Bar Code Reader BCL 80 with Integrated Decoder Connector Unit MA 10

Technical Description
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1 General Information

1.1 Explanation of Symbols

The symbols used in this operating manual are explained below.

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

**Attention Laser Radiation!**
This symbol warns of possible danger through hazardous laser radiation.

**Note!**
This symbol indicates text which contains important information.

1.2 Definition of Terms

**Activation**
Initiates a read process, e.g. by triggering the switched input.

**ASCII**
Standard character set (American Standard Code for Information Interchange) with 128 characters. Each character of the ASCII character set has been assigned a number from 0 to 127. This number is usually displayed in decimal format, but can also be displayed in hexadecimal or octal.

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

**autoConfig**
The function integrated into the bar code reader which automatically recognises the type and number of characters of the code to be read in.

**autoControl**
The function integrated into the bar code reader used to monitor the read quality.

**Bar code**
An arrangement of parallel bars and spaces which are arranged according to a standardised protocol such that they have a certain numeric or alphanumeric meaning.

**CRT**
The code reconstruction technology permits the reconstruction of the correct code from multiple fragments. This feature can be rather useful if, for some reason, the barcode reader is unable to read the entire label in one pass and needs to piece the code together from several "fragments."

**Deactivation**
End a read process, e.g. by using an online command.
Decoder/Decoding system
The microprocessor control unit which translates the scanned bar code information into a simple sig-
nal that can be processed further.

Hex.
Abbreviation for hexadecimal notation.

Host
External computer or programmable logic controller (PLC) which is connected to the bar code reader
via a serial interface and is used to further process the decoded bar code information.

Label
Barcode label

Read quality
The read quality can be monitored using the autoControl function. The relationship of the number of
successful reads to the total number of reads is determined and monitored.

multiNet
The network developed by Leuze for networking together several bar code readers.

No Read
Read failure; a read process was initiated but a label could not be decoded.

Online command
A command which is sent directly to the bar code reader from the host or a computer connected to the
interface.

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

PD
Programming device

Postfix
Trailer of the data transfer protocol (frame protocol) between the bar code reader and the host.

Prefix
Header of the data transfer protocol (frame protocol) between the bar code reader and the host.

Protocol
Interface protocol of the serial interface.

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

Reference code
Bar code, to be compared with scanned labels.

Scanner
Bar code reader that optically scans the bar code with a laser beam.

Switched output
Connection for output of status or event messages, e.g. after a failed read.
Switched input
Bipolar input for connecting a sensor or switch used for initiating a read process or for acquiring a reference code.

Interface module
Electronic component in the connector unit MA 10 which carries out the electrical adjustment of the various serial interface types (e.g. RS 232, RS 422, etc.).

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

Bar code
An arrangement of parallel bars and spaces which are arranged according to a standardised protocol such that they have a certain numeric or alphanumeric meaning.

Teach-In
Programming a reference code using an example bar code.

1.3 Declaration of Conformity
The bar code reader BCL 80 and the connector unit MA 10 have been developed and produced in accordance with the applicable European standards and directives.

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

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

2.1 Safety Standard

The bar code reader BCL 80 and the connector unit MA 10 have been developed, produced and tested subject to the applicable safety standards. They correspond to the state of the art.

2.2 Intended Use

Attention!
The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not corresponding to its intended use.

Bar code readers of the type BCL 80 are conceived as stationary, high-speed scanners with integrated decoders for all current bar codes used for automatic object recognition.

The connector and interface unit MA 10 simplifies the connection of the bar code reader of type BCL 80 / BCL 40 and adapts to various host interfaces. Connection to other bar code readers is not authorised.

In particular, unauthorised use includes:
• rooms with explosive atmospheres
• operation for medical purposes

Fields of application

The bar code reader BCL 80 with optional connector unit MA 10 is conceived particularly for the following fields of application:
• for package distribution and sorting installations
• for pallet transportation applications
• storage and conveying engineering, in particular for object identification on fast-moving conveyor belts
• pharmaceutical industry
• for all applications where great depth of focus and reading distances are required

2.3 Working Safety

Attention Laser Radiation!
The BCL 80 is a laser device of laser class 2. Do not look directly into the laser beam. Observe the legal and local regulations applicable to the operation of laser units.

• Never look at the laser beam directly (same as sunlight).
• Do not point the laser beam of the device to other persons.
• When mounting and adjusting the BCL, heed the reflection of the laser beam on reflective surfaces.
• Do not open the housing.

Opening it does not interrupt the activation of the laser diode through read clocking.
• Heed the laser safety regulations according to DIN EN 60825-1 (most current version).
2.4 Organisational Measures

**Documentation**
All entries in this operating manual must be heeded, in particular those in the sections “Safety Notices” and “Commissioning”.
Carefully store this operating manual where it is accessible at all times.

**Safety regulations**
Observe the locally applicable legal regulations and the rules of the employers’ liability insurance association.

**Qualified personnel**
Mounting, commissioning and maintenance of the device may only be carried out by qualified personnel.
Electrical work must be carried out by a certified electrician.

**Repair**
Repairs must only be carried out by the manufacturer or an authorised representative.
3 Description

3.1 The Bar Code Readers BCL 80

The bar code reader BCL 80 is a high-speed scanner with integrated decoder for all bar codes currently in use, e.g. 2/5 Interleaved, EAN, etc.

The many possible configurations of the device allow its adaptation to a multitude of reading tasks. Due to the large reading distance combined with the great depth of focus, the device is ideally suited for package and pallet transportation systems.

Together with the connector unit MA 10, it can easily be adapted for use with various interfaces, thus allowing additional processing by other systems. The MA 10 connector unit can also be used to network together several BCL 80 devices and to simplify electrical installation.

3.2 Features of the BCL 80

Performance features

- Maximum depth of focus
- Scanning rate: 600 Scans/s; application-specific adjustable
- Maximum reading distance of 2300 mm
- A switched input for triggering a read process using sensors
- Automatic monitoring of the read quality with the ‘autoControl’ function
- Automatic recognition of the bar code type using ‘autoConfig’
- All device parameters can be set by software
- Heavy-duty housing of protection class IP 65 with corresponding cable
- RS 232 or RS 485 interface to host
- Extensive formatting possibilities for data output
- Reference code (comparison code)
- A version of the BCL 80 with an oscillating mirror add-on is available

Added features with MA 10

- Device status display with 4 LEDs
- RS 485 interface with electrical isolation for networking several devices
- Alternative interface RS 232, RS 422 or TTY using a selectable interface module with electrical isolation for directly connecting to the host
- Switched output for status messages (second output on request)
- Additional switched input for the definition of reference code 1
- Simple electrical connection via double terminal clamps, i.e. both the power supply and the interface circuits can easily be connected in series.
- Heavy-duty housing of protection class IP 65
- 2 parameter sets can be stored locally in the MA 10
  (current parameter set, customer-specific parameter set)
- Built-in RS 232 service interface for fast commissioning or troubleshooting on site using a PC or programming device
- Switch for the autoConfig function
Modular Concept

BCL 80 'stand alone'

The bar code reader BCL 80 can be operated as an individual 'stand alone' (©) device. Electrical connection of the power supply, interface and switched input are centrally made via a 15 pin SubD socket.

For connection, it is best to use the 15 conductor connection cable from Leuze. The requirements for protection class IP 65 are fulfilled when using this cable only (see Chapter 5)!

BCL 80 with MA 10

When using several BCL 80 units or under rough environment conditions, the installation of one connector unit MA 10 for each BCL 80 unit is recommended.

Electrical connection, commissioning, and service can be comfortably carried out in a short period of time.

The BCL 80 and MA 10 can be mounted directly together (©) or arranged separately next to each other. When mounted separately (©), the two units are connected by a cable. Protection class IP 65 is maintained when the sealed accessory cable is used (see Chapter 5).

Figure 3.1: Possible combinations of the BCL 80 / MA 10

© BCL 80 as 'Stand alone'-device

© BCL 80 with the connector unit MA 10 mounted together

© BCL 80 and MA 10 mounted separately and connected together by a cable
Networking

Up to 31 BCL 80 bar code readers can be networked together using the connector unit MA 10 (with interface module RS 485). The devices are interconnected by connecting the individual RS 485 interfaces in parallel.

multiNet plus

In the Leuze multiNet plus, the individual network devices sequentially transfer their data to the network master MA 30 when requested (‘polling’). The master station can also be fitted with an BCL 80, making it a complete scanner station which also controls the network.

Each network device declared as a slave maintains a device address which is set in the respective MA 10 with a coding switch. If the reader unit is exchanged (BCL), the device address and all settings in the MA 10 are maintained.

The master then transmits the data of all network devices via its host interface to a primary PLC control system or a computer, i.e. it “collects” the scanner data in the network and transmits them to one interface on the host computer. This reduces interface costs (CP’s) and time programming the software.

Suitable network master devices are: DD 55, MDS 70 and MA 30.

Figure 3.2: Networking possibilities using the multiNet plus
Two-wire RS 485

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

Interface modules

Shielded, twisted pair conductors should be used for the multiNet. This allows a total network length of up to 1200 m. Connection of the network to the primary computer is made via the host interface of the MA 30 which can be equipped with 4 different physical interface modules. Modules for RS 232, RS 422, TTY and RS 485 are available.

3.3 Construction

Device construction BCL 80

Figure 3.3: Bar code reader BCL 80
**Description**

**Device construction MA 10**

Mounting holes for the BCL 80 with M4 screws

4 Status-LEDs on the rear

Screw gland PG11 for the power supply cable

Screw glands PG9 for the switched input and the interface cables

4 fastening threads M4 on the base of the device

15-pin SubD connector

Dovetail fastening grooves

Fig. 3.4: connector unit MA 10

**Device variations MA 10**

The MA 10 is available in four models:

- **MA 10 100** with host interface module RS 485
- **MA 10 110** with host interface module RS 232
- **MA 10 120** with host interface module TTY
- **MA 10 130** with host interface module RS 422

All modules are galvanically isolated, i.e. they are EMC interference protected and immune to differences in voltage potentials across long cable lengths.

![Note!]

*Only the type MA 10 100 can be used as a multiNet slave unit.*
## 4 Technical Data

### 4.1 General Technical Data

**Manufacturer:** Leuze electronic GmbH + Co., In der Braike 1, D-73277 Owen / Teck  
**Type:** BCL 80, bar code reader with integrated decoder MA 10, connector / interface unit for BCL 80

#### Technical Data BCL 80

**General Specifications**

- **Housing:** Diecast aluminium  
- **Dimensions:** 100 x 155 x 90 mm (H x W x D)  
- **Weight:** approx. 1.63 kg  
- **Protection class:** IP 65  
- **Scanner**
  - **Resolution:** 0.2 … 1 mm  
  - **Reading distance:** 300 … 2300 mm  
  - **Scanning rate:** 600 Scans/s (adjustable)  
  - **Laser source:** laser diode, red 660 nm, 1 mW, protection class 2  
  - **Beam deflection:** by means of rotating polygon mirror wheel  
  - **Optical window:** glass with scratch-resistant Indium coating  
  - **Mirror oscillating frequency:** 0.2 … 5.0 Hz (adjustable)

**Decoder**

- **Code types:**
  - 2/5 Interleaved  
  - Code 39  
  - UPC (A, E)  
  - EAN  
  - Code 128 / EAN 128  
  - Pharmacode  
  - Add-On (EAN)  
  - CODABAR  
- **Code reconstruction:** all versions of the BCL 80 are available with optional code reconstruction technology

**Interfaces**

- **Type:** can be switched between RS 232 and RS 485, additional service interface (RS 232)  
- **Baud rate:** 110 … 57600 Baud selectable (host only)  
- **Switching input:** 12 … 36 V DC / AC voltage, selectable galvanic isolation or supplied operating voltage, max. insulation voltage: 250 V (with galvanic isolation)

**Power supply**

- **Operating voltage:** 18 … 36 V DC  
- **Power consumption:** 6 VA max.  
  - 18 VA max. (version with oscillating mirror)
### Technical Data

#### Environmental conditions
- **Operating temperature range**: 0 … + 40°C
- **Storage temperature range**: -20 … + 60°C
- **Air humidity**: max. 90% rel. humidity, non-condensing
- **Vibration**: accord. to IEC 68.2.6
- **Shock**: accord. to IEC 68.2.27
- **EMC**: accord. to IEC 801

#### Technical Data MA 10

#### General Specifications
- **Housing**: Diecast aluminium
- **Dimensions**: 130 x 90 x 78 mm (H x W x D)
- **Weight**: approx. 0.74 kg
- **Protection class**: IP 65

#### Interfaces
- **Type (optional)**: RS 232, with galvanic isolation
- **RS 422, with galvanic isolation**
- **RS 485, with galvanic isolation**
- **TTY, with galvanic isolation**

- **Service interface**: RS 232 internal, 9 pin Sub D plug, male

#### Inputs/outputs
- **2 switched inputs**: galvanically isolated, with supply voltage terminal for sensors
- **12 … 36 V DC/AC, insulation voltage 500 V**
- **2 switched outputs**: can be operated galvanically isolated or not isolated
- **Switching voltage**: 5 … 48 V DC, max. load 500 mA

#### Power supply
- **Operating voltage**: 18 … 36 V DC
- **Power consumption**: 2 VA max.

#### Environmental conditions
- **Operating temperature range**: 0 … +50°C
- **Storage temperature range**: -20 … +60°C
- **Air humidity**: max. 90% rel. humidity, non-condensing
- **Vibration**: accord. to IEC 68.2.6
- **Shock**: accord. to IEC 68.2.27
- **EMC**: accord. to IEC 801
## 4.2 Dimensioned drawings

<table>
<thead>
<tr>
<th>Diagram</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Figure 4.1" /></td>
<td>Dimensioned drawing BCL 80</td>
<td>M4 - 10 deep (4 x)</td>
</tr>
<tr>
<td><img src="image2.png" alt="Figure 4.2" /></td>
<td>Dimensioned drawing of BCL 80 with oscillating mirror add-on</td>
<td>171.5 x 170</td>
</tr>
<tr>
<td><img src="image3.png" alt="Figure 4.3" /></td>
<td>Dimensioned drawing MA 10</td>
<td>M4 (4x)</td>
</tr>
</tbody>
</table>
4.3 Optical Data

The range in which the bar code can be read by the BCL 80 (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.

\[
\begin{align*}
M &= \text{Module: The narrowest line or space of a bar code in mm} \\
Z_B &= \text{Wide elements: Wide lines and spaces are a multiple (ratio) of the module} \\
& \quad \text{Module} \times \text{Ratio} = Z_B \ (\text{Normal Ratio} \ 1 : 2.5) \\
B_Z &= \text{Quiet zone: The quiet zone should be at least 10 times the module, but not less than 2.5 mm.} \\
L &= \text{Code length: The length of the bar code in mm including the start and stop characters. The quiet zone is included depending on the code definition.} \\
S_L &= \text{Element length: Height of the elements in mm} \\
\end{align*}
\]

Figure 4.4: The most important characteristics of a bar code

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.

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.

The BCL 80 is available in various models for various reading tasks. A distinction is made between line scanners and line scanners with an oscillating mirror add-on. The latter may be used as de-facto raster scanners. For both varieties, there is also a version featuring code reconstruction technology (CRT). The device specifications are given in the following table and accompanying figure.
4.3.1 Type overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Maximum range (mm)</th>
<th>Module/resolution (mm)</th>
<th>Sweep principle S*, OM** or R1***</th>
<th>Scanning rate (scan/s)</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL 80 S N1 100</td>
<td>500</td>
<td>0.2</td>
<td>S</td>
<td>600</td>
<td>500 31668</td>
</tr>
<tr>
<td>BCL 80 S N2 100</td>
<td>900</td>
<td>0.3</td>
<td>S</td>
<td>600</td>
<td>500 31669</td>
</tr>
<tr>
<td>BCL 80 S M 100</td>
<td>1600</td>
<td>0.5</td>
<td>S</td>
<td>600</td>
<td>500 26181</td>
</tr>
<tr>
<td>BCL 80 S L 100</td>
<td>2300</td>
<td>0.7</td>
<td>S</td>
<td>480</td>
<td>500 31607</td>
</tr>
<tr>
<td>BCL 80 OT N1 100</td>
<td>500</td>
<td>0.2</td>
<td>OM</td>
<td>600</td>
<td>500 36447</td>
</tr>
<tr>
<td>BCL 80 OT N2 100</td>
<td>800</td>
<td>0.3</td>
<td>OM</td>
<td>600</td>
<td>500 36449</td>
</tr>
<tr>
<td>BCL 80 OT M 100</td>
<td>1400</td>
<td>0.5</td>
<td>OM</td>
<td>600</td>
<td>500 36450</td>
</tr>
<tr>
<td>BCL 80 OT L 100</td>
<td>1800</td>
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<td>OM</td>
<td>480</td>
<td>500 36451</td>
</tr>
<tr>
<td>BCL 80 CRT M 100</td>
<td>1600</td>
<td>0.5</td>
<td>S</td>
<td>600</td>
<td>500 29025</td>
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<tr>
<td>BCL 80 CRT O1 M 100</td>
<td>1400</td>
<td>0.5</td>
<td>OM</td>
<td>600</td>
<td>500 36452</td>
</tr>
<tr>
<td>BCL 80 R1 M 100</td>
<td>1600</td>
<td>0.5</td>
<td>R1</td>
<td>600</td>
<td>500 29221</td>
</tr>
</tbody>
</table>

S*: Line Scanner Single Line (1 line)  
OM**: Line Scanner with oscillating mirror add-on  
R1***: Raster Scanner (8 lines)

4.3.2 Sweep principle

*Line scanner (single line)*

1 line scans the label.

*Areas of use:*
- when the bar code is printed in the conveying direction ('ladder arrangement')
- with bar codes having very short bar lengths
- when the scanning distance is large

![Sweep principle for the line scanner](image)

Figure 4.5: Sweep principle for the line scanner
**Technical Data**

**Line scanner with oscillating mirror add-on**

1 line that is continuously deflected by a mirror during scanning scans the label at varying heights.

**Areas of use:**
- when the label’s position is not fixed, e.g., on palettes
- when the bar code is printed in the conveying direction (‘picket fence arrangement’)
- when reading stationary objects
- when the scanning distance is large
- when a large reading field has to be covered

![Diagram of line scanner with oscillating mirror add-on](image)

**Figure 4.6:** Sweep principle for the line scanner with oscillating mirror add-on

### 4.3.3 Reading Fields

The BCL 80 is available in two different versions (with / without oscillating mirror add-on) that also differ in range and resolution (see Chapter 4.3.1).

**Version S** (BCL 80 S N1 100 / BCL 80 S N2 100 / BCL 80 S M 100 / BCL 80 S L 100):
Standard version with / without CRT
Medium to very long range for barcodes with a medium module.

**Version O** (BCL 80 O N1 100 / BCL 80 O N2 100 / BCL 80 O M 100 / BCL 80 O L 100):
Version with oscillating mirror add-on and with / without CRT
Medium to very long range for barcodes with a medium module.

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

**Note!**

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*Please note that the actual scanning curves can vary due to factors such as label material, print quality, reading angle, print contrast, etc.*
4.3.4 Scanning curves of the BCL 80

BCL 80 S N1 100

BCL 80 S N2 100

BCL 80 S M 100

BCL 80 S L 100

BCL 80 O N1 100
vertical

BCL 80 O N1 100
horizontal at +15°/-20°
Technical Data

Leuze electronic

BCL 80 O N2 100
- horizontal at +15˚ / -20˚

BCL 80 OL 100
- vertical

BCL 80 O M 100
- vertical
- horizontal at +15˚ / -20˚

BCL 80 OL 100
- vertical
- horizontal at +15˚ / -20˚
5 Accessories / Order Designation

5.1 Connector and interface unit MA 10

<table>
<thead>
<tr>
<th>Type</th>
<th>Short Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 10 100</td>
<td>standard model, multiNet Slave with host interface RS 485</td>
<td>500 26110</td>
</tr>
<tr>
<td>MA 10 110</td>
<td>standard, with host interface RS 232</td>
<td>500 26109</td>
</tr>
<tr>
<td>MA 10 120</td>
<td>standard, active and passive operation with host interface TTY</td>
<td>500 27186</td>
</tr>
<tr>
<td>MA 10 130</td>
<td>standard, with host interface RS 422</td>
<td>500 27187</td>
</tr>
</tbody>
</table>

Note! All MA 10 units are supplied with an additional RS 232 service interface (9 pin Sub D).

5.2 Mounting accessories

A wide range of mounting accessories are available for mounting the BCL 80 and MA 10.

Mounting device BT 56

Clamping fixture for mounting to the BCL 80 or MA 10

Clamp for mounting to a round or oval pipe ø 16 ... 20 mm

Note! For weight reasons, the mounting kit BT 56 is not suitable for the version with oscillating mirror add-on.
### Mounting device BT 57

Figure 5.2: Mounting device BT 57

### Mounting device BT 58

Figure 5.3: Mounting device BT 58

<table>
<thead>
<tr>
<th>Type</th>
<th>Short Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT 56</td>
<td>Mounting kit with dovetail for mounting on round rods $\varnothing$ 16 ... 20 mm</td>
<td>500 27375</td>
</tr>
<tr>
<td>BT 57</td>
<td>Mounting kit suitable for ITEM MB system</td>
<td>500 27167</td>
</tr>
<tr>
<td>BT 58</td>
<td>Mounting kit suitable for ITEM MB system</td>
<td>500 27394</td>
</tr>
</tbody>
</table>
5.3 Cable accessories

**KB 040 xxxx**
15-conductor connection cable BCL 80 / MA 10, Sub D plug and socket

*xxxx = Length in mm*

![Connection cable between the BCL 80 and MA 10](image_url)

Figure 5.4: Connection cable between the BCL 80 and MA 10

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

*xxxx = Length in mm*

![Connection cable BCL 80 'stand alone'](image_url)

Figure 5.5: Connection cable BCL 80 'stand alone'

<table>
<thead>
<tr>
<th>Type</th>
<th>Short Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB 040-3000</td>
<td>15-conductor connection cable BCL 80 / MA 10, Sub D plug and socket, length: 3 m</td>
<td>500 26658</td>
</tr>
<tr>
<td>KB 040-6000</td>
<td>as above, length: 6 m</td>
<td>500 29381</td>
</tr>
<tr>
<td>KB 040-10000</td>
<td>as above, length: 10 m</td>
<td>500 29382</td>
</tr>
<tr>
<td>KB 040-3000-B</td>
<td>15-conductor connection cable BCL 80 'stand alone', open strand ends, Sub D socket, length: 3 m</td>
<td>500 29316</td>
</tr>
<tr>
<td>KB 040-6000-B</td>
<td>as above, length: 6 m</td>
<td>500 29317</td>
</tr>
<tr>
<td>KB 040-10000-B</td>
<td>as above, length: 10 m</td>
<td>500 29318</td>
</tr>
</tbody>
</table>

**Note!**
The requirements for protection class IP 65 are fulfilled with this cable type only!

**Software**

<table>
<thead>
<tr>
<th>Type</th>
<th>Short Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL-Config</td>
<td>terminal software for on-line and off-line programming via PC or programming device with serial RS 232 interface (V.24)</td>
<td>500 31298</td>
</tr>
</tbody>
</table>
6 Installation

6.1 Storage, Transportation

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

Unpacking

- Check the packaging for any damage. If damage is found, notify the post office or shipping agent as well as the supplier.
- Check the delivery contents using your order and the delivery papers:
  - delivered quantity
  - device type and model as indicated on the nameplate
  - Accessories
  - operating manual(s)

Figure 6.1: Device nameplates MA 10 and BCL 80

- Save the original packaging in case the device must be stored or shipped at a later time.

If you have any questions concerning your shipment, please contact your supplier or your local Leuze electronic sales office (see the last page of this operating manual).

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

Cleaning

- Clean the glass window of the BCL 80 with a soft cloth before mounting. Remove any remaining packaging from the device such as cardboard fibres and Styrofoam balls, particularly in the area of the connector socket.

Attention!
Do not use aggressive cleaning agents such as thinner or acetone for cleaning the device.
6.2 Mounting

6.2.1 Types of Mounting

Accessories

A wide range of mounting accessories are available for mounting the BCL 80 and MA 10 (Chapter 5 "Accessories / Order Designation").

BCL 80 without oscillating mirror add-on

Mounting the BCL 80

There are two basic types of mounting arrangements for the BCL 80:

• using the dovetail groove and the corresponding mounting accessories
• using the fastening threads on the back- and underside of the devices
  (see Chapter 4.2 “Dimensioned drawings”)

Mounting BCL 80 and MA 10

You can fasten the scanner BCL 80 and connector unit MA 10 tightly together to form a single compact unit.

• Plug the two devices together at the 15 pin SubD connector. Be sure that there is no dirt in the area of the seal (this guarantees an IP 65 protection class). Insert the two M4 x 30 screws included with the connector unit MA 10 into the countersunk drill holes on the bottom side of the MA 10, screw them into the corresponding threads in the BCL 80 and tighten them down.

There are three basic mounting arrangements for the BCL 80 / MA 10 unit:

• using the dovetail groove of the BCL 80 or the MA 10 and the corresponding mounting accessories
• using the two upper fastening threads on the back side of the BCL 80
• using the four fastening threads on the underside of the MA 10
  (see Chapter 4.2 “Dimensioned drawings”)

Figure 6.2: Mounting example BCL 80 'stand alone'
Installation

**Note!**
The cable screw glands of the MA 10 can be set either on the right or the left side of the unit. Loosen the four Phillips screws on the back side of the MA 10, carefully lift off the cover, replace it into the desired position and tighten down the four screws again. Be careful not to damage the ribbon cable.

![Figure 6.3: Mounting example for the combined BCL 80 / MA 10 unit](image)

**Independent mounting BCL 80 / MA 10**

Independent mounting of the BCL 80 and MA 10 is necessary when

- the available mounting depth is not sufficient for both devices, e.g. is less than 85 mm, or
- access to the mounting location of the scanner is difficult, but easy installation, commissioning and service are required, or
- the operating status LEDs on the back side of the MA 10 must be easily seen.

![Figure 6.4: Mounting examples for the BCL 80 and MA 10 mounted independently](image)
You can mount the individual devices in the following way as already described above:

- using the dovetail groove of the BCL 80 or the MA 10 and the corresponding mounting accessories
- using the fastening threads on the back- or underside of the devices
- the connector unit can additionally be mounted using two M5 screws into the threaded holes that are otherwise used for fastening the BCL 80. The threaded holes have M5 threads

**BCL 80 with oscillating mirror add-on**

For weight reasons, we do not recommend to mount the unit together with the MA 10. Always use a BT 58 when installing the BCL 80 with oscillating mirror.

![BCL 80 with oscillating mirror](image)

Figure 6.5: BCL 80 with oscillating mirror and MA 10, mounted separately

### 6.3 Proper Configuration of the Devices

**Selecting a mounting location**

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

- size, orientation, and position tolerance of the bar codes on the objects to be scanned
- the reading field of the BCL 80 in relation to the bar-code module width
- the resulting minimum and maximum reading distance from the respective reading field (see Chapter 4.3 "Optical Data")

The best reading results with the line scanner are obtained when

- the bar code is moved along the reading window at an angle of approx. 9 … 15°
- the bars of the label are perpendicular to the scan line
- the reading distance lies in the middle area of the reading field
- high gloss labels or labels made from thermopaper are not used
Best reading results with the oscillating mirror version are obtained if

- the unit is tilted downwards by 10° ... 30° to avoid total reflections and to achieve the best depth of focus, or
- it is rotated by 5° ... 20° around its vertical axis.

**Large depth of focus**

Due to the large reading distance and the large depth of focus, the BCL 80 is especially suited for applications with varying goods or reading distances.

Examples are transport of pallets and packages, sorting and distribution applications.

![Diagram of BCL 80 configurations](image)

Figure 6.6: Minimum space requirements for installation

**Note!**

The beam of the BCL 80 without oscillating mirror is emitted perpendicular to the housing's lid. Therefore, you should mount the unit at an angle of 9° ... 15° or move the labels past the housing at the same angle.

When selecting a mounting location, pay attention to

- maintaining the required environmental conditions (temperature, humidity)
- possible soiling of the reading window due to liquids, abrasion by boxes, or packaging material residues
- reducing the chance of damage to the scanner by mechanical collision or jammed parts
Due to the great depth of focus, the BCL 80 is ideally suited for packet and pallet transportation applications.

### 6.4 Connection

**Attention!**
Connection of the device and maintenance work while under voltage must only be carried out by a qualified electrician.

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

Before connecting the device, be sure that the supply voltage agrees with the value printed on the nameplate.

The power supply unit used to power the BCL 80 and MA 10 must have protected electrical separation by way of a safety transformer with double insulation according to DIN VDE 0551 (equivalent IEC 724).

Be sure that the earthing conductor is connected correctly. Error-free operation is only guaranteed when the device is properly earthed.
6.4.1 Connecting the BCL 80 for 'Stand Alone' Operation

If you would like to connect the BCL 80 for ‘stand alone’ operation, you must make a corresponding connector cable with a 15 pin SubD plug (female) for the following connections:

- power supply of 18 ... 36 V DC, 5 W max. power
- host RS 232 interface, or RS 485 when operating as a ‘multiNet slave’
- a sensor connection for triggering a read process

Figure 6.8: Connecting the BCL 80 'stand alone'

Attention!
When using a normal 15 pin SubD plug, the device only has a protection class of IP 54 instead of IP 65! Therefore, use the original Leuze cable from the accessories list. These cables are fitted with a seal so that protection class IP 65 is maintained.

Switching inputs
A read process can be triggered by applying a voltage of 12 ... 36 V DC to the switched input connections ‘Sensor 1A’ and ‘Sensor 1B’. The switched input maintains an electrical separation of up to max. 250 V.
Figure 6.9: Connection diagram for the SubD connector plug

Operating mode

Insert a resistor $R = 220 \, \Omega / 0.25 \, W$ here, if the device is the last subscriber on the RS 485 data line. Do not use a resistor, if the RS 485 line continues.

Wiring description

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND 0 V signal reference potential (RS 232 / RS 485)</td>
</tr>
<tr>
<td>2</td>
<td>Sensor 1A switched input 1A, 12 ... 36 V DC, see fig. 6.18 and 6.19 for wiring</td>
</tr>
<tr>
<td>3</td>
<td>CTS (Host) CTS signal, host interface RS 232 / RS 485 B</td>
</tr>
<tr>
<td>4</td>
<td>RTS (Host) RTS signal, host interface RS 232 / RS 485 B</td>
</tr>
<tr>
<td>5</td>
<td>TXD service used when MA 10 is connected / without MA 10: service interface, standard protocol</td>
</tr>
<tr>
<td>6</td>
<td>MODE_F RS 232: open; RS 485: connect with MODE_S</td>
</tr>
<tr>
<td>7</td>
<td>Reserved must not be used</td>
</tr>
<tr>
<td>8</td>
<td>V_IN supply voltage + 18 ... 36 V DC</td>
</tr>
<tr>
<td>9</td>
<td>Sensor 1B switched input 1B, 12 ... 36 V DC, see fig. 6.18 and 6.19 for wiring</td>
</tr>
<tr>
<td>10</td>
<td>NC not used</td>
</tr>
<tr>
<td>11</td>
<td>RXD (Host) RXD signal, host interface RS 232 / RS 485 A</td>
</tr>
<tr>
<td>12</td>
<td>TXD (Host) TXD signal, host interface RS 232 / RS 485 A</td>
</tr>
<tr>
<td>13</td>
<td>RXD service used when MA 10 is connected / without MA 10: service interface, standard protocol</td>
</tr>
<tr>
<td>14</td>
<td>MODE_S RS 232: open; RS 485: connect with MODE_F</td>
</tr>
<tr>
<td>15</td>
<td>GND_IN Supply voltage 0 V DC</td>
</tr>
</tbody>
</table>
6.4.2 Connecting the BCL 80 with the Connector Unit MA 10

Connection of the BCL 80 is considerably easier when using the MA 10.

Open the MA 10 housing

- Loosen the four Phillips screws on the back side of the MA 10 and carefully lift off the part with the electronics on it.

The two halves of the housing are now connected to each other only by the ribbon cable. You can now disconnect the ribbon cable from the electronic circuit board for better access, as shown in Figure 6.11.

To disconnect the ribbon cable, carefully press down the two latches of the ribbon cable plug at the same time, as shown in logo of Figure 6.11.

The cable is now free (© in Figure 6.11) and the half with the electronics and the connection terminal can be removed for unhindered connection.

- To reconnect the ribbon cable, insert the ribbon cable plug back into its socket, observing the correct orientation, until it securely latches.
**Note!**

All electrical connections can be carried out on the terminal strip quickly and without screwing down or soldering. Wires with ferruled ends can be inserted directly into the terminal without depressing the clamping lever.

The clamp is opened by depressing the orange coloured clamping lever.

The wire can then be inserted into the terminal.

By releasing the clamping lever, the wire is fixed into the terminal.

Figure 6.12: Wiring to the terminal strip without screwing down or soldering

**Attention!**

The pin assignment of the connection terminals depends on the inserted interface module. Leuze offers four modules which can be used with the serial interfaces RS 485, RS 232, TTY or RS 422. The terminal designations are printed on the module.

Figure 6.13: Position of the connections for the MA 10
Type overview

The following table lists the MA 10 device types and which interface is installed.

| MA 10 100 | RS 485 interface |
| MA 10 110 | RS 232 interface |
| MA 10 120 | TTY interface    |
| MA 10 130 | RS 422 interface |

- Make the connections to the terminal strip as described below.

Wiring description

Terminals 1 through 6 are used depending on the type of interface:

<table>
<thead>
<tr>
<th>RS 232</th>
<th>RS 422</th>
<th>RS 485</th>
<th>TTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td>Signal</td>
<td>Terminal</td>
<td>Signal</td>
</tr>
<tr>
<td>1</td>
<td>RXD</td>
<td>1</td>
<td>TX+</td>
</tr>
<tr>
<td>2</td>
<td>TXD</td>
<td>2</td>
<td>TX-</td>
</tr>
<tr>
<td>3</td>
<td>CTS</td>
<td>3</td>
<td>RX+</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>4</td>
<td>RX-</td>
</tr>
<tr>
<td>5</td>
<td>not used</td>
<td>5</td>
<td>not used</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>6</td>
<td>GND</td>
</tr>
</tbody>
</table>

RS 485 Interface

![RS 485 Interface Diagram](image)

Figure 6.14: Connecting the MA 10 to a RS 485 Host
**RS 232 Interface**

![RS 232 Interface Diagram](image)

Figure 6.15: Connecting the MA 10 to a RS 232 Host

**Notice for connecting the RS 232 interface!**

The wiring for RTS and CTS must only be connected, if RTS/CTS hardware-handshake is used.

**TTY Interface**

MA 10 active / Host passive

![TTY Interface Diagram](image)

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

MA 10 passive / Host active

![TTY Interface Diagram](image)

Figure 6.17: Connecting the MA 10 as passive subscriber to a TTY Host
Installation

Remarks for connecting the TTY interface!

- The active subscriber is the one which supplies the current (20 mA).
- Switching between active/passive on the host interface card is carried out using two jumper pairs, independent for transmit (Tx) and for receive (Rx).
- The jumpers for active/passive switching must always be changed in pairs (upper and lower jumpers in the same position). This switches the MA 10 host interface module power source and GND internally.
- Mixed operation is possible (transmit active/receive passive or the opposite).
- When switching from active to passive operation or the reverse, the wiring of the connection cable (pin order) changes.

RS 422 Interface

![Diagram of RS 422 Interface](image)

Figure 6.18: Connecting the MA 10 to a RS 422 Host

The additional pins are uniformly assigned for all MA 10 models and are described below.

Switching inputs

The MA 10 has two galvanically isolated switching inputs SE1 and SE2.

- Input voltage: 12 … 36 V DC / AC.
- Insulation voltage: 500 V

Each switching input has an optical coupler and is wired with a protection resistor.

The switching voltage and GND can be externally applied or taken from the operating voltage VDD_SE and GND_SE.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>SE2_A</td>
<td>switching input 2, connection A</td>
</tr>
<tr>
<td>8</td>
<td>SE2_B</td>
<td>switching input 2, connection B</td>
</tr>
<tr>
<td>9</td>
<td>SE1_A</td>
<td>switching input 1, connection A</td>
</tr>
<tr>
<td>10</td>
<td>SE1_B</td>
<td>switching input 1, connection B</td>
</tr>
<tr>
<td>11</td>
<td>VDD_SE</td>
<td>supply voltage, switching input, equal to V_IN device</td>
</tr>
<tr>
<td>12</td>
<td>GND_SE</td>
<td>supply voltage, switching input, equal to GND_IN device</td>
</tr>
</tbody>
</table>
Switching outputs

The MA 10 comes standard with two switching outputs (SA1 and SA2) that can be programmed for various switching functions using the BCL software.

- Output voltage: 5 … 48 V DC
- Insulation voltage: 250 V (only in combination with connection type b)
- Output current:  \( I_{\text{max}} = 500 \, \text{mA} \) (at \( \text{VDD}_{\text{SA}} = 5 \ldots 32 \, \text{V} \))  
  \( I_{\text{max}} = 300 \, \text{mA} \) (at \( \text{VDD}_{\text{SA}} = 32 \ldots 48 \, \text{V} \))

The switching voltage can be connected in two different ways:

a  The operating voltage \( V_{\text{IN}} \) is used as the switching voltage \( \text{VDD}_{\text{SA}} \)  
    (factory setting):
    \( \text{VDD}_{\text{SA}} = V_{\text{IN}} \)
    \( \text{GND}_{\text{SA}} = \text{GND}_{\text{IN}} \)

b  An external voltage is connected as the switching voltage (galv. decoupled)  
    \( \text{VDD}_{\text{SA}} = V_{\text{IN}} \)
    \( \text{GND}_{\text{SA}} = \text{GND}_{\text{IN}} \)
Installation

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>SA2</td>
<td>Switching output 2</td>
</tr>
<tr>
<td>14</td>
<td>SA1</td>
<td>switching output 1</td>
</tr>
<tr>
<td>15</td>
<td>VDD_SA</td>
<td>external voltage supply for switched output 5 ... 48 V DC</td>
</tr>
<tr>
<td>16</td>
<td>GND_SA</td>
<td>external voltage supply for switched output 0 V DC</td>
</tr>
</tbody>
</table>

Galvanic decoupling of the switched output

Galvanic decoupling is achieved by carefully scratching through the two solder jumpers JL5 and JL6 so that there is no longer an electrical connection. The switched output is then galvanically decoupled from the operating voltage. The solder jumpers are located on the circuit board of the MA 10 directly across from the connection terminals VDD_SA and GND_SA.

Figure 6.21: Position of the solder jumpers JL5 and JL6

Figure 6.22: Operating voltage used as the switching voltage

Figure 6.23: Switching voltage connected externally (galvanically decoupled)
Controlling the function of the switching outputs

The function of the switching outputs can be controlled by removing the cover to the MA 10. Sitting directly next to the connection terminals for the switching outputs are red SMD-LEDs that illuminate when the respective switching output is in the HI state (log.1). Please note that the event which sets the switching outputs must be set and activated in the software setup of the BCL 80.

Supply voltage

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>V_IN</td>
<td>Operating voltage +18 … 36 V DC</td>
</tr>
<tr>
<td>18</td>
<td>V_IN</td>
<td>Operating voltage +18 … 36 V DC</td>
</tr>
<tr>
<td>19</td>
<td>GND_IN</td>
<td>Operating voltage 0 V DC</td>
</tr>
<tr>
<td>20</td>
<td>GND_IN</td>
<td>Operating voltage 0 V DC</td>
</tr>
<tr>
<td>21</td>
<td>PE</td>
<td>Protective earth, grounding</td>
</tr>
<tr>
<td>22</td>
<td>PE</td>
<td>Protective earth, grounding</td>
</tr>
</tbody>
</table>

6.4.3 Wire Lengths and Shielding

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

<table>
<thead>
<tr>
<th>Connection</th>
<th>Interface</th>
<th>Max. wire length</th>
<th>Shielding</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL 80 - MA 10</td>
<td>RS 232 / RS 485</td>
<td>10 m</td>
<td>absolutely required, braided shielding</td>
</tr>
<tr>
<td>BCL 80 - Host</td>
<td>RS 232 / RS 485</td>
<td>10 m</td>
<td>absolutely required, braided shielding</td>
</tr>
<tr>
<td>MA 10 - Host</td>
<td>RS 485</td>
<td>1200 m</td>
<td>absolutely required, flexible leads as twisted pairs</td>
</tr>
<tr>
<td>MA 10 - Host</td>
<td>RS 422</td>
<td>1200 m</td>
<td>absolutely required, flexible leads as twisted pairs</td>
</tr>
<tr>
<td>MA 10 - Host</td>
<td>RS 232</td>
<td>10 m</td>
<td>absolutely required, flexible leads as twisted pairs</td>
</tr>
<tr>
<td>MA 10 - Host</td>
<td>TTY</td>
<td>1000 m</td>
<td>not required, loop resistance &lt; 100 Ω</td>
</tr>
<tr>
<td>Switched inputs</td>
<td></td>
<td></td>
<td>not necessary</td>
</tr>
<tr>
<td>Switched outputs</td>
<td></td>
<td></td>
<td>not necessary</td>
</tr>
</tbody>
</table>

6.4.4 Disassembling, Packing, Disposing

Repacking

For later reuse, the device is to be packed so that it is protected against shocks and dampness. Optimal protection is achieved when using the original packaging.

Note!

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

7.1 Steps Before the First Commissioning

- Before commissioning, familiarise yourself with the operation and configuration of the device(s)!
- Before switching on, recheck all connections and ensure that they have been properly made.

**DIP switch 1 'ParaDefault':**
- **ON** At Reset (cold start) the factory default parameter set is loaded
- **OFF** At Reset (cold start) the user-specific parameter set is loaded

**DIP switch 2 'autoConfig' and parallel connected jumper:**
- **ON** 'autoConfig' function activated
- **OFF** 'autoConfig' function deactivated

**Reset button:**
- Press < 4 s: 'warm start'
- Press > 4 s: 'cold start'

**DIP switch 0 ... F for setting the device address:**
- The switch positions 0 ... F correspond to the device address 0 ... 15 or 16 ... 31.

**Coding switch 0 ... F:**
- Jumper above: Data from Host
- Jumper below*: Data from BCL

**Jumper for setting the device address range:**
- **Right jumper** Adr. 0 ... 15
- **Left jumper** Adr. 16 ... 31

**Operating modes switch:**
- Switch setting 1: SERVICE*
- Switch setting 2: OPERATION

**Interface terminal:**
- RS 232 for commissioning
- Interface and service

*In service operation, the jumper must be in the "lower" position. Communication is otherwise not possible.

Figure 7.1: Control elements of the MA 10

**Setting the device address**

The device address is set in the MA 10 using a rotary code switch.

- Set the device address on the code switch to:
  - 0, if the combined BCL 80 / MA 10 unit will not be operated in a network,
  - 1 ... 31, if several BCL 80 / MA 10 units will be operated in a network. Each multiNet plus network device must have a different device address assigned to it. If the RS 485 module is plugged in and connected to the multiNet master, the BCL 80 / MA 10 automatically becomes a multiNet plus slave device.
Reset

Both devices can be reset using the reset button in the MA 10:

‘Warm start’

If the reset button in the MA 10 is pressed for a short time (0.2 to 4 sec.), a so-called ‘warm start’ will be carried out. This will reinitialise both devices and load the current parameter set into memory from the EEPROM.

‘Cold start’

If the reset button in the MA 10 is pressed until all four LEDs on the back of the device illuminate (longer than 4 seconds), a so-called ‘cold start’ will be carried out. This will reinitialise both devices and, depending on the DIP switch setting ‘ParaDefault’, will either load the customer-specific parameter set or the factory default parameter set into memory.

DIP switch setting 1 ‘ParaDefault’:

OFF  -  the customer-specific parameter set is loaded.
ON   -  the factory default parameter set is loaded.

Note!
The customer-specific parameter set is a backup copy of the current parameter set. It must be explicitly loaded using the command ‘PC01’ after saving the BCL setup and is only available in the MA 10 (not the BCL 80).
The customer-specific parameter set can then be loaded by executing a ‘cold-start’.
See Chapter 9.1.6: ‘Online commands for parameter set operations’

• Set DIP switch 1 corresponding to the parameter set that should be loaded after a ‘cold start’ has been initiated.

After resetting the device, all four LEDs on the back side of the MA 10 illuminate for approx. 0.5 second. During software initialisation, the green ‘RDY’ (ready) LED blinks.

If the green ‘RDY’ LED continuously illuminates, the initialisation is complete and the device is ready for operation.

Note!
If the BCL 80 is to be operated as a ‘stand alone’ device, a reset is only possible via software. There is a small green LED inside the BCL 80 at the lower edge of the reading window that displays the operation readiness. The LED can also be used to monitor the operating status of the BCL 80 in ‘stand alone’ operation. During a reset, the LED remains dark and continuously illuminates when the device is ready for operation.
7.2 Function Test

‘Power On’ test

After connecting the operating voltage, the devices carry out an automatic ‘Power On’ function test. All four LEDs on the back of the MA 10 illuminate for approx. 0.5 second. During software initialisation, the green ‘RDY’ (ready) LED blinks.

Once the green ‘RDY’ LED continuously illuminates, the device is ready for operation.

Interface

Proper functioning of the interface can be checked easiest in the service mode via the service interface with a suitable terminal program (BCL Config) and a PC (notebook, see Chapter 5 "Accessories / Order Designation").

‘Online’ commands

Using the ‘Online’ commands, the important device functions can be checked, e.g. proper functioning of the laser (see Chapter 9.2.2 and following).

Problems

If problems are encountered during commissioning of the device, check first under Chapter 8.3 "Error Handling".

Should the problem persist after checking all electrical connections and settings on the device and host, contact a Leuze service office (see last page of this operating manual).

7.3 Setting the Parameters

Three different parameter sets are maintained by the MA 10 when using the BCL 80 / MA 10 combined unit:

• the factory default parameter set
• the customer-specific parameter set
• the current parameter set

Before a parameter set is loaded into the BCL 80 processor memory, the validity of the parameter set is checked using checksums.

Factory default parameter set

This parameter set contains the default settings made ex works for all BCL 80 parameters. It is permanently stored in the ROM of the BCL 80. The parameter set with the default settings is loaded into the memory of the BCL 80

• the first time the device is commissioned after delivery
• after a ‘cold start’ reset (‘ParaDefault’ switch ON)
• if the check sums of the current and the customer-specific parameter set are invalid
\textbf{Customer-specific parameter set}

In this parameter set, customer-specific settings for all device parameters can be stored. There are two ways to store the parameter set in the EEPROM of the MA 10:

- by copying a valid parameter set, i.e. an already stored and tested 'current parameter set' from the EEPROM of the MA 10.
- by copying (parameter 'Download') a valid parameter set from the host computer (e.g. a PC or PLC).

The customer-specific parameter set is copied into the current parameter set

- after a 'cold start' reset ('ParaDefault' switch OFF)
- if the checksum of the current parameter set is invalid

\textbf{Current parameter set}

In this parameter set, the current settings for all device parameters are stored. If the BCL 80 is in 'stand alone' operation, the parameter set is stored in the EEPROM of the BCL 80. If an MA 10 is also used, the parameter set is stored in EEPROM of the MA 10 and a copy thereof in the EEPROM of the BCL 80 The current parameter set can be stored in three ways:

- by changing and storing the current parameter set using the integrated SETUP program of the BCL 80
- by copying (parameter 'Download') a valid parameter set from the host computer (e.g. a PC or PLC).
- by means of an OFF line setup with the PC setup program BCL Config

The current parameter set is loaded into the memory of the BCL 80

- each time the supply voltage is connected
- after a 'warm start' reset, as well as a software reset

Figure 7.2: Block diagram storage concept for parameter sets
7.3.1 Service Operating Mode

Setting the required parameters is carried out easiest in the 'service' operating mode.

Terminal Interface

By switching the operating mode switch from operation (setting 2) to service (setting 1), the connection to the host computer is broken and the RS 232 service interface is activated. The MA 10 offers a service interface for commissioning the read station in a network. The interface consists of a 9 pin SubD connector (male) and can be reached by removing the housing cover on the MA 10.

Connection

A PC or terminal can be connected to the MA 10 via the RS 232/V.24 serial interface and used to set the parameters of the BCL 80. The connection is made using a crossed RS 232 connection cable that establishes the RxD, TxD and GND connections. The hardware handshake at the service interface is via RTS. A CTS handshake is not supported.

Note!

By storing all current and customer-specific values in the connector unit MA 10, a connected BCL 80 can be exchanged without difficulty since all parameters are maintained.

Communication to the host computer via the host interface is no longer possible.

Note!

Switching to service mode results in a pre-set transfer protocol with the following parameters:

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

The 9 pin SubD RS 232 Terminal connector (male) has the following pin assignments:

- Pin 1: NC, not used
- Pin 2: RXD, receive signal of the RS 232 service interface
- Pin 3: TXD, transmit signal of the RS 232 service interface
- Pin 4: NC, not used
- Pin 5: GND, signal reference potential 0 V DC
- Pin 6: NC, not used
- Pin 7: RXD_Host, receive signal of the host interface
- Pin 8: NC, not used
- Pin 9: reserved, for service purposes only

Using a PC and a terminal program, the setup program of the BCL 80 can be called, online commands sent and data received via this interface terminal.

Note!

In setting 2 ('operation') of the operating mode switch, the terminal connector can be used as a data monitor. In this case, data sent from the BCL 80 (jumper in Figure 7.1 in upper position) or data received from host (jumper in Figure 7.1 in lower position) can be logged. The data protocol is set by the host interface in the latter case.

Configuration software

Leuze offers a convenient configuration program ‘BCL Config’ for setting the required device parameters (see Chapter 5 "Accessories / Order Designation").
7.3.2 Setting Parameters ‘Offline’ (Loading)

Setting parameters
The parameters are programmed on a PC without direct connection to the BCL 80 (‘Offline’ programming) and saved in a file (parameter file).

Downloading parameters
After successful programming, the parameters are loaded into the BCL 80 (parameter ‘Download’).

This causes the required parameters to be transferred from the host computer, or a computer connected to the interface terminal of the MA 10, to the BCL 80 or MA 10, respectively. If the same parameters are to be loaded into several devices, parameter download is the most efficient method.

Leuze electronic offers the configuration and terminal program ‘BCL-Config’ with which parameter sets can be easily loaded, changed and stored.

See Chapter 5 “Accessories / Order Designation”.

Detailed information concerning customer-specific applications can be requested from Leuze sales and service offices.

A description of the parameters that can be set using the configuration program can be found in Chapter 9.

7.3.3 Setting Parameters ‘Online’

The other possibility for setting the required operating parameters of the BCL 80 is through ‘Online’ programming via the integrated, two-language setup program (English, German) in the BCL 80.

Setup program
Using a PC (notebook) connected to the interface terminal, the menu-driven setup program can be called while in the service operating mode.

‘Online’ commands can then be directly entered that query data or carry out a software reset.

Communication is carried out using a terminal program or more conveniently using the Leuze configuration program.

A detailed description of the setup program along with all parameters which can be set, as well as the most important ‘Online’ commands can be found in Chapter 9.
7.3.4 Setting the Bar Code Parameters Using 'autoConfig'

The parameters of the bar codes which are to be read can be easily set using the function 'autoConfig'. In order to check the programmed bar codes, the BCL 80 should be connected to a data terminal. The detection of the desired bar code(s) can be checked on the terminal.

**Manual or 'Online' activation**

- The 'autoConfig' function is activated on the MA 10 using DIP switch 2 (see Fig. 7.1 for the location of the DIP switch).
- The 'autoConfig' function can be activated and deactivated via the serial interface (host or service interface) using the 'Online' commands 'CA+' (activate) and 'CA-' (deactivate).

Details of 'Online' commands can be found in Chapter 9.

If 'autoConfig' is active, the ERR LED and RDY LED on the MA 10 alternately blink.

**Setting parameters**

After activating the 'autoConfig' function, the BCL 80 can read from one to eight example labels containing the bar codes which are to be read. The BCL 80 decodes the labels and displays, via the interface, the code type, the number of decoded characters and the character itself.

**Number of labels to be decoded**

While 'autoConfig' is active, have the BCL 80 read as many labels in row as it will later during a reading cycle when in normal operation. The number of labels can be set from 'Set Code' in the submenu 'Decoding' of the setup program. The number of labels is limited to 8 when using the 'autoConfig' function.

**Code type and No. of characters of the label to be decoded**

The BCL 80 evaluates the number of labels, and at the same time, the code type and number of characters. This corresponds to the programming of the code types in the submenu 'Decoding / Select Code Type' of the setup program.

**Normal state of the MA 10 switched input SE1**

The state (high or low) which is present at the switched input SE1 while the 'autoConfig' function is active is taken as the new normal state for this switched input. This corresponds to the function 'Inversion' in the submenu 'Switched Inputs and Outputs / Switched Input Decoding (S1)' of the setup program.

**Store parameters**

When the 'autoConfig' function is deactivated, the programmed parameters are stored and copied into the current parameter set.

**Before** deactivating the 'autoConfig' program, please remove any labels from the scanning area of the BCL 80 since the new code parameters otherwise will not be stored properly.
8 Operation

8.1 Display Elements

On the back side of the MA 10, there are 4 LEDs which display the momentary operating status.

<table>
<thead>
<tr>
<th>LED</th>
<th>Colour</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDY</td>
<td>green</td>
<td>Ready</td>
</tr>
<tr>
<td>ERR</td>
<td>yellow</td>
<td>Error</td>
</tr>
<tr>
<td>ACT</td>
<td>red</td>
<td>Scanner active</td>
</tr>
<tr>
<td>DEC</td>
<td>green</td>
<td>Decoding successful</td>
</tr>
</tbody>
</table>

**Status conditions of the LEDs**

- **All four LEDs illuminate**
  - for approx. 0.5 second after connecting the operating voltage.
  - after accepting a ‘cold start’ reset (> 4 s) up until the reset button is released.

- **All four LEDs blink**
  - if the connection between the MA 10 and BCL 80 is interrupted.

- **RDY blinks**
  - during the ‘Power On’ function test.

- **RDY illuminates**
  - when the devices are ready.

- **ERR illuminates**
  - if a hardware error is encountered after the initialisation phase or in the case of a serious software error.

- **RDY and ERR blink simultaneously**
  - when the setup program is activated. Notice: No read operations can be carried out.

- **RDY and ERR blink alternately**
  - when the ‘autoConfig’ function is activated by setting the corresponding DIP switch.
  - when a reference code is defined (Teach-In).

- **ACT illuminates**
  - while the scanner is active, i.e. when the laser is in operation.

- **ACT blinks**
  - if a warning is output during the ‘autoControl’ function.

- **DEC illuminates**
  - for approx. 0.5 second after successfully completing a decoding process.
8.2 Important Functions During Operation

The BCL 80 has a function which automatically monitors the reading quality as well as the quality of the bar code label.

`autoControl` function

When the `autoControl` function is active, the BCL 80 constantly compares the total number of scans with the number of decoded scans. If the number of decodable scans falls below a user defined percent of the total scans, the MA 10 outputs a warning:

- the ACT LED blinks.
- a warning symbol can be output to the host.
- a switched output can be controlled.

A detailed description of all adjustable parameters can be found in Chapter 9.

8.3 Error Handling

Errors are visibly indicated on the MA 10 via the ERR LED (see Chapter 7.2).

Further error, warning and status messages are transferred via the host interface or the terminal interface.

Types of errors

Errors are divided up into the following types.

- Warnings
- Serious errors

Warnings

Warnings indicate temporary operating faults which do not effect the proper functioning of the device.

Serious errors

Serious errors impair the proper functioning of the device. The device must be reinitialised.

Troubleshooting

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

After a serious error has occurred, you should reboot the system. The BCL will be reinitialised and should then function properly again. If a hardware problem is present, the BCL 80 will not reinitialise.

If you are still unable to eliminate faults and errors, contact your local Leuze service office (addresses can be found on the back page of this operating manual).
9 Configuration

9.1 Overview of Commands and Parameters

‘Online’ commands can be used to send commands directly to the device for diagnosis and configuration. In order to use this feature, the BCL 80 /MA 10 must be connected to a host or service computer via the serial interface. The commands can be sent either via the host or the service interface.

Be sure that both data devices are set to the same protocol:
• service interface: 9600 Baud, 8-None-1
• host interface: protocol configured by user

‘Online’ commands

With the commands, you can
• call the setup program.
• carry out a software reset in order to reinitialise the device.
• call up error messages.
• call up statistical device information.
• internally copy and test parameter sets.
• activate and test system components.

Syntax

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

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

Example:
Command ‘CA’: autoConfig function
Parameter ‘+’: Active
Transmitted is: ‘CA+’

Notation

Commands, command parameters and returned data are enclosed between single quotation marks ‘’. Most online commands are acknowledged by the BCL 80 and any requested data returned. With commands that are not acknowledged, the results of carrying out the command can be observed or checked directly at the device.
9.1.1 General 'Online' Commands

**Software version number**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Parameter</th>
<th>Acknowledgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>'V'</td>
<td>Requests information about the software version</td>
<td>none</td>
<td>BCL 80’ V 50.13’ 22.06.97’ MA 10’ (only when a connector unit V 01.07’ MA 10 is installed)</td>
</tr>
</tbody>
</table>

The device type appears in the first line followed by the software version number and date. The device type on the connector unit appears on the fourth line followed by the version number (the dates may be different than those shown here).

**Note!**
Using this command, you can check whether the connected host or service computer is properly connected and configured. If an acknowledgement is not received, then the interface connections, protocol and service switch must be checked.

**Software reset**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Parameter</th>
<th>Acknowledgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>'H'</td>
<td>Carries out a software reset. The device is restarted and reinitialised, leaving it in the same state as when the supply voltage is switched on.</td>
<td>none</td>
<td>‘S’ (Start character)</td>
</tr>
</tbody>
</table>

**Call the setup program**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Parameter</th>
<th>Acknowledgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>'E'</td>
<td>Calls the setup program. The main menu of the setup program is displayed.</td>
<td>none</td>
<td>'Load Parameter Set' Setup Enter:'</td>
</tr>
</tbody>
</table>

**Note!**
Read/write operations cannot be carried out in the service mode. The setup program must always be ended (see Chapter 9.2.1), in order to return to normal operation.
### 'autoConfig'

<table>
<thead>
<tr>
<th>Command</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Activates or deactivates the 'autoConfig' function. Certain label reading parameters are programmed automatically in the setup by the labels which are read while the 'autoConfig' function is active (see also Chapter 7.3.4).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>+</code></td>
<td>activates 'autoConfig'</td>
</tr>
<tr>
<td><code>/</code></td>
<td>rejects the last code read</td>
</tr>
<tr>
<td><code>-</code></td>
<td>deactivates 'autoConfig' and stores the decoded data in the current parameter set.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acknowledgement</th>
<th>xx yy zzzzzz (only with <code>CA+</code>)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>xx Code type of the read code</td>
</tr>
<tr>
<td></td>
<td>01 = 2/5 Interleaved</td>
</tr>
<tr>
<td></td>
<td>02 = Code 39</td>
</tr>
<tr>
<td></td>
<td>03 = 2/5 IATA</td>
</tr>
<tr>
<td></td>
<td>04 = 2/5 INDUSTRIAL</td>
</tr>
<tr>
<td></td>
<td>06 = UPC (A,E)</td>
</tr>
<tr>
<td></td>
<td>07 = EAN</td>
</tr>
<tr>
<td></td>
<td>08 = Code 128 / EAN 128</td>
</tr>
<tr>
<td></td>
<td>09 = Pharmacode</td>
</tr>
<tr>
<td></td>
<td>10 = Add-On (EAN / UPC)</td>
</tr>
<tr>
<td></td>
<td>11 = CODABAR</td>
</tr>
<tr>
<td>yy</td>
<td>No. of digits of the read code</td>
</tr>
<tr>
<td>zzzzzz</td>
<td>Contents of the decoded label. The ↑ appears if the label was not correctly read.</td>
</tr>
</tbody>
</table>

### Reference code

<table>
<thead>
<tr>
<th>Command</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>This command can be used to define a new reference code in the BCL 80 by means of direct entry via the serial interface. The data are saved in the parameter set according to their input under reference code 1 or 2 and stored in the working buffer for further processing. See Chapter 9.2.7 for reference codes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>RSyxxxxxxxx</th>
</tr>
</thead>
<tbody>
<tr>
<td>y, x and z are place holders (variables) for the actual input.</td>
<td></td>
</tr>
<tr>
<td><code>y</code></td>
<td>def. Reference code No. = '1' (Code 1) '2' (Code 2)</td>
</tr>
<tr>
<td><code>xx</code></td>
<td>def. Code type</td>
</tr>
<tr>
<td>('01', '02', '03', '04', '06', '07', '08', '09', '10', '11', as above)</td>
<td></td>
</tr>
<tr>
<td><code>z</code></td>
<td>def. Code information (1 … 31 characters)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acknowledgement</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Example</strong></td>
<td>input = &quot;RS10678654331&quot; [Code 1 (1), UPC (06), 78654331]</td>
</tr>
</tbody>
</table>
### Teach-In

<table>
<thead>
<tr>
<th>Command</th>
<th>RT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>This command enables a reference code to be defined quickly by reading an example label. See Chapter 9.2.7 for reference codes.</td>
</tr>
</tbody>
</table>
| Parameter | 1' defines reference code 1  
2' defines reference code 2  
'-' Exit the Teach-In process |
| Acknowledgement | zzzzzz Contents of the decoded label |

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

After each reading via a 'RT1' or 'RT2' command, explicitly switch off the function again using the 'RT-' command since failure to do so will interfere with other commands as well as prevent execution of a new 'RT1' or 'RT2' command.

### Code recognition

<table>
<thead>
<tr>
<th>Command</th>
<th>CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Reads the code type and contents of an unknown label <strong>without</strong> storing it in Setup.</td>
</tr>
<tr>
<td>Parameter</td>
<td>none</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>xx yy zzzzzz</td>
</tr>
<tr>
<td>Description</td>
<td>The acknowledgement is the same as that of the 'autoConfig' function.</td>
</tr>
</tbody>
</table>
9.1.2 ‘Online’ Commands for System Control

**Activate sensor input 1**

<table>
<thead>
<tr>
<th>Command</th>
<th>'+'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Activates decoding (sensor input 1). A signal can be simulated on sensor input 1 with this command.</td>
</tr>
<tr>
<td>Parameter</td>
<td>none</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>none</td>
</tr>
</tbody>
</table>

**Deactivate sensor input 1**

<table>
<thead>
<tr>
<th>Command</th>
<th>'-'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Deactivates decoding (sensor input 1). A signal can be simulated on sensor input 1 with this command.</td>
</tr>
<tr>
<td>Parameter</td>
<td>none</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>none</td>
</tr>
</tbody>
</table>

**Activate sensor input 2**

<table>
<thead>
<tr>
<th>Command</th>
<th>','</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Activates the definition of reference code 1 (sensor input 2). A signal can be simulated on sensor input 2 with this command.</td>
</tr>
<tr>
<td>Parameter</td>
<td>none</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>none</td>
</tr>
</tbody>
</table>

**Deactivate sensor input 2**

<table>
<thead>
<tr>
<th>Command</th>
<th>'.'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Deactivates the definition of reference code 1 (sensor input 2). A signal can be simulated on sensor input 2 with this command.</td>
</tr>
<tr>
<td>Parameter</td>
<td>none</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>none</td>
</tr>
</tbody>
</table>
### 9.1.3 'Online' Commands for System Testing

#### Diagnosis laser

<table>
<thead>
<tr>
<th>Command</th>
<th>'DL'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Controls and tests the laser diode in the device.</td>
</tr>
<tr>
<td>Parameter</td>
<td>'+' switches on the laser diode.</td>
</tr>
<tr>
<td></td>
<td>'-' switches off the laser diode.</td>
</tr>
<tr>
<td></td>
<td>'C' outputs the laser current.</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>'DS33': invalid parameter for the command 'DL'</td>
</tr>
<tr>
<td></td>
<td>'DS34': invalid command length</td>
</tr>
<tr>
<td></td>
<td>'DLCyyyy'</td>
</tr>
<tr>
<td>Description</td>
<td>yyy is the laser current in mA</td>
</tr>
</tbody>
</table>

#### Diagnosis motor

<table>
<thead>
<tr>
<th>Command</th>
<th>'DMS'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Returns the rotary frequency of the polygon mirror wheel drive motor.</td>
</tr>
<tr>
<td>Parameter</td>
<td>none</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>'DMSxxxxx'</td>
</tr>
<tr>
<td>Description</td>
<td>xxxxx is the current rotary frequency of the motor in revolutions/minute.</td>
</tr>
</tbody>
</table>

#### Supply voltage

<table>
<thead>
<tr>
<th>Command</th>
<th>'DUV'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Returns the supply voltage of the BCL 80.</td>
</tr>
<tr>
<td>Parameter</td>
<td>none</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>'DUVxx.x'</td>
</tr>
<tr>
<td>Description</td>
<td>xx.x is the current supply voltage in V.</td>
</tr>
</tbody>
</table>
9.1.4 ‘Online’ Commands for Querying Statistical Data

**Query device statistics**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>'SR'</td>
<td>Returns the current contents of the given field of the statistical device data memory.</td>
</tr>
</tbody>
</table>

**Parameter**

<table>
<thead>
<tr>
<th>'00' to '19'</th>
</tr>
</thead>
</table>

**Acknowledgement**

| ST00XXXXX | XXXXX is the length of time in seconds that the laser diode has been switched on since the last initialisation |
| ST01XXXXX | XXXXX is the length of time in minutes that the polygon wheel motor has been switched on since the last initialisation |
| ST05XXXXX | XXXXX the number of correctly received commands via the interface |
| ST06XXXXX | XXXXX the number of incorrectly received commands via the interface |
| ST07XXXXX | XXXXX the number of sent commands via the interface that have received positive acknowledgement |
| ST08XXXXX | XXXXX the number of sent commands via the interface that have received negative acknowledgement |
| ST09XXXXX | XXXXX the number of correctly received commands via the host |
| ST10XXXXX | XXXXX the number of incorrectly received commands via the host |
| ST11XXXXX | XXXXX the number of sent commands via the host that have received positive acknowledgement |
| ST12XXXXX | XXXXX the number of sent commands via the host that have received negative acknowledgement |
| ST13XXXXX | XXXXX the number of recorded read processes since the last read enable |
| ST14XXXXX | XXXXX the number of read labels since the last reset |
| ST15XXXXX | XXXXX the number of read labels since the last read enable |
| ST16XXXXX | XXXXX the number of read labels from the last scan |
| ST17XXXXX | XXXXX is the number of read enables since the last reset |
| ST18XXXXX | XXXXX the number of correctly decoded labels since the last reset |
| ST19XXXXX | XXXXX the number of incorrectly decoded labels since the last reset |
### 'Online' Commands for Parameter Set Operations

#### Test parameter set

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Parameter</th>
<th>Acknowledgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA</td>
<td>Tests the given parameter set for validity using a checksum.</td>
<td>0: current parameter set. 1: customer-specific parameter set (MA 10 only).</td>
<td>all possible acknowledgements are listed below.</td>
</tr>
</tbody>
</table>

#### Copy parameter set

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Parameter</th>
<th>Example</th>
</tr>
</thead>
</table>

#### Possible acknowledgements

<table>
<thead>
<tr>
<th>Acknowledgement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS0</td>
<td>valid parameter set</td>
</tr>
<tr>
<td>PS1</td>
<td>invalid message</td>
</tr>
<tr>
<td>PS2</td>
<td>invalid message length</td>
</tr>
<tr>
<td>PS3</td>
<td>invalid type of BCC check sum</td>
</tr>
<tr>
<td>PS4</td>
<td>invalid BCC check sum</td>
</tr>
<tr>
<td>PS5</td>
<td>invalid length of data</td>
</tr>
<tr>
<td>PS6</td>
<td>invalid message parameters</td>
</tr>
<tr>
<td>PS7</td>
<td>invalid start address in parameter set</td>
</tr>
<tr>
<td>PS8</td>
<td>invalid CRC check sum of parameter set</td>
</tr>
<tr>
<td>PS9</td>
<td>invalid type of parameter set</td>
</tr>
</tbody>
</table>

**Note!**
A valid parameter set operation must be acknowledged with 'PS0'. Should an error occur, the command should be repeated. Repeated error acknowledgements indicate an error in the parameter set. If in doubt, contact your Leuze sales or service office (see back page for addresses).
9.1.6 ‘Online’ Commands for BCL 80 with Oscillating Mirror

Attention!
The ‘PT’ command lets you change the parameter set in a way that may render it useless. Make sure that you only use parameter numbers and ranges that have been described here.

Transmit parameters

<table>
<thead>
<tr>
<th>Command</th>
<th>PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>This command permits the programming of arbitrary reading areas. They can be selected during operation. The scan area can be adapted to any application.</td>
</tr>
<tr>
<td>Parameter</td>
<td>PT000xxxxy</td>
</tr>
<tr>
<td>x and y are variables that are to be replaced with the actual input.</td>
<td></td>
</tr>
<tr>
<td>‘xxx’ defines the parameter number (384, 386, 387, 388, 389)</td>
<td></td>
</tr>
<tr>
<td>‘yy’ defines the range for the parameter (in hexadecimal)</td>
<td></td>
</tr>
<tr>
<td>384 = mode of mirror oscillation (00h … 02h)</td>
<td></td>
</tr>
<tr>
<td>00 (mode 0) when activated the oscillating mirror moves from start to stop position</td>
<td></td>
</tr>
<tr>
<td>01 (mode 1) when activated the oscillating mirror moves from start position and back</td>
<td></td>
</tr>
<tr>
<td>02 (mode 2) when activated the oscillating mirror moves permanently between start and stop position</td>
<td></td>
</tr>
<tr>
<td>386 = time interval for forward movement (02h … 5Fh)</td>
<td></td>
</tr>
<tr>
<td>selectable in 50 ms steps, e.g.</td>
<td></td>
</tr>
<tr>
<td>03 corresponds to a forward movement time of 150 ms.</td>
<td></td>
</tr>
<tr>
<td>02 is the smallest value = high osc. frequency (5 Hz)</td>
<td></td>
</tr>
<tr>
<td>5F is the highest value = low osc. frequency (0.1 Hz)</td>
<td></td>
</tr>
<tr>
<td>387 = time interval for reverse movement (02h … 5Fh), as 386.</td>
<td></td>
</tr>
<tr>
<td>388 = start position of the oscillation movement (00h … 5Fh)</td>
<td></td>
</tr>
<tr>
<td>00 corresponds to +15° (see Chapter 4.3.3 “Reading Fields”)</td>
<td></td>
</tr>
<tr>
<td>389 = stop position of the oscillation movement (00h … 5Fh)</td>
<td></td>
</tr>
<tr>
<td>5F corresponds to -20° (see Chapter 4.3.3 “Reading Fields”)</td>
<td></td>
</tr>
</tbody>
</table>

Acknowledgement no

Example

- Input = ‘PT00038402’ (sets mirror into mode 2)
- Input = ‘PT0003860A’ (forward movement time 0Ah = 10 x 50 ms)
- Input = ‘PT00038704’ (reverse movement time 04h = 4 x 50 ms)
- Input = ‘PT00038804’ (start position 04h)
- Input = ‘PT00038953’ (stop position 53h)

Note!
To change the default values, you may transmit one or more parameters in a string online to the scanner. A subsequent soft reset (‘H’ command) activates the new settings.
### Read parameters

<table>
<thead>
<tr>
<th>Command</th>
<th>'PR'</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>The command shows the actual content of the given parameter number (see 'PT' command).</td>
</tr>
<tr>
<td><strong>Parameter</strong></td>
<td>PR00xxxyyy</td>
</tr>
<tr>
<td>x and y are variables that are to be replaced with the actual input. 'xxx' defines the number of the parameter to be read (384, 386, 387, 388, 389; see 'PT' command)</td>
<td></td>
</tr>
<tr>
<td>'yyy' defines the number of bytes to be displayed; this should always be 001, such that only the desired value is displayed</td>
<td></td>
</tr>
<tr>
<td><strong>Acknowledgement</strong></td>
<td>'xx' = current value from the parameter's range of values (e.g. 03h)</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>Input = 'PR00387001' returns the value for the current setting of the reverse movement time (e.g. '0A')</td>
</tr>
</tbody>
</table>
9.2 Setup Program

9.2.1 Overview of the Parameter Structure

The setup program is menu driven and largely self-explanatory. Figure 9.1 displays an overview of the menu structure.

---

**Language**
- English
- German

**Decode Setup**
- 1: Decoding
- 2: Host Interface
- 3: Digital IN/OUT
- 4: General
- 5: Additional Functions

**Decode**
- 1: Select Codetype
- 2: Code Configuration
- 3: Activation
- 4: Deactivation
- 5: Output Format

**Host Interface**
- 1: General Settings
- 2: Framing Protocol
- 3: 3964 / RK512

**Digital IN/OUT**
- 1: Sensor Decode (S1)
- 2: Sensor Teach-In (S2)
- 3: Switch 1
- 4: Switch 2

**General Settings**
- 1: Decoder Address [00H]
- 2: Startcode Character ['S']
- 3: Error Character ['&']
- 4: Warning Character ['@']

**Additional Functions**
- 1: Reference Code
- 2: AutoControl

---

**Command 'e'**  (run setup)

**Command 'x'**  (exit setup)

---

Figure 9.1: Overview of the parameter structure
Note!
The text of the setup program can be set to either German or English. The language is set to English in the factory default parameter set which is loaded when the device is commissioned.

Only the English version of the setup program is described below.

First change the language of the setup program to English as described below.

Conventions
• The desired menu point can be reached with ‘Number’ + ‘Enter’.
• ‘Esc’ takes you back one level.
• The ‘space key’ moves you to the next menu on the same level.
• Entries must be confirmed with ‘Enter’. Character values are entered as described below:
  • decimal: xx where xx is the decimal code of the ASCII character
  • hexadecimal: xxh or xxH where xx is the hexadecimal code of the ASCII character
  • ‘Character’ input: ‘xx’ where xx is the character itself

A complete ASCII table can be found in the appendix (Chapter 11.1).

• Activated options are indicated by a ‘*’ in the menus.
• The currently set character value appears in square brackets ‘[]’.
• The default values and factory settings are marked [ITALIC] or listed in a default table and marked by ‘[ ]’. These values are valid when the device is shipped or after a ‘cold-start’ (RESET) to the factory settings.
• ‘X’ exits the setup program independent of which level you are in. A menu will appear the following options:
  • Return: returns to the setup program
  • Quit: exits the setup program without saving any changes made to the parameter set
  • Save and Quit: saves the new settings in the current parameter set and exits the setup program.
**Calling the setup program**

- Call the setup program using the 'Online' command 'E'.

The main menu appears:

'Load Parameter Set'
  - Setup

'1: Language'
'2: Decode Setup'

'Input:'

**Select language**

- Enter '1' + 'Enter' to reach the menu 'Language'.
  
  The current language is indicated by a ‘*’.
- Enter '2' + 'Enter' to change the setup language to e.g. 'German'.
  
  The setup program returns to the main menu.

**Decode Setup**

- Enter '2' + 'Enter' in the main menu to reach the 'Reader Setup' menu.

  The 'Reader Setup' menu appears:

  - Decode Setup

  '1: Decode'
  '2: Host Interface'
  '3: Digital IN/OUT'
  '4: General'
  '5: Additional Functions'

  'Enter:'

  The individual menu points of the 'Decode Setup' are described below.
9.2.2  Setting the Decoding Parameters

The following submenus can be selected under the 'Decode' menu of the Setup program:

- Select code type
- Code configuration
- Type of scanner activation
- Type of scanner deactivation
- Data output format

**Select code type**

You can select one or several of the following codes:

<table>
<thead>
<tr>
<th>Code type No.</th>
<th>Code</th>
<th>Digits</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&quot;2/5 Interleaved&quot;</td>
<td>2 … 62</td>
<td>[10]</td>
</tr>
<tr>
<td>2</td>
<td>Code 39</td>
<td>1 … 63</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>UPC (A, E)</td>
<td>8 or 12</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>EAN</td>
<td>8 or 138</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Code 128, EAN 12</td>
<td>1 … 63</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pharmacode</td>
<td>1 … 63</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Add-on for EAN</td>
<td>2 or 5</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Codabar</td>
<td>1 … 63</td>
<td></td>
</tr>
</tbody>
</table>

- Selected codes are indicated by a ‘*’. The set number of digits of the code is given in square brackets [ ].
- Only labels which have the same code type and number of characters are recognised.
- Several numbers of characters and areas can be given.
  - Example: number of characters [10-14] = 10 to 14 characters
  - number of characters [10, 20] = 10 and 20 characters
- Always activate only those code types and number of characters that will actually be read.
- If you do not exactly know the code type and/or the number of characters, use the 'CC' (code detection) or 'CA' (autoConfig) function (see Chapter 9.1.1 "General 'Online' Commands").
- When using the 'Code 128, EAN 128', the number of read characters can deviate from the set number of characters in certain situations. Use the 'CA' or 'CC' command to avoid mistakes.
- A code type can be deselected by setting its number of characters to the value '0'. 
Configuration

**Code configuration**

The following settings can be made for the selected codes in the menu 'Code Configuration':

- The number of labels which are to be read during a read process.
- The number of equal scans for a read process, i.e. the number of times a label must be scanned and return the same code for it to be considered correctly read.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of labels</td>
<td>1 … 64</td>
<td>[1]</td>
</tr>
<tr>
<td>Equal scans</td>
<td>1 … 255</td>
<td>[2]</td>
</tr>
</tbody>
</table>

**Activation**

You can set continuous read processes in the menu ‘Activation’ without a hardware sensor:

- Start a new read process after an adjustable delay time following the previous read process.
- Start a new read process immediately after the previous read process.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay Time</td>
<td>0 … 30 in 100 ms steps</td>
<td>[0]</td>
</tr>
<tr>
<td>Continuous</td>
<td>Yes, No</td>
<td>[No]</td>
</tr>
</tbody>
</table>

If 'Yes' is set under 'Continuous', the time set under 'Delay Time' will have no influence.

**Deactivation**

In the menu ‘Deactivation’, you can specify when a read process should be cancelled after failing to read a label:

- Cancel after a specified time from the beginning of the read process (Gate Time).
- Cancel after a specified number of unsuccessful scans.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Gate Time</td>
<td>0 … 30 in 100 ms steps</td>
<td>[0]</td>
</tr>
<tr>
<td>Scans without Data</td>
<td>0 … 255</td>
<td>[0]</td>
</tr>
</tbody>
</table>

If a value greater than 0 is given for both parameters, the read is cancelled by the first condition which is exceeded.

**Output formatting**

The menu 'Output Format' is more extensive and is therefore discussed later in its own section (see Chapter 9.2.3 "Setting the Output Format Parameters").
9.2.3 Setting the Output Format Parameters

In the menu ‘Output Format’, the setup program determines how the results of a decoding process are formatted and sent to the host.

The basic structure of the data output is shown in Fig. 9.2.

Each label in a separate message
(String)

Message 1:
  Title Header 1
  Title Header 2

Message 2: Label 1
  Header Label 1
  Information Label 1
  Footer Label 1
  Separator Char. Label 1

Message n+1: Label n
  Header Label n
  Information Label n
  Footer Label n
  Separator Char. Label n

All labels in a single message
(String)

Message 1
  Title Header 1
  Title Header 2

Label 1
  Header Label 1
  Information Label 1
  Footer Label 1
  Separator Char. Label 1

Label n
  Header Label n
  Information Label n
  Footer Label n
  Separator Char. Label n

Fig. 9.2: Structure of the data output

Note!

The length of one message is limited to 255 characters!

You can select the following submenus in the menu ‘Output Format’:

- Formatter modes
- Title headers
- Label headers
- Label footers
- Output constants
**Formatter modes output formatting**

In the menu 'Formatter Modes', you can specify how the output of the decoded bar code data should be formatted:

- Select whether the data of all labels should be sent together in a single message or in individual messages.
- Select whether the data of each decoded label should be separated by a separator character.
- Select whether the data of the decoded label should be output to an even address (i.e. with an even number of bytes).
- Select whether the data of the decoded label should have the same length independent of the number of digits.

**Parameter** | **Valid range of values** | **Default**
--- | --- | ---
All labels in a single message | Yes, No | [No]
Separate labels with separation character | Yes, No | [No]
Label output on even address | Yes, No | [No]
Equal length of labels | Yes, No | [No]

**Note!**

If all labels are to have the same length, then the length of all labels should agree with the length of the longest label. The unused digits of the smaller labels are then filled with separator characters.

**Title Headers**

Two title header texts can be specified in the menu 'Title Header':

- Header 1
- Header 2

**Parameter** | **Valid range of values**
--- | ---
Header 1 | Nothing, Title Header char 1, No. of Valid Labels, No. of All Scans of the gate time
Header 2 | Nothing, Title Header char 1, No. of Valid Labels, No. of All Scans of the gate time, Other entries on request
Leuze electronic

Configuration

**Label Headers**

Three headers can be specified in the menu 'Label Header':

- Label Header 1
- Label Header 2
- Label Header 3

**Note!**

The Label Header Text Char 1 can be defined in the menu 'Output Constants'. The scan quality of the label is calculated from the number of valid decodings divided by the number of possible decodings in % (also valid for Label Footnote).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label Header 1</td>
<td><strong>Nothing</strong></td>
</tr>
<tr>
<td></td>
<td>Tag Header Char 1</td>
</tr>
<tr>
<td></td>
<td>No. of Label</td>
</tr>
<tr>
<td></td>
<td>Codetype</td>
</tr>
<tr>
<td></td>
<td>Digits</td>
</tr>
<tr>
<td></td>
<td>Label Quality</td>
</tr>
<tr>
<td>Label Header 2</td>
<td><strong>Nothing</strong></td>
</tr>
<tr>
<td></td>
<td>Tag Header Char 1</td>
</tr>
<tr>
<td></td>
<td>No. of Label</td>
</tr>
<tr>
<td></td>
<td>Codetype</td>
</tr>
<tr>
<td></td>
<td>Digits</td>
</tr>
<tr>
<td></td>
<td>Label Quality</td>
</tr>
<tr>
<td>Label Header 3</td>
<td><strong>Nothing</strong></td>
</tr>
<tr>
<td></td>
<td>Tag Header Char 1</td>
</tr>
<tr>
<td></td>
<td>No. of Label</td>
</tr>
<tr>
<td></td>
<td>Codetype</td>
</tr>
<tr>
<td></td>
<td>Digits</td>
</tr>
<tr>
<td></td>
<td>Label Quality</td>
</tr>
<tr>
<td></td>
<td>Other entries on request</td>
</tr>
</tbody>
</table>

**Label Footer**

Three footer texts can be specified in the menu 'Label Footer':

- Label Footer 1
- Label Footer 2
- Label Footer 3
### Configuration

**Parameter** | **Valid range of values**
--- | ---
Label Footer 1 | *Nothing*
Tag Header Char 1  
No. of Label  
Codetype  
Digits  
Label Quality

Label Footer 2 | *Nothing*
Tag Header Char 1  
No. of Label  
Codetype  
Digits  
Label Quality

Label Footer 3 | *Nothing*
Tag Header Char 1  
No. of Label  
Codetype  
Digits  
Label Quality  
Other entries on request

### Output constants

Characters and texts can be entered from the menu ‘Output Constants’ for the following format characters:

- Title header character
- Label header text character 1
- Label separation character
- Good read character
- No read string

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefix Character</td>
<td>ASCII character</td>
<td>[00H]</td>
</tr>
<tr>
<td>Label Header Text Character 1</td>
<td>ASCII character</td>
<td>[00H]</td>
</tr>
<tr>
<td>Label Separator Character</td>
<td>ASCII character</td>
<td>[20H]</td>
</tr>
<tr>
<td>Good Read Char</td>
<td>ASCII character</td>
<td>[00H]</td>
</tr>
<tr>
<td>Text for unsuccessful scan</td>
<td>text string with up to 20 characters</td>
<td>[18H]</td>
</tr>
</tbody>
</table>

---

Note!

The characters can be entered as decimal code, hexadecimal code or as a character. Characters set to '00H' are not output!
### 9.2.4 Setting the Host Interface Parameters

The following submenus can be selected in the menu 'Host Interface' of the Setup program:

- General Settings
- Framing Protocol
- 3964 / RK 512 Protocol

#### General Settings

In the menu 'General Settings', the parameters are entered for the serial transfer to the host:

- Data format
- Baud rate
- Protocol
- Handshake Mode

#### Valid range of values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Format</td>
<td></td>
</tr>
<tr>
<td>7 Bit, no parity</td>
<td>2 stop bits</td>
</tr>
<tr>
<td>7 Bit, even parity</td>
<td>1 stop bit</td>
</tr>
<tr>
<td>7 Bit, odd parity</td>
<td>2 stop bits</td>
</tr>
<tr>
<td>7 Bit, odd parity</td>
<td>1 stop bit</td>
</tr>
<tr>
<td>8 Bit, no parity</td>
<td>1 stop bit</td>
</tr>
<tr>
<td>8 Bit, even parity</td>
<td>2 stop bits</td>
</tr>
<tr>
<td>8 Bit, even parity</td>
<td>1 stop bit</td>
</tr>
<tr>
<td>8 Bit, odd parity</td>
<td>2 stop bits</td>
</tr>
<tr>
<td>8 Bit, odd parity</td>
<td>1 stop bit</td>
</tr>
<tr>
<td>9 Bit, no parity</td>
<td>1 stop bit</td>
</tr>
<tr>
<td>multiNet mode</td>
<td></td>
</tr>
<tr>
<td>Baudrate</td>
<td></td>
</tr>
<tr>
<td>110 baud</td>
<td></td>
</tr>
<tr>
<td>300 baud</td>
<td></td>
</tr>
<tr>
<td>600 baud</td>
<td></td>
</tr>
<tr>
<td>1200 baud</td>
<td></td>
</tr>
<tr>
<td>2400 baud</td>
<td></td>
</tr>
<tr>
<td>4800 baud</td>
<td></td>
</tr>
<tr>
<td><strong>9600 baud</strong></td>
<td></td>
</tr>
<tr>
<td>19200 baud</td>
<td></td>
</tr>
<tr>
<td>38400 baud</td>
<td></td>
</tr>
<tr>
<td>57600 baud</td>
<td></td>
</tr>
</tbody>
</table>
Configuration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>No protocol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Protocol Frame</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Protocol frame with acknowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3964 / RK 512 Protocol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>multiNet Plus slave</td>
<td></td>
</tr>
<tr>
<td>Handshake Mode</td>
<td>No Handshake</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RTS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RTS / CTS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RTS / CTS ; TX active</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Half duplex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XON / XOFF</td>
<td></td>
</tr>
</tbody>
</table>

**Framing Protocol**

The following parameters for transfer to the host can be set in the menu 'Framing Protocol':

- Prefix 1 (title header character)
- Prefix 2 (title header character)
- Postfix 1 (title footer character)
- Postfix 2 (title footer character)
- Address Format
- BCC Mode (Block Check Character)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefix 1</td>
<td>00h … FFh</td>
<td>[02h]</td>
</tr>
<tr>
<td>Prefix 2</td>
<td>00h … FFh</td>
<td>[00h]</td>
</tr>
<tr>
<td>Postfix 1</td>
<td>00h … FFh</td>
<td>[0Dh]</td>
</tr>
<tr>
<td>Postfix 2</td>
<td>00h … FFh</td>
<td>[0Ah]</td>
</tr>
<tr>
<td>Address Format</td>
<td>No Address</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Binary address</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASCII address</td>
<td></td>
</tr>
<tr>
<td>BCC-Mode</td>
<td>No BCC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCC mode 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCC mode 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCC mode 3</td>
<td></td>
</tr>
</tbody>
</table>

More detailed information concerning the BCC modes is available on request.

**Note!**

If the BCL 80 should operate 'stand alone' as a slave in the multiNet, then the following settings are required:

- **Data format:** multiNet mode
- **Baud rate:** 57600 baud
- **Protocol:** MultiNet Plus slave
- **Handshake:** none
- **Address format:** ASCII address
3964 / RK 512 Protocol

The BCL 80 / MA 10 can be operated with the procedure 3964 / RK 512. For this the option '3964 / RK 512 protocol' must be activated in the menu 'General Settings / Protocol'. The required parameters are set in the menu '3964 / RK 512'. The following operating modes are possible:

- 3964
- 3964 R
- 3964 / RK 512

Parameter | Valid range of values | Default
---|---|---
use BCC within 3964 | Yes, No | [No]
transmit with high priority | Yes, No | [No]
correct receive timeout | 0 ... 3000 ms | [220]
acknowledge receive timeout | 0 ... 3000 ms | [550]
no. of retransmissions | 0 ... 255 | [5]
use RK 512 | Yes, No | [No]
no. of data module | 0 ... 255 | [10]
start address within module | 0 ... 255 | [0]
address offset of slave | 0 ... 255 | [64]
use reaction telegr. in RK 512 | Yes, No | [No]

9.2.5 Setting the Parameters of the Digital IN/OUT

The following submenus can be selected from the menu 'Digital IN/OUT':

- Sensor Decode (S1)
- Sensor Teach In (S2)
- Switch 1
- Switch 2

Sensor Decode (S1)

The switching parameters of this input can be entered in the menu ‘Sensor Decode (S1)’:

- Debounce Time
- Delay Off
- Inversion

Parameter | Valid range of values | Default
---|---|---
Debounce Time | 0 ... 255 ms | [5]
Delay Off | 0 ... 2500 ms | [0]
Inversion | Yes, No | [No]
**Sensor Teach In (S2)**

The switching parameters of this input can be entered in the menu ‘Sensor Teach-In (S2)’:

- Debounce Time
- Delay Off
- Inversion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debounce time</td>
<td>0 ... 255 ms</td>
<td>[5]</td>
</tr>
<tr>
<td>Delay Off</td>
<td>0 ... 2500 ms</td>
<td>[0]</td>
</tr>
<tr>
<td>Inversion</td>
<td>Yes, No</td>
<td>[No]</td>
</tr>
</tbody>
</table>

**Note!**

When using switches with contact bounce (e.g. relay contacts) set the end bounce time high (between 50 and 255 ms), since contact bounce can cause multiple switching impulses and interfere with the BCL software.

**Switch 1**

The switching parameters of this output can be entered in the menu ‘Switch 1’:

- Enable
- Activation
- Inversion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable</td>
<td>Yes, No</td>
<td>[Yes]</td>
</tr>
<tr>
<td>Activation</td>
<td>Good Read</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bad Read</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start Reading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop Reading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device Ready</td>
<td></td>
</tr>
<tr>
<td></td>
<td>autoControl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reference code 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reference code 2</td>
<td></td>
</tr>
<tr>
<td>Inversion</td>
<td>Yes, No</td>
<td>[No]</td>
</tr>
</tbody>
</table>
Switch 2

The switching parameters of this output can be entered in the menu 'Switch 2':

- Enable
- Activation
- Inversion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable</td>
<td>Yes, No</td>
<td>[No]</td>
</tr>
<tr>
<td>Activation</td>
<td>Good Read</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bad Read</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start Reading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop Reading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device Ready</td>
<td></td>
</tr>
<tr>
<td></td>
<td>autoControl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reference code 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reference code 2</td>
<td></td>
</tr>
<tr>
<td>Inversion</td>
<td>Yes, No</td>
<td>[No]</td>
</tr>
</tbody>
</table>

9.2.6 Setting the General Parameters

Generals

The following parameters can be set in the menu 'Generals' of the setup program:

- Decoder address:
  A decoder address must be set if the BCL 80 is to be operated without an MA 10 in the multiNet, thus no address switch is available. Here the option 'Host interface / frame protocol / ASCII address' must be activated. The hardware switch has priority when operating with an MA 10.
- Startcode character
- Error character
- Warning character

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decoder address</td>
<td>00h … 1Fh</td>
<td>[00h]</td>
</tr>
<tr>
<td>Startcode character</td>
<td>00h … 7Ah</td>
<td>['S']</td>
</tr>
<tr>
<td>Error character</td>
<td>00h … 7Ah</td>
<td>['&amp;']</td>
</tr>
<tr>
<td>Warning character</td>
<td>00h … 7Ah</td>
<td>['@']</td>
</tr>
</tbody>
</table>
9.2.7 Additional Functions: Setting the Reference Code Parameters

The following submenus can be selected from the submenu ‘Reference Code’ under the menu ‘Additional Functions’:

- Code 1
- Code 2
- Don't care i.e. two reference codes can be defined and particular characters hidden.

**Code 1 and Code 2**

The following can be defined for code 1 and code 2:

- The content of the label to be read
- The code type of the label to be read
- Comparison operations which activate switch 1 or 2

### Parameter | Valid range of values | Default
---|---|---
Code information | contents of the label to be detected | [" "]
Code type selection | code types that can also be set as decoding parameters | ['none']
Compare Mode | No compare |
| Equal |
| Unequal |

Settings for ‘Comparison mode’

- **No comparison**: deactivates the reference code detection,
- **equal**: activates the set switching output when detected code and reference code are equal,
- **unequal**: activates the set switching output when detected code and reference code are not equal

The assignment of switching output 1/2 to reference code 1/2 is set in the menu ‘Switching inputs/outputs / Switching output 1/2 / Activation’.

**Don’t care**

In order to allow the comparison of several similar labels, a ‘Don't Care’ character can be defined. The character is not permanently defined, thus giving the user the greatest flexibility when defining the reference code. It should be defined so that it does not occur in the code which will be read.

### Parameter | Valid range of values | Default
---|---|---
Definition Mode | Yes, No | [No]
Don't Care Character | any ASCII character | [*]

Settings for ‘Override mode’

- **Yes**: When a reference code is defined, the ‘Don't care’ character is taken into account
- **No**: When a reference code is defined, the ‘Don't care’ character is not taken into account

**Example**: Code 1: Code Info: 1234****

By setting the 'Don't-Care' character, the affected positions are "ignored", i.e. they are not relevant to the code comparison.
9.2.8 Additional Functions: Setting the 'autoControl' Parameters

The following submenus can be selected from the submenu 'autoControl' under the menu 'Additional Functions':

- Enable
- Limit Scan Quality
- Send Warning to Com
- Character for AutoControl warning

Enable

Specify here whether the autoControl function is activated.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable</td>
<td>Yes, No</td>
<td>[No]</td>
</tr>
</tbody>
</table>

Limit Scan Quality

The scan quality is defined as the relationship between the number of decodable scans to the total number of possible scans. A threshold in percent can be entered here. If the percent of successful scans falls below this limit, a warning message will be sent and, if enabled, a switched output can be activated.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit Scan Quality</td>
<td>0 … 100 in %</td>
<td>[50]</td>
</tr>
</tbody>
</table>

Send Warning to Com

Specify here whether a warning message should be output over the serial interface if the scan quality falls below the given value.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send warning to com</td>
<td>Yes, No</td>
<td>[No]</td>
</tr>
</tbody>
</table>

Character for AutoControl warning

Define here the warning character which will be sent out over the serial interface if the scan quality falls below the given limit. It can be any ASCII character.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Valid range of values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character for AutoControl warning</td>
<td>all ASCII characters</td>
<td>'!'</td>
</tr>
<tr>
<td></td>
<td>00: no output via the serial interface</td>
<td></td>
</tr>
</tbody>
</table>
10  Maintenance

10.1  General Maintenance Information

The bar code reader BCL 80 and the connector unit MA 10 normally should not require any main-tenance by the user.

Cleaning

Should it become soiled, clean the glass window of the BCL 80 with a soft cloth.

Attention

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

10.2  Repair, Service

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

For repairs, contact your Leuze sales or service office. The addresses can be found on the back page of this operating manual.
## Appendix

### 11.1 ASCII Table

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NUL</td>
<td>0</td>
<td>00</td>
<td>0</td>
<td>NULL</td>
<td>Null</td>
</tr>
<tr>
<td>SOH</td>
<td>1</td>
<td>01</td>
<td>1</td>
<td>START OF HEADING</td>
<td>Kopfzeilenbeginn</td>
</tr>
<tr>
<td>STX</td>
<td>2</td>
<td>02</td>
<td>2</td>
<td>START OF TEXT</td>
<td>Textanfangszeichen</td>
</tr>
<tr>
<td>ETX</td>
<td>3</td>
<td>03</td>
<td>3</td>
<td>END OF TEXT</td>
<td>Textendezeichen</td>
</tr>
<tr>
<td>EOT</td>
<td>4</td>
<td>04</td>
<td>4</td>
<td>END OF TRANSMISSION</td>
<td>Ende der Übertragung</td>
</tr>
<tr>
<td>ENQ</td>
<td>5</td>
<td>05</td>
<td>5</td>
<td>ENQUIRY</td>
<td>Aufforderung zur Datenübertrag.</td>
</tr>
<tr>
<td>ACK</td>
<td>6</td>
<td>06</td>
<td>6</td>
<td>ACKNOWLEDGE</td>
<td>Positive Rückmeldung</td>
</tr>
<tr>
<td>BEL</td>
<td>7</td>
<td>07</td>
<td>7</td>
<td>BELL</td>
<td>Klingelzeichen</td>
</tr>
<tr>
<td>BS</td>
<td>8</td>
<td>08</td>
<td>10</td>
<td>BACKSPACE</td>
<td>Rückwärtsschritt</td>
</tr>
<tr>
<td>HT</td>
<td>9</td>
<td>09</td>
<td>11</td>
<td>HORIZONTAL TABULATOR</td>
<td>Horizontal Tabulator</td>
</tr>
<tr>
<td>LF</td>
<td>10</td>
<td>0A</td>
<td>12</td>
<td>LINE FEED</td>
<td>Zeilenvorschub</td>
</tr>
<tr>
<td>VT</td>
<td>11</td>
<td>0B</td>
<td>13</td>
<td>VERTICAL TABULATOR</td>
<td>Vertikal Tabulator</td>
</tr>
<tr>
<td>FF</td>
<td>12</td>
<td>0C</td>
<td>14</td>
<td>FORM FEED</td>
<td>Seitenvorschub</td>
</tr>
<tr>
<td>CR</td>
<td>13</td>
<td>0D</td>
<td>15</td>
<td>CARRIAGE RETURN</td>
<td>Wagennläufer</td>
</tr>
<tr>
<td>SO</td>
<td>14</td>
<td>0E</td>
<td>16</td>
<td>SHIFT OUT</td>
<td>Dauerumschaltungszeichen</td>
</tr>
<tr>
<td>SI</td>
<td>15</td>
<td>0F</td>
<td>17</td>
<td>SHIFT IN</td>
<td>Rückschaltungszeichen</td>
</tr>
<tr>
<td>DLE</td>
<td>16</td>
<td>10</td>
<td>20</td>
<td>DATA LINK ESCAPE</td>
<td>Datenübertragungsumschaltung</td>
</tr>
<tr>
<td>DC1</td>
<td>17</td>
<td>11</td>
<td>21</td>
<td>DEVICE CONTROL 1 (X-ON)</td>
<td>Gerätesteuerzeichen 1</td>
</tr>
<tr>
<td>DC2</td>
<td>18</td>
<td>12</td>
<td>22</td>
<td>DEVICE CONTROL 2 (TAPE)</td>
<td>Gerätesteuerzeichen 2</td>
</tr>
<tr>
<td>DC3</td>
<td>19</td>
<td>13</td>
<td>23</td>
<td>DEVICE CONTROL 3 (X-OFF)</td>
<td>Gerätesteuerzeichen 3</td>
</tr>
<tr>
<td>DC4</td>
<td>20</td>
<td>14</td>
<td>24</td>
<td>DEVICE CONTROL 4</td>
<td>Gerätesteuerzeichen 4</td>
</tr>
<tr>
<td>NAK</td>
<td>21</td>
<td>15</td>
<td>25</td>
<td>NEGATIVE ACKNOWLEDGE</td>
<td>Negative Rückmeldung</td>
</tr>
<tr>
<td>SYN</td>
<td>22</td>
<td>16</td>
<td>26</td>
<td>SYNCHRONOUS IDLE</td>
<td>Synchronisierung</td>
</tr>
<tr>
<td>ETB</td>
<td>23</td>
<td>17</td>
<td>27</td>
<td>END OF TRANSMISSION BLOCK</td>
<td>Ende der Datenübertragungsblocks</td>
</tr>
<tr>
<td>CAN</td>
<td>24</td>
<td>18</td>
<td>30</td>
<td>CANCEL</td>
<td>Urgültig</td>
</tr>
<tr>
<td>EM</td>
<td>25</td>
<td>19</td>
<td>31</td>
<td>END OF MEDIUM</td>
<td>Ende der Aufzeichnung</td>
</tr>
<tr>
<td>SUB</td>
<td>26</td>
<td>1A</td>
<td>32</td>
<td>SUBSTITUTE</td>
<td>Substitution</td>
</tr>
<tr>
<td>ESC</td>
<td>27</td>
<td>1B</td>
<td>33</td>
<td>ESCAPE</td>
<td>Umschaltung</td>
</tr>
<tr>
<td>FS</td>
<td>28</td>
<td>1C</td>
<td>34</td>
<td>FILE SEPARATOR</td>
<td>Hauptgruppentrennzeichen</td>
</tr>
<tr>
<td>GS</td>
<td>29</td>
<td>1D</td>
<td>35</td>
<td>GROUP SEPARATOR</td>
<td>Gruppentrennzeichen</td>
</tr>
<tr>
<td>RS</td>
<td>30</td>
<td>1E</td>
<td>36</td>
<td>RECORD SEPARATOR</td>
<td>Untergruppentrennzeichen</td>
</tr>
<tr>
<td>US</td>
<td>31</td>
<td>1F</td>
<td>37</td>
<td>UNIT SEPARATOR</td>
<td>Teilgruppentrennzeichen</td>
</tr>
<tr>
<td>SP</td>
<td>32</td>
<td>20</td>
<td>40</td>
<td>SPACE</td>
<td>Leerzeichen</td>
</tr>
<tr>
<td>!</td>
<td>33</td>
<td>21</td>
<td>41</td>
<td>EXCLAMATION POINT</td>
<td>Ausrufzeichen</td>
</tr>
<tr>
<td>&quot;</td>
<td>34</td>
<td>22</td>
<td>42</td>
<td>QUOTATION MARK</td>
<td>Anführungszeichen</td>
</tr>
<tr>
<td>#</td>
<td>35</td>
<td>23</td>
<td>43</td>
<td>NUMBER SIGN</td>
<td>Nummerzeichen</td>
</tr>
<tr>
<td>$</td>
<td>36</td>
<td>24</td>
<td>44</td>
<td>DOLLAR SIGN</td>
<td>Dollarzeichen</td>
</tr>
<tr>
<td>%</td>
<td>37</td>
<td>25</td>
<td>45</td>
<td>PERCENT SIGN</td>
<td>Prozentzeichen</td>
</tr>
<tr>
<td>&amp;</td>
<td>38</td>
<td>26</td>
<td>46</td>
<td>AMPERSOND</td>
<td>Kommerzielles UND-Zeichen</td>
</tr>
<tr>
<td>'</td>
<td>39</td>
<td>27</td>
<td>47</td>
<td>APOSTROPHE</td>
<td>Apostroph</td>
</tr>
<tr>
<td>(</td>
<td>40</td>
<td>28</td>
<td>50</td>
<td>OPENING PARENTHESIS</td>
<td>runde Klammer (offen)</td>
</tr>
<tr>
<td>)</td>
<td>41</td>
<td>29</td>
<td>51</td>
<td>CLOSING PARENTHESIS</td>
<td>runde Klammer (geschlossen)</td>
</tr>
<tr>
<td>*</td>
<td>42</td>
<td>2A</td>
<td>52</td>
<td>ASTERISK</td>
<td>Stern</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>---------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>+</td>
<td>43</td>
<td>2B</td>
<td>53</td>
<td>PLUS</td>
<td>Pluszeichen</td>
</tr>
<tr>
<td>.</td>
<td>44</td>
<td>2C</td>
<td>54</td>
<td>COMMA</td>
<td>Komma</td>
</tr>
<tr>
<td>-</td>
<td>45</td>
<td>2D</td>
<td>55</td>
<td>HYPHEN (MINUS)</td>
<td>Bindestrich (Minuszeichen)</td>
</tr>
<tr>
<td>.</td>
<td>46</td>
<td>2E</td>
<td>56</td>
<td>PERIOD (DECIMAL)</td>
<td>Punkt</td>
</tr>
<tr>
<td>/</td>
<td>47</td>
<td>2F</td>
<td>57</td>
<td>SLANT</td>
<td>Schrägstreich (rechts)</td>
</tr>
<tr>
<td>0</td>
<td>48</td>
<td>30</td>
<td>60</td>
<td></td>
<td>Zahl</td>
</tr>
<tr>
<td>1</td>
<td>49</td>
<td>31</td>
<td>61</td>
<td></td>
<td>Zahl</td>
</tr>
<tr>
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Table 11.1:  ASCII Table
11.2 Example Bar Code Label Types

11.2.1 Module 0.5

**Codetype 01:** Interleaved 2 of 5

**Codetype 02:** Code 39

**Codetype 11:** Codabar

**Code 128**

**Codetype 08:** EAN 128

Figure 11.1: Barcode sample labels (module 0.5)
Figure 11.2: Barcode sample labels (module 0.5) - continued
11.2.2 Module 1.0

Figure 11.3: Barcode sample labels (module 1.0)
Interleaved 2 of 5
Modul 1.0

EAN 13
SC 9

Figure 11.4: Barcode sample labels (module 1.0) - continued