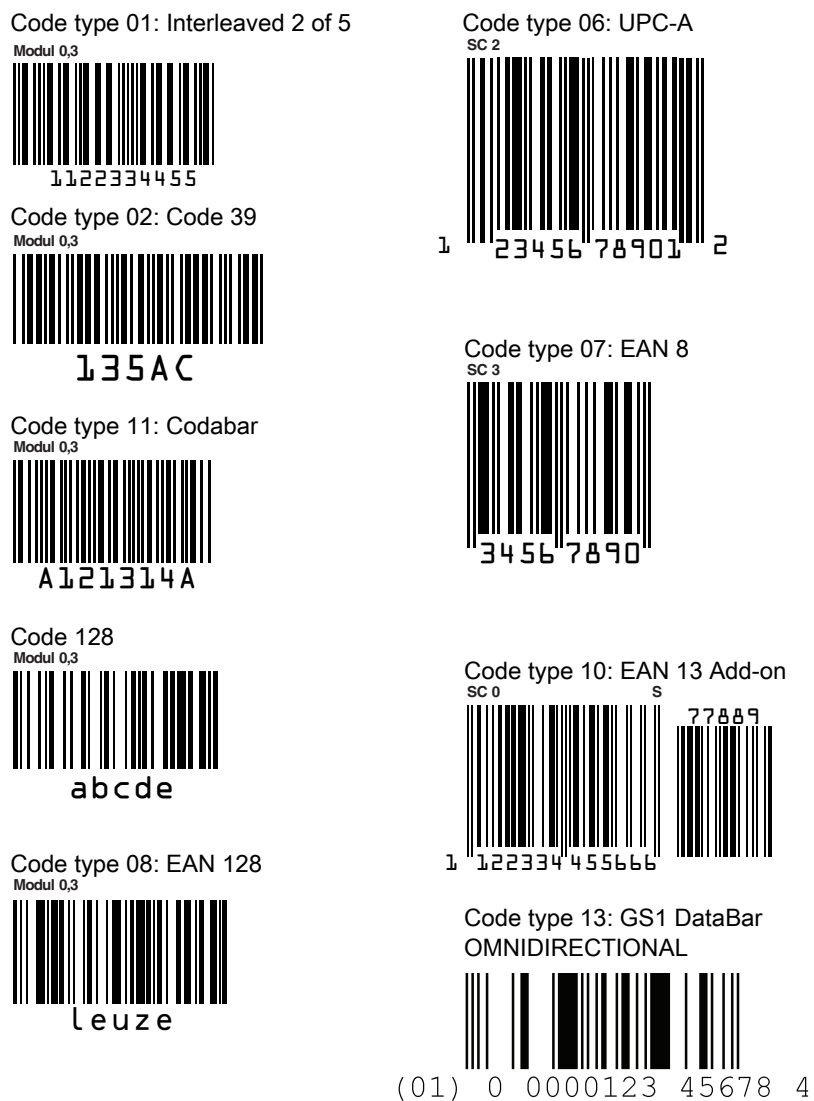


Figure 15.1: Bar code sample labels (module 0.3)

## 15.2.2 Module 0.5

Code type 01: Interleaved 2 of 5

Modul 0,5



Code type 02: Code 39

Modul 0,5



Code type 11: Codabar

Modul 0,5



Code 128

Modul 0,5



Code type 08: EAN 128

Modul 0,5



Code type 06: UPC-A

SC 4



Code type 07: EAN 8

SC 6



Code type 10: EAN 13 Add-on

SC 2



Figure 15.2: Bar code sample labels (module 0.5)