Leuze

Original operating instructions

DCR 50
Scan Engine

The Sensor People

We reserve the right to make technical changes
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1 About this document

1.1 Used symbols and signal words

Tab. 1.1: Warning symbols and signal words

	Symbol indicating dangers to persons
	Symbol indicating possible property damage
NOTE	Signal word for property damage Indicates dangers that may result in property damage if the measures for danger avoidance are not followed.
CAUTION	Signal word for minor injuries Indicates dangers that may result in minor injury if the measures for danger avoidance are not followed.
WARNING	Signal word for serious injury Indicates dangers that may result in severe or fatal injury if the measures for danger avoidance are not followed.
DANGER	Signal word for life-threatening danger Indicates dangers with which serious or fatal injury is imminent if the measures for danger avoidance are not followed.

Tab. 1.2: Other symbols

	Symbol for tips Text passages with this symbol provide you with further information.
	Symbol for action steps Text passages with this symbol instruct you to perform actions.
	Symbol for action results Text passages with this symbol describe the result of the preceding action.

Tab. 1.3: Terms and abbreviations

BCL	Bar code reader
CMOS	Semiconductor process for implementing integrated circuits (Complementary Metal-Oxide-Semiconductor)
DCR	Image-based code reader (Dual Code Reader)
DTM	Software device manager (Device Type Manager)
EMC	Electromagnetic compatibility
EN	European standard
FDT	Software frame for management of device managers (DTM) (Field Device Tool)
FE	Functional earth
GUI	Graphical user interface
HID	Device class for input devices with which users directly interact (Human Interface Device)
IO or I/O	Input/output
LED	LED (Light Emitting Diode)
PLC	Programmable Logic Control (corresponds to Programmable Logic Controller (PLC))

2 Safety

This scan engine was developed, manufactured and tested in line with the applicable safety standards. It corresponds to the state of the art.

2.1 Intended use

The DCR 50 scan engine is designed as an installation scanner with integrated decoder for all of the most popular 1D and 2D codes for automatic object recognition.

Areas of application

The DCR 50 scan engine is intended especially for the following areas of application:

- Automatic analyzers
- For space-critical code reading tasks
- For installation in a housing or beneath covers

⚠ CAUTION

Observe intended use!

The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not complying with its intended use.

- ↳ Only operate the device in accordance with its intended use.
- ↳ Leuze electronic GmbH + Co. KG is not liable for damages caused by improper use.
- ↳ Read these operating instructions before commissioning the device. Knowledge of the operating instructions is an element of proper use.

NOTICE

Comply with conditions and regulations!

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

2.2 Foreseeable misuse

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

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

- in rooms with explosive atmospheres
- in circuits which are relevant to safety
- for medical purposes

NOTICE

Do not modify or otherwise interfere with the device!

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

2.3 Competent persons

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

Prerequisites for competent persons:

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

Certified electricians

Electrical work must be carried out by a certified electrician.

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

In Germany, certified electricians must fulfill the requirements of accident-prevention regulations DGUV (German Social Accident Insurance) provision 3 (e.g. electrician foreman). In other countries, there are respective regulations that must be observed.

2.4 Disclaimer

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

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

3 Device description

3.1 Device overview

3.1.1 About the DCR 50 scan engine

The code reader is based on a scan engine with CMOS imager with integrated decoder for all commonnly used 1D and 2D codes such as DataMatrix, Aztec, QR Code, 2/5 Interleaved, Code 39, Code 128, UPC/EAN etc.

The many possible configurations of the device allow it to be adapted to a multitude of reading tasks. Due to the small dimensions of the unit and the large reading field, the device can also be used in highly constrained spaces.

Information on technical data and characteristics: see chapter 12 "Technical data".

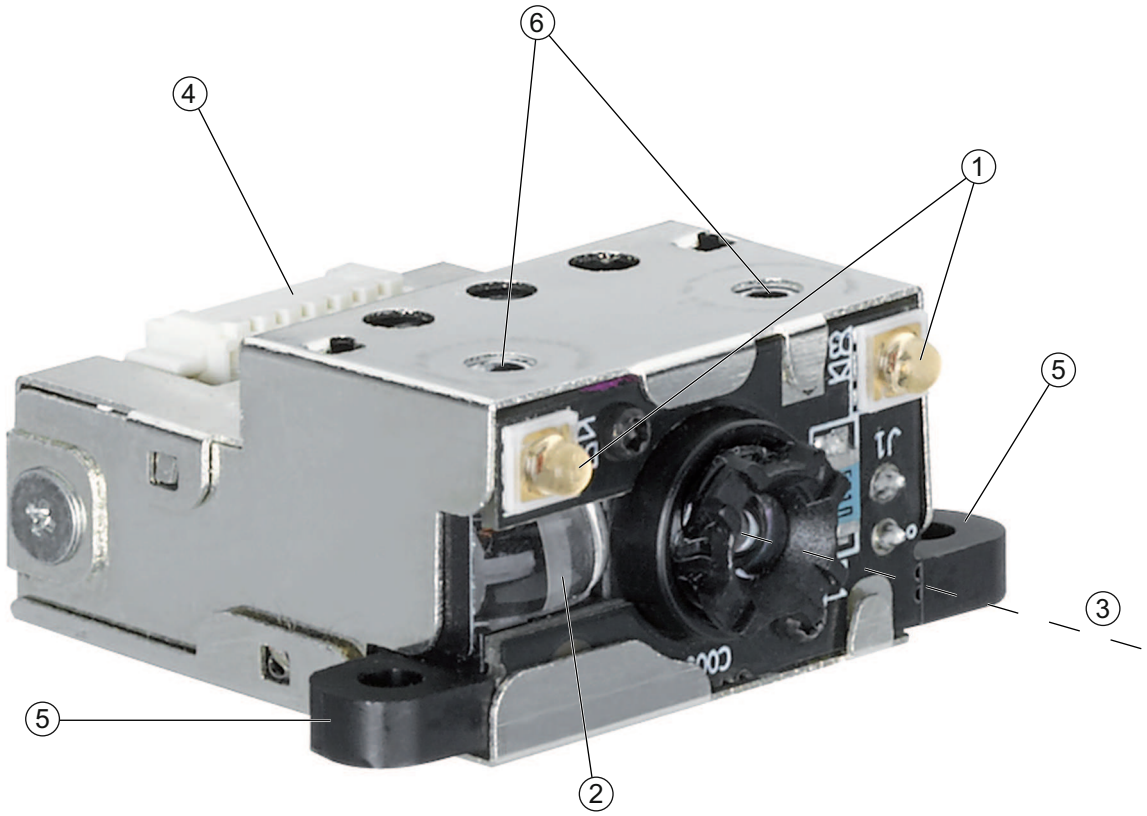
3.1.2 Stand-alone operation

The scan engine is operated as a single "stand-alone" device. It is equipped with a 6-pin Molex connector for the power supply electrical connection, the interface, the trigger input, and the switching output.

3.2 Performance characteristics

- High-performance miniature CMOS imager scan engine
- Compact design for simple integration, even in constrained spaces
- Reading of extremely small high-density codes and recording of standard codes in a large reading area using a special optical system
- Reading of shiny surfaces using a gloss reduction process
- Excellent decoding characteristics
- Clearly visible alignment LED
- RS 232 interface, one trigger input, one switching output

3.3 Device construction



1 Two integrated LEDs for illumination (red light)
2 One integrated target LED (blue light)
3 Center of optical axis
4 Connector Molex (53261-0671), 6-pin
5 Mounting tabs, M2.5 through-hole
6 Inserts for M1.8 self-tapping screws, 2 mm deep

Fig. 3.1: DCR 50 device construction

3.4 Connection technology

6-pin Molex connector (53261-0671)

4 Mounting

The scan engine can be attached at two M2.5 through-hole mounting tabs.

In addition, two 2 mm deep inserts for M1.8 self-tapping screws are provided on top of the scan engine.

4.1 Selecting a mounting location

NOTICE

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

NOTICE

Observe when choosing the mounting location!

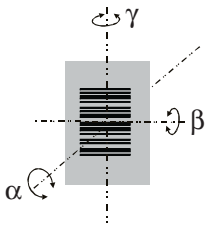
- Maintaining the required environmental conditions (temperature, humidity).
- Possible soiling of the reading window due to liquids, abrasion by boxes, or packaging material residues.
- Lowest possible chance of damage to the scanner by mechanical collision or jammed parts.
- Possible extraneous light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

The best read results are obtained when

- the reading distance lies in the middle area of the reading field.
- there is no direct sunlight and extraneous light is avoided.
- the bar code labels are of good print quality and have good contrast ratios.
- you do not use high-gloss labels.
- the bar code or the Data Matrix code is moved past the reading window with an angle of rotation of 10° to 15°.
- the red light beam is narrowed down for its respective reading task in order to avoid reflections on shiny components.

NOTICE

The front beam exit of the device is almost vertical to the optics. The code label must be rotated by > 10° to avoid a total reflection of the red light beam in the case of glossy labels.



α	Azimuth angle
β	Angle of inclination
γ	Angle of rotation
	Recommended angle of rotation: γ > 10°

Fig. 4.1: Definition of the reading angles

5 Electrical connection

CAUTION

Safety notices

- Before connecting the device, be sure that the supply voltage agrees with the value printed on the name plate.
- Connection of the device and maintenance work while under voltage must only be carried out by a qualified electrician.
- The power supply unit for the generation of the supply voltage for the device and the corresponding connection units must have a secure electrical insulation according to IEC 60742 (PELV). For UL applications: only for use in class 2 circuits according to NEC.
- If faults cannot be cleared, the device should be switched off and protected against accidental use.

5.1 Voltage supply

The scan engine is designed for connection to a 5 V supply voltage.

- +5 V DC (pin 1)
- GND (pin 2)

A MA-CR Modular adapter unit (interface device-to-host to connect to a PC for evaluation, 50128204) with spring terminals, Molex connector, and D-SUB 9-pin socket is available as an accessory (see chapter 13.2 "Accessories").

- With the MA-CR Modular adapter unit, the 6-pin connector of the scan engine can be contacted via a 150 mm long interconnection cable with a 12-pin Molex terminal strip and connected to the PC via the D-SUB 9-pin socket using an RS 232 interconnection cable.
- With the MA-CR Modular adapter unit, the voltage supply of 10 … 30 V DC can be fed in via spring terminals or, alternatively, 5 V DC can be fed in via a micro USB connector.

5.2 Pin assignment

Pin	Signal	IN / OUT
1	VCC / +5 V DC	IN
2	GROUND	IN
3	TRIGGER	IN
4	GOOD READ	OUT
5	RS 232 TX	OUT
6	RS 232 RX	IN

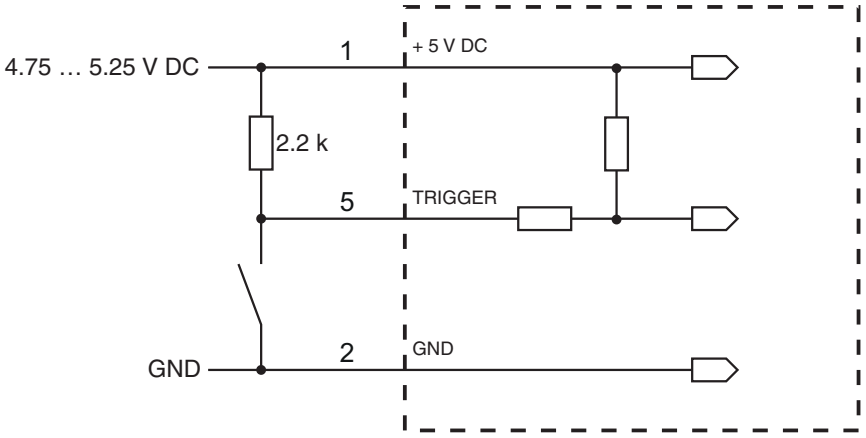
5.3 Switching input / switching output

The scan engine has a switching input and a switching output.

- The switching input is used to trigger code reading.
- The switching output signals successful code reading.

5.3.1 Switching input

A read process can be triggered using the trigger input (pin 5) in the **standard setting** (low = active) via the connection to GND (pin 2). We recommend wiring a 2.2 kΩ pull-up resistor as defined cable termination.



Connection version **NPN**: standard setting (low = active)

Fig. 5.1: Wiring example of the trigger input

5.3.2 Switching output

The NPN switching output connection between switching output (pin 4) and GND (pin 2) switches if a code is detected against GND.

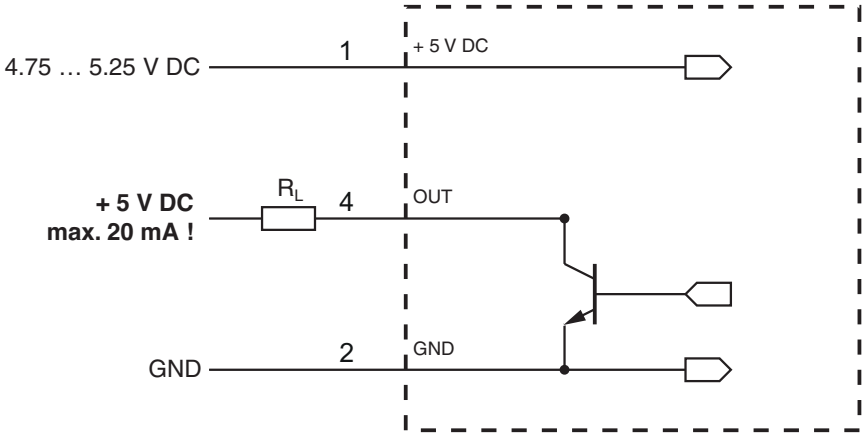


Fig. 5.2: Switching output

NOTICE	
	Maximum loading of the switching output ↳ Do not load the switching output of the scan engine with more than 20 mA at +5 … V DC!

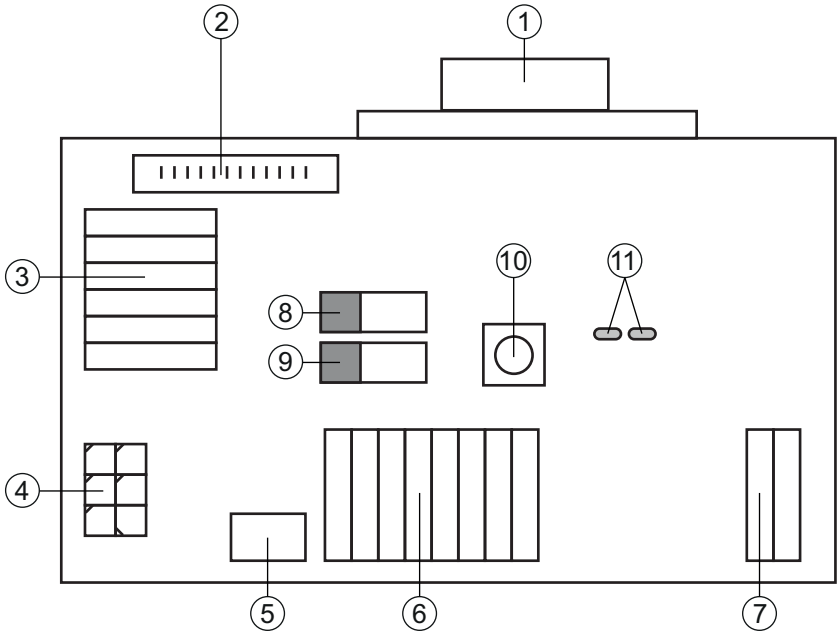
5.4 PC or terminal connection

Via the serial interface, you can configure the scan engine by means of a PC or terminal. For this, you need an RS 232 connection that establishes the RxD, TxD and GND connections between PC and scan engine.

The RS 232 connection can be established in the following ways:

- Direct connection of the plug connector of the scan engine to the PC or terminal via its own connector.
- Connection via a MA-CR modular adapter unit

  To simplify the connection of the connection wires to the PC interface, a modular adapter unit (MA-CR) is available for implementing the 6-pin plug connector to D-SUB, 9-pin (see chapter 13.2 "Accessories").



1 RS 232 connection
2 CR 50 or DCR 80 connection
3 DCR 50, DCR 55, DCR 85, CR 100, CR 55 connection
4 Molex Micro-Fit, 6-pin
5 USB connection
6 Connection to machine control, PLC, external voltage supply 5 VDC
7 External voltage supply 10 … 30 VDC
8 SWIN DIP switch (level for trigger button; 5 V if the scanner high switching input is active, GND if the low input is active)
9 USB/PWR DIP switch (USB position if voltage is supplied via USB; PWR position if voltage is supplied via (7))
10 Trigger button
11 Status LEDs

Fig. 5.3: Connection options for MA-CR modular adapter unit

5.5 Cable lengths and shielding

The maximum cable length is 3 m.

Should a cable extension be necessary, make certain that the cables of the RS 232 interface are shielded.

6 Configuration and diagnostics software - Sensor Studio

The *Sensor Studio* configuration software provides a graphical user interface for the operation, configuration and diagnostics of the device via the RS 232 interface.

A device that is not connected to the PC can be configured offline.

Configurations can be saved and reopened as projects for transferring back to the device at a later time.

NOTICE
Only use the *Sensor Studio* configuration software for products manufactured by **Leuze**. The *Sensor Studio* configuration software is offered in the following languages: German, English, French, Italian and Spanish. The FDT frame application of the *Sensor Studio* supports all languages; all languages may not be supported in the device DTM (Device Type Manager).

The *Sensor Studio* configuration software is designed according to the FDT/DTM concept:

- You make the individual configuration settings for the scan engine in the Device Type Manager (DTM).
- The individual DTM configurations of a project can be called up via the frame application of the Field Device Tool (FDT).
- Communication DTM for scan engines: *LeCommInterface*
- Device DTM for scan engine DCR 50

Procedure for the installation of the software and hardware:

- Install the *Sensor Studio* configuration software on the PC.
- Install the communication and device DTMs.
  Communication and device DTMs are included in the *LeAnalysisCollectionSetup* installation package.
  With the USB model (part no. 50136773), install the USB drivers.
- Create DCR 50-DTM in the project tree of the *Sensor Studio* FDT frame.
- Connect the scan engine to the PC (see chapter 5.4 "PC or terminal connection").

6.1 System requirements

To use the *Sensor Studio* configuration software, you need a PC or laptop with the following specifications:

Tab. 6.1: System requirements for *Sensor Studio* installation

Operating system	Windows XP or higher (32 bit, 64 bit) Windows Vista Windows 7 Windows 8
Computer	Processor type: 1 GHz or higher Serial COM interface CD-ROM drive Main memory (RAM): at least 64 MB Keyboard and mouse or touchpad
Graphics card	At least 1024 x 768 pixels
Required hard disk capacity for *Sensor Studio* and communication DTM	35 MB

NOTICE
Administrator privileges on the PC are necessary for installing *Sensor Studio*.

6.2 Installing Sensor Studio configuration software

NOTICE
The installation files of the *Sensor Studio* configuration software must be downloaded from the Internet at **www.leuze.com**. For subsequent updates, you can find the most recent version of the *Sensor Studio* installation software on the Internet at **www.leuze.com**.

6.2.1 Downloading configuration software

- Call up the Leuze home page: **www.leuze.com**
- Enter the type designation or part number of the device as the search term.
- The configuration software can be found on the product page for the device under the *Downloads* tab.

6.2.2 Installing the Sensor Studio FDT frame

NOTICE
First install the software! Do not yet connect the device to the PC. First install the software.

NOTICE
If FDT frame software is already installed on your PC, you do not need the *Sensor Studio* installation. You can install the communication DTM and the device DTM in the existing FDT frame. Communication DTM and device DTM are included in the *LeAnalysisCollectionSetup* installation package.

- Start the PC.
- Download the configuration software from the Internet to the PC (see chapter 6.2.1 "Downloading configuration software").
  Unpack the installation package.
- Start the *SensorStudioSetup.exe* file.
- Follow the instructions on the screen.

The installation wizard installs the software and places a shortcut on the desktop ( ).

6.2.3 Install the communication DTM and device DTM

Prerequisites:

- ✓ An FDT frame is installed on the PC.
- Start the LeAnalysisCollection.exe file from the installation package and follow the instructions on the screen.

The installation wizard installs communication DTM and device DTM for DCR 50.

6.2.4 Connecting device to PC

The device is connected to the PC via the RS 232 interface.

- You need an RS 232 connection that establishes the RxD, TxD and GND connections between PC and device (see chapter 5.4 "PC or terminal connection").
- The 5 V DC voltage supply is to be fed in externally (see chapter 5.1 "Voltage supply").

NOTICE
The MA-CR modular adapter unit with spring terminals and plug connector for connecting the device, as well as a D-SUB 9-pin socket for connecting an RS 232 interconnection cable, is available as an accessory (see chapter 13 "Order guide and accessories"). The MA-CR modular adapter unit requires 10 V … 30 V DC as external voltage supply, which can be fed in via spring terminals. Alternatively, 5 V DC can be fed via the 6-pin plug connector of the DCR 50 using a 150 mm long interconnection cable with 12-pin Molex terminal strip.

6.3 Starting the Sensor Studio configuration software

Prerequisites:

- The device has been mounted (see chapter 4 "Mounting") and connected (see chapter 5 "Electrical connection") correctly.
- The device is connected to the PC via the RS 232 interface (see chapter 6.2.4 "Connecting device to PC").
- The *Sensor Studio* configuration software is installed on the PC (see chapter 6.2 "Installing Sensor Studio configuration software").

↳ Start the *Sensor Studio* configuration software by double-clicking the *Sensor Studio* icon ( ).
The **mode selection** of the **Project Wizard** is displayed.

↳ Select the **Device selection without communication connection (offline)** configuration mode and click on [Next].

The **Project Wizard** displays the **device selection** list of the configurable devices.

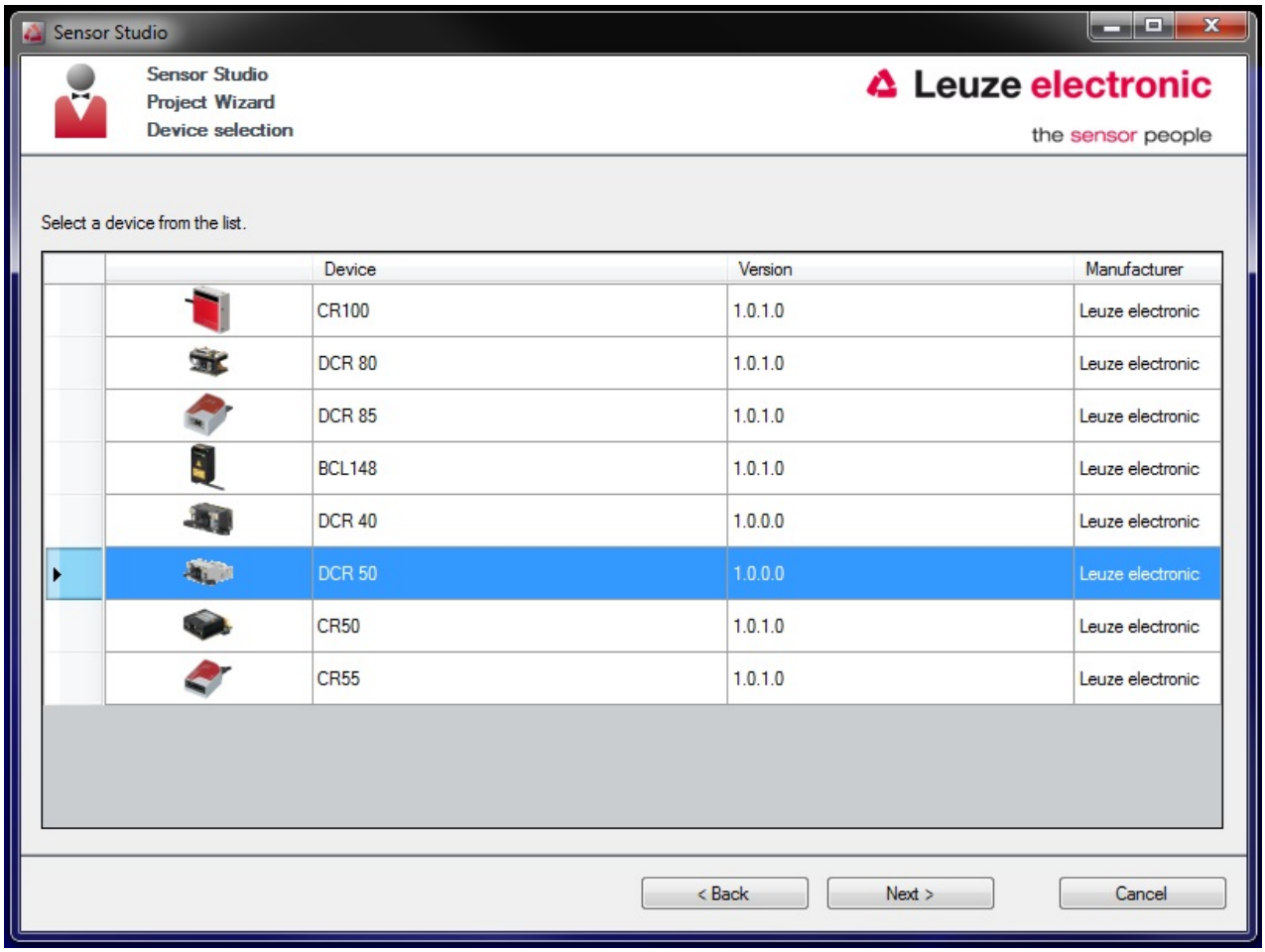


Fig. 6.1: Device selection for scan engine DCR 50

- Select **DCR 50** in the **device selection** and click on [Next].
  The device manager (DTM) of the connected DCR 50 starts with the offline view for the *Sensor Studio* configuration project.
- Establish the online connection to the connected DCR 50.
  In the *Sensor Studio* FDT frame, click on the [Establish connection with device] button ( ).
  In the *Sensor Studio* FDT frame, click on the [Upload parameters to device] button ( ).

The current configuration data is displayed in the device manager (DTM).

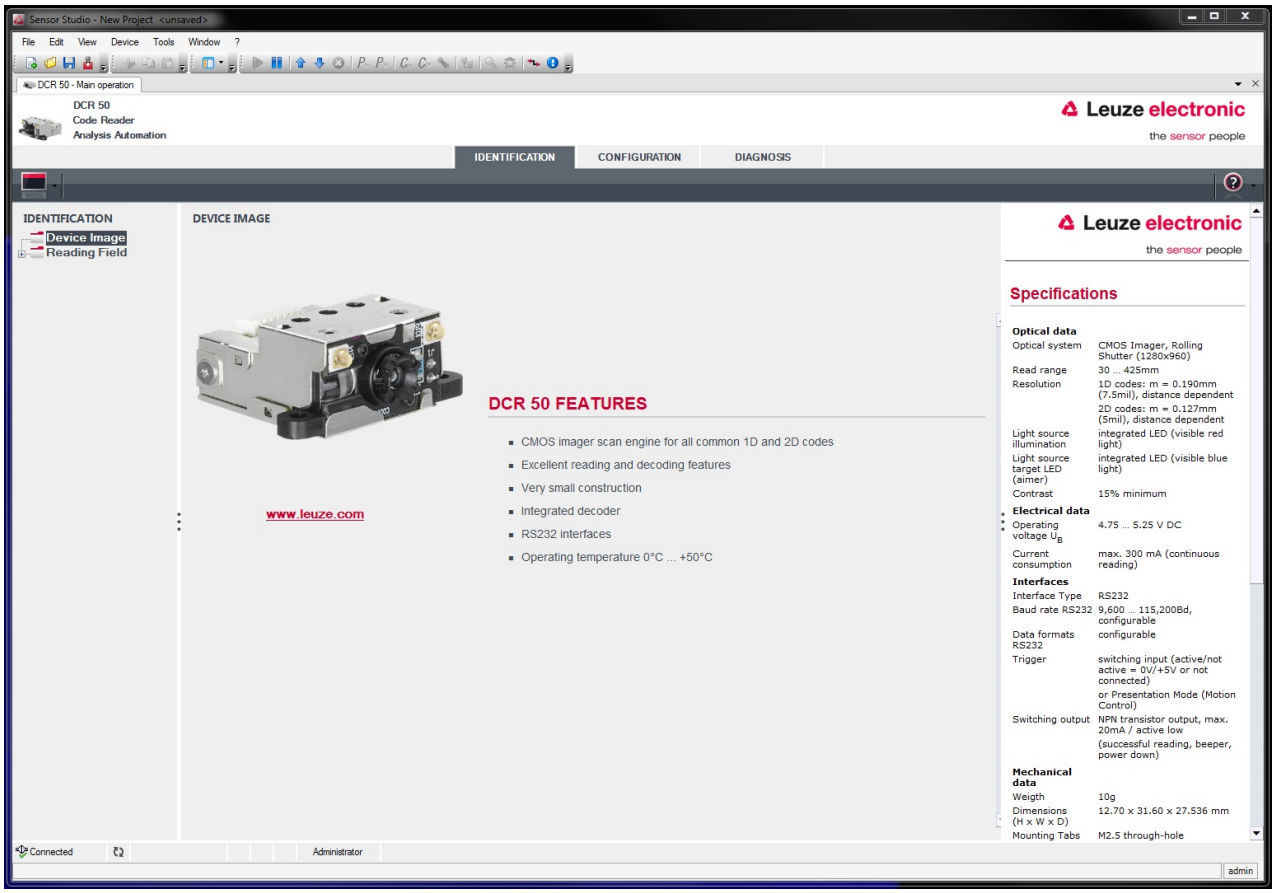


Fig. 6.2: Configuration project: Sensor Studio device manager (DTM) for DCR 50

- The menus of the *Sensor Studio* device manager (DTM) can be used to change or read out the configuration of the connected device.
  The user interface of the *Sensor Studio* device manager (DTM) is largely self-explanatory.
  The online help system provides information on the menu items and adjustment parameters. Select the **Help** menu item in the menu [?] ( ).
- Transfer the modified configuration parameters to the device.
  If a connection exists, click on the [Download parameters to device] button ( ) on the task bar.

6.4 Exiting Sensor Studio

After completing the configuration settings, close the *Sensor Studio* configuration software.

- Exit the program via **File > Exit**.
- Save the configuration settings as a configuration project on the PC.

You can open the configuration project again at later time via **File > Open** or with the *Sensor Studio* **Project Wizard** ( ).

6.5 Configuration parameters

In this chapter, you will find information and explanations on the configuration parameters of the device manager (DTM).

NOTICE

This chapter does not include a complete description of the *Sensor Studio* configuration software.

Complete information on the FDT frame menu and on the functions in the device manager (DTM) can be found in the online help system.

The device manager (DTM) of the *Sensor Studio* configuration software offers the following configuration functions:

- *General (Control)*
- *Decode* (see chapter 6.5.2 "Decode tab")
- *Communications* (see chapter 6.5.3 "Communication tab")
- *Diagnosis* (see chapter 6.5.4 "Diagnostics / Terminal")

NOTICE

The online help system displays information on the menu items and configuration parameters for each function. Select the **Help** menu item in the menu [?].

6.5.1 Control tab

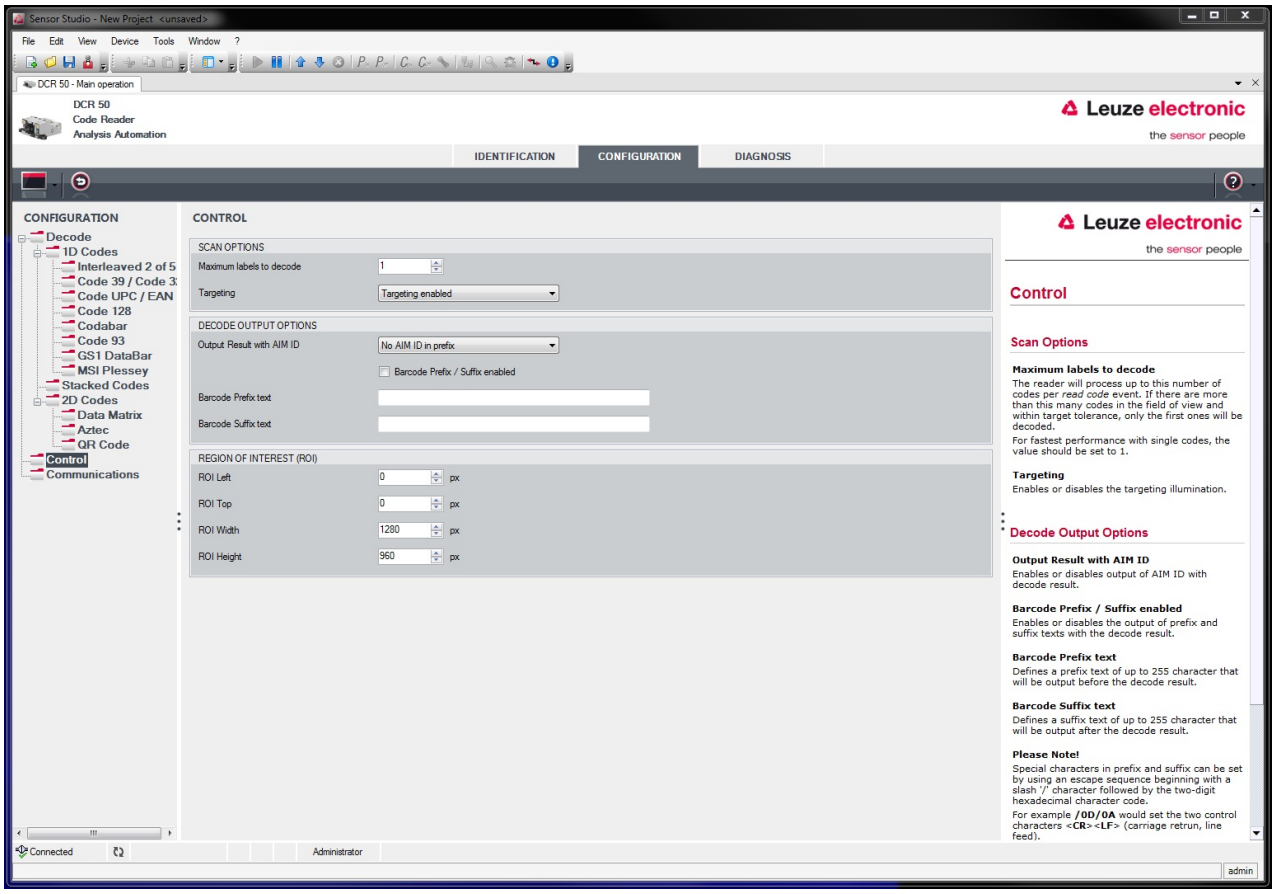


Fig. 6.3: Control tab

SCAN OPTIONS	
Max. number of labels to decode	The device processes up to this number of codes per *read code* event. • If there are more codes in the field of view and within target tolerance and the device is set to decode more than one code, it will decode all codes in the field of view. • Set to 1 for fastest performance with single codes.
Targeting	Switch the blue targeting LED on and off.
DECODE OUTPUT OPTIONS	
Output Result with AIM ID	Allows for the output of the AIM symbology identifier with the decode result.
Barcode Prefix / Suffix enabled	Enables/ disables the output of prefix and suffix text with the decode result.
Barcode Prefix text Barcode Suffix text	Defines text of up to 255 characters that is added before/after the decode result.
REGION OF INTEREST (ROI)	
ROI left ROI top ROI width ROI Height	Allows for setting the region of interest in the image where the labels are decoded.

6.5.2 Decode tab

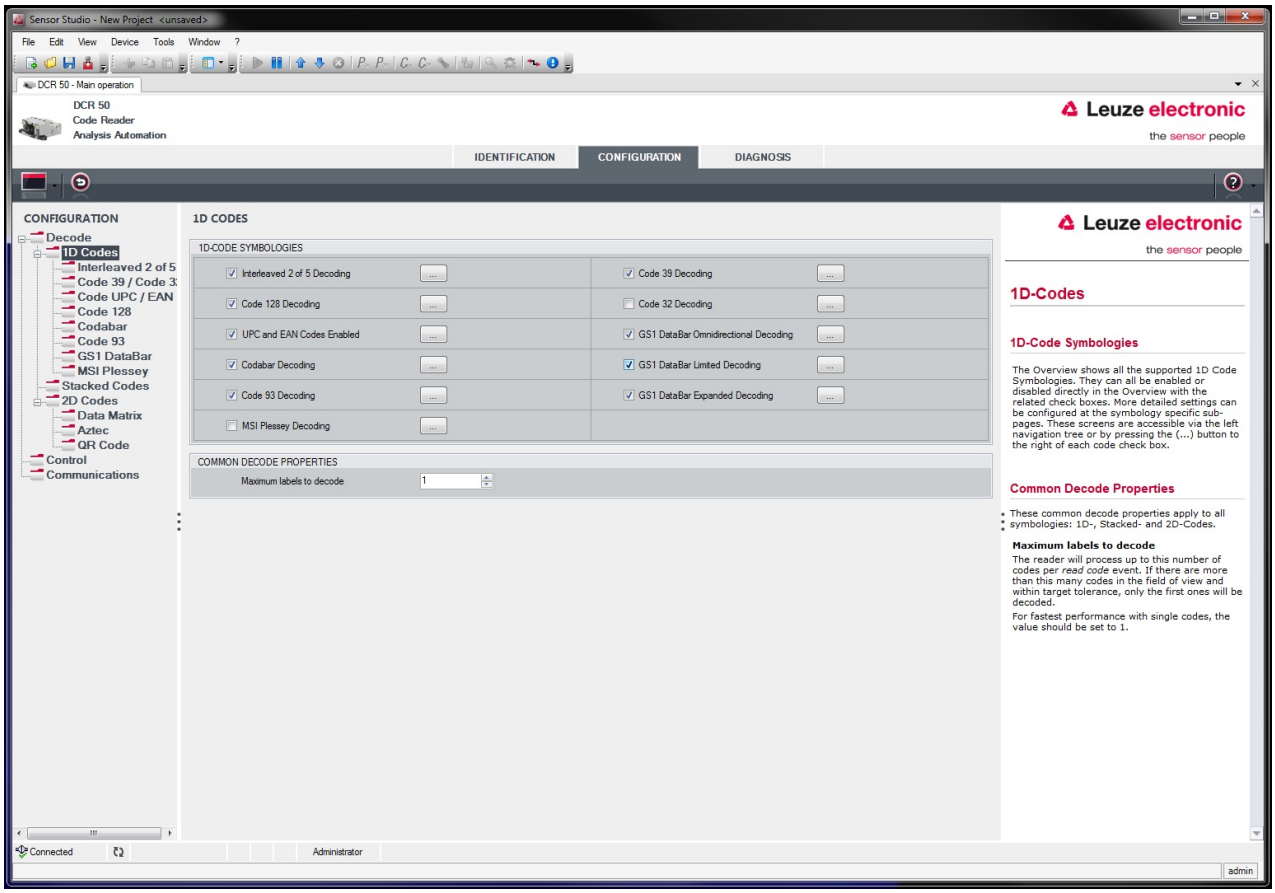


Fig. 6.4: Decode tab

SYMBOLOGIES	Use the … button to the right of the given code to select the code-specific settings. Alternatively, the property settings can be selected directly via the navigation tree under the Decode button. The properties can be individually set for each code type.
COMMON DECODE PROPERTIES	Max. number of labels to decode The device processes up to this number of codes per *read code* event. • If there are more codes in the field of view and within target tolerance and the device is set to decode more than one code, it will decode all codes in the field of view. • Set to 1 for fastest performance with single codes.

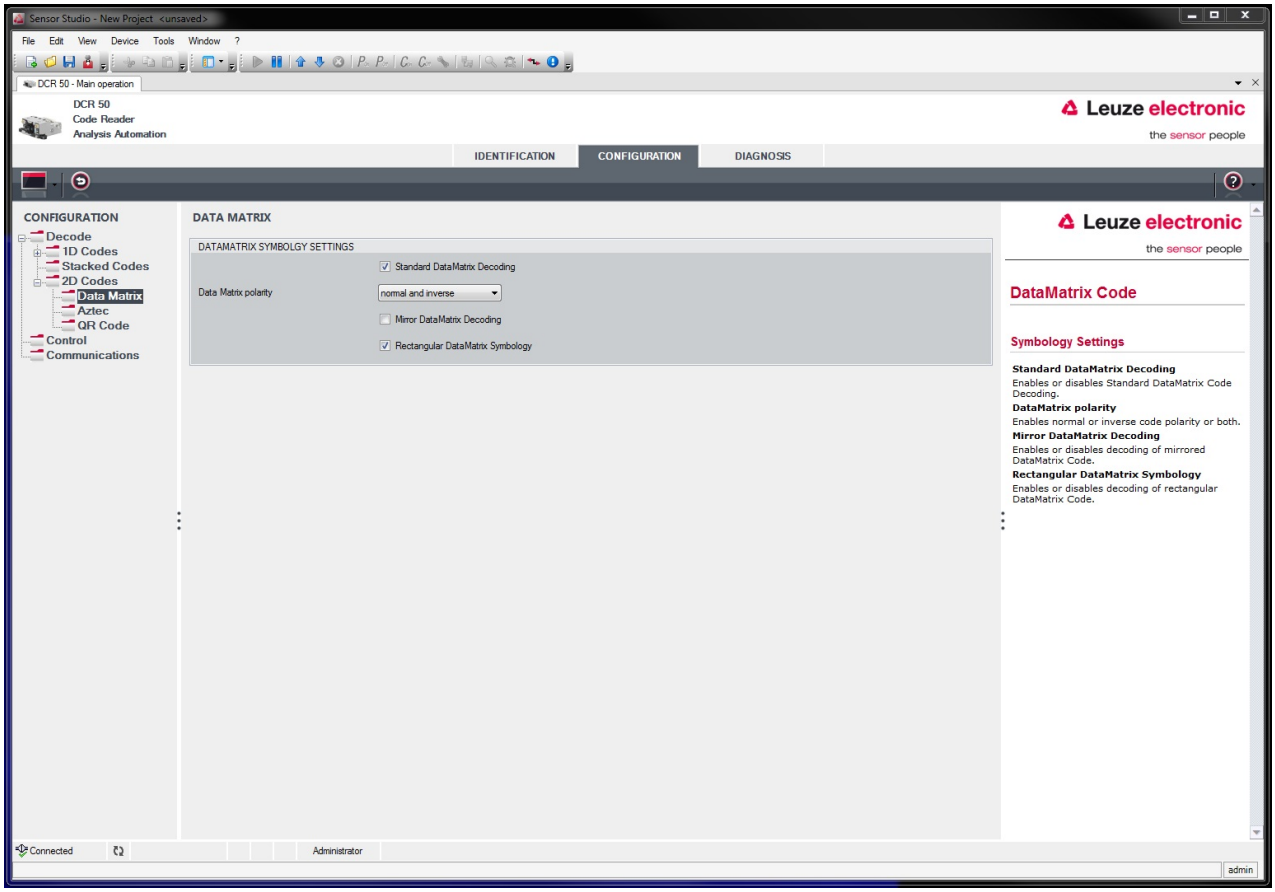


Fig. 6.5: Standard settings for the Properties window (SYMBOLOGY SETTINGS) – Decode tab

6.5.3 Communication tab

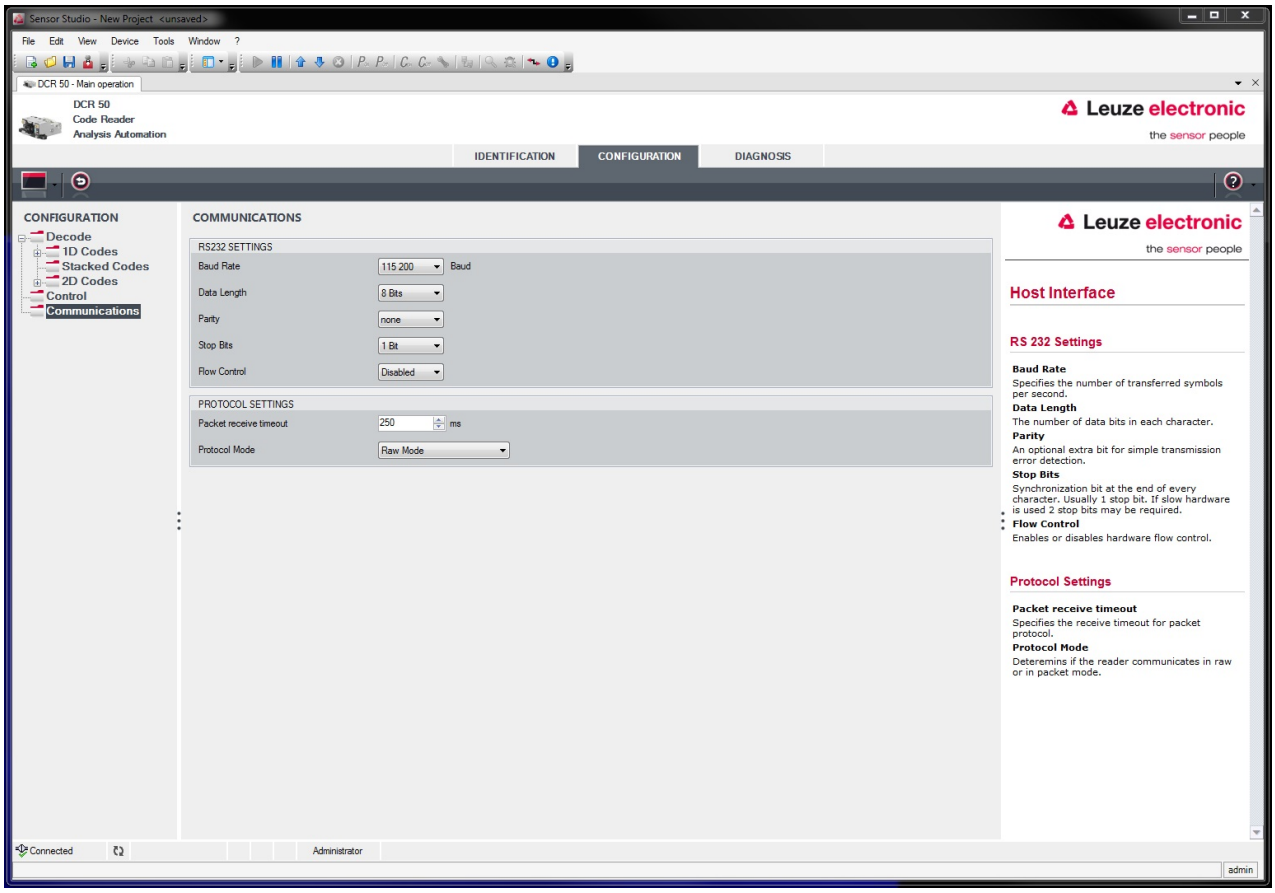


Fig. 6.6: Communication tab

Select the desired baud rate, the stop bits, the data bits, the parity and various transmission modes here. The desired acknowledgment settings are also to be set in this selection window.

6.5.4 Diagnostics / Terminal

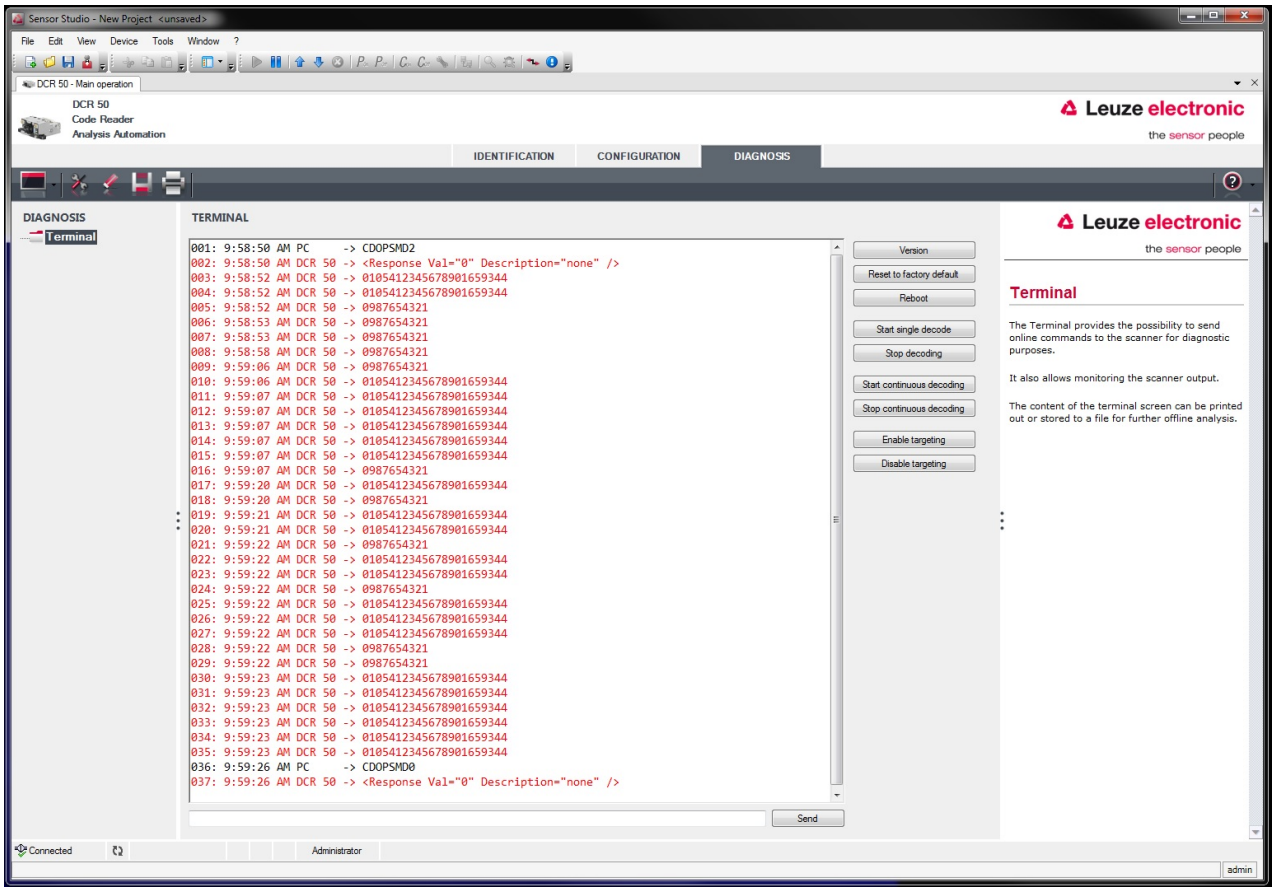


Fig. 6.7: Terminal

The Terminal tab provides the following functions:

- Send online commands to the scan engine for diagnostic purposes.
- Visualize the output of the scan engine.

The contents of the terminal display can be printed out or saved in a file for subsequent offline evaluation.

7 Starting up the device - Configuration

7.1 Measures to be performed prior to the initial commissioning

	NOTICE
	↳ Please observe the notices for device arrangement, see chapter 4.1 "Selecting a mounting location". ↳ If possible, always trigger the scanner with the aid of commands or an external signal transmitter (photoelectric sensor). ↳ Before commissioning, familiarize yourself with the operation and configuration of the device(s). ↳ Before connecting the supply voltage, recheck all connections and ensure that they have been properly made.

7.2 Starting the device

7.2.1 Interface

Proper function of the interface can be most easily tested in service operation using the serial interface with the Sensor Studio configuration software and a notebook computer.

7.2.2 Online commands

Using the online commands, important device functions can be checked, e.g. reading activation.

7.2.3 Problems

If a problem occurs that cannot be rectified even after checking all electrical connections and settings on the devices and on the host, contact your responsible Leuze subsidiary or Leuze customer service; see chapter 11 "Service and support".

7.3 Setting the communication parameters

You commissioned the device. Usually, you will have to configure it before you can use it. Using the configuration options offered in the *Sensor Studio* or by means of the device DTM, the device can be individually configured according to your application. For information on the various configuration options, see chapter 6 "Configuration and diagnostics software - Sensor Studio" or refer to the online help.

It is normally sufficient to set the code type and code length in accordance with the 1D or 2D codes that are to be read in order to be able to operate the device.

The setting of code type and code length is usually accomplished by using the *Sensor Studio* configuration software (see chapter 6 "Configuration and diagnostics software - Sensor Studio").

8 Configuration control

This chapter specifies the configuration commands of the device.

Notation

The interface protocol is described as a set of grammars, indicated by different type styles and symbols.

Example	Certification	Grammar
Text-Command	Italic type	Syntactic categories (non-terminals)
space	Bold type	Terminal symbols
%xx	Byte data	In Hex
0xFF	0x prefix indicating hexa-decimal	Literal byte values
'X'	Single quotes	Literal ASCII characters
SOH	All caps	Non-printable ASCII characters
esc | tab	Vertical line	Alternatives (this or that)
$data_{opt}$	$_{opt.}$ (opt subscript)	Optional terminals and non-terminals
$crc16_{nr}$	$_{nr}$ (nr subscript)	Applies to packets sent in non-raw mode, i. e. in packet mode

8.1 Configuration command architecture

This section describes the format of configuration commands that the device will accept to change and save configuration settings.

Command format

Primary category	Sub-category	Action code (S/P/R/G)	Parameter	Parameter value (when actions is S or P)
Example: SY, CM, etc.	Example: AZTC, SE, etc.	S – Change and save P – Change but do not save R – Reset to default value G – Get value in effect	Example: AL, BA , [, etc.	String of decimal number or text

Example: SYAZTCSPO1

This command sets the polarity to Inverse mode of the Aztec symbology and saves it to non-volatile memory. Breakdown of the command:

- SY = Symbology
- AZTC = Aztec
- S = Set
- PO = Polarity
- 1 = Inverse Mode

Example: SYAZTCSPO1,MR1

This compound command sets the polarity to Inverse mode of the Aztec symbology and sets the ability to read mirrored Aztec codes. It saves both to non-volatile memory. Breakdown of the command:

- SY = Symbology
- AZTC = Aztec
- S = Set
- PO = Polarity
- 1 = Inverse Mode
- MR = Mirror
- 1 = Enable

8.2 Supported commands

8.2.1 Symbology

Code description	Command format options				Default	Notes/examples	
Get all symbology parameters	SY	ALLS	G			Returns all symbology values in a single XML element **Example:** SYALLSG	
Australian Post – Get all parameters	SY	AUPO	G			Returns all Australian Post parameter values in an XML element. **Example**: SYAUPOG	
Australian Post	SY	AUPO	S/P/R/G	EN	0	0	Deactivate **Example:** SYAUPOSEN0
						1	Activate **Example:** SYAUPOSEN1
Australian Post – Strip checksum	SY	AUPO	S/P/R/G	SC	0	0	Deactivate **Example:** SYAUPOSSC0
						1	Activate **Example:** SYAUPOSSC1
						This setting value is ignored if Australian Post decoding is disabled.	
Aztec – Get all parameters	SY	AZTC	G			Returns all Aztec parameter values in an XML element. **Example**: SYAZTCG	
Aztec	SY	AZTC	S/P/R/G	EN	1	0	Deactivate **Example:** SYAZTCSEN0
						1	Activate Example: SYAZTCSEN1

Code description	Command format options				Default	Notes/examples	
Aztec – Polarity	SY	AZTC	S/P/R/G	PO	0	0	Normal mode enabled – black on white background **Example:** SYAZTCSPO0
						1	Inverse mode enabled – white on black background **Example:** SYAZTCSPO1
						2	Both normal and inverse mode enabled **Example:** SYAZTCSPO2
						Note: This setting value is ignored if Aztec decoding is disabled.	
Aztec – Mirror	SY	AZTC	S/P/R/G	MR	0	0	Deactivate **Example:** SYAZTCSMR0
						1	Activate Example: SYAZTCSMR1
						The ability to decode an Aztec code that has been printed as a mirror image of a standard Aztec code. **Note:** This setting value is ignored if Aztec decoding is disabled.	
BC412 – Get all parameters	SY	B412	G			Returns all BC412 parameter values in an XML element. **Example**: SYB412G	
BC412	SY	B412	S/P/R/G	EN	0	0	Deactivate **Example:** SYB412SEN0
						1	Activate Example: SYB412SEN1
BC412 – Reverse decoding	SY	B412	S/P/R/G	RD	0	0	Deactivate **Example:** SYB412SRD0
						1	Activate Example: SYB412SRD1
						The ability to decode a BC412 code that is printed in reverse. **Note:** This setting value is ignored if BC412 decoding is disabled.	
Canada Post	SY	CAPO	S/P/R/G	EN	0	0	Deactivate **Example:** SYCAPOSEN0
						1	Activate Example: SYCAPOSEN1
Codabar – Get all parameters	SY	CBAR	G			Returns all Codabar parameter values in an XML element. **Example**: SYCBARG	

Code description	Command format options				Default	Notes/examples	
Codabar	SY	CBAR	S/P/R/G	EN	1	0	Deactivate **Example:** SYCBARSEN0
						1	Activate Example: SYCBARSEN1
Codabar – Request checksum	SY	CBAR	S/P/R/G	CS	0	0	Disable checksum check and return checksum if one exists. **Example:** SYCBARSCS0
						1	Enable checksum check and return checksum. **Example:** SYCBARSCS1
						2	Enable checksum check and strip checksum. **Example:** SYCBARSCS2
						Note: This setting value is ignored if Codabar decoding is disabled.	
Codabar – Strip start/stop characters	SY	CBAR	S/P/R/G	SS	0	0	Deactivate **Example:** SYCBARSSS0
						1	Activate **Example:** SYCBARSSS1
						Note: This setting value is ignored if Codabar decoding is disabled.	
Codablock F	SY	CODF	S/P/R/G	EN	0	0	Deactivate **Example:** SYCODFSEN0
						1	Activate **Example:** SYCODFSEN1
Code 11 – Get all parameters	SY	CO11	G			Returns all Code 11 parameter values in an XML element. **Example**: SYBCO11G	
Code 11	SY	CO11	S/P/R/G	EN	0	0	Deactivate **Example:** SYCO11SEN0
						1	Activate **Example:** SYCO11SEN1
Code 11 – Checksum off / 1-digit / 2-digit	SY	CO11	S/P/R/G	CS	2	0	Decoding with checksum disabled **Example:** SYCO11SCS0
						1	Decoding with checking of one checksum digit. **Example:** SYCO11SCS1
						2	Decoding with checking of two checksum digits. **Example:** SYCO11SCS2
						Note: This setting value is ignored if Code 11 decoding is disabled.	

Code description	Command format options				Default	Notes/examples	
Code 11 – Checksum characters on/off	SY	CO11	S/P/R/G	SC	0	0	Deactivate **Example:** SYCO11SSC0
						1	Activate **Example:** SYCO11SSC1
						Note: This setting value is ignored if Code 11 decoding is disabled.	
Code 32	SY	CO32	S/P/R/G	EN	0	0	Deactivate **Example:** SYCO32SEN0
						1	Activate Example: SYCO32SEN1
Code 39 – Get all parameters	SY	CO39	G			Returns all Code 39 parameter values in an XML element. **Example**: SYCO39G	
Code 39	SY	CO39	S/P/R/G	EN	1	0	Deactivate **Example:** SYCO39SEN0
						1	Activate **Example:** SYCO39SEN1
Code 39 – Checksum off/on/on strip check character	SY	C039	S/P/R/G	CS	0	0	Disable checksum check and return checksum if one exists. **Example:** SYCO39SCS0
						1	Enable checksum check and return checksum. **Example:** SYCO39SCS1
						2	Enable checksum check and strip checksum from decoding data. **Example:** SYCO39SCS2
						Note: This setting value is ignored if Code 39 decoding is disabled.	
Code 39 – Extended ASCII on/off	SY	CO39	S/P/R/G	IO	0	0	Deactivate **Example:** SYCO39SEA0
						1	Activate **Example:** SYCO39SEA1
						Note: This setting value is ignored if Code 39 decoding is disabled.	
Code 39 – Start/stop on/off	SY	CO39	S/P/R/G	SS	0	0	Deactivate **Example:** SYCO39SSS0
						1	Activate **Example:** SYCO39SSS1
						Note: This setting value is ignored if Code 39 decoding is disabled.	
Code 49	SY	CO49	S/P/R/G	EN	1/0	0	Deactivate **Example:** SYCO49SEN0
						1	Activate **Example:** SYCO49SEN1

Code description	Command format options				Default	Notes/examples	
Code 93	SY	CO93	S/P/R/G	EN	1	0	Deactivate **Example:** SYCO93SEN0
						1	Activate **Example:** SYCO93SEN1
Code 128	SY	C128	S/P/R/G	EN	1	0	Deactivate **Example:** SYC128SEN0
						1	Activate **Example:** SYC128SEN1
Composite	SY	COMP	S/P/R/G	EN	0	0	Deactivate **Example:** SYCOMPSEN0
						1	Activate **Example:** SYCOMPSEN1
Data Matrix – Get all parameters	SY	DATM	G			Returns all Data Matrix parameter values in an XML element. **Example**: SYDATMG	
Data Matrix	SY	DATM	S/P/R/G	EN	1	0	Deactivate **Example:** SYDATMSEN0
						1	Activate **Example:** SYDATMSEN1
Data Matrix – Polarity	SY	DATM	S/P/R/G	PO	2	0	Normal mode enabled – black on white background **Example:** SYDATMSPO0
						1	Inverse mode enabled – white on black background **Example:** SYDATMSPO1
						2	Both normal and inverse mode enabled **Example:** SYDATMSPO2
						Note: This setting value is ignored if Data Matrix decoding is disabled.	
Data Matrix – Mirror	SY	DATM	S/P/R/G	MR	0	0	Deactivate **Example:** SYDATMSMR0
						1	Activate **Example:** SYDATMSMR1
						Note: This setting value is ignored if Data Matrix decoding is disabled.	
Data Matrix rectangular	SY	DATM	S/P/R/G	RE	1	0	Deactivate **Example:** SYDATMSRE0
						1	Activate **Example:** SYDATMSRE1
						Note: This setting value is ignored if Data Matrix decoding is disabled.	

Code description	Command format options				Default	Notes/examples	
Data Matrix rectangular extended	SY	DATM	S/P/R/G	RX	0	0	Deactivate **Example:** SYDATMSRX0
						1	Activate **Example:** SYDATMSRX1
						Note: This setting value is ignored if Data Matrix decoding is disabled.	
Grid Matrix – Get all parameters	SY	GDMX	G			Returns all Grid Matrix parameter values in an XML element. **Example**: SYGDMXG	
Grid Matrix	SY	GDMX	S/P/R/G	EN	0	0	Deactivate **Example:** SYGDMXSEN0
						1	Activate **Example:** SYGDMXSEN1
Grid Matrix – Polarity	SY	GDMX	S/P/R/G	PO	1	0	Normal mode enabled – black on white background **Example:** SYGDMXSPO0
						1	Inverse mode enabled – white on black background **Example:** SYGDMXSPO1
						2	Both normal and inverse mode enabled **Example:** SYGDMXSPO2
						Note: This setting value is ignored if Grid Matrix decoding is disabled.	
Grid Matrix – Mirror	SY	GDMX	S/P/R/G	MR	0	0	Deactivate **Example:** SYGDMXSMR0
						1	Activate **Example:** SYGDMXSMR1
						Note: This setting value is ignored if Grid Matrix decoding is disabled.	
Han Xin – Get all parameters	SY	HAXN	G			Returns all Han Xin parameter values in an XML element. **Example**: SYHAXNG	
Han Xin	SY	HAXN	S/P/R/G	EN	0	0	Deactivate **Example:** SYHAXNSEN0
						1	Activate **Example:** SYHAXNSEN1

Code description	Command format options				Default	Notes/examples	
Han Xin – Polarity	SY	HAXN	S/P/R/G	PO	0	0	Normal mode enabled – black on white background **Example:** SYHAXNSPO0
						1	Inverse mode enabled – white on black background **Example:** SYHAXNSPO1
						2	Both normal and inverse mode enabled **Example:** SYHAXNSPO2
						Note: This setting value is ignored if Han Xin decoding is disabled.	
Han Xin – Mirror	SY	HAXN	S/P/R/G	MR	0	0	Deactivate **Example:** SYHAXNSMR0
						1	Activate **Example:** SYHAXNSMR1
						Note: This setting value is ignored if Han Xin decoding is disabled.	
Hong Kong 2 of 5	SY	H2O5	S/P/R/G	EN	0	0	Deactivate **Example:** SYH2O5SEN0
						1	Activate **Example:** SYH2O5SEN1
Interleaved 2 of 5– Get all parameters	SY	I2O5	G			Returns all Interleaved 2 of 5 parameter values in an XML element. **Example**: SYI2O5G	
Interleaved 2 of 5	SY	I2O5	S/P/R/G	EN	1	0	Deactivate **Example:** SYI2O5SEN0
						1	Activate **Example:** SYI2O5SEN1
Interleaved 2 of 5 – Checksum options off/ on / strip checksum characters	SY	I2O5	S/P/R/G	CO	0	0	Disable checksum check and return checksum if one exists. **Example:** SYI2O5SCO0
						1	Enable checksum check and return checksum with decoding data. **Example:** SYI2O5SCO1
						2	Enable checksum check and strip checksum from decoding data. **Example:** SYI2O5SCO2
						Note: This setting value is ignored if Interleaved 2 of 5 decoding is disabled.	
Interleaved 2 of 5 – Length	SY	I2O5	S/P/R/G	LN	0	0	Minimum value **Example:** SYI2O5SLN0
						100	Maximum value **Example:** SYI2O5SLN100
						Note: This setting value is ignored if Interleaved 2 of 5 decoding is disabled.	

Code description	Command format options				Default	Notes/examples	
Japan Post	SY	JAPO	S/P/R/G	EN	0	0	Deactivate **Example:** SYJAPOSEN0
						1	Activate **Example:** SYJAPOSEN1
KIX (Dutch Post)	SY	KIX0	S/P/R/G	EN	0	0	Deactivate **Example:** SYKIX0SEN0
						1	Activate **Example:** SYKIX0SEN1
Korean Post	SY	KOPO	S/P/R/G	EN	0	0	Deactivate **Example:** SYKOPOSEN0
						1	Activate **Example:** SYKOPOSEN1
Matrix 2 of 5	SY	M2O5	S/P/R/G	EN	0	0	Deactivate **Example:** SYM2O5SEN0
						1	Activate **Example:** SYM2O5SEN1
Maxicode	SY	MAXC	S/P/R/G	EN	0	0	Deactivate **Example:** SYMAXCSEN0
						1	Activate **Example:** SYMAXCSEN1
MSI Plessey – Get all parameters	SY	MSIP	G			Returns all MSI Plessey parameter values in an XML element. **Example**: SYMSIPG	
MSI Plessey	SY	MSIP	S/P/R/G	EN	0	0	Deactivate **Example:** SYMSIPSEN0
						1	Activate **Example:** SYMSIPSEN1
MSI Plessey – Request checksum	SY	MSIP	S/P/R/G	CS	0	0	Deactivate **Example:** SYMSIPSCS0
						1	Activate **Example:** SYMSIPSCS1
						2	10/10 checksum type **Example:** SYMSIPSCS2
						3	11/10 checksum type **Example:** SYMSIPSCS3
						Note: This setting value is ignored if MSI Plessey decoding is disabled.	
MSI Plessey – Strip checksum	SY	MSIP	S/P/R/G	SC	0	0	Deactivate **Example:** SYMSIPSSC0
						1	Activate **Example:** SYMSIPSSC1
						Note: This setting value is ignored if MSI Plessey decoding is disabled.	

Code description	Command format options				Default	Notes/examples	
Plessey – PLE	SY	MSIP	S/P/R/G	PE	0	0	Deactivate **Example:** SYMSIPSPE0
						1	Activate **Example:** SYMSIPSPE1
NEC 2 of 5 – Get all parameters	SY	N2O5	G			Returns all NEC 2 of 5 parameter values in an XML element. **Example**: SYN2O5G	
NEC 2 of 5	SY	N2O5	S/P/R/G	EN	0	0	Deactivate **Example:** SYN2O5SEN0
						1	Activate **Example:** SYN2O5SEN1
NEC 2 of 5 – Request checksum	SY	N2O5	S/P/R/G	CS	0	0	Deactivate **Example:** SYN2O5SCS0
						1	Activate **Example:** SYN2O5SCS1
						Note: This setting value is ignored if NEC 2 of 5 decoding is disabled.	
PDF417	SY	P417	S/P/R/G	EN	1	0	Deactivate **Example:** SYP417SEN0
						1	Activate **Example:** SYP417SEN1
Micro PDF417	SY	P417	S/P/R/G	MI	0	0	Deactivate **Example:** SYP417SMI0
						1	Activate **Example:** SYP417SMI1
Pharmacode – Get all parameters	SY	PHCO	G			Returns all Pharmacode parameter values in an XML element. **Example**: SYPHCOG	
Pharmacode	SY	PHCO	S/P/R/G	EN	0	0	Deactivate **Example:** SYPHCOSEN0
						1	Activate **Example:** SYPHCOSEN1
Pharmacode – Reverse	SY	PHCO	S/P/R/G	RV	0	0	Deactivate **Example:** SYPHCOSRV0
						1	Activate **Example:** SYPHCOSRV1
						Note: This setting value is ignored if Pharmacode decoding is disabled.	

Code description	Command format options				Default	Notes/examples	
Pharmacode – Support color bars	SY	PHCO	S/P/R/G	CB	0	0	Deactivate **Example:** SYPHCOSCB0
						1	Activate **Example:** SYPHCOSCB1
						Note: This setting value is ignored if Pharmacode decoding is disabled.	
Pharmacode – Bar count min.	SY	PHCO	S/P/R/G	CN	4	4	Minimum value **Example:** SYPHCOSCN4
						Note: This setting value is ignored if Pharmacode decoding is disabled.	
Pharmacode – Bar count max.	SY	PHCO	S/P/R/G	CX	16	16	Maximum value **Example:** SYPHCOSCX16
						Note: This setting value is ignored if Pharmacode decoding is disabled.	
Pharmacode – Min. value	SY	PHCO	S/P/R/G	MI	15	15	Minimum value **Example:** SYPHCOSMI15
						Note: This setting value is ignored if Pharmacode decoding is disabled.	
Pharmacode – Max. value	SY	PHCO	S/P/R/G	MX	131070	131070	Maximum value **Example:** SYPHCOSMX131070
						Note: This setting value is ignored if Pharmacode decoding is disabled.	
QR Code – Get all parameters	SY	QRCO	G			Returns all QR Code parameter values in an XML element. **Example**: SYQRCOG	
QR code	SY	QRCO	S/P/R/G	EN	1	0	Deactivate **Example:** SYQRCOSEN0
						1	Activate **Example:** SYQRCOSEN1
QR Code – Polarity	SY	QRCO	S/P/R/G	PO	0	0	Normal mode enabled – black on white background **Example:** SYQRCOSPO0
						1	Inverse mode enabled – white on black background **Example:** SYQRCOSPO1
						2	Both normal and inverse mode enabled **Example:** SYQRCOSPO2
						Note: This setting value is ignored if QR Code decoding is disabled.	
Micro QR code	SY	QRCO	S/P/R/G	MI	0	0	Deactivate **Example:** SYQRCOSMI0
						1	Activate **Example:** SYQRCOSMI1

Code description	Command format options				Default	Notes/examples	
QR Code – Mirror	SY	QRCO	S/P/R/G	MR	0	0	Deactivate **Example:** SYQRCOSMR0
						1	Activate **Example:** SYQRCOSMR1
						Note: This setting value is ignored if QR Code decoding is disabled.	
QR Code – Mode 1	SY	QRCO	S/P/R/G	M1	0	0	Deactivate **Example:** SYQRCOSM10
						1	Activate **Example:** SYQRCOSM11
						Note: This setting value is ignored if QR Code decoding is disabled.	
QR Code – Custom	SY	QRCO	S/P/R/G	CQ	0	0	Deactivate **Example:** SYQRCOSCQ0
						1	Activate **Example:** SYQRCOSCQ1
						Note: This setting value is ignored if QR Code decoding is disabled.	
Straight 2 of 5	SY	S2O5	S/P/R/G	EN	0	0	Deactivate **Example:** SYS2O5SEN0
						1	Activate **Example:** SYS2O5SEN1
Telepen – Get all parameters	SY	TELP	G			Returns all Telepen parameter values in an XML element. **Example**: SYTELPG	
Telepen	SY	TELP	S/P/R/G	EN	0	0	Deactivate **Example:** SYTELPSEN0
						1	Activate **Example:** SYTELPSEN1
Telepen – Output ASCII	SY	TELP	S/P/R/G	OA	0	0	Deactivate **Example:** SYTELPSOA0
						1	Activate **Example:** SYTELPSOA1
						Note: This setting value is ignored if Telepen decoding is disabled.	
Trioptic – Get all parameters	SY	TRIO	G			Returns all Trioptic parameter values in an XML element. **Example**: SYTRIOG	
Trioptic	SY	TRIO	S/P/R/G	EN	0	0	Deactivate **Example:** SYTRIOSEN0
						1	Activate **Example:** SYTRIOSEN1

Code description	Command format options				Default	Notes/examples	
Trioptic – Reverse	SY	TRIO	S/P/R/G	RV	0	0	Deactivate **Example:** SYTRIOSRV0
						1	Activate **Example:** SYTRIOSRV1
						Note: This setting value is ignored if Trioptic decoding is disabled.	
Trioptic – Start/stop	SY	TRIO	S/P/R/G	SS	0	0	Deactivate **Example:** SYTRIOSSS0
						1	Activate **Example:** SYTRIOSSS1
						Note: This setting value is ignored if Trioptic decoding is disabled.	
UK Royal Mail	SY	UKRO	S/P/R/G	EN	0	0	Deactivate **Example:** SYUKROSEN0
						1	Activate **Example:** SYUKROSEN1
UK Royal Mail – Request check character	SY	UKRO	S/P/R/G	CC	0	0	Deactivate **Example:** SYUKROSCC0
						1	Activate **Example:** SYUKROSCC1
						Note: This setting value is ignored if UK Royal Mail decoding is disabled.	
UPC/EAN – Get all parameters	SY	UPC0	G			Returns all UPC/EAN parameter values in an XML element. **Example**: SYUPC0G	
UPC/EAN	SY	UPC0	S/P/R/G	EN	1/0	0	Deactivate **Example:** SYUPC0SEN0
						1	Activate **Example:** SYUPC0SEN1
UPC/EAN – Expand UPC-E to UPC-A	SY	UPC0	S/P/R/G	IO	1	0	Deactivate **Example:** SYUPC0SEA0
						1	Activate **Example:** SYUPC0SEA1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Supplemental	SY	UPC0	S/P/R/G	SU	0	0	Deactivate **Example:** SYUPC0SSU0
						1	Activate **Example:** SYUPC0SSU1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	

Code description	Command format options				Default	Notes/examples	
UPC/EAN – Expand EAN-8 to EAN-13	SY	UPC 0	S/P/R/G	E8	0	0	Deactivate **Example:** SYUPC0SE80
						1	Activate **Example:** SYUPC0SE81
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Expand UPC-A to EAN-13	SY	UPC 0	S/P/R/G	Field staff	0	0	Deactivate **Example:** SYUPC0SAD0
						1	Activate **Example:** SYUPC0SAD1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Convert Bookland EAN-13 to ISBN	SY	UPC 0	S/P/R/G	DI	0	0	Deactivate **Example:** SYUPC0SDI0
						1	Activate **Example:** SYUPC0SDI1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Convert Bookland EAN-13 to ISSN	SY	UPC 0	S/P/R/G	DN	0	0	Deactivate **Example:** SYUPC0SDN0
						1	Activate **Example:** SYUPC0SDN1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Send UPC-A checksum	SY	UPC 0	S/P/R/G	AC	0	0	Deactivate **Example:** SYUPC0SAC0
						1	Activate **Example:** SYUPC0SAC1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Send UPC-A number system	SY	UPC 0	S/P/R/G	ON	0	0	Deactivate **Example:** SYUPC0SAN0
						1	Activate **Example:** SYUPC0SAN1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Send UPC-E checksum	SY	UPC 0	S/P/R/G	EC	0	0	Deactivate **Example:** SYUPC0SEC0
						1	Activate **Example:** SYUPC0SEC1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	

Code description	Command format options				Default	Notes/examples	
UPC/EAN – Send UPC-E number system	SY	UPC0	S/P/R/G	ES	0	0	Deactivate **Example:** SYUPC0SES0
						1	Activate **Example:** SYUPC0SES1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Send EAN-13 checksum	SY	UPC0	S/P/R/G	DC	0	0	Deactivate **Example:** SYUPC0SDC0
						1	Activate **Example:** SYUPC0SDC1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Send EAN-8 checksum	SY	UPC0	S/P/R/G	8C	0	0	Deactivate **Example:** SYUPC0S8C0
						1	Activate **Example:** SYUPC0S8C1
						Note: This setting value is ignored if UPC/EAN decoding is disabled.	
UPC/EAN – Send AIM modifier	SY	UPC0	S/P/R/G	AM	0	0	Deactivate **Example:** SYUPC0SAM0
						1	Activate **Example:** SYUPC0SAM1
USPS Planet	SY	USPL	S/P/R/G	EN	0	0	Deactivate **Example:** SYUSPLSEN0
						1	Activate **Example:** SYUSPLSEN1
USPS Postnet	SY	USPO	S/P/R/G	EN	0	0	Deactivate **Example:** SYUSPOSEN0
						1	Activate **Example:** SYUSPOSEN1
UPU ID Tags	SY	UPUI	S/P/R/G	EN	0	0	Deactivate **Example:** SYUPUISEN0
						1	Activate **Example:** SYUPUISEN1
USPS Intelligent Mail	SY	USIM	S/P/R/G	EN	0	0	Deactivate **Example:** SYUSIMSEN0
						1	Activate **Example:** SYUSIMSEN1

8.2.2 Communication

Code description	Command format options				Default	Notes/examples	
Get all communication parameters	CM	CM	G			Example: CMCMG	
Communication mode	CM	MO	S/P/R/G	CM	UK	SI	RS-232 serial **Example:** CMMOSCMSE
						UK	USB keyboard **Example:** CMMOSCMUK
						UV	USB VCOM **Example:** CMMOSCMUV
						UN	USB native **Example:** CMMOSCMUN
						UP	USB HID POS **Example:** CMMOSCMUP
						UC	USB CDC VCOM **Example:** CMMOSCMUC
Communication protocol	CM	CP	S/P/R/G	PM	0	0	Raw mode **Example:** CMCPSPM0
						1	Packet mode **Example:** CMCPSPM1
Connection retry timeout (s)	CM	GE	S/P/R/G	CR	5000	If the reader disconnects, it will try to reconnect after the timeout interval in seconds. Valid range: **Example**: CMGESCR5000	
RS-232 interface – Get all parameters	CM	SI	G			Returns all serial communication parameter values in an XML element. **Example**: CMSEG	

Code description	Command format options				Default	Notes/examples	
RS-232 interface – Baud rate	CM	SI	S/P/R/G	BA	115200	1200	1200 bits per second **Example:** CMSESBA1200
						2400	2400 bits per second **Example:** CMSESBA2400
						4800	4800 bits per second **Example:** CMSESBA4800
						9600	9600 bits per second **Example:** CMSESBA9600
						19200	19200 bits per second **Example:** CMSESBA19200
						38400	38400 bits per second **Example:** CMSESBA38400
						57600	57600 bits per second **Example:** CMSESBA57600
						115200	115200 bits per second **Example:** CMSESBA115200
						Supported baud rate	
RS-232 interface – Data bits	CM	SI	S/P/R/G	DB	8	7	7 data bits **Example:** CMSESDB7
						8	8 data bits Example: CMSESDB8
						Number of bits per character	
RS-232 interface – Stop bit	CM	SI	S/P/R/G	SB	1	1	1 stop bit **Example:** CMSESSB1
						2	2 stop bits **Example:** CMSESSB2
						Number of stop bits sent	
RS-232 interface – Parity	CM	SI	S/P/R/G	PA	N	N	None – No parity bits **Example:** CMSESPAN
						E	Even parity bit **Example:** CMSESPAE
						O	Odd parity bit **Example:** CMSESPAO
						A parity bit, or check bit, is a bit added to a string of binary code to ensure that the total number of 1-bits in the string is even or odd.	

Code description	Command format options				Default	Notes/examples	
RS-232 interface – Flow control	CM	SI	S/P/R/G	FC	0/1	0	**Example:** CMSESFC0
						1	**Example:** CMSESFC1
						2	Enables flow control (used in POS interfaces). The reader sets RTS high and waits for CTS high before sending the data. Or RTS remains low. **Example:** CMSESFC2
						Send flow control	
RS-232 interface – Signal polarity	CM	SI	S/P/R/G	PO	0	0	Standard or non-inverted UART0 signals **Example:** CMSESPO0
						1	Inverted UART0 signals **Example:** CMSESPO1
						Note: UART1 does not have polarity control **Note:** The default polarity is controlled by the STRAP[3] value at power up.	

8.2.3 USB and HID

Tab. 8.1: USB and HID

Code description	Command format options				Default	Notes/examples	
USB – Get all parameters	CM	UB	G			Returns all USB communication parameter values in an XML element. **Example**: CMUBG	
USB – Manufacturer	CM	UB	S/P/R/G	MF	LEUZE	A string representing the name of the product manufacturer **Example**: CMUBSMFLEUZE	
USB – Part number	CM	UB	S/P/R/G	PN	DCR50	A string representing the part number or name of the product **Example:** CMUBSPNDCR50	
USB – Full speed	CM	UB	S/P/R/G	FS	0	0	Disable full speed **Example:** CMUBSFS0
						1	Enable full speed **Example:** CMUBSFS1
HID keyboard – Get all parameters	CM	HD	G			Returns all HID keyboard parameter values in an XML element. **Example**: CMHDG	
HID keyboard – Inter-character delay (ms)	CM	HD	S/P/R/G	IC	0	In milliseconds **Valid range:** 0 – 10000 **Example:** CMHDSIC4	
HID keyboard – Inter-scan delay (ms)	CM	HD	S/P/R/G	IS	0	In milliseconds **Valid range:** 0 – 10000 **Example:** CMHDSIS4	

Code description	Command format options				Default	Notes/examples	
HID keyboard – Release delay (ms)	CM	HD	S/P/R/G	RL	0	In milliseconds **Valid range:** 0 – 10000 **Example:** CMHDSRL4	
HID keyboard – Control characters	CM	HD	S/P/R/G	CC	0	0	Use language **Example:** CMHDSCC0
						1	Use Ctrl+<char> **Example:** CMHDSCC1
						2	Use Alt+<keypad> **Example:** CMHDSCC2
						3	Use Alt+0<keypad> **Example:** CMHDSCC3
						Handling of character values in the range 0x00 to 0x1F	
HID keyboard – Decoding data input conversion	CM	HD	S/P/R/G	IE	0	0	ASCII – No conversion **Example:** CMHDSIE0
						1	ASCII to Unicode code point **Example:** CMHDSIE1
						2	UTF-8 to Unicode code point **Example:** CMHDSIE2
HID keyboard – Decoding data output conversion	CM	HD	S/P/R/G	OM	0	0	Unicode as XML lookup **Example:** CMHDSOM0
						1	Unicode as Windows-Alt sequence **Example:** CMHDSOM1
						Note: This parameter is only relevant where Input Conversion > 0	
HID keyboard – Windows code page for extended ASCII characters	CM	HD	S/P/R/G	IO	0	0	Append leading zero (code page 1232) **Example**: CMHDSEA0
						1	Do not append leading zero (code page 437) **Example**: CMHDSEA1
						Extended ASCII characters [0x80, 0xFF] are output as Alt sequences with or without a leading zero which Windows uses to determine whether to display the character from CP1232 or CP437. This only applies when "HID keyboard – Decoding data output conversion" is set to Unicode as a Windows-Alt sequence.	
USB keyboard – Get all parameters	CM	UK	G			Returns all USB keyboard parameter values in an XML element. **Example**: CMUKG	

Code description	Command format options				Default	Notes/examples	
USB keyboard – Number of endpoints	CM	UK	S/P/R/G	NE	1	1	One endpoint **Example:** CMUKSEN1
						2	Two endpoints **Example:** CMUKSEN2
USB keyboard – Declaration wait state	CM	UK	S/P/R/G	EM	0	0	Declare enumeration when addressed **Example:** CMUKSEM0
						1	Declare enumeration after receipt of output report **Example:** CMUKSEM1
						2	Declare enumeration after receipt of "Get report" descriptor **Example:** CMUKSEM2
						3	Declare enumeration after receipt of output report or "Get report" descriptor **Example:** CMUKSEM3
USB keyboard – Use serial number	CM	UK	S/P/R/G	SN	0/1	0	**Example:** CMUKSSN0
						1	**Example:** CMUKSSN1
						2	If the serial number is defined, the actual serial number of the reader is used for the USB identification strings. In some cases, however, more than one device is connected to a modem and must report a serial number of "0000000" in order to register correctly at the modem.
USB keyboard – IN endpoint polling interval (µs)	CM	UK	S/P/R/G	IN	1000	Controls the USB HID keyboard IN endpoint polling interval **Example:** CMUKSIN1000	
USB vendor – Use serial number	CM	UN	S/P/R/G	SN	0/1	0	**Example:** CMUNSSN0
						1	**Example:** CMUNSSN1
						2	If the serial number is defined, the actual serial number of the reader is used for the USB identification strings. In some cases, however, more than one device is connected to a modem and must report a serial number of "0000000" in order to register correctly at the modem.
USB vendor – IN endpoint polling interval (µs)	CM	UN	S/P/R/G	IN	1000	Controls the USB HID vendor IN endpoint polling interval **Example:** CMUNSIN1000	

Code description	Command format options				Default	Notes/examples	
USB VCOM – Use serial number	CM	UV	S/P/R/G	SN	0/1	0	**Example:** CMUVSSN0
						1	**Example:** CMUVSSN1
						2	If the serial number is defined, the actual serial number of the reader is used for the USB identification strings. In some cases, however, more than one device is connected to a modem and must report a serial number of "0000000" in order to register correctly at the modem.
USB HID POS – Use serial number	CM	UP	S/P/R/G	SN	0/1	0	**Example:** CMUPSSN0
						1	**Example:** CMUPSSN1
						2	If the serial number is defined, the actual serial number of the reader is used for the USB identification strings. In some cases, however, more than one device is connected to a modem and must report a serial number of "0000000" in order to register correctly at the modem.

Tab. 8.2: HID language support

Code description	Command format options				Default	Notes/examples
Get all language parameters	LA	IN	G			Get all language settings Example: LAING
Active language	LA	IN	S/P/R/G	AL	USEnglish_Win	Active language setting **Valid range:** Languages listed by the LAINGIL command **Example:** LAINGAL
Get installed languages list	LA	IN	G	IL		List installed language names **Example:** LAINGIL

8.2.4 Packet and protocol parameters

Code description	Command format options				Default	Notes/examples
Packet – Get all parameters	PK	OP	G			Returns all packet parameter values in an XML element. **Example**: PKOPG
Receive timeout (ms)	PK	OP	S/P/R/G	RT	250	If a retry count is specified and the reader does not receive the ACK, it will resend the response after the timeout. In milliseconds **Example**: PKOPSRT250

Code description	Command format options				Default	Notes/examples
Connection protocol timeout (s)	PK	OP	S/P/R/G	CT	60	When sending fragmented data in packet mode, this timeout specifies the maximum time between two fragments. The reader cancels the transaction when the timeout expires and the reader did not receive new fragmented data. In seconds **Example**: PKOPSCT120
Reader retry count	PK	OP	S/P/R/G	RC	0	Number of retries by the reader if no ACK is received from the host. **Example**: PKOPSRC1

8.2.5 Decoder and general decoding parameters

Code description	Command format options				Default	Notes/examples
Get all decoder parameters	CD	CD	G			Returns all decoder parameter values in an XML element. **Example**: CDCDG
	CD	DP				DPM parameters (not supported)
Decoder timing – Get all parameters	CD	DT	G			Returns all decoder timing parameter values in an XML element. **Example**: CDDTG
Decoding time limit (ms)	CD	DT	S/P/R/G	TL		The time in milliseconds that the decoder needs to perform a decoding attempt before a decoding error is returned. **Example:** CDDTSTL9830720 9830720 = 0x00960140 (0x0096 = 150; 0x0140 = 320) where 320 ms is the total time and 150 ms is the local time for the bar code
Get all decoder operational parameters	CD	OP	G			Returns all decoder operational parameter values in an XML element. **Example**: CDOPG
Maximum decodes per read	CD	OP	S/P/R/G	PR	1	The reader will process up to this number of bar codes per read. If there are more bar codes in the field of view and target tolerance, only the first ones will be decoded. Valid range: 1 to 16 **Example**: CDOPSPR2

Code description	Command format options				Default	Notes/examples	
Ensure region of interest	CD	OP	S/P/R/G	RO	0	0	Disable ROI **Example**: CDOPSRO0
						1	Enable ROI **Example**: CDOPSRO1
						Ensures that the decoded bar code is always inside the region of interest. When disabled, the bar code may be decoded as long as it is partially inside the ROI.	
Region of interest leftmost pixel	CD	OP	S/P/R/G	RL	0	ROI left	
Region of interest topmost pixel	CD	OP	S/P/R/G	RT	0	ROI top	
Region of interest width (pixels)	CD	OP	S/P/R/G	RW		ROI width	
Region of interest height (pixels)	CD	OP	S/P/R/G	RH		ROI height	
Low contrast 1D	CD	OP	S/P/R/G	LC	0	0	Disable low contrast **Example:** CDOPSLC0
						1	Enable low contrast **Example:** CDOPSLC1
FOI zoom	CD	OP	S/P/R/G	ZR	0	0	Disable FOI zoom Example: CDOPSZR0
						1	Enable FOI zoom Example: CDOPSZR1
						Increases the FOI resolution to robustly decode small bar codes when the FOI is set to a sub-region of the entire FOI. For faster speed, set the FOI width * FOI height to < 320 * 480.	
Enhance contrast	CD	OP	S/P/R/G	EC	0	0	Deactivate **Example:** CDOPSEC0
						1	Activate **Example:** CDOPSEC1
						Enhances the image contrast before decoding	

Code description	Command format options				Default	Notes/examples	
1D bar code aggressiveness	CD	OP	S/P/R/G	SI	0	0	Most aggressive **Example:** CDOPSSE0
						1	Less aggressive for poorly printed 1D bar codes. **Example:** CDOPSSE1
						2	Least aggressive for poorly printed 1D bar codes. **Example:** CDOPSSE2
						11	Less aggressive for 1D bar codes with low modulus size **Example:** CDOPSSE11
						12	Least aggressive for 1D bar codes with low modulus size **Example:** CDOPSSE12
Decoding attempt time	CD	OP	S/P/R/G	AT	0	Attempt time (same as "sticky time" in CR8x) **Example:** CDOPSAT0	
Stop decoding on duplicate	CD	OP	S/P/R/G	SD	0	Instructs the decoder to stop looking for decodes in the current image when a duplicate is found.	
Cellphone enable	CD	OP	S/P/R/G	CE	0	0	Disable cellphone reading mode
						1	Enable cellphone reading mode
Upload images	CD	OP	S/P/R/G	DI	0	0	Disable image uploading **Example:** CDOPPDI0
						1	Enable uploading **Example:** CDOPPDI1
						When "Upload images" is set, each image captured by the reader will be sent as a stream of data to the host.	
Decode trigger mode	CD	OP	S/P/R/G	MD	0	0	Trigger mode (default) **Example:** CDOPSMD0
						1	Motion detection mode **Example:** CDOPSMD1
						2	Continuous scan mode **Example:** CDOPSMD2
						Notes: TBD	

Code description	Command format options				Default	Notes/examples	
Target tolerance (percent)	CD	VA	S/P/R/G	TT	1600	For the reader to accept a bar code, it must be within a certain distance from the center of the image. The distance is defined as a percentage of the bar code's smaller dimension. For example, with a 10 x 20 mm bar code and a setting of 150 (%), the bar code must be within 15 mm of the center of the image. Any value over 1000 is considered infinite tolerance, and no target checking is performed. Valid range: 1 to 1000 **Example**: CDVASTT1600	
Duplicate block time (ms)	CD	VA	S/P/R/G	BT	0	**Example**: CDVASBT100	
Block duplicates	CD	VA	S/P/R/G	BD	0	0	Disable – do not block duplicates **Example**: CDVASBD0
						1	Enable - block duplicates for the amount of time set in DCVAGBT **Example**: CDVASBD1
						If enabled, the reader will not output the same bar code until the bar code has not been detected for the "Duplicate block time" period.	

Code description	Command format options				Default	Notes/examples	
Selection of data processing format	CD	OP	S/P/R/G	FO	0	0	Do not format the data output **Example**: CDOPSFO0
						1	Format the data with prefix/suffix or data configuration string **Example**: CDOPSFO1
						2	Perform match string validation* **Example**: CDOPSFO2
						3	Perform GS1 validation* **Example**: CDOPSFO3
						4	Perform UDI validation **Example**: CDOPSFO4
						5	Perform ISO15434 validation **Example**: CDOPSFO5
						6	Perform ISO15434 und ISO15418 validation **Example**: CDOPSFO6
						8	Perform simple age verification without configuration **Example**: CDOPSFO8
						9	Perform DL parsing with configuration string **Example**: CDOPSFO9
						10	Perform DL parsing without configuration **Example**: CDOPSFO10
						11	Perform Success and Raw validation **Example**: CDOPSFO11
Simple prefix	CD	OP	S/P/R/G	PX		Data formatting, prefix **Example**: CDOPSPX	
Simple suffix	CD	OP	S/P/R/G	SX		Data formatting, suffix **Example**: CDOPSSX	
Output in uppercase letters, lowercase letters or bracketed hex bytes	CD	OP	S/P/R/G	FC			Uppercase
							Lowercase
							Hex bytes
						Data formatting output case/hex **Example**: CDOPSFC	
Full data format string	CD	OP	S/P/R/G	FD		Configuration string for data formatting raw format **Example**: CDOPSFD	
Configuration string for validation and public sector	CD	OP	S/P/R/G	FP		Configuration string for validation and public sector **Example**: CDOPSFP	

8.2.6 Power mode parameters

Code description	Command format options				Default	Notes/examples	
Get All Power Management Parameters	PM	PM	G			Returns all power management parameter values in an XML element. **Example**: PMPMG	
Standby Mode Timer	PM	SB	S/P/R/G	EN	0	0	Disable Standby Mode Timer **Example**: PMSBSEN0
						1	Enable Standby Mode Timer **Example**: PMSBSEN1
Standby Mode Timer Delay (ms)	PM	SB	S/P/R/G	VA	5000	If Standby Mode Timer is enabled, the device will go into Standby Mode after this timer has expired. Valid range: **Example**: PMSBSVA2000	
Sleep Mode Timer	PM	SM	S/P/R/G	EN	0	0	Disable Sleep Mode Timer **Example**: PMSMSEN0
						1	Enable Sleep Mode Timer **Example**: PMSMSEN1
						The Standby Mode Timer must be enabled for the device to go into Sleep Mode.	
Sleep Mode Timer Delay (ms)	PM	SM	S/P/R/G	VA	3600	If both Standby Mode Timer and Sleep Mode Timer are enabled, the device will go into Sleep Mode after this timer has expired. Valid range: **Example**: PMSMSVA3600	
Sleep Mode Timer – Maintain Connection	PM	SM	S/P/R/G	MC	1	0	Disconnect from host in Sleep Mode **Example**: PMSMSMC0
						1	Retain connection in Sleep Mode **Example**: PMSMSMC1
Power Mode Enter Sleep	PM	ES				Forces the device to go into Sleep Mode even if Standby Mode Timer and Sleep Mode Timer are disabled. This command should be sent as RAW. The device will immediately go into Sleep Mode after receiving this command. Example: PMES	

8.2.7 General reader information

Code description	Command format options				Default	Notes/examples
Get all reader information parameters	RD	RD	G			Returns all reader information parameter values in an XML element. **Example**: RDRDG
Get all firmware information	RD	FW	G			Returns all firmware parameter values in an XML element. **Example**: RDFWG
Firmware major version	RD	FW	G	MJ		Returns the firmware major version as a parameter value in an XML element. **Example**: RDFWGMJ
Firmware minor version	RD	FW	G	MN		Returns the firmware minor version as a parameter value in an XML element. **Example**: RDFWGMN
Firmware build version	RD	FW	G	BU		Returns the firmware build version as a parameter value in an XML element. **Example**: RDFWGBU
Decoder version	RD	FW	G	DV		Returns the decoder version as a parameter value in an XML element. **Example**: RDFWGDV
Chip revision	RD	CP	G	RV		Returns the chip revision as a parameter value in an XML element **Example**: RDCPGRV
Reader serial number	RD	CP	G	SN		Returns the reader serial number as a parameter value in an XML element **Example**: RDCPGSN
Reader information	RD	RR	G			Returns the reader information as a parameter value in an XML element **Example**: RDRRG
Reader ID	RD	RR	G	ID		Returns the reader ID as a parameter value in an XML element. **Example**: RDRRGID
Hardware revision	RD	RR	G	HR		Returns the reader hardware revision as a parameter value in an XML element. **Example**: RDRRGHR
Reader model type	RD	RR	S/P/R/G	MT	0	DCR 50 **Example**: RDRRSMT6
Reader information string	RD	RR	G	IS		Returns the reader information string as a parameter value in an XML element. **Example**: RDRRGIS
Reader output format – Line ending	RD	OF	S/P/R/G	LE	<CR><LF> (%0D %0A)	Defines the line ending for the output format. Non-printable ASCII characters must be set using a URL-encoded hex value. **Example**: RDOFSLE%0D%0A
Reader command – Process bar code data	RD	CM	X	BD	<data>	Sends <data> to the host as bar code data **Example:** RDCMXBD12345

Code description	Command format options				Default	Notes/examples
Reader command – Reboot	RD	CM	X	RB	1	Reboots the reader **Example**: RDCMXRB1
Reader command – Post event	RD	CM	X	EV		Posts an event. If the event has parameters, it uses P1 and P2. The values for these parameters are specified after each parameter. **Example**: Posts an event to start a single decode RDCMXEV1, P11, P20
				P1		(See the reader command list below)
				P2		(See the reader command list below)
				P3		(See the reader command list below)
				P4		(See the reader command list below)
				PL		(See the reader platform command below)
RDCMX Reader command execute list						
	EV 1	P10				Stop decoding
		P11	P20			Start single decode
		P11	P21			Start continuous decoding
	EV 2	P10				Disable targeting
		P11				Enable targeting
RDCMXPL Reader command to set a platform configuration		"<Configuration>"			Quoted string containing the configuration control command. The configuration is saved and restored on reboot/restart. Enclose the command in square brackets (inside the quotes) and add a caret between the opening square bracket and command to delete a command from the platform configuration. Save example: RDCMXPL"FBGRPBI1" Delete example: RDCMXPL"[^FBGRPBI1]"	
Get all reader licenses	RD	LC	G	GL		Returns all reader license values in an XML element. **Example**: RDLCGGL
Load license	RD	LC	X	LD	"URL-encoded license string"	Loads the license on the reader Copies the contents of the license CRB file, starting after the '?' character, for use as the URL-encoded license string. This string must be in quotes in the command. **Example**: RDLCXLD"%23%45…."
Delete license	RD	LC	X	DL	License number	Deletes a license The license number is an integer that represents just the license number, not the serial number of the license you want to delete. **Example**: RDLCXDL5000

8.2.8 Reader configuration

Code description	Command format options				Default	Notes/examples
Get All Reader Parameters	CF		G			Returns all Reader Parameter values in an XML element. Example: CFG
Reset Reader to Factory Default	CF		R			Resets all reader parameters to factory default values. Example: CFR

8.2.9 General firmware operation

Code description	Command format options				Default	Notes/examples	
Get All Firmware Parameters	FW	FW	G			Returns all firmware parameter values in an XML element. **Example**: FWFWG	
Echo option	FW	CM	S/P/R/G	OE	0	0	Disable Raw Command Echoing **Example**: FWCMSOE0
						1	Enable Raw Command Echoing **Example**: FWCMSOE1
Raw Command Enable	FW	CM	S/P/R/G	OR	0	0	Disable Raw Commands **Example**: FWCMSOR0
						1	Enable Raw commands **Example**: FWCMSOR1

8.2.10 General reader feedback parameters

Code description	Command format options				Default	Notes/examples	
Get all reader feedback parameters	FB	FB	G			Returns all reader feedback parameter values in an XML element. **Example**: FBFBG	
Good-read indication – Frequency (Hz)	FB	GR	S/P/R/G	FQ	2730	Good-read beep output frequency Valid range: **Example**: FBGRSFQ2730	
Good-read indication – Beep volume (percent)	FB	GR	S/P/R/G	VO	100	**Valid range:** 0 to 100 percent **Example**: FBGRSVO100	
Good-read indication – Beep as IO	FB	GR	S/P/R/G	BI	0	0	The good-read indication is an acoustic signal output with a frequency defined by FBGRGFQ **Example**: FBGRSBI0
						1	The good-read indication is an IO signal **Example**: FBGRSBI1

8.2.11 Setup default AGC mode

Code description	Command format options				Default	Notes/examples	
Get All Scene Manager Parameters	SC	SC	G			Returns all Scene Manager parameter values in an XML element. **Example**: SCSCG	
Scene Manager Mode	SC	SP	S/P/R/G	MO	NO	NO	Normal AGC Mode **Example**: SCSPSMONO
						BY	Bypass AGC Mode **Example**: SCSPSMOBY
						FX	Fixed AGC Mode **Example**: SCSPSMOFX
Set Imager Exposure	SC	SP	S/P/R/G	EX		This defines the imager exposure in Bypass AGC Mode. **Example**: SCSPSEX50	
Set Imager Gain	SC	SP	S/P/R/G	GN		This defines the imager gain in Bypass AGC Mode. **Example**: SCSPSGN50	
Set Imager Illumination	SC	SP	S/P/R/G	IL		This defines the Imager Illumination in Bypass AGC Mode. **Example**: SCSPSIL50	
Set Fixed percent (percent)	SC	SP	S/P/R/G	FP		Set Fixed percent Valid Range: 0 to 100 Example:	

8.2.12 Setup AGC parameters

Code description	Command format options				Default	Notes/examples
Get all AGC parameters	AG	AG	G			Returns all AGC parameters values in an XML element. **Example**: AGAGG
AGC time limit	AG	TM	S/P/R/G	HQ	360	AGC time limit for high quality Valid range: **Example**: AGTMSHQ360
AGC time limit for medium quality	AG	TM	S/P/R/G	MQ	320	AGC time limit for medium quality Valid range: **Example**: AGTMSMQ320
AGC time limit for low quality	AG	TM	S/P/R/G	LQ	120	AGC time limit for low quality Valid range: **Example**: AGTMSLQ120
Timeout multiplier (FP24_8)	AG	TM	S/P/R/G	MT	0x100	Timeout multiplier (FP24_8) Valid range: **Example**: AGTMS

8.2.13 Setup motion detection parameters

Code description	Command format options				Default	Notes/examples
Get All motion detect settings	MD	PM	G			Returns all motion detection parameter values in an XML element. **Example**: MDPMG
Minimum Illumination	MD	PM	S/P/R/G	NI	0	0 | Minimum value This is the lowest value the AGC should use to set the illumination. **Valid Range:** 0 to Maximum illumination **Example**: MDPMSNI1
Maximum illumination	MD	PM	S/P/R/G	XI	6	100 | Maximum value This is the highest value the AGC should use to set the illumination. **Valid Range:** Minimum illumination to 100 **Example**: MDPMSXI0
Initial illumination value	MD	PM	S/P/R/G	II	1	The starting value the AGC will use to start adjusting illumination. **Valid Range:** Minimum illumination to Maximum illumination **Example**: MDPMSII1
Minimum exposure time (µs)	MD	PM	S/P/R/G	NE	1	1 | Minimum value **Valid Range:** 1 to Maximum exposure time microseconds **Example:** MDPMSNE100 This is the minimum time the camera lets light into the element to take the picture in microseconds.
Maximum exposure time (µs)	MD	PM	S/P/R/G	XE	46	20000 | Maximum value **Valid Range:** Minimum exposure time to 20000 microseconds **Example:** MDPMSXE10040
Initial exposure time (µs)	MD	PM	S/P/R/G	IE	40	**Valid Range:** Minimum exposure time to Maximum exposure time microseconds **Example**: MDPMSIE100
Minimum gain	MD	PM	S/P/R/G	NG	1	0 | Minimum value **Valid Range:** 0 to Maximum Gain **Example**: MDPMSNG15
Maximum gain	MD	PM	S/P/R/G	XG	47	64 | Maximum value Gain is the amount of signal amplification the AGC can apply to make the picture easier to read **Valid Range:** Minimum Gain to 64 **Example**: MDPMSXG35

Code description	Command format options				Default	Notes/examples
Initial gain	MD	PM	S/P/R/G	IG	21	**Valid Range:** Minimum Gain to Maximum Gain **Example**: MDPMSIG15
Minimum lightest pixel value	MD	PM	S/P/R/G	NL	60	0 Minimum value **Valid Range:** 0 to Maximum lightest pixel value **Example**: MDPMSNL60
Maximum lightest pixel value	MD	PM	S/P/R/G	XL	90	255 Maximum value The lightest values give the motion calculations a base range for maximum brightness before the image begins to saturate. If you set these too high, the algorithm will not be able to detect individual pixels because the image is washed out. **Valid Range:** Minimum lightest pixel value to 255 **Example**: MDPMSXL90
Detection pixel threshold	MD	PM	S/P/R/G	PL	15	This pixel threshold is the minimum difference value between the background brightness and the pixel brightness for the current pixel to be considered a pixel. Valid range: **Example**: MDPMS PL15
Detection total threshold	MD	PM	S/P/R/G	TL	5	Total threshold is the minimum number of pixels detected per detection region (left, center, right) to be considered detected motion Valid range: **Example**: MDPMS TL5
Detection blob threshold	MD	PM	S/P/R/G	BT	4	The minimum number of sequential pixels to be considered a group or blob (like a bar width) Valid range: **Example**: MDPMSBT4

8.2.14 Setup camera parameters

Code description	Command format options				De-fault	Notes/examples	
Test Mode	IM	CP	S/P/R/G	TM		Example: IMCPG	
Minimum Exposure (percent)	IM	CP	S/P/R/G	ME	20	0	Minimum value
						Defines the minimum exposure parameter of camera **Valid Range:** 0 to Maximum Exposure percent **Example**: IMCPSME20	
Maximum Exposure (percent)	IM	CP	S/P/R/G	XE	100	100	Maximum value
						Valid Range: 0 and Minimum Exposure to 100 percent **Example**: IMCPSXE100	

Take Picture – capturing images

NOTICE
The *Take Picture* configuration requires firmware version 1.7.5 or higher.

Code description	Command format options				De-fault	Notes/examples	
Take Picture command	CD	TP	X	EV		Allows the device to take a picture. Image capture only; no data decoding. **Example**: CDPXEV1	
Trigger Enable for capturing images	CD	TP	S/P/R/G	WD		0	Disables image capture with a trigger press. **Example**: CDTPSTE0
						1	Enables image capture with a trigger press. **Example**: CDTPSTE1
Modify Width of the capture window	CD	TP	S/P/R/G	WD		Changes the width of the capture window from the default value to a customer-specific width. **Valid Range** [pixel]: 1 … 1280 **Example**: CDTPSWD1280	
Modify Height of the capture window	CD	TP	S/P/R/G	HT		Changes the height of the capture window from the default value to a customer-specific height. **Valid Range** [pixel]: 1 … 960 **Example**: CDTPSHT960	
Rotate Image	CD	TP	S/P/R/G	RO		Rotates the captured picture in 90° increments. **Note**: No rotation by other degree-values. **Valid Numbers** [degrees]: 0, 90, 180, 270, 360 **Example**: CDTPSRO270	

Code description	Command format options				Default	Notes/examples
AGC Before	CD	TP	S/P/R/G	AB		Sets the number of images to capture before the requested image; used for AGC tuning (Automatic Gain Control). **Note**: Since all images are written into the same buffer, only the last image is actually preserved. **Example**: CDTPSAB0
Convert Image to BW	CD	TP	S/P/R/G	CB		Converts an image from grayscale to black-and-white. **Example**: CDTPSCB0 **Example**: CDTPSCB1
X coordinate	CD	TP	S/P/R/G	XO		Sets the starting x-coordinate for the window-of-interest of the picture. **Example**: CDTPSXO0
Y-coordinate	CD	TP	S/P/R/G	YO		Sets the starting y-coordinate for the window-of-interest of the picture. **Example**: CDTPSYO0

Uploading decoded and non-decoded images

Code description	Command format options				Default	Notes/examples	
Transfer Decoded images	FW	IM	P/G/R	DI		0	Disables transferring decoded images. **Example**: FWIMPDI0
						1	Enables transferring decoded images. **Example**: FWIMPDI1
Transfer Non-decoded images	FW	IM	P/G/R	NI		0	Disables transferring non-decoded images. **Example**: FWIMPNI0
						1	Enables transferring non-decoded images. **Example**: FWIMPNI1

8.2.15 Command barcode format

The device can receive commands directly through user input, via serial or text and via configuration command barcodes. This section describes the format of configuration command barcodes.

Header	Command	Trailer
<SOH>Y<GS><STX> (%01%59%1D%02)	String	<ETX><EOT> (%03%04)

Multiple commands can be included in one configuration command barcode by separating each command with <ETX>.

Example: Scanning a barcode generated from `%01%59%1d%02SYAZTCG%03SYAUPOG%03%04` will output all settings of the AZTC and AUPO symbologies.

Configuration command barcodes:

- Configuration command barcodes use the QR code barcode symbology.
- Source files to generate configuration barcodes have a file extension of .CRCCS and an intermediate file extension of .CRMKR.

- If source files contain comments, the comment should start with two forward slash (//) characters.
- Source files can have only one Primary Category command per line (see chapter 8.1 "Configuration command architecture").

Examples:

- example.crccs

  Contains:

  // Hypothetical

  // Outputs all settings of symbologies Aztec and Australian Post

  // Rev 1 – 6/22/16 – Jackson – Initial Release

- example.crmkr

  Contains:

  %01%59%1d%02SYAZTCG%03SYAUPOG%03%04

- example.tif

8.3 Motion detection

The device supports motion detection, which means, the device can detect codes brought into the field of view and decode them without manually triggering a decode. Motion detect is often used with the device stationary or mounted, and targets passing in front of it. The device is set to use the minimum internal illumination possible, and works best when in bright ambient light shining from behind the device.

Motion detection parameters

The motion detection determination uses many parameters. The exposure time, gain, and illumination are camera settings used to get the best picture to determine whether or not objects have moved into the field of view. They all have minimum and maximum values which the AGC (Automatic Gain Control) uses to get that best picture.

- The exposure is how long the camera “shutter” lets light into the detector array. If it is not open long enough, all the device can see is blackness. If it is open too long, all the pixels are over-exposed, and the picture is white. By setting the minimum and maximum time, the AGC is allowed to open the shutter. We can try to force the AGC to not over- or under-expose the picture.
- The gain is the amount of amplification the AGC can use to attempt to increase the contrast of the picture between light and dark pixels. Setting the minimum too low does not produce enough contrast, and setting the maximum too high overflows the AGC. Thus, the gain range helps the AGC to optimize the contrast of the data without overflowing the calculations.
- The illumination is how much additional light the device shines on the image to increase the sensitivity of the motion detection algorithm. The more illumination, the easier it is to read the codes, however, it also makes the device more obvious in a given environment. By setting the minimum and maximum illumination, the device can be set to add much less light into an environment.
- Thresholds are used to detect motion in the following way:
  - A baseline is created when motion detection starts. Thus, the device has a set of values to compare against.
  - Motion detection finds pixels that vary (more or less) from the baseline by more than the *pixelThreshold* threshold. Motion detection then filters out groups of pixels detected when the number of consecutive pixels is less than the *blobThreshold* threshold, considering it a false positive.
  - When the total number of pixels not filtered out is greater than the total threshold, the device determines that a code has come into the field of view: motion detected.
- The motion detect takes three blocks - a left block, a center block, and a right block - from the complete image from which to detect motion. Motion in any one of the three blocks or in the combined detection from all three blocks causes motion detection.

8.4 Data formatting

The device supports data formatting at the decoder level. This produces fast, consistent results in a minimal amount of device space. The device supports simple prefixes and suffixes around the decoded data – the simplest form of data formatting – and allows full user control by using the data format string. The device performs data validations and public sector parsing by using the format parse setting in conjunction with the selected format option.

Data formatting options

The decoder allows many types of data formatting, selected by setting the data format option and setting the appropriate configuration string.

Tab. 8.3: Data format options

Value	Description
0	Data formatting off
1	Simple data formatting using either prefix and suffix, or by setting the format data string directly.
2	Match string validation
3	GS1 DataBar validation (requires a license)
4	UDI/HIBC validation (requires a license)
5	ISO 15434 validation
6	ISO 15434 and ISO 15418 validation
8	Simple age verification without using a configuration string
9	DL parsing using a configuration string
10	DL parsing without using a configuration string
11	Success and Raw validation
Note: Several options require a license	

Data format string

The data format string allows full user control of the data formatting. The data format string consists of a 12-digit configuration string, typically zeros, a prefix, decoding data and a suffix. Also, there may be user data injected into the string. Example of a format string that adds a carriage return line feed to the decoded data:

```
CDOPSFD”000000000000!,,/0d/0a"
```

Prefixes and suffixes

Prefix and suffix values define data that is added to the read code data. The firmware adds the prefix and suffix to the beginning and end of the decoded data. Adding prefix or suffix data allows you to define prefixes and/or suffixes and enable/disable them as needed.

- Define the prefix and/or suffix strings:
  - Command to define a prefix: `CDOPSPX"string"`
  - Command to define a suffix: `CDOPSSX"string"`
  - The "string" must be in quotes in the command.
  - Non-printable characters are represented by a forward slash and the corresponding hexadecimal value, such as `/0D` for a carriage return.

  Examples:
  - Command to define a prefix comma: `CDOPSPX","`
  - Command to define a non-keyboard tab as a prefix: `CDOPSPX"/09"`
- Enable the application of prefixes and suffixes:

  After defining prefix and/or suffix strings, the application of prefixes and suffixes must be enabled.

  Command: `CDOPSFO1`

Format case

The decoder decodes the code data. Setting the format case option changes the default configuration string. You can set the following data output options:

- Decoded (0)
- Uppercase (1)
- Lowercase (2)
- Bracketed hex (3)

Example: `CDOPSFC1` sets uppercase data output.

Format parse and validation configuration string

Validation and public sector parsing also require a configuration string. This string is set using the `CDOPSFP"string"` command.

	NOTICE
	Configuration strings and special character sequences are used to enable validation or public sector parsing. ↳ Public sector validations and data formatting cannot be used at the same time. ↳ When changing from public sector validation mode to data formatting mode, you must enter the configuration string again.

9 Command protocol

Each device has a well-defined protocol for communication. The protocol can be split into three parts:

- General command/response-type communication
- Bar code decoding
- Raw commands

9.1 General commands

Most of the time, the user will use the command protocol when communicating with the device. The figure shows the general command sequence for sending a command to the device.

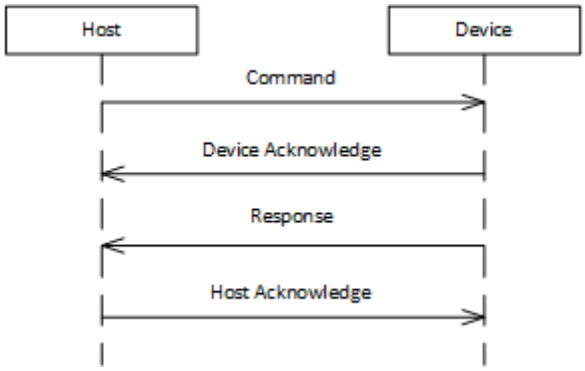


Fig. 9.1: General command sequence

- The host device sends a properly formatted command to the device.
- The device sends an acknowledgement to the host device.
- Immediately after the acknowledgement, the device sends a response to the command.
- To maintain communication integrity, the host device sends an acknowledgement back to the device.

9.1.1 Command packet

To send a command to the device, a properly formatted packet must be formed.

Tab. 9.1: Command packet format

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	Three bytes that indicate the beginning of a message
Packet Version	0x31	1	Indicates the version number for the packet format. This value is always 0x31.
Packet Length	0x0013 – 0xFFFF	2	Indicates the number of bytes that are sent after these two bytes, up to and including the CRC. This value should be 19+N. This value is written as a 2-byte big endian value.
Destination Address	0x00000000 – 0x0FFFFFFE	4	Represents the address of the device that you are attempting to communicate with. 0x0FFFFFFF is a special address indicating that the host device wants to broadcast to all devices on the network. Anything less than this value is a real device address. This value is written as a 4-byte big endian value.

Section	Bytes (or Range)	Number of Bytes	Description
Source Address	0x40000000 – 0x4FFFFFFF	4	Represents the address of the host computer. This value can be any value within the range specified and can be arbitrarily chosen. This value is written as a 4-byte big endian value.
Protocol Type	0x01	1	Indicates the type of protocol to use when communicating. This value is always 0x01.
Flags	0x00		Single byte representing a bit field. For sending a command, this value is always 0x00.
Payload Protocol	0x02	1	Value indicating the type of packet. This value is always 0x02 when sending a command.
Acknowledgement Number	0x0000	2	Represents the acknowledgement number. For a command packet, this value is always 0x0000. This value is written as a 2-byte big endian value.
Transaction Number	0x0000 – 0x7FFF	2	Represents a transaction number for a command. This value is tracked by the host device and is sent to the device as a new command. The host device increments the transaction number by 1. Typically, this value starts at 0x0000 when the device is first powered. This value is written as a 2-byte big endian value.
Request ID	0x8000 – 0xFFFF	2	Represents a unique request ID for this command packet. It is used in the resulting acknowledgement packet. Typically, this value is the transaction number + 0x8000.
Payload		N	Data payload that contains the ASCII command that the host device wants to send to the device.
CRC16	0x0000 – 0xFFFF	2	Represents a CRC16 (using the CCITT zero algorithm) value calculated on the bytes after the packet length. • Destination Address • Source Address • Protocol Type • Flags • Payload Protocol • Acknowledgement Number • Transaction Number • Request ID • Payload

9.1.2 Device acknowledgement

Upon receipt of a command, the device immediately sends an acknowledgement.

Tab. 9.2: Acknowledgement packet format

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	Three bytes that indicate the beginning of a message
Packet Version	0x31	1	Indicates the version number for the packet format. This value is always 0x31.
Packet Length	0xFFFF	2	For an acknowledgement packet, this value is always 15.
Destination Address	0x40000000 – 0x4FFFFFFF	4	Represents the address of the host computer. This value is written as a 4-byte big endian value.
Source Address	0x00000000 – 0x0FFFFFFE	4	Represents the address of the device that you are attempting to communicate with. This value is written as a 4-byte big endian value.
Protocol Type	0x01	1	Indicates the type of protocol to use when communicating. This value is always 0x01.
Flags	0x00		Single byte representing a bit field. For sending a command, this value is always 0x00.
Payload Protocol	0x00	1	Value indicating the type of packet. This value is always 0x00 when sending an acknowledgement.
Acknowledgement Number	0x0000 … 0xFFFF	2	Represents the acknowledgement number. This value is written as a 2-byte big endian value.
CRC16	0x0000 – 0xFFFF	2	Represents a CRC16 (using the CCITT zero algorithm) value calculated on the bytes after the packet length. • Destination Address • Source Address • Protocol Type • Flags • Payload Protocol • Acknowledgement Number

NOTICE

The destination address and the source address now have the source address and destination address values from the previous command packet.

- If a broadcast address is set in the destination address, it is replaced with the address of the device in the corresponding acknowledgement packet.
- You must use this address in any following sequences. Without using it, the device will not respond.

NOTICE
The acknowledgement number in the device acknowledgement packet is the same as the transaction number in the previous command packet.

9.1.3 Response packet

After the acknowledgement is sent, the device sends a response to the command. The response packet has the same format as the command packet (see chapter 9.1.1 "Command packet") with the following differences:

- The payload part of the response packet contains the response from the device.
- The transaction number and the request ID are swapped in the response packet (as compared to the command packet).
- The destination address and the source address are swapped in the response packet (as compared to the command packet).

The response is formatted as XML message. Each command description shows an example of a response from each command when getting a value for a setting.

9.1.4 Host acknowledgement

After reception of the response packet, the host device must send an acknowledgement packet to the device. This host acknowledgement has the same format as the device acknowledgement (see chapter 9.1.2 "Device acknowledgement") with the following differences:

- The destination address and the source address are swapped in the host acknowledgement packet (as compared to the device acknowledgement packet).
- The acknowledgement number in the host acknowledgement packet is the same as the transaction number in the response packet.

9.1.5 Example 1: Enabling Code 93 upon startup

In this example, the host device has just powered the device and is ready to send its first command: make sure Code 93 is enabled.

Assumptions:

- The host device does not know what the address of the device is and thus, will send out a broadcast.
- Address of the host device: 0x40000000
- Address of the device: 0x01234567

Tab. 9.3: Command packet for example 1

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x001D	2	19 + 10 = 29 = 0x001D
Destination Address	0x0FFFFFFF	4	Broadcasting to every listening device.
Source Address	0x40000000	4	
Protocol Type	0x01	1	
Flags	0x00		
Payload Protocol	0x02	1	
Acknowledgement Number	0x0000	2	

Section	Bytes (or Range)	Number of Bytes	Description
Transaction Number	0x0000	2	Starting with zero for the transaction number.
Request ID	0x8000	2	Following the convention, we add 0x8000 to the transaction number.
Payload		10	The bytes represent the ASCII command `SYCO93PEN1`.
CRC16	0x4501	2	

Upon reception of the command, the device sends an acknowledgement.

Tab. 9.4: Device acknowledgement for example 1

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x000F	2	
Destination Address	0x40000000	4	
Source Address	0x01234567	4	The device returns its unique address.
Protocol Type	0x01	1	
Flags	0x01		
Payload Protocol	0x00	1	
Acknowledgement Number	0x0000	2	
CRC16	0xED19	2	

After the acknowledgement, the device sends a response packet to the initial command packet.

Tab. 9.5: Response packet for example 1

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x003A	2	19 + 39 = 58 = 0x003A
Destination Address	0x40000000	4	
Source Address	0x01234567	4	
Protocol Type	0x01	1	
Flags	0x00		
Payload Protocol	0x02	1	
Acknowledgement Number	0x0000	2	
Transaction Number	0x8000	2	

Section	Bytes (or Range)	Number of Bytes	Description
Request ID	0x0000	2	Following the convention, we add 0x8000 to the transaction number.
Payload		39	Returns `<Response Val="0" Descrip-tion="none" />`
CRC16	0xDA64	2	

In accordance with the protocol, the host device sends an acknowledgement packet before sending the next command.

Tab. 9.6: Host acknowledgement for example 1

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x000F	2	
Destination Address	0x01234567	4	
Source Address	0x40000000	4	
Protocol Type	0x01	1	
Flags	0x01		
Payload Protocol	0x00	1	
Acknowledgement Num-ber	0x8000	2	
CRC16	0x2CCE	2	

9.1.6 Example 2: Getting information about a device after startup

In this example, the host device has been communicating with the device for some time and is ready to send another command: enable Code 128 and set it as a default value.

Assumptions:

- Address of the host device: 0x40000000
- Address of the device: 0x01234567

Tab. 9.7: Command packet for example 2

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x001D	2	19 + 10 = 29 = 0x001D
Destination Address	0x01234567	4	
Source Address	0x40000000	4	
Protocol Type	0x01	1	

Section	Bytes (or Range)	Number of Bytes	Description
Flags	0x00		
Payload Protocol	0x02	1	
Acknowledgement Number	0x0000	2	
Transaction Number	0x0001	2	
Request ID	0x8000	2	Following the convention, we add 0x8000 to the transaction number.
Payload		10	The bytes represent the ASCII command `SYC128PEN1.`
CRC16	0x4501	2	

Upon reception of the command, the device sends an acknowledgement.

Tab. 9.8: Device acknowledgement for example 2

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x000F	2	
Destination Address	0x40000000	4	
Source Address	0x01234567	4	The device returns its unique address.
Protocol Type	0x01	1	
Flags	0x01		
Payload Protocol	0x00	1	
Acknowledgement Number	0x0001	2	
CRC16	0xFD38	2	

After the acknowledgement, the device sends a response packet to the initial command packet.

Tab. 9.9: Response packet for example 2

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x003A	2	19 + 39 = 58 = 0x003A
Destination Address	0x40000000	4	
Source Address	0x01234567	4	
Protocol Type	0x01	1	
Flags	0x00		
Payload Protocol	0x02	1	

Section	Bytes (or Range)	Number of Bytes	Description
Acknowledgement Number	0x0000	2	
Transaction Number	0x8001	2	
Request ID	0x0001	2	
Payload		39	Returns <Response Val="0" Description="none" />
CRC16	0xF213	2	

In accordance with the protocol, the host device sends an acknowledgement packet before sending the next command.

Tab. 9.10: Host acknowledgement for example 2

Section	Bytes (or Range)	Number of Bytes	Description
Start of Frame	0x01 0x43 0x54	3	
Packet Version	0x31	1	
Packet Length	0x000F	2	
Destination Address	0x01234567	4	
Source Address	0x40000000	4	
Protocol Type	0x01	1	
Flags	0x01		
Payload Protocol	0x00	1	
Acknowledgement Number	0x8001	2	
CRC16	0x3CEF	2	

9.2 Bar code decoding

The figure shows the command sequence for activating the device for decoding - for a single scan or for continuous scanning.

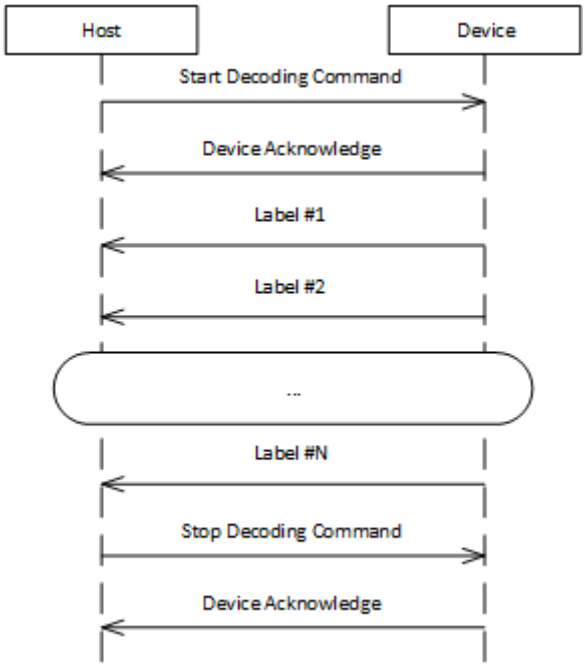


Fig. 9.2: Command sequence for decoding

- The host device sends a start decoding command to the device - for single decode or for continuous decoding
- The device sends the corresponding acknowledgement back to the host device.
- The barcode decoder takes over and sends the barcode result to the host device. The barcode result is sent in clear ASCII text, that is, without the framing protocol.
- The host device sends a stop decoding command to the device.
- The device sends the corresponding acknowledgement back to the host device.

9.3 Raw commands

Raw commands can be sent to the reader using any serial software for communication in RS-232 mode (e.g. SecureCRT, TeraTerm). The raw format is described as follows:

[CmdID] <command><0x00>

Tab. 9.11: Raw command structure

Element	Description
[cmdID]	Optional, but must be kept between square brackets. Contains a marking that is returned with all responses.
<command>	A single array of letters (non-null-terminated) is the command. For supported configuration commands, see Code Configuration Control Device (CCD)
<0x00>	Represents a carriage return that ends the raw data.

Example:

Command to enable Aztec (AZTC) symbology on the reader, with a command ID (ends with a carriage return)

[1234]SYAZTCSEN

Example:

Command to enable Aztec (AZTC) symbology on the reader, without a command ID (ends with a carriage return)

SYAZTCSEN

10 Care, maintenance and disposal

Cleaning

Clean the glass window of the device with a soft cloth before mounting.

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

Maintenance

Usually, the device does not require any maintenance by the operator.

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

For repairs, contact your responsible Leuze subsidiary or Leuze customer service (see chapter 11 "Service and support").

Disposing

↳ For disposal observe the applicable national regulations regarding electronic components.

11 Service and support

Service hotline

You can find the contact information for the hotline in your country on our website **www.leuze.com** under **Contact & Support**.

Repair service and returns

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

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

Please register the merchandise concerned. Simply register return of the merchandise on our website **www.leuze.com** under **Contact & Support > Repair Service & Returns**.

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

What to do should servicing be required?

	NOTICE
	**Please use this chapter as a master copy should servicing be required!** ↳ Enter the contact information and fax this form together with your service order to the fax number given below.

Customer data (please complete)

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

Leuze Service fax number:

+49 7021 573-199

12 Technical data

12.1 General specifications

Tab. 12.1: Optics

Optical system	CMOS Imager, Rolling Shutter (1280 x 960)
Reading field	30 mm … 425 mm
Contrast	1D code: minimum 15 % 2D code: minimum 15 %
Resolution	1D code: m = 0.190 mm (7.5 mil), distance dependent 2D code: m = 0.127 mm (5 mil), distance dependent
Light sources • Illumination • Alignment LEDs (Aimer)	integrated LEDs • visible red light • visible blue light

Tab. 12.2: Code specifications

Code type: 1D	BC412, Codabar, Code 11, Code 32, Code 39, Code 93, Code 128, IATA 2 of 5, Interleaved 2 of 5, GS1 DataBar, Hong Kong 2 of 5, Matrix 2 of 5, MSI Plessey, NEC 2 of 5, Pharmacode, Plessey, Straight 2 of 5, Telepen, Trioptic, UPC/EAN/JAN
Code type: Stacked 1D	Codablock F, Code 49, GS1 Composite (CC-A/CC-B/CC-C), MicroPDF, PDF417
Code type: 2D	Aztec Code, Data Matrix, Han Xin, Micro QR Code, QR Code
Postal Codes	Australian Post, Canada Post, Intelligent Mail, Japan Post, KIX Code, Korea Post, Planet, Postnet, UK Royal Mail, UPU ID Tags

Tab. 12.3: Interfaces

Interface type	RS 232
Baud rate	9600 … 115200 baud, configurable
Data formats	configurable

Trigger	• Switching input
	  • active: 0 V
	  • inactive: +5 V or not connected
	• Presentation Mode (Motion Control)

Switching output	NPN transistor output, max. 20 mA, Good Read
Buzzer	NPN transistor output, modulated, Good Read

Tab. 12.4: Electrical equipment

Operating voltage	4.75 … 5.25 V DC
Current consumption	Duration reading: typ. 350 mA Inactive illumination: typ. 75 mA

Tab. 12.5: Mechanical data

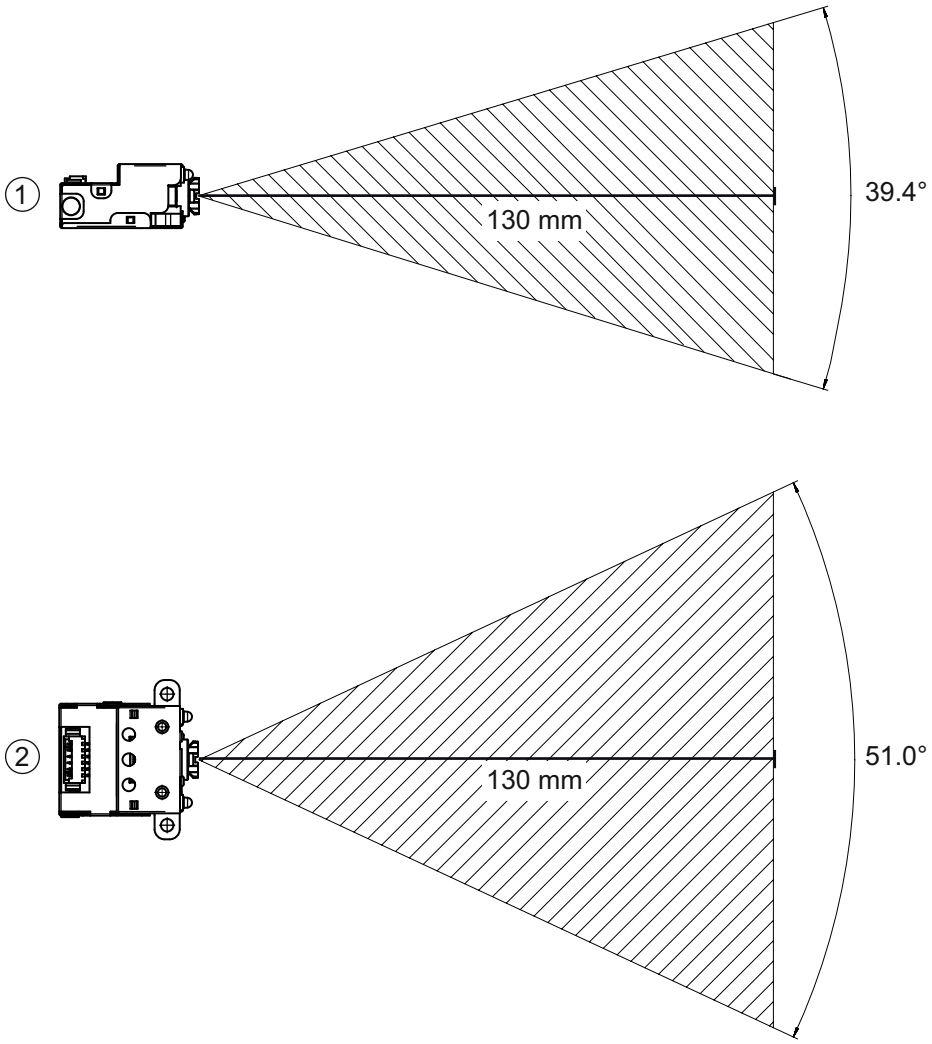
Connection type	Molex Inc. (53261-0671), 6-pin
Weight	10 g
Dimensions (H x W x D)	31.5 x 31.60 x 27.53 mm
Fastening	4x M1.8 self-tapping screws, 2 mm deep

Tab. 12.6: Environmental data

Ambient temp. (operation/storage)	0 °C … +50 °C/-20 °C … +60 °C
Air humidity	10 % … 90 % rel. humidity, non-condensing
Ambient light	max. 100000 Lux
Electromagnetic compatibility	EN 55022:2006 Class B IEC 62471:2006
Conformity	CE, FCC, RoHS

12.2 Reading fields

	NOTICE
	Please note that the actual reading fields are also influenced by factors such as labeling material, printing quality, reading angle, printing contrast etc., and may thus deviate from the reading fields specified here. The origin of the read distance always refers to the front edge of the housing of the beam exit.



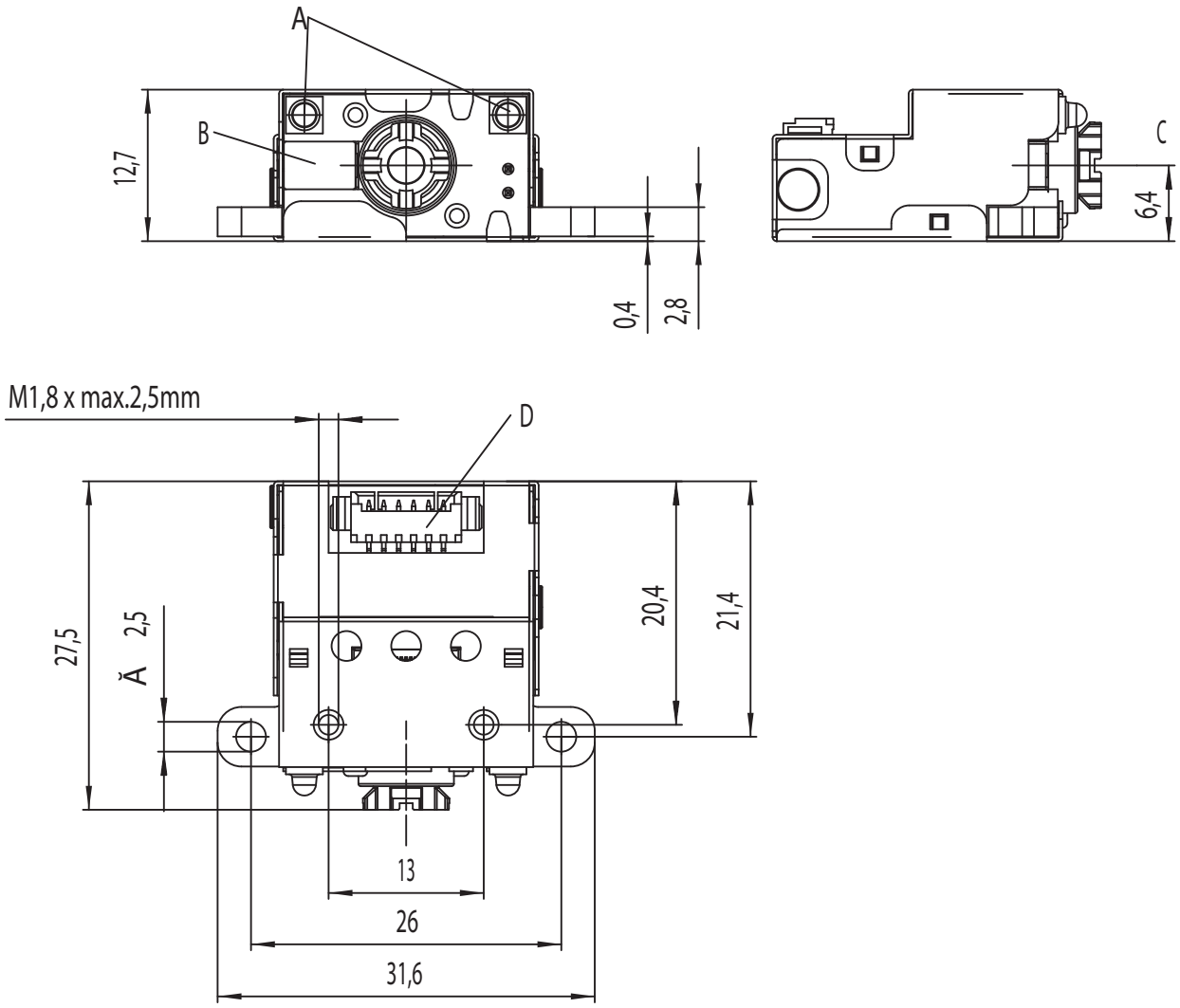
1 Reading field – side view
2 Reading field – top view

Fig. 12.1: Reading field

Tab. 12.7: Reading fields

Code type	Resolution m	Typical reading distance [mm] ([inch])
Code 39	0.190 mm (7.5 mil)	50 (2.0) 245 (9.6)
GS1 Data bar	0.267 mm (10.5 mil)	35 (1.4) 225 (8.9)
UPC	0.330 mm (13 mil)	40 (1.5) 370 (14.6)
PDF417	0.147 mm (5.8 mil)	85 (3.3) 155 (6.1)
PDF417	0.170 mm (6.7 mil)	65 (2.6) 175 (6.9)
Data Matrix	0.127 mm (5 mil)	75 (3.0) 90 (3.5)
Data Matrix	0.160 mm (6.3 mil)	70 (2.8) 135 (5.3)
Data Matrix	0.254 mm (10 mil)	50 (2.0) 205 (8.1)
Data Matrix	0.528 mm (20.8 mil)	30 (1.2) 425 (16.7)

12.3 Dimensioned drawings



all dimensions in mm

A 2 integrated LEDs for illumination (red light)
B 1 integrated target LED (blue light)
C Center of optical axis
D Connector Molex (53261-0671), 6-pin

Fig. 12.2: DCR 50 dimensioned drawing

NOTICE

It is advisable to use a transparent, double-sided anti-reflective coated material when installing the scan engine behind a pane of glass. Recommended pane thickness: 1 mm; optics as flush as possible with the glass.

13 Order guide and accessories

13.1 Type overview

Tab. 13.1: Part numbers

Part no.	Part designation	Description
50135000	DCR50M2/R2	CMOS imager scan engine for 1D and 2D codes, RS 232 interface, Molex 53261-0671 connection, 6-pin

13.2 Accessories

Tab. 13.2: Accessories

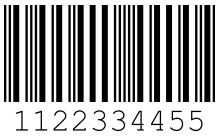
Part no.	Part designation	Description
50128204	MA-CR	Modular adapter unit to interface device-to-host to connect to PC for evaluation
Sensor Studio configuration software Download at www.leuze.com see chapter 6.2.1 "Downloading configuration software"		*Sensor Studio* designed according to the FDT/DTM concept. Contains: communication DTM and device DTM

14 EC Declaration of Conformity

The scan engines of the DCR 50 series have been developed and manufactured in accordance with the applicable European standards and directives.

15 Appendix

15.1 Bar code sample



Module 0.3

Fig. 15.1: Code type 01: Interleaved 2 of 5

Module 0.3

Fig. 15.2: Code type 02: Code 39

Module 0.3

Fig. 15.3: Code type 11: Codabar

Module 0.3

Fig. 15.4: Code 128

Module 0.3

Fig. 15.5: Code type 08: EAN 128

SC 2

Fig. 15.6: Code type 06: UPC-A

SC 3

Fig. 15.7: Code type 07: EAN 8

Fig. 15.8: Example codes

15.2 Configuration via configuration codes

The device can also be configured using configuration codes. The device parameters in the device are set and permanently saved after reading this code.

Fig. 15.9: Configuration Guide

Suffix Tab (RS232 Mode Only) M20217 A1	Suffix Carriage Return (RS232 Mode Only) M20212_01 A2	Suffix Carriage Return Line Feed (RS232 Mode Only) - Default M20213_01 A3	Suffix Line Feed (RS232 Mode Only) M20214_01 A4
Erase Suffix Data M20208_01 B1	Convert Barcode Data to Uppercase M20221_01 B2	Convert Barcode Data to Lowercase M20222_01 B3	Intentionally Blank B4
Symbology Settings	Australian Post On M20000_01 C2	Australian Post Off - Default M20001_01 C3	Aztec On - Default M20002_01 C4
Aztec Off M20003_01 D1	Aztec Inverse & Normal On M20004_01 D2	Aztec Inverse Off - Default M20005_01 D3	BC412 On M20006_01 D4
BC412 Off - Default M20007_01 E1	Canada Post On M20008_01 E2	Canada Post Off - Default M20009_01 E3	Codabar On - Default M20010_01 E4

Fig. 15.10: Configuration Guide

Codabar Off M20011_01 A1	Codabar Checksum On M20012_01 A2	Codabar Checksum Off - Default M20013_01 A3	Remove Codabar Start and Stop Delimiters M20014_01 A4
Keep Codabar Start and Stop Delimiters - Default M20015_01 B1	Codablock A On M20016_01 B2	Codablock A Off - Default M20017_01 B3	Codablock F On M20018_01 B4
Codablock F Off - Default M20019_01 C1	Code 11 Checksum Stripped from Result On - Default M20022_01 C2	Code 11 Checksum Stripped from Result Off - Default M20023_01 C3	Code 11 On M20020_01 C4
Code 11 Off - Default M20021_01 D1	Code 11 One Digit Checksum M20032_01 D2	Code 11 Two Digit Checksum - Default M20033_01 D3	Code 128 On - Default M20034_01 D4
Code 128 Off M20035_01 E1	Code 32 (Italian Pharmacode) On M20024_01 E2	Code 32 (Italian Pharmacode) Off - Default M20025_01 E3	Code 39 On - Default M20026_01 E4

Fig. 15.11: Configuration Guide

Code 39 Off M20027_01 A1	Code 39 Checksum On M20028_01 A2	Code 39 Checksum Off - Default M20029_01 A3	Code 39 Checksum Stripped from Result On - Default M20030_01 A4
Code 39 Checksum Stripped from Result Off - Default M20031_01 B1	Composite On M20036_01 B2	Composite Off - Default M20037_01 B3	Data Matrix On - Default M20038_01 B4
Data Matrix Off M20039_01 C1	Data Matrix Mirror On M20042_01 C2	Data Matrix Mirror Off - Default M20043_01 C3	Data Matrix Inverse and Normal On - Default M20040_01 C4
Data Matrix Inverse Off M20041_01 D1	Data Matrix Rectangular On - Default M20044_01 D2	Data Matrix Rectangular Off M20045_01 D3	Data Matrix Rectangular Extended On M20046_01 D4
Data Matrix Rectangular Extended Off - Default M20047_01 E1	Grid Matrix On M20048_01 E2	Grid Matrix Off - Default M20049_01 E3	GS1 DataBar On - Default M20050_01 E4

Fig. 15.12: Configuration Guide

Fig. 15.13: Configuration Guide

Fig. 15.14: Configuration Guide

NEC 2 of 5 Checksum Off M20087_01 A1	NEC 2 of 5 On M20084_01 A2	NEC 2 of 5 Off - Default M20085_01 A3	PDF417 On - Default M20088_01 A4
PDF417 Off M20089_01 B1	Pharmacode On M20092_01 B2	Pharmacode Off - Default M20093_01 B3	Pharmacode Normal Barcode Decoding (Left to Right) - Default M20095_01 B4
Pharmacode Reverse Barcode Decoding (Right to Left) M20094_01 C1	QR Code On - Default M20096_01 C2	QR Code Off M20097_01 C3	QR Code Standard Only - Default M20098_01 C4
QR Code Mirror On M20101_01 D1	QR Code Mirror Off - Default M20102_01 D2	QR Code Inverse and Normal On M20100_01 D3	QR Code Inverse Only M20099_01 D4
Telepen On M20109_01 E1	Telepen Off - Default M20110_01 E2	Output Telepen as Numeric - Default M20117_01 E3	Output Telepen as ASCII M20116_01 E4

Fig. 15.15: Configuration Guide

Fig. 15.16: Configuration Guide

Transmit UPC-A Number System M20142_01 A1	Do Not Transmit UPC-A Number System - Default M20143_01 A2	Do Not Transmit UPC-E Check Digit - Default M20145_01 A3	Transmit UPC-E Number System M20146_01 A4
Do Not Transmit UPC-E Number System - Default M20147_01 B1	Convert EAN-8 to EAN-13 M20130_01 B2	Do Not Convert EAN-8 to EAN-13 - Default M20131_01 B3	Transmit UPC-E Check Digit M20144_01 B4
Convert Bookland EAN-13 to ISBN M20136_01 C1	Do Not Convert Bookland EAN-13 to ISBN - Default M20137_01 C2	Convert Bookland EAN-13 to ISSN M20138_01 C3	Do Not Convert Bookland EAN-13 to ISSN - Default M20139_01 C4
Transmit EAN-8 Check Digit M20148_01 D1	Do Not Transmit EAN-8 Check Digit - Default M20149_01 D2	Transmit EAN-13 Check Digit M20150_01 D3	Do Not Transmit EAN-13 Check Digit - Default M20151_01 D4
UPU ID Tags On M20152_01 E1	UPU ID Tags Off - Default M20153_01 E2	USPS Intelligent Mail On M20154_01 E3	USPS Intelligent Mail Off - Default M20155_01 E4

Fig. 15.17: Configuration Guide

USPS Planet On M20156_01 A1	USPS Planet Off - Default M20157_01 A2	USPS Postnet On M20158_01 A3	USPS Postnet Off - Default M20159_01 A4
Keyboard Language Settings	List Installed Languages M20180_01 B2	Get Active Language M20179_01 B3	Keyboard Support: US English Keyboard Mapping for Windows - Default M20182_01 B4
Keyboard Support: English Keyboard Mapping for Apple M20184_01 C1	Keyboard Support: French-Belgian Keyboard Mapping for Windows M20181_01 C2	Keyboard Support: French Keyboard Mapping for Windows M20185_01 C3	Keyboard Support: French Keyboard Mapping for Apple M20186_01 C4
Keyboard Support: German Keyboard Mapping for Apple M20187_01 D1	Keyboard Support: German Keyboard Mapping for Windows M20188_01 D2	Keyboard Support: German-Swiss Keyboard Mapping for Apple M20189_01 D3	Keyboard Support: German-Swiss Keyboard Mapping for Windows M20190_01 D4
Keyboard Support: Italian Keyboard Mapping for Apple M20191_01 E1	Keyboard Support: Japanese Keyboard Mapping for Windows M20192_01 E2	Keyboard Support: Russian Keyboard Mapping for Windows M20194_01 E3	Keyboard Support: Spanish-Latin American Keyboard Mapping for Windows M20193_01 E4

Fig. 15.18: Configuration Guide

Fig. 15.19: Configuration Guide

Fig. 15.20: Configuration Guide

Set Duplicate Scan delay to 10 Seconds M20234_01 A1	Set Duplicate Scan delay to 30 Seconds M20235_01 A2	Set Duplicate Scan delay to 1 hour M20236_01 A3	Set Duplicate Scan delay to 1 day M20237_01 A4
Reader/Modem Command Settings	Output Reader Configuration M20113_01 B2	Get Reader Parameters M20114_01 B3	Intentionally Blank B4
Reset, Clear and Save Reader Settings	Reset to Factory Defaults M20111_01 C2	Intentionally Blank C3	Intentionally Blank C4
Intentionally Blank D1	Intentionally Blank D2	Intentionally Blank D3	Intentionally Blank D4
Intentionally Blank E1	Intentionally Blank E2	Intentionally Blank E3	Intentionally Blank E4

Fig. 15.21: Configuration Guide