

New Connectivity
CDB 420 and CDM 420

OPERATING INSTRUCTIONS

ICR 85x
Image Code Reader



Scanner family for reading
1-D and 2-D codes



Software versions

Software/Tool	Function	Version
ICR 85x	Firmware	V 1.80 0217
CLV Setup	Operating software (Windows-based)	V 4.1 0508
CLV Setup Help	Online help (HTML)	V 4.1 0508



**The ICR 85x is exclusively intended for use in an industrial environment.
In case of use in residential areas, RF interference may occur.**

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Latest manual version

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ICR 85x Image Code Reader

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Installation procedure (overview)

Procedure for reading 2-D codes (DataMatrix):

Reading pulses via "Sensor 1" switching input (default setting)

Note In the default setting, the ICR does not read any **bar codes**.

Do not switch off the power supply during configuration.

1. Check the scope of delivery to ensure that it is complete.
2. Install the ICR in the reading station and align it with the stationary object with the 2-D code (**DataMatrix ECC 200**) in the conveyor system (with the conveyor switched off). Use the following reading distances:
ICR 850: 100 mm (3.94 in)/110 mm (4.33 in) for side /front reading window
ICR 852, ICR 855: 60 mm (2.36 in)/70 mm (2.75 in) for side/front reading window
These distances must be observed! Use the accompanying distance tool.
3. Install the CDB 420 or CDM 420 Connection Module and connect the ICR.
4. Install the reading pulse sensor and connect the sensor to the "Sensor 1" switching input in the CDB 420 or CDM 420.
5. Connect the host to the "host interface" in the CDB 420 or CDM 420.
6. Switch on the power supply for the CDB 420 or CDM 420.
Once the ICR has been started, the "Device Ready" LED lights up. The beeper beeps twice to indicate that reading mode has been started.
7. Switch on the PC and start Windows™ (minimum requirement: Windows 95™).
8. Install the CLV Setup operating software and the CLV Setup Help online help software, which is supplied on the accompanying CD-ROM ("Manuals & Software"), on your PC.
9. Establish a physical connection between the PC and the Ethernet interface. To do so, connect the PC directly to the ICR by means of a crossover cable or connect the PC and ICR to the Ethernet by means of patch cables (OK = green "Ready" LED (Ethernet) lights up on the ICR)
10. Start "CLV Setup".
To initiate communication, select the Ethernet interface (OPTIONS/INTERFACE). CLV Setup establishes communication with the ICR (standard IP address).
11. Upload the parameter set of the ICR (displayed on the tab pages).
12. Start the CLV Assistant and carry out the following steps consecutively: CONNECTION ASSISTANT, ETHERNET ASSISTANT, SCANNER ADJUSTMENT, and DATAMATRIX AUTOSETUP.
13. To adjust the ICR (reading distance), use the accompanying test pattern.
14. DataMatrix-AutoSetup: for checking the image, start the IMAGEFTP program in the Assistant.
15. Start the reading trigger on request. The red illumination line appears. Move the 2-D code **evenly** through the red line using the conveyor system (constant speed).
16. Check the reading result (2-D code in the image memory) with ImageFTP. If OK (2-D code visible, good quality), start the DataMatrix AutoSetup. If successful, exit the Assistant after the final check. If not, repeat AutoSetup.
17. Continue configuring the ICR using the setting options on the tabs in CLV Setup (reading clock, data output). Download the modified parameter set to the ICR temporarily.
18. Make sure that data is transferred properly to the ICR.
19. If necessary, check and optimize the set parameter values. Download the parameter set to the ICR **permanently** and save the parameter set as an "*.scl" configuration file in CLV Setup.

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Abbreviations

CAN	C ontroller A rea N etwork (standardized field-bus system with a message-oriented data transfer protocol)
CCD	C harge C oupled D evice
CDB	C onnection D evice B asic.
CDM	C onnection D evice M odular.
DOF	D ePTH of F ield
EEPROM	E lectrically E rasable P rogrammable R eAD O nly M emory
HTML	H yper T ext M arkup L anguage (language of Internet websites)
ICR	I mage C ode R eadER.
LED	L ight E mitting D iode
PLC	P rogrammable L ogic C ontroller
RAM	R andom A ccess M emory. Temporary memory which is accessed directly
ROM	R eAD O nly M emory
RTF	R ich T ext F ormat (standardized document format with format descriptions)
SMART	S ICK M odular A dvanced R ecognition T echnology

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1 Notes on this document

1.1 Purpose

This document contains instructions for operating the 2-D code reader with fixed focus

- ICR 850 standard
- ICR 852 high density
- ICR 855 high speed

The devices are available

- with side reading window
- with front reading window

In reading mode, the Image Code Reader detects 2-D codes (DataMatrix ECC 200), which move steadily in one direction through the red reading line. The device does not read any 2-D codes that are stationary.

This document provides information on

- Installation and electrical installation
- Startup
- Operation and configuration (parameterizing)
- Maintenance
- Exchanging the device while retaining the parameter set
- Special applications and procedures

The 85x Image Code Reader with all its variants is simply referred to as “ICR” in the document, except where a distinction is necessary.

1.2 Target audience

This document is intended for persons who are responsible for the following activities:

1.2.1 Installation, electrical installation, maintenance and replacement

Electricians and service technicians

1.2.2 Startup, operation and configuration

Technicians and engineers

1.3 Information content

This document contains all of the information necessary for the installation, electrical installation and startup of the ICR with the **factory default settings**.

A series of step-by-step instructions is provided for each of these activities.

The ICR is configured for **specific applications** using the Windows-based “CLV Setup” program. Further assistance is also available in the form of the online help system “CLV Setup Help”. The procedure for installing and operating the software is described in the Appendix.

Additional information on the structure of the 2-D code reader and 2-D code/bar code technology is available from the Auto Ident division of SICK AG.

Internet address: **www.2d-code.com**.

1.4 Symbols

Some of the information in this document is marked specially so that you can access it quickly:



Warning

Warnings are provided to prevent injury to operating personnel or serious damage to the Image Code Reader.

- Always read warnings carefully and observe them at all times.

Note Notes indicate special features or characteristics.

Explanation Explanations provide background information on technical correlations.

Recommendation Recommendations help you carry out certain procedures more effectively.

Tip Tips explain settings in the user interface of the CLV Setup program.

Default setting Marks a section containing the values of the factory default settings.

SCANNING FREQUENCY This font indicates a term in the user interface of the CLV Setup program.



Icons refer to buttons in the user interface of the CLV Setup program.

“Host receive fault” This font indicates messages output via the auxiliary interface of the ICR.



This symbol identifies sections that describe steps carried out with the user interface of the CLV Setup program.



This symbol refers to additional technical documentation.

- This symbol identifies single-step instructions. An action must be performed. Instructions consisting of several steps are numbered consecutively.

- ⇒ Here you select a function of the user interface of CLV Setup.

2 Safety information

2.1 Authorized users

For the ICR to function properly and safely, it must be installed and operated by sufficiently qualified personnel.

The end user must be supplied with the operating instructions.

The end user must be provided with expert tuition and is advised to read the operating instructions.

The following qualifications are required for the various tasks involved:

2.1.1 Installation and maintenance

- General technical training
- Knowledge of the standard guidelines relating to safety in the workplace

2.1.2 Electrical installation and replacement

- Practical electrical training
- Knowledge of the common electrical safety guidelines
- Knowledge regarding the operation of the devices in the relevant application (e.g. conveyor belt)

2.1.3 Startup, operation and configuration

- Knowledge regarding the operation of the devices in the relevant application (e.g. conveyor belt)
- Knowledge of the hardware and software environment of the relevant application (e.g. conveyor belt)
- Basic knowledge of Windows 95™/98™, Windows NT4.0™, Windows 2000™ or Windows XP™
- Basic knowledge of an HTML browser (e.g. Internet Explorer™)
- Basic knowledge of data transmission
- Basic knowledge of Ethernet connections
- Basic knowledge of 2-D code/bar code technology

2.2 Intended use

The ICR automatically scans and decodes 2-D codes and bar codes. It is installed in a reading station and reads these codes on objects positioned on a conveyor belt, for example.

The ICR transfers the data content of the decoded codes via its data interface (Host, CAN or Ethernet) to a host for further processing.

Any warranty claims vis-à-vis SICK AG will be rendered invalid if the device is used for any other purpose or if changes are made to the device, also as part of the installation and electrical installation procedures.

Note Don't open the device. The producer warranty will be forfeited if the device is opened.

2.3 General safety precautions and protection measures

- Read the general safety precautions carefully and observe them at all times. This also applies to the warnings and operating instructions in the individual chapters of this document.



The ICR 85x is exclusively intended for use in an industrial environment. In case of use in residential areas, RF interference may occur.



Risk of injury by electrical current

In the CDM 420 Connection Module, the CMP 400 Power Supply Module is connected to a mains voltage of 100 to 250 V AC/50 to 60 Hz.

- When working with electrical equipment, always follow the relevant safety regulations.



Laser beam can cause blindness.

The ICR uses two Class 2 red-light laser diodes. Looking directly at the laser beam can seriously damage your eyesight.

The entire glass window acts as a laser outlet aperture.

Caution – use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- As with sunlight, never look directly into the laser beam.
- Do not direct the laser beams at other persons.
- Mount and align the ICR in such a way to prevent the laser beam reflecting off mirrored surfaces.
- Do not open the housing.
(Opening the housing does not deactivate the laser diodes).
- Observe the laser protection specifications (latest version).

Laser power

The lasers operate at a wavelength of $\lambda = 650 \text{ nm}$ (visible red light). The power output of the laser beams at the reading window is max. $2 \times 3.5 \text{ mW}$.

The emitted beam is not dangerous to human skin.

The product is classified in laser class 2 (laser class II) in accordance with EN 60825-1, IEC 60825-1, and 21 CFR 1040.10 (for publication date, see the warning sign on the device).

Laser warnings

The laser warning labels ([Fig. 2-1](#)) are attached at the following positions on the ICR:

- The laser warning symbol and the laser warning in GB English/US English are located on the wide side of the housing (see [Fig. 3-1, Page 3-5](#)).
- The additional laser warnings in English relevant for the USA are located on the wide side of the housing and additionally near by the reading window.

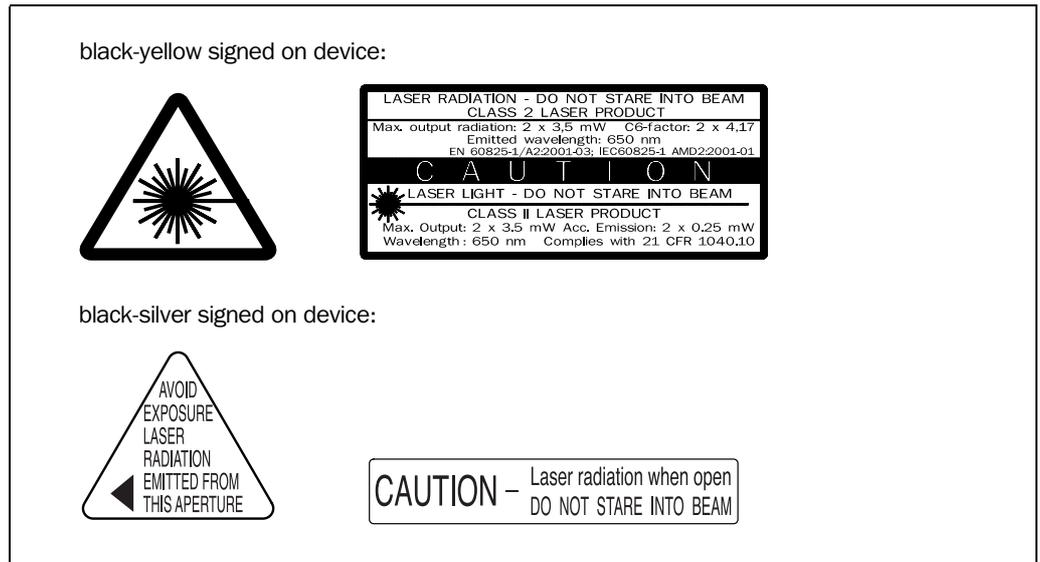


Fig. 2-1: Laser warning labels found on the ICR

Note The device is supplied with an additional set of laser warning labels in German/US English and in French/US English. If necessary, these can be used to cover the GB English/US English warning.

If the ICR is installed in a machine/panel with the result that the laser warning plates are no longer visible, additional warnings (not included in the scope of delivery) must be provided on the machine beside the emergence aperture of the laser beam.

Internal protective circuits:

The ICR is equipped with monitoring circuits-breakers that prevent the laser class from being exceeded. No maintenance required to keep this product in compliance with laser class II. Activation and deactivation of the laser diodes when reading is controlled by the reading pulse (trigger source).

A timer (laser timeout) automatically deactivates the laser diodes 10 minutes (default setting) after a continuous reading pulse is initiated in Reading mode with switching input pulse modes "Sensor Input" and "Serial Interface". However, it does not end the reading interval. In this case, the ICR outputs the following message to the auxiliary interface:

"Laser safety timeout"

The reading interval must be terminated by resetting the trigger signal. The laser diodes are activated again by the next reading pulse.

The laser timeout can be set in the range of 1 min. to 25 h or deactivated (see [Table 6-3, Page 6-26](#)).

In the operating mode "Percentage Evaluation" and in the pulse mode "Free Running" in Reading mode, the laser diode is always activated.

2.4 Quick stop and quick restart

2.4.1 Switching the ICR off

➤ Switch off the power supply or remove the ICR cable plug from the connection module.

This can result in loss of the following (at the most):

- The application-specific parameter set, if it was only stored **temporarily** in the ICR
- The last reading result
- Daily operating data
(operating hours counter, reading interval count, good read count, no read count, maximum duration reading interval, minimum duration reading interval, number of matches with match code 1, number of matches with match code 2, number of No Matches.)

2.4.2 Switching the ICR on again

➤ Switch on the supply voltage or reattach cable plug of the ICR to the connection module.
The ICR resumes operation with the **last permanently stored** parameter set and resets the daily operating data.

2.5 Environmental information

The ICR is designed to cause minimum impact on the environment. It does not contain any silicone-based materials on the housing surface and, therefore, does not represent any problems for paint sprayers in paint shops, for example.

2.5.1 Power requirements

The power requirements are particularly low: The ICR has a max. power consumption of 8.5 W.

The value is given for devices with disconnected switching outputs.

2.5.2 Disposal after final removal from service

Dispose of unusable or irreparable devices in accordance with the respective state regulations on waste disposal in a manner compatible with the environment. The ICR can be separated into recyclable secondary raw materials and special-category waste (electronic scrap) (see [Chapter 7.3 "Disposal", Page 7-2](#)).

At present SICK AG does not take back devices which have become unusable or irreparable.

3 Product description

3.1 Design

3.1.1 Scope of delivery

The ICR is **supplied with** the following:

- An information sheet (note on device) with terminal diagram and Quick Start instructions
- An additional set of Class 2 laser warning labels (self-adhesive) in German/US English and French/US English
- A special print (no. 8 010 754) containing test pattern with several resolutions for adjusting the ICR (reading distance)
- A distance tool for installing the ICR (type dependent)

Depending on the **number of devices ordered**, one or more copies of the following:

- CD ROM (no. 2 029 112) with
 - "CLV Setup" program for Windows™ and the "CLV Setup Help" online help system (HTML files)
 - "CLV-Connect" PC software (HTML files showing terminal diagrams)
 - ICR 85x Operating Instructions in English and German as PDF edition as well as additional publications (connections module, other SICK bar code scanners)
 - freely available "Acrobat Reader" PC software for reading PDF files

Note The latest versions of all the current publications/programs on the CD ROM can also be downloaded from **www.sick.com**.

Depending on the number of **copies ordered**, the delivery includes (**optional**):

- ICR 85x Operating Instructions in English and/or German (printed edition)

An overview of the available installation accessories, connection modules, incremental encoder, cables, plug connections, and sensors for reading pulse generation is contained in [Chapter 10.9 "Accessories", Page 10-39](#).

3.1.2 Variants

The ICR is available in the following variants:

Type (red light)	Part No.	Category	Host interface type	Reading window
ICR 850-0020	1 022 583	Standard	RS 232/422/485, Ethernet	Front
ICR 850-1020	1 022 585		RS 232/422/485, Ethernet	Side
ICR 852-0020	1 025 525	High Density	RS 232/422/485, Ethernet	Front
ICR 852-1020	1 025 526		RS 232/422/485, Ethernet	Side
ICR 855-0020	1 025 527	High Speed	RS 232/422/485, Ethernet	Front
ICR 855-1020	1 025 528		RS 232/422/485, Ethernet	Side

Table 3-1: ICR 85x variants

3.1.3 System requirements

The following are required to start up and operate the ICR:

Electrical connecting:

1. A SICK connection module for power supply of the ICR (10 to 30 V DC) and connection of the data and functional interfaces.

Available types:

- CDB 420-001 (no. 1 023 885) for 10 to 30 V DC, enclosure rating max. IP 65
- CDB 420-101 (no. 1 024 305) for 10 to 30 V DC, enclosure rating max. IP 65
- CDM 420-0001 (no. 1 025 362) for 10 to 30 V DC, enclosure rating max. IP 65

– or –

Alternatively, a non-SICK power supply unit with a voltage output of 10 to 30 V DC (functional extra-low voltage pursuant to IEC 364-4-41) and at least **10 W** power output.

Use cable no. 6 010 137 with 15-pin D-Sub HD socket and one open end for connecting the ICR to the power supply unit.

2. The following operating voltages/power output values
 - CDB 420-001: 10 to 30 V DC, pursuant to IEC 364-4-41, at least 10 W
 - CDM 420-0001: 10 to 30 V DC, pursuant to IEC 364-4-41, at least 10 W.
 - 100 to 250 V AC, 50 to 60 Hz when using the CMP 400 Power Supply Module
 - If the following modules are additionally built-in in the **CDB 420** module:
 - CMC 400 Connection Module Cloning: 10 to 30 V DC, additionally 0.5 W
 - If the following modules are additionally built-in in the **CDM 420** module:
 - CMC 400 Connection Module Cloning: 10 to 30 V DC, additionally 0.5 W
 - CMD 400 Connection Module Display: **18** to 30 V DC, additionally 1 W
 - CMF 400 Connection Module Fieldbus: **18** to 30 V DC, additionally 2 W
3. With external clock pulse (start/stop of reading interval) supply via the “Sensor 1“ switching input: a suitable reading pulse sensor for signaling the presence of an object with a bar code, e. g. a photoelectric reflex switch.
4. With optional external clock pulse (stop of reading interval) supply via the “Sensor 2“ switching input: a suitable reading pulse sensor for signaling the end of reading interval, e. g. a photoelectric reflex switch.
5. To separate bar codes with the same name (same code type, identical data content) using the "Compare Code Position" function: a suitable incremental encoder.
6. A higher-level computer (host) with a data interface of type RS 422/485 or RS 232.
7. To connect the ICR to the Profibus DP and the DeviceNet: the corresponding CMF 400 Connection Module Fieldbus (Operating instructions see [Chapter 10.11](#) “*Supplementary documentation*“, Page 10-43).
8. For connection of the ICR to the CAN bus: the operating instructions “Using the CAN interface“ (no. 8 009 180, English).

Starting-up and configuring:

9. A PC (at least 80486, 66 MHz, 16 MB RAM, CD ROM drive, serial interface, mouse (recommended) with Windows 95™/98™, Windows NT4.0™, Windows 2000™ or Windows XP™).
10. For configuring the ICR via the auxiliary interface a 3-core RS 232 data cable (null modem cable) with two 9-pin D-Sub sockets for connecting the PC to the auxiliary

interface of the ICR in the CDB 420 or CDM 420 Connection Module, e. g. no. 2 014 054. Pin 2 (RxD) and pin 3 (TxD) are crossed.

11. For configuring the ICR and outputting images via the Ethernet interface:
For the connection of the ICR to the network: a standard Ethernet data cable (patch cable), e.g. no. 6 026 083.
For the connection of the ICR to the PC (network card): an Ethernet crossover line, e. g. no. 6 026 084.
12. To use the online help system "CLV Setup Help", an HTML browser is required, e. g. "Internet Explorer™" browser.

3.1.4 Product features and functions (overview)

High-performance laser scanner:

- CCD-line
- Fixed focus
- Front reading window, variant: side reading window
- Standard, High Density, High Speed
- Reading range 53 to 111 mm (2 to 4.4 in), type dependent
- Resolution 0.1 to 1.0 mm (3.94 to 39.4 mil), type dependent
- Scanning/decoding frequency 100 Hz to 45 kHz (type dependent)
- Function to adjust on the code print quality
- Variable active evaluation range of the CCD-line

Safety and user-friendly features:

- Robust, compact metal housing, max. IP 65, CE certification
- Laser class 2, laser diode switches off if reading interval is active for too long and if the output power is exceeded
- Automatic self-test on startup. Can also be triggered at any time
- Diagnosis tools for installing and monitoring the system
- Parameterized output of reading diagnosis data in the read result
- Operating data query, and error messages on request
- Test string function for signaling readiness for operation
- Future proof thanks to firmware update via serial data interface (flash PROM)
- Low power consumption, other voltage range

Easy operation/configuration:

- With "CLV Setup" PC software for Windows (online), Help system and four assistants (Connection Assistant, Ethernet Assistant, Scanner Adjustment and DataMatrix-AutoSetup).
Displaying the image memory content via the ImageFTP program.
- Alternatively with simple command strings, also for use with special devices
- Four status LEDs
- Beeper to confirm device functions or operating steps (can be switches off)

Operating modes:

- Reading mode
- Percentage evaluation - for assessing the quality of the reads (bar codes only)
- Special functions for system installation

2-D code/Bar code evaluation:

- DataMatrix ECC 200/all standard bar code types
- Max. 50 codes per reading pulse (max. 4,000 characters), max. 20 per scan
- Separation of identical bar codes of the same code type
- Code comparison (max. 2 matchcodes), can also be used as filter or sort criterion for the reading result
- Sort sequences: code position, FIFO, LIFO, code length list
- Manipulation of the data output string via filter or format mask

Data communication:

- Main data interface: Host interface (with variable telegram structure), communication can be routed via the Ethernet interface
- Auxiliary data interface: Terminal interface (with fixed telegram structure) with special diagnosis functions, communication can be routed via the Ethernet interface

Reading pulse:

- External reading pulse, via switching input(s) or serial data interface
- Free running with timeout

Electrical interfaces:

- Serial host interface (RS 232, RS 422/485) with variable transfer rate and protocol
- Serial terminal interface (RS 232) as auxiliary data interface with variable transfer rate and fixed protocol
- CAN interface for integration in the SICK CAN scanner network or a CANopen network
- Ethernet interface with TCP/IP or FTP
- 2 switching inputs for external reading pulse and special function (e. g. teach-in of match code or encoder increment)
- 2 switching outputs for signaling defined events in reading mode

Connections:

- All interfaces excepting the Ethernet interface are connected via one 15-pin D Sub HD plug, Ethernet interface: RJ 45 10 base T socket
- CDB 420 or CDM 420 Connection Module for connection to host (stand-alone) and for integration in SICK CAN scanner network
- CMF 400 Connection Module Fieldbus in the CDM 420 Connection Module for connection to field bus systems

3.1.5 View of the device

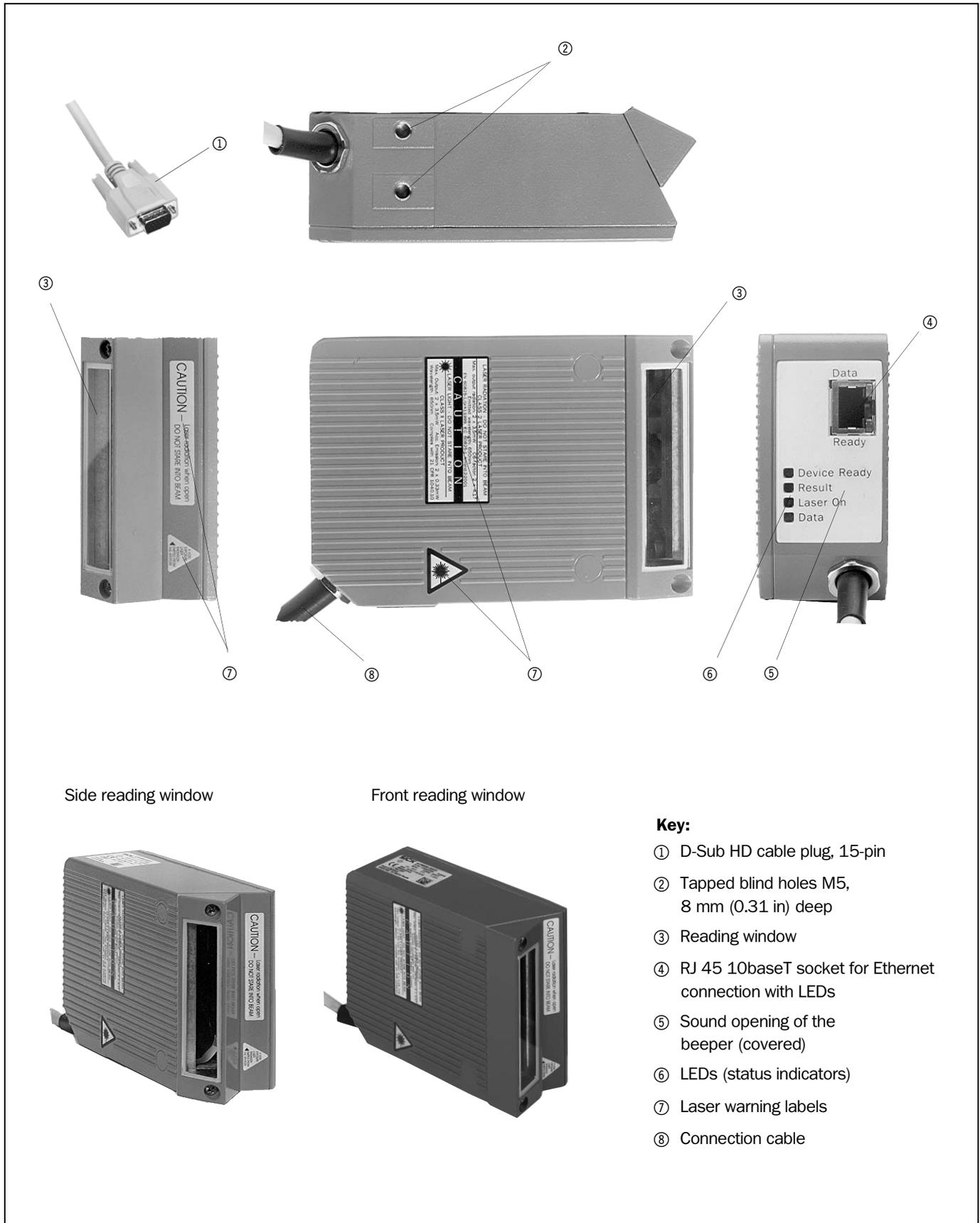


Fig. 3-1: Design of the ICR

3.2 Method of operation

The ICR uses a CCD-line array to scan 2-D codes and bar codes. The illumination is realised with a combination of 2 laser diodes. A special optics setup illuminates the scan line with a red laser line. With the start of a reading cycle, at a high scan frequency, the ICR continuously stores 4,000 line images from the CCD line array to its internal image buffer memory. As an object moves through the scan line at a **constant speed**, a 2-dimensional grey-scale image is built up from the high frequency scans in the image buffer memory. Recorded by the CCD line array, a 2 dimensional image of the scene, e. g. a 2-D code label, is available for further decoding and analysis tasks in the ICR. Due to the ring-architecture of the image memory, the recorded scene continuously scrolls "through" the image memory. As 2-D-codes or bar codes are detected in the image data, the ICR's decoding algorithms determine the code contents. At the end of the reading cycle or immediately after successful decoding, the ICR outputs the code data information via its data interface (main data interface: Host, CAN or Ethernet interface) to a host/PC for further processing.

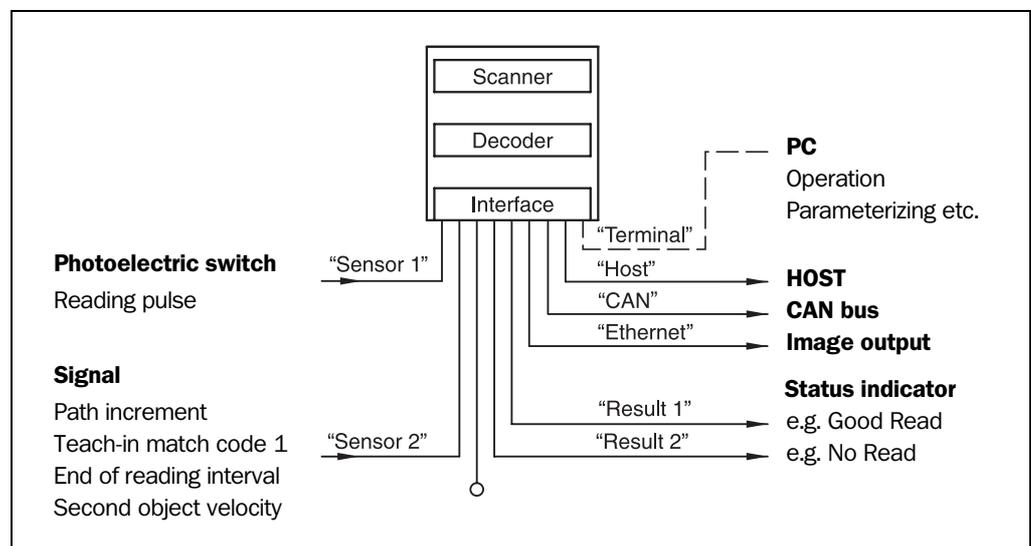


Fig. 3-2: Block diagram: functions of the ICR

The ICR is equipped with three decoders:

- The decoder for 2-D codes
- The SMART decoder (**SICK Modular Advanced Recognition Technology**) for decoding bar codes with a small aspect ratio (ratio of the code height to the code length), bar codes that are dirty or damaged, as well as bar codes that are tilted excessively (azimuth angle)
- The tried-and-tested standard decoder of the CLV series for bar codes

The ICR derives useful diagnosis data from the reading process and transfers it to the host. It also records operating data that can be requested at any time. The reading quality of bar codes can be checked in the "Percentage Evaluation" operating mode. The reading quality of 2-D codes can be checked using the reading diagnosis data in normal Reading mode. On request, the ICR outputs the image memory content as binary or grey scale bitmap via the Ethernet interface.

To start the reading process when an object is located in the reading field, the ICR requires a suitable trigger. This opens a time window ("reading interval") in the ICR for the reading procedure. In the default setting, this trigger is supplied by an external reading pulse sensor. Alternative trigger sources include Free Running mode and a command sent via the host interface.

The current operating status is indicated by four LEDs. A beeper indicates the status of the reading result. In the default setting, the “Good Read“ function is selected for this.

If the trigger is supplied externally by a sensor, the “Sensor 1“ switching input signals the start of the reading procedure to the ICR. The “Sensor 2“ switching input is used to signal the end of reading procedure or to enter the path increment. Alternatively, it can be used e. g. to teach in a match code. The “Result 1“ and “Result 2“ switching outputs can be assigned various functions and trigger external devices, such as a PLC.

The ICR is operated and configured via the serial auxiliary interface (auxiliary data interface) with the user interface of the “CLV Setup“ software or via the host/auxiliary interface and command strings. Alternatively, the Ethernet interface is available for both types of operation.

The ICR outputs system and error messages as error codes, which can be requested from the error memory using command strings.

3.3 Indicators and control elements

3.3.1 Control elements

The ICR is operated and configured as described above. A variety of parameter options allow you to adapt the device to a wide range of applications.

The following can be defined:

- The configuration of the code types to be read
- The reading, evaluation and output characteristics
- The communication parameters of the host interface, CAN or Ethernet interface
- The structure of the data output string for “Good Read“ and “No Read“ (host interface)
- The function of the auxiliary interface

[Chapter 10.3 “Installation and operating instructions for the PC-based “CLV Setup“ program“, Page 10-3](#) describes the procedure for installing the “CLV Setup“ program and explains how to use it. Configuration (parameterizing) is explained in [Chapter 6.3.2 “Configuring the ICR for the application with the Setup Assistant“, Page 6-4](#).

3.3.2 Function of the LEDs

General LEDs

Four LEDs indicate the operating status, activity of the laser diode, the reading result status and data transfer on the host interface. The LEDs ([Fig. 3-3](#)) are located on the rear of the device toward the bottom. [Table 3-2, Page 3-8](#) shows the meaning of the LEDs in the different operating modes/functions.

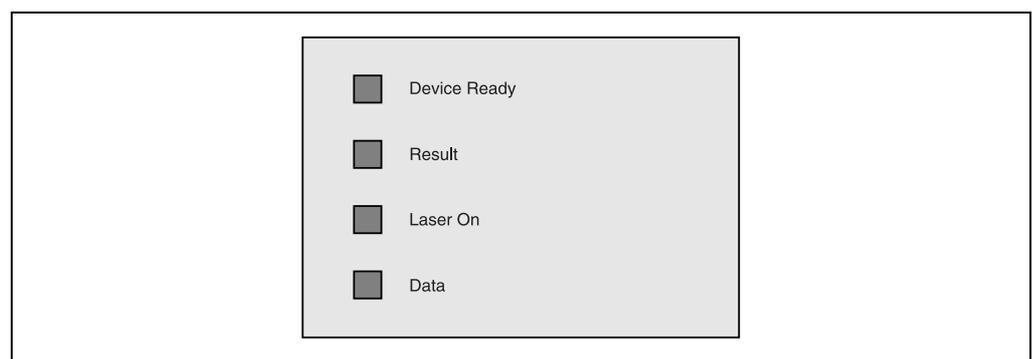


Fig. 3-3: LEDs

Operating mode	LED	Indication	Function
Start	Device Ready	<i>Orange</i>	<ul style="list-style-type: none"> Lights up after power-up if the self-test was successful and the wait time for reading the profile bar codes (not suitable for ICR) has expired.
	Laser On	<i>Orange</i>	<ul style="list-style-type: none"> Lights up while the laser diodes for reading the profile bar codes (not suitable for ICR) are active.
Reading mode	Device Ready	<i>Orange</i>	<ul style="list-style-type: none"> Lights up constantly Extinguishes with new operating mode/function
	Laser On		<ul style="list-style-type: none"> Lights up when the laser diodes are active (The laser diodes are activated/deactivated by reading pulse). Lights up constantly in the pulse mode Free Running, as the laser diodes are always active.
	Result	<i>Orange</i>	<p>LED is connected to the "Result 2" switching output. It indicates the selected result status for the set pulse duration of the output.</p> <ul style="list-style-type: none"> Lights up after a good read (default setting: Good Read) Lights up (match code comparison active) if the read code matches the predefined match code(s) and the corresponding result status output is selected for the "Result 2" output.
Percentage Evaluation	Data	<i>Orange</i>	<ul style="list-style-type: none"> Flickers while the ICR transfers data to the host on the host interface.
	Laser On	<i>Orange</i>	<ul style="list-style-type: none"> Lights up constantly (Free Running mode)
	Result	<i>Orange</i>	<p>Behavior depends on the reading quality:</p> <ul style="list-style-type: none"> Extinguishes if reading rate < 30 % Flashes twice a second if reading rate is 30 % to 70 % Flashes five times a second if reading rate is 70 % to 90 % Lights up constantly if reading rate > 90 %

Table 3-2: Meaning of the general LEDs

LEDs of the Ethernet interface

Two LEDs, integrated in the RJ 45 socket 10baseT ([Fig. 3-1, Page 3-5](#)), indicate the status of the Ethernet connection. [Table 3-3](#) lists the meaning of the LEDs.

LED	Indication	Function
Ready	<i>Green</i>	Indicates the physical Ethernet connection
Data	<i>Yellow</i>	Lights up when the ICR receives or sends addressed data via Ethernet

Table 3-3: Meaning of the LEDs of the Ethernet interface

3.3.3 Function of the beeper

The beeper uses different tone sequences and lengths (*Table 3-4*) to signal whether functions have been executed successfully and whether any malfunctions have occurred. For information on troubleshooting, see *Chapter 8.5 “Troubleshooting”, Page 8-5*.

In the default setting, the beeper is activated and indicates the result status “Good Read” for the Reading mode. It is assumed in these Operating Instructions, that the beeper is operated with the default setting in Reading mode.

The sound opening of the beeper is located on the rear, narrow side of the device and below the LED labeling.

Operating mode	Tone sequence	Beeper function
Start	Beep	<ul style="list-style-type: none"> Signals that the self-test after power-up was successful
Reading mode	Beep Beep	<ul style="list-style-type: none"> Confirms that the device has assumed Reading mode after power up and that the wait time of 5 s for reading the profile bar codes (not suitable for ICR) has elapsed
	Beep	<ul style="list-style-type: none"> Confirms a successful read (good read; default setting) and the reading result output
Exceeding the laser timeout	Beep Beep Beep	<ul style="list-style-type: none"> Signals that the laser diode has been deactivated after the laser timeout of 10 min (default setting) was exceeded in Reading mode. The reading interval is still active.

Table 3-4: Beeper function



Tip

The behavior of the beeper in **Reading mode** can be changed on the DEVICE CONFIGURATION tab of the CLV Setup user interface.

ON/OFF:

➤ To switch off the beeper, click on the OFF radio button in the BEEPER group.

Output function for the result status:

1. Click the RESULT OUTPUT PARAMETERS button.
The RESULT OUTPUT PARAMETERS dialog box is displayed.
2. Click the BEEPER list field in the RESULT FUNCTIONS section.
The list containing the available result status functions appears.
3. Click the desired function and choose “OK”.
4. Perform a download to the ICR. This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
5. Confirm the dialog box by selecting the PERMANENT save option.

The ICR operates the beeper with the values selected for the function of the result status.

Notes:

4 Installation

4.1 Overview of installation sequence

- Changing the language version of the laser warning label (if necessary)
- Selecting the installation location for the ICR
- Aligning the ICR with the code (adjusting the reading distance)
- Installing ICR
- Installing and configuring the CDB 420 or CDM 420 Connection Module
- Connecting the IRC to the CDB 420 or CDM 420 Connection Module
- Adjusting the ICR
- Installing the reading pulse sensor for triggering the reading pulse

Note **Don't open the device. The producer warranty will be forfeited if the device is opened.**

4.2 Installation preparations

4.2.1 Laying out the components to be installed

- ICR 85x Image Code Reader

4.2.2 Laying out accessories

- Mounting bracket no. 2 025 491 with 2 M5 x 16 mm (0.63 in) screws (not included in the ICR scope of delivery)
Alternatively, if the bracket is supplied by the user:
Stable installation device that allows the alignment of the ICR to be varied in the x and y axes. The ICR weighs approx. 900 g (31.75 oz) with the connection cable.
Two M5 screws for the ICR. The screw length depends on the wall thickness of the bracket used. Depth of engagement in **ICR max. 8 mm (0.31 in)** from housing surface
- Distance tool (included in the scope of delivery of the ICR)
- Special print (no. 8 010 754) containing test pattern with several resolutions for adjusting the reading distance of the ICR (included in the scope of delivery of the ICR)
- CDB 420 or CDM 420 Connection Module (not included in the scope of delivery of the ICR)
- Reading pulse sensor(s) for external reading pulse trigger, e. g. photoelectric reflex switch(es)/photoelectric proximity switch(es) (not included in the scope of delivery of the ICR)

4.2.3 Laying out the required tools

- Two M5 screws for fastening the SICK mounting bracket (strength: 8 mm (0.31 in)) to the installation base. The screw length depends on the wall thickness of the base
- Set of laser warning labels (if necessary)
- Tool
- Protractor

4.2.4 Replacing the laser warning label

If necessary, replace the laser warning label on the ICR in GB English/US English with the required language ([Fig. 4-1](#)).

The device is delivered with a set of laser warnings in:

- German/US English
- French/US English

See also [Chapter 2.3 "General safety precautions and protection measures"](#), [Page 2-2](#).

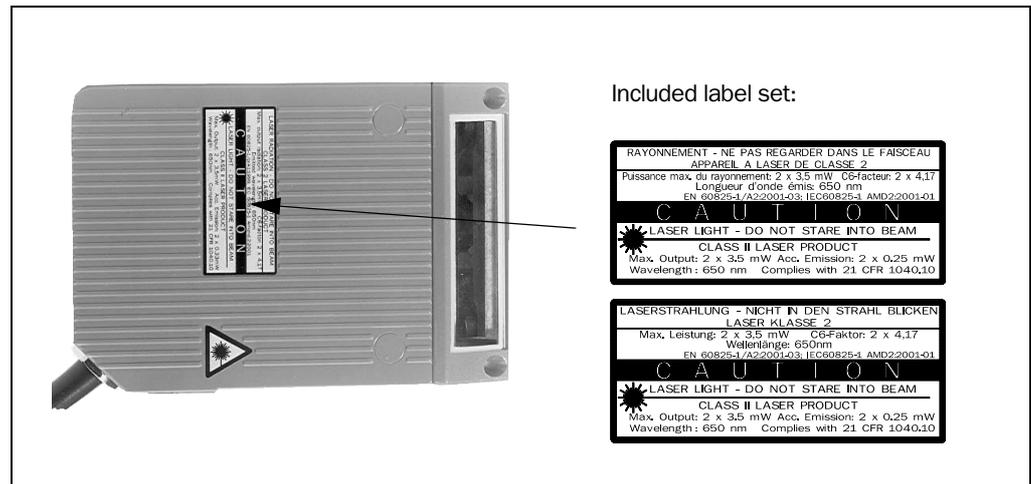


Fig. 4-1: Replacing the laser warning label

4.2.5 Selecting the installation site

When you select the mounting location, the distance between the ICR and the host and between the ICR and the code are important.

Distance between ICR and host

The ICR can be installed in a bus connection max. 1,200 m (3,936.96 ft) from the host. The distance which can be achieved depends on the selected model of the host interface and the set data transfer rate, however (see [Table 5-5, Page 5-5](#)). Via the Ethernet interface the ICR can be connected to the Ethernet.

Distance between the ICR and the CDB 420 or CDM 420 Connection Module

The CDB 420 or CDM 420 Connection Module must not be located further than 10 m (32.8 ft) from the ICR, since the "CLV Setup" program on the PC accesses the auxiliary interface of the ICR via this module (RS 232) by default.

4.2.6 Mounting accessories

The ICR is mounted with two tapped blind holes (M5) located on the bottom narrow side of the device. [Fig. 4-2](#) shows the position of the threaded hole.

The dimensions of the IRC housing are shown in [Fig. 9-1, Page 9-2](#).

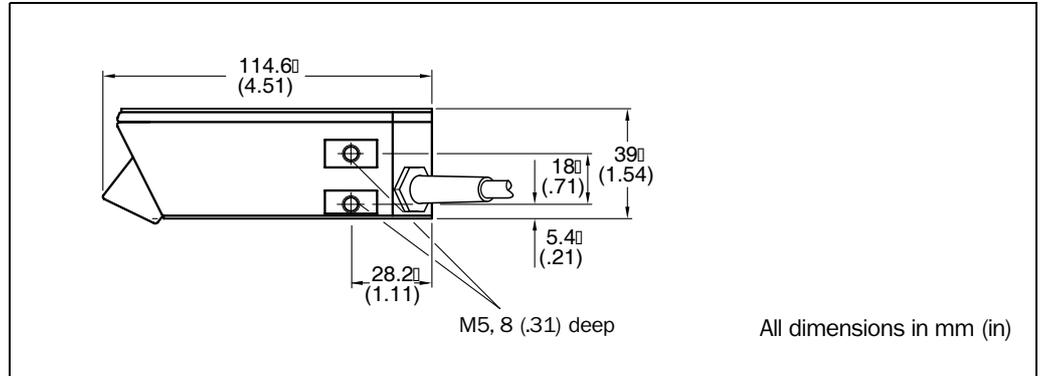


Fig. 4-2: Position of the securing threads on the ICR

The ICR is installed with the mounting bracket no. 2 025 491.

The bracket is designed to support a variety of installation positions and alignments in two planes. [Fig. 4-3](#) shows a mounting example.

The slots in the mounting bracket allow a turning freedom of $\pm 15^\circ$ for the fine adjustment of the ICR.

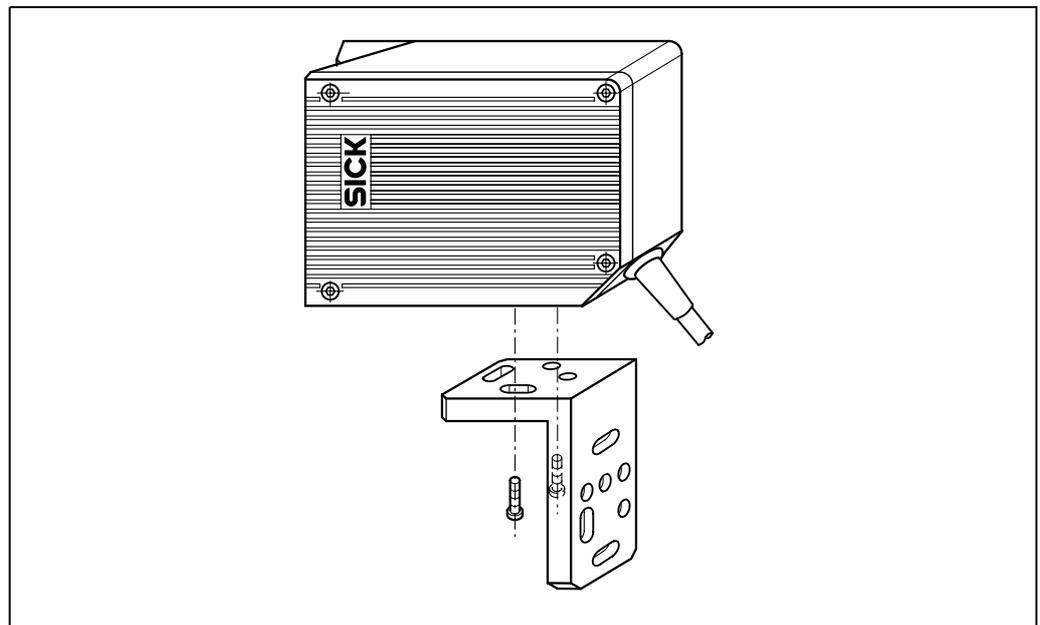
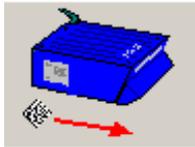


Fig. 4-3: ICR installation options using the mounting bracket no. 2 025 491

The dimensions of the mounting bracket are shown in [Chapter 10.10 "Dimensional drawings of the accessories", Page 10-42](#).

4.2.7 Distance between ICR and code

a) Basic alignment with the 2-D code/bar code



The ICR is either used with the side or front reading window, depending on the application. Fig. 4-4 shows how the red illumination line (scan line) is aligned with the code on the object and with the conveyor direction. In the default setting, the ICR reads in the direction “Forwards” of conveyor movement.

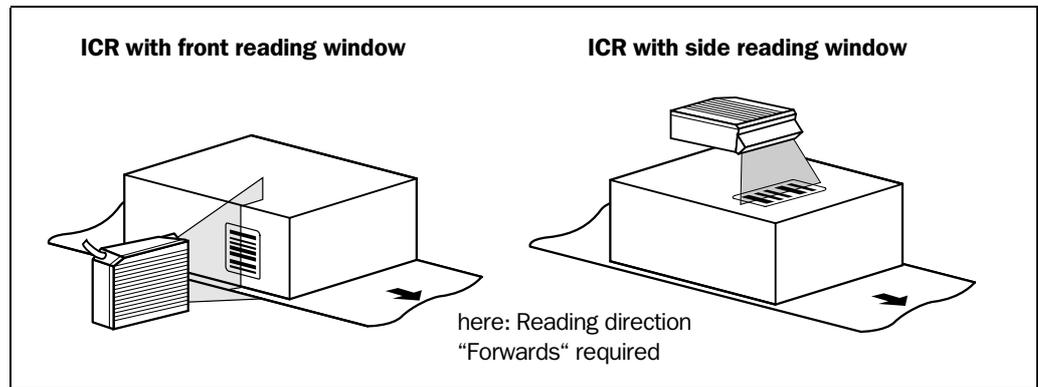


Fig. 4-4: Alignment of ICR with code and conveyor direction

Note If the conveyor direction is always in one direction, the evaluation of the image memory can be simplified in order to optimize the reading capacity with time-critical applications (output mode “immediate”) (see Chapter 10.4.2, Page 10-20). Only enable this reading direction in the ICR.

b) Reading distance to code

The distance between the reading window of the ICR and the code is determined by the fixed focus position of the ICR and the resolution-specific depth of field for the desired cell size/module width. The distance may not exceed the total technical limits. The resolution-specific depth of field around the focus position is shown in Chapter 9.3.2 “Reading ranges of ICR – preliminary –”, Page 9-3 .

The reading distance of the device in the focus position for installation:

- ICR 850: X: 100 mm (3.94 in) for side reading window
Y: 110 mm (4.33 in) for front reading window
- ICR 852, ICR 855: X: 60 mm (2.36 in) for side reading window
Y: 70 mm (2.75 in) for front reading window

Fig. 4-5 shows the exact definition of the reading distance from the reading window.

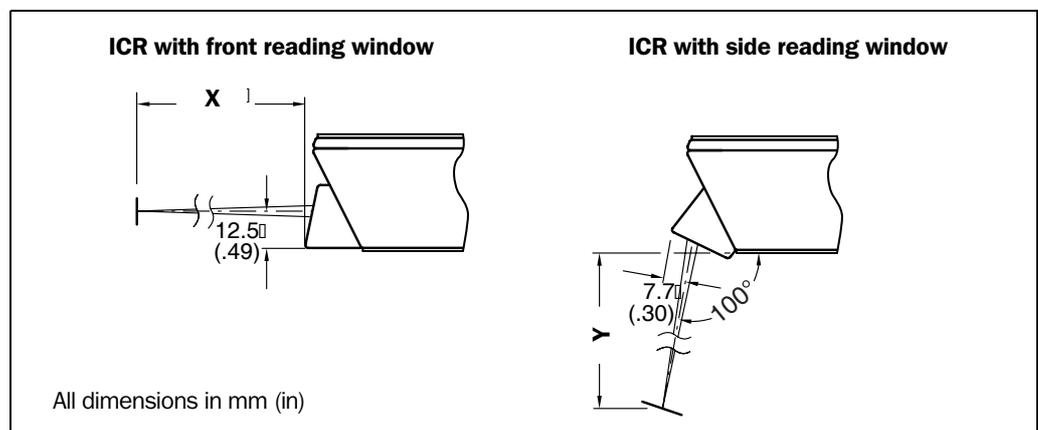


Fig. 4-5: Definition of the reading distance

Note The specified reading distance must be correctly maintained, especially at high resolution (ICR 852 with only small DOF).

Distance tool

To make it easier to mount the ICR, a metal type-dependent distance tool is included with the ICR.



Danger of injury due to misuse.

The tip of the distance tool is very sharp, which ensures accurate alignment.

When in the packaging for the ICR, the tip is not covered.

- Only use the distance tool for mounting the ICR.
- Use the distance tool with caution (keep it away from your eyes!).
- Do not throw the distance tool or point it at other people.

Because the distance tools are not stamped, [Fig. 4-6](#) shows an overview of the different versions designed for the different ICR types.

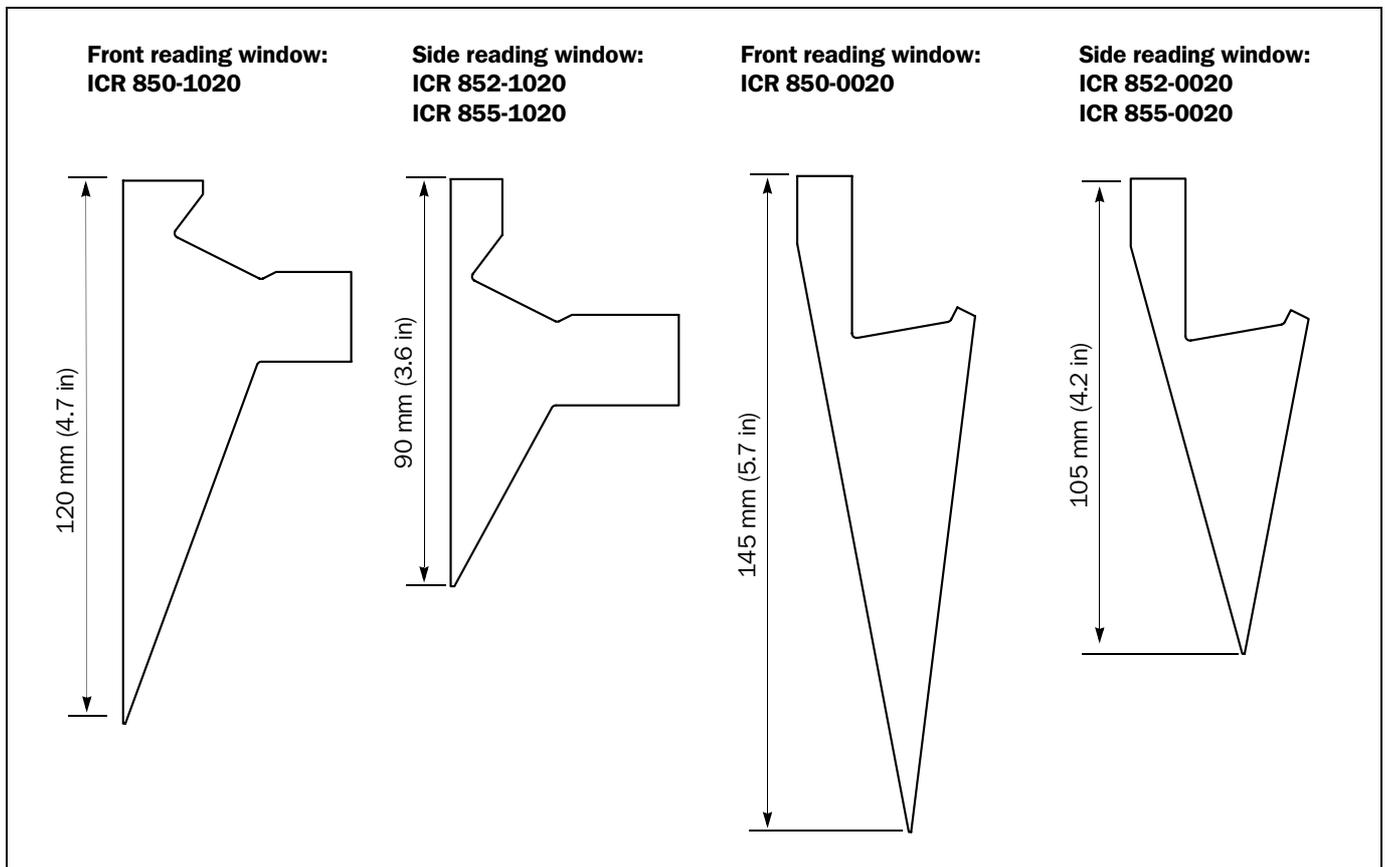


Fig. 4-6: Distance tools: assignment to the ICR types

For instructions on using the distance tool, see [Chapter 4.3.1 "Installing the ICR"](#), [Page 4-10](#).

Test pattern

The Setup Assistant in CLV Setup helps you mount the ICR accurately on a planar surface. To use the Setup Assistant, you have to select a suitable test pattern from the original special print (no. 8 010 754; see Fig. 4-7), which is enclosed.

- Cut out the required test pattern with scissors. Do not bend or fold the pattern. The pattern must lie flat in the reading plane.

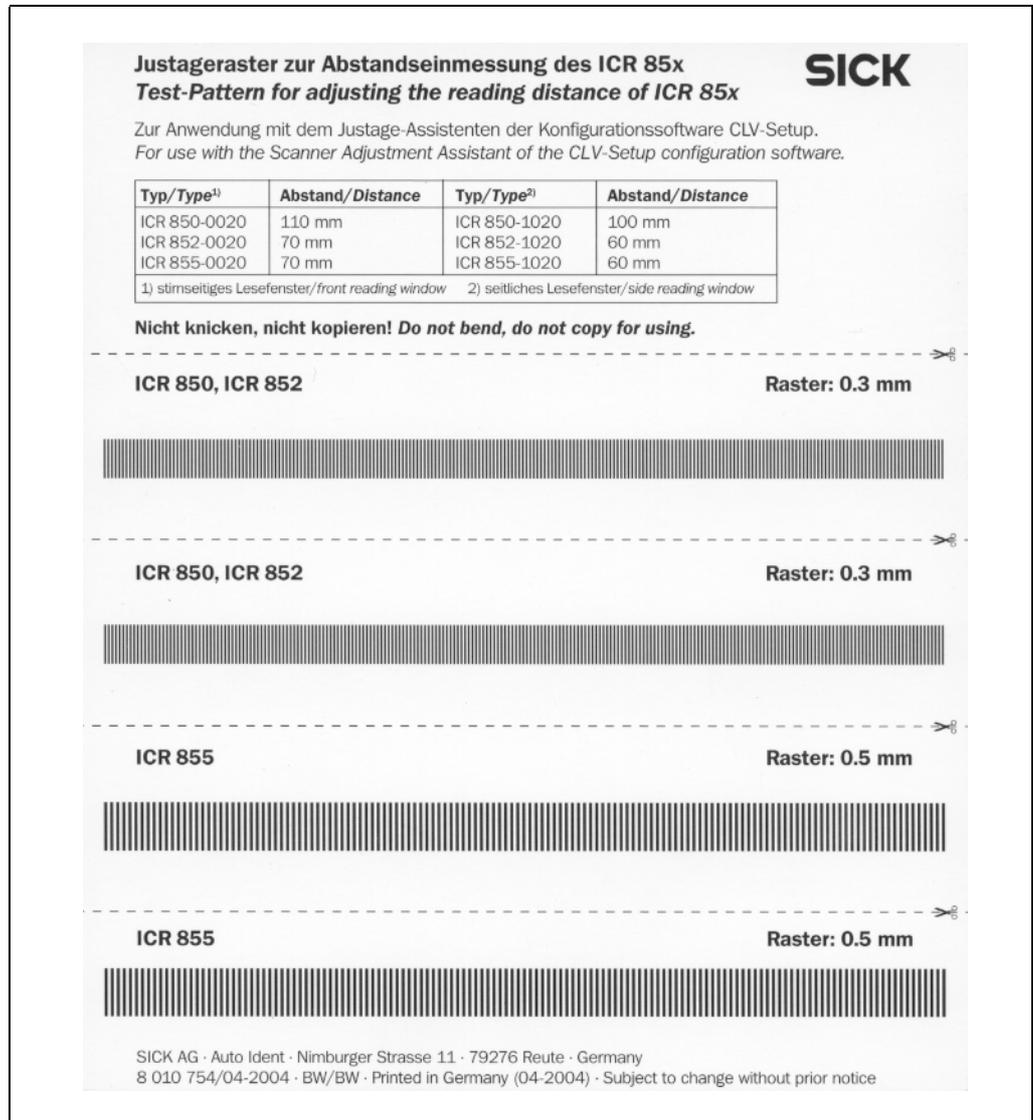


Fig. 4-7: Scaled-down view of the special print no. 8 010 754 (not an original)

Angular alignment of the ICR

The alignment of the ICR is optimum when the red illumination line (scan line) travels over the bar code lines at a right angle (90°) (Fig. 4-4). All possible reading angles that can occur between the illumination line and the code must be taken into consideration (Fig. 4-8 and Table 4-2).

2-D codes are read by the ICR omnidirectionally.

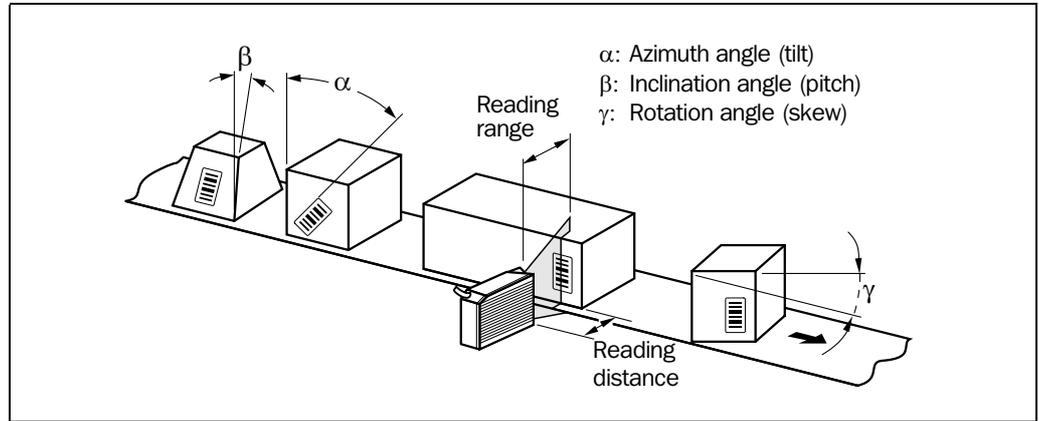


Fig. 4-8: Line scanner: Reading angles between the illumination line and the code

The following applies for bar codes and 2-D codes (DataMatrix ECC 200) when reading with omni-directional decoder:

Angle	Limit value
Azimuth α (tilt)	360°
Incline β (pitch)	Max. $\pm 45^\circ$ (depending on the cell size)
Rotation γ (skew)	Max. $\pm 45^\circ$ (depending on the cell size)

Table 4-1: Permissible reading angle between the illumination line and the bar code/2-D code when reading with omni-directional decoder

The following applies for bar codes when reading with standard/SMART decoder:

Angle	Limit value
Azimuth α (tilt)	Max. $\pm 45^\circ$ (in scanning axis and in focus position 100 mm (3.94 in) for module width 0.2 to 0.5 mm (7.9 mil to 19.7 mil))
Incline β (pitch)	Max. $\pm 45^\circ$ (depending on the module width)
Rotation γ (skew)	Max. $\pm 45^\circ$ (depending on the module width)

Table 4-2: Permissible reading angles between the illumination line and bar code when reading with standard/SMART decoder

Preventing surface reflections

If the light from the red illumination line strikes the surface of the code vertically, interference may be caused by reflections when the returned light is received.

To prevent this effect, the ICR with a front reading window must be installed in such a way that the emitted light of the illumination line is tilted slightly with respect to the vertical.

The ICR with a side reading window already has an angle of emergence at 100°; it can be installed parallel to the object surface according to diagram.

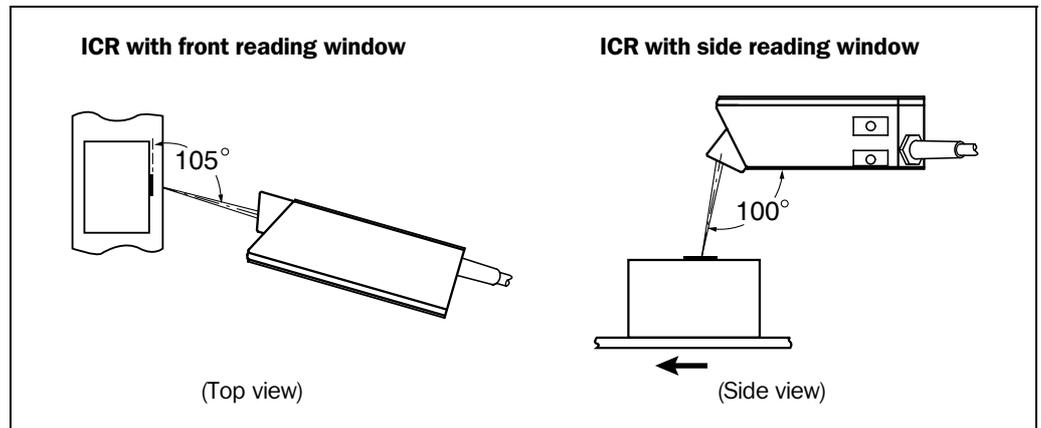


Fig. 4-9: Preventing surface reflection: Angle between the emitted light and code (tilted away from the vertical axis)

4.2.8 Count direction of the code position CP

Explanation

The ICR can scan and decode several codes with each read.

In doing so, it determines the local reading diagnosis data for each code in the image memory, relative to the illumination line for bar codes.

Fig. 4-10 shows the count direction of the code position along the illumination line.

By determining the value, the device can separate identical codes (code type, code length, and data content) and assign the code data in the reading result to its position on the object.

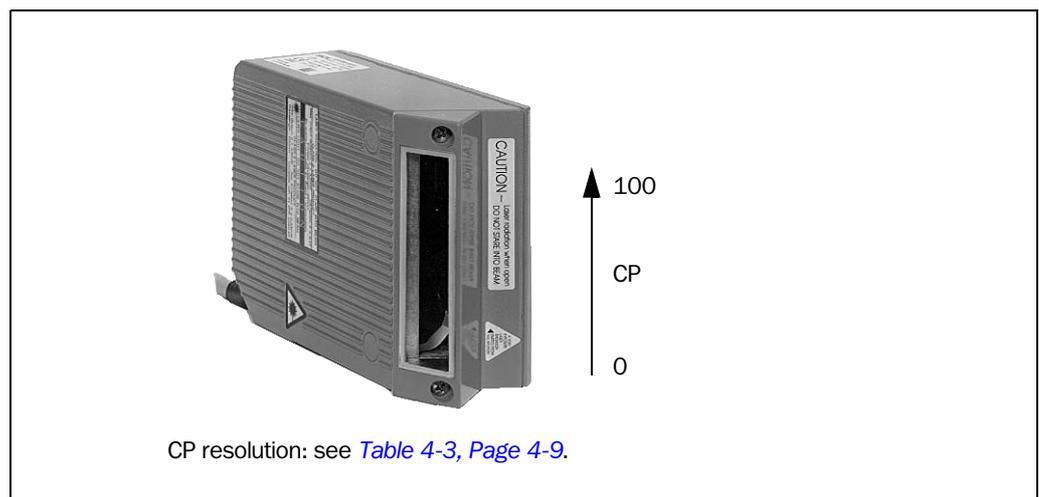


Fig. 4-10: Count direction of the code position CP for bar codes along the illumination line

For **2-D codes**, the ICR determines the spatial position of the finder patterns in the image memory. It outputs its corner points in the shape of two-dimensional coordinates in the reading result of the auxiliary interface as the "PT" reading diagnosis data (see "1. Output of reading result: 2-D code (DataMatrix ECC 200)", Page 6-31).

For **bar codes**, the ICR determines the position of the first dark line of the start character in the image memory. It outputs the value in the reading result of the auxiliary interface as reading diagnosis data “CP” (see “2. Output of reading result: Bar code”, Page 6-33).

The resolution of the code position depends on the number of pixels and the resolution of the pixels (Table 4-3).

Type	Scanning frequency	Reading field height	Number of pixels	Pixel resolution	CP resolution
ICR 850	max. 15 kHz	80 mm (3.15 in)	2048	42 µm	0.80 mm (31.5 mil)
ICR 852	max. 15 kHz	40 mm (1.58 in)	2048	21 µm	0.40 mm (15.75 mil)
ICR 855	max. 45 kHz	40 mm (1.58 in)	512	87 µm	0.40 mm (15.75 mil)

Table 4-3: Resolution of the code position CP

For the ICR 850, 1 internal CP corresponds to a 0.80 mm (31.5 mil) line.

The CP value multiplied by the CP resolution yields the exact location in the illumination line and, with objects which are fed in properly, on the object as well, of course.



Tip

In the default setting, the ICR does not output the values “PT” or “CP” in the reading result of the host interface. If this is required to evaluate the result in the host, the values can be included in the “reading data” block of the output string using the CLV Setup program.

Configuring reading data:

1. Select the DATA STRINGS tab.
2. Click the READING DATA field.
The dialog window EDIT PARAMETER: TFS dialog box is displayed.
3. Use the mouse to place the cursor before or after the “BC” (bar code) placeholder.
4. In the drop-down list box below it, click the parameter PT for 2-D codes or CP for bar codes. PT or CP is added in the selected position in the input field.
5. Confirm the dialog box with “OK”.
6. Perform a download to the ICR. This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
7. Confirm the dialog box by selecting the PERMANENT save option.
The ICR outputs the PT or CP value for each code in the reading result via the host interface. The values are always multi-digit numbers located in the selected position in the reading data.

4.3 Installing and adjusting the device

4.3.1 Installing the ICR

1. Prepare the base for installing the bracket as described in [Chapter 4.2.2 "Laying out accessories", Page 4-1](#).



Risk of damage to the housing

The maximum depth of engagement of the two tapped blind holes M5 is 8 mm (0.31 in). Longer screws will damage the housing.

- Use screws with the correct length.

2. Screw the screws M5 through the bracket into the tapped blind holes of the ICR.
3. Tighten the screws slightly so that the ICR can to be varied in the x and y axes.
4. Place the object containing the 2-D code within the visible range of the ICR in the position at which it is to be read (with the conveyor switched off).
5. Align the ICR with the code in such a way that
 - The wide side of the device with the laser warning labels is nearly parallel with the code surface, when using a side reading window.
 - The narrow side of the device with the LEDs is tilted approx. 15° from the vertical, when using a front reading window

All of the possible reading angles must be taken into consideration (see [Fig. 4-8, Page 4-7](#)).

6. Use the enclosed distance tool (type dependent) to ensure that the system complies with the required reading distances. Place the distance tool on the ICR from the side (be careful not to damage the paintwork) and move it slowly across the whole range of the reading window ([Fig. 4-11](#)). The reading window must remain parallel to the reading plane across the whole range.

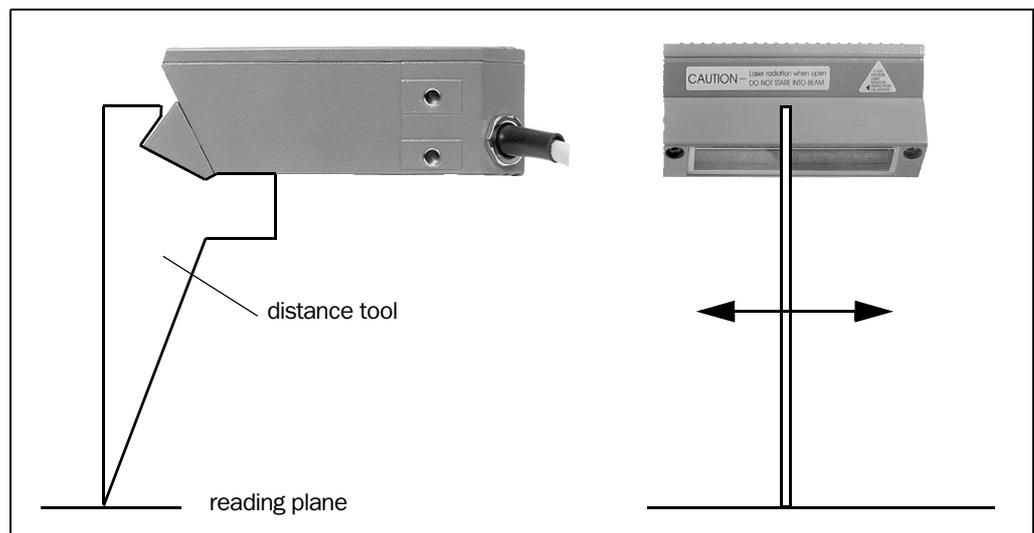


Fig. 4-11: Using the distance tool (in this example: ICR 85x with reading window on side)

Reading distances:

ICR 850: 110 mm (4.33 in)/100 mm (3.94 in) for front/side reading window

ICR 852, ICR 855: 70 mm (2.75 in)/60 mm (2.36 in) for front/side reading window

7. If relevant to the evaluation, note the count direction of the code position (see [Fig. 4-10, Page 4-8](#)).
8. Mark the bracket of the ICR on the base (supporting stand), drill the required holes, and mount the bracket on the base.

4.3.2 Adjusting the ICR

The test pattern and the Setup Wizard in CLV Setup allow you to align the ICR quickly and easily. For more information, see [Chapter 6.3.2 "Configuring the ICR for the application with the Setup Assistant", Page 6-4](#).

4.4 Installing external components

4.4.1 Installing the CDB 420 or CDM 420 Connection Module

1. Install the CDB 420 or CDM 420 Connection Module near the ICR. The distance between the CDB 420 or CDM 420 and ICR must not exceed 10 m (32.8 ft).
2. Install the CDB 420 or CDM 420 in such a way that the device can be accessed when opened. The auxiliary interface of the ICR, used for parameterizing/diagnosis, is accessed via the internal "Aux" connector.



Detailed information on the installation and electrical installation procedures is provided in the "CDB 420 Connection Module" *Operating Instructions* (order no. 8 010 001, German/English version) respectively in the "CDM 420 Connection Module" *Operating Instructions* (order no. 8 010 004, German/English version).

4.4.2 Installing the external reading pulse sensor

If the ICR is triggered by an external reading pulse sensor, the sensor must be installed in the vicinity of the ICR. The "Sensor 1" switching input is selected as the default trigger source for this trigger type.

[Fig. 4-12](#) shows two examples of where a photoelectric reflex switch can be installed. This depends on the distance a from the code to the front of the object. Depending on the application, you may need to attach the sensor in such a way that codes on objects of different sizes can be read completely during the reading interval.

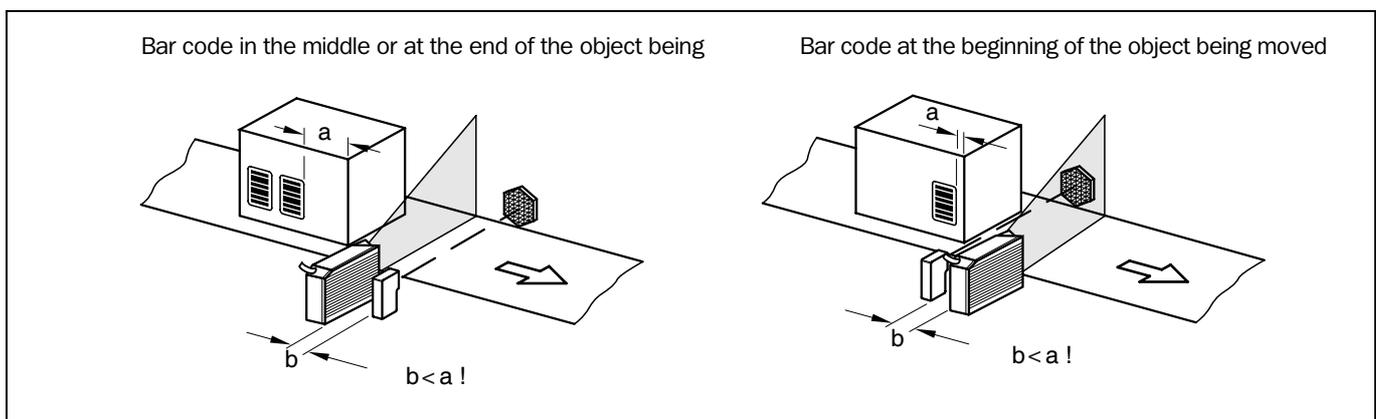


Fig. 4-12: Line scanner: Installation example for the external reading pulse sensor

Note As the ICR must completely read a 2-D code into its image memory for decoding, it must be ensured that the appropriate time is available when positioning the pulse sensor.



1. Attach the reading pulse sensor to the installation location.
2. Connect the reading pulse sensor to the "Sensor 1" switching input of the ICR via the CDB 420 or CDM 420 Connection Module (see [Chapter 5.5.8 "Connecting the "Sensor 1" switching input", Page 5-13](#)).
3. Connect the ICR to the CDB 420 or CDM 420 Connection Module and switch on the power supply to the module (see [Chapter 5.5.3 "Connecting the power supply", Page 5-7](#)).

After the ICR has started, it emits a tone to indicate that the self-test was successful. After a short while, it outputs two consecutive tones to indicate that it has switched to Reading mode. The "Device Ready" LED lights up.

4. Connect the PC to the auxiliary interface of the ICR. For this purpose, connect a 3-core RS 232 data cable (null modem cable) to the internal 9-pin "Aux" plug of the module. (see [Chapter 5.5.7 "Connecting the PC", Page 5-12](#)).

– or –

Connect the PC to the Ethernet interface of the ICR.

(see [Chapter 5.5.6 "Connecting the Ethernet interface", Page 5-10](#))

5. Start Windows and "CLV Setup" on your PC. (see [Chapter 10.3.3 "Starting "CLV Setup"", Page 10-6](#)).
6. Click  in the toolbar in CLV Setup. The Terminal Emulator dialog box is then displayed.
7. Click READING MODE under DEVICE MODE. Monitor the reading result during each of the subsequent steps!
8. Using the conveyor system, move objects with 2-D codes through the red illumination line of the ICR one after another.
9. Check for proper reading pulse triggering and the reading result.
10. Repeat the procedure under realistic conditions with the conveyor belt running if necessary.
11. Check whether the reading procedure is synchronized with the approaching objects.



Parameterizing an external sensor as a trigger source (not applicable in the case of default setting):

1. Select the DEVICE CONFIGURATION tab.
2. Click the READING TRIGGER PARAMETERS button. The READING TRIGGER PARAMETERS dialog box is then displayed.
3. Choose SENSOR INPUT in the START OF READING INTERVAL section and confirm your selection.
4. Perform a download to the ICR. This is done by clicking  in the toolbar. The DOWNLOAD PARAMETER dialog box is displayed.
5. Confirm the dialog box by selecting the PERMANENT save option. The ICR operates with the "Sensor 1" switching input as an external trigger source. The reading pulse starts when power is applied.

4.4.3 Installing the incremental encoder

An encoder is required to separate bar codes of the same symbology with identical content.

1. Install the incremental encoder (e. g. no. 2 022 714) near the ICR but in front of it, preferably against the direction of the conveyor belt. The increment pulses must originate from the area of the conveyor belt which the ICR is reading.
2. Ensure that the incremental encoder is contacting the conveyor and that the friction wheel turns without slipping.
3. Connect incremental encoder to the "Sensor 2" switching input of the ICR). See [Chapter 5.5.9 "Connecting the "Sensor 2" switching input", Page 5-14](#).

4.5 Removing the device

1. Switch off the power supply to the CDB 420 or CDM 420 Connection Module.
2. Loosen the screws and remove the ICR cable plug from the CDB 420 or CDM 420 Connection Module.
3. When using the Ethernet interface, detach the connection cable from the socket on the ICR.
4. Unscrew the ICR from the installation device.

When removing the device from service for the last time, please dispose of it in an environmentally-friendly manner, as described in [Chapter 7.3 "Disposal", Page 7-2](#).

5 Electrical installation

5.1 Overview of the installation sequence

- Connecting the ICR to the CDB 420 or CDM 420 Connection Module
- Connecting the data and functional interfaces of the ICR in the module
- Connecting the Ethernet interface for image output and parameterization (recommended). Alternatively without image output: Connect the PC to the auxiliary interface on the ICR)
- Connecting the power supply to the connection module

5.1.1 SICK Connection Modules (Overview)

Connection Module	Design	Purpose
CDB 420-001 CDB 420-101		<ul style="list-style-type: none"> – Connecting one ICR – 1 x 15-pin D Sub HD socket, 4 x cable gland (CDB 420-101: 2 x cable gland, 2 x M12 plug connection (1 x plug, 1 x socket)) – Operating voltage 10 to 30 V DC – Enclosure rating max. IP 65 – Temperature range –35 to +40 °C (–31 to +104 °F)
CDM 420-0001		<ul style="list-style-type: none"> – Connecting one ICR – 1 x 15-pin D Sub HD socket, 6 x cable gland – Operating voltage 10 to 30 V DC – Enclosure rating max. IP 65 – Temperature range –35 to +40 °C (–31 to +104 °F)

Tab. 5-1: Connection modules for the ICR

For technical data on the modules see [Chapter 10.9.2 "Connection modules", Page 10-39](#).

5.2 Electrical connections and cables

The electrical connection of the ICR consists of a 15-pin D-Sub HD cable plug and an 8-pin RJ 45 socket 10baseT on the device. It supplies the following interfaces:

- Four serial data interfaces (host, CAN, Ethernet and auxiliary interface)
 - Two switching inputs (external reading pulse and multifunctional input)
 - Two switching outputs (for result status function, or connecting to a PLC for example)
 - Power supply
- All of the connections must be wired with copper cables with a minimum wire diameter of 0.09 mm² (approx. 17 AWG)!

5.2.1 Pre-fabricated cables (Overview)

Temperature range 0 to +40 °C (+32 to +104 °F).

Connection of ICR to	Cable	Length	Purpose
CDB 420 CDM 420	No. 6 010 075	2 m (6.56 ft)	Extension cable for data and function interfaces, with 15-pin D Sub HD socket and plug
Non-SICK power pack	No. 6 010 137	2 m (6.56 ft)	Connection cable for data and functions interfaces, with 15-pin D Sub HD socket and open end
PC (RS 232)	No. 2 014 054	3 m (9.84 ft)	RS 232 data cable (null modem cable) with two 9-pin D Sub sockets (TxD and RxD are crossed)
Ethernet	No. 6 026 083	3 m (9.84 ft)	Ethernet data cable (patch cable) with two 8-pin RJ-45 plugs (grey)
PC with Ethernet card	No. 6 026 084	3 m (9.84 ft)	Ethernet cross-over cable with two 8-pin RJ-45 plug (red)

Tab. 5-2: Cables for connecting the ICR

For technical data on the cables [Chapter 10.9.4 “Cables and plug-in connections”, Page 10-41.](#)

5.2.2 Connections/cables for the CDB 420 or CDM 420 Connection Module

The CDB 420 or CDM 420 Connection Module is suitable for connecting the ICR to peripherals (distribution function) and the power supply. The module can be used to establish a connection to the host (point-to-point) and integrate the device into the CAN scanner network. The CDB 420 is available in two variants. All modules can be operated with an operating temperature to -35 to +40 °C (-31 to +104 °F).

[Fig. 5-1](#) shows the connection principle of the CDB 420 or CDM 420 for one ICR.

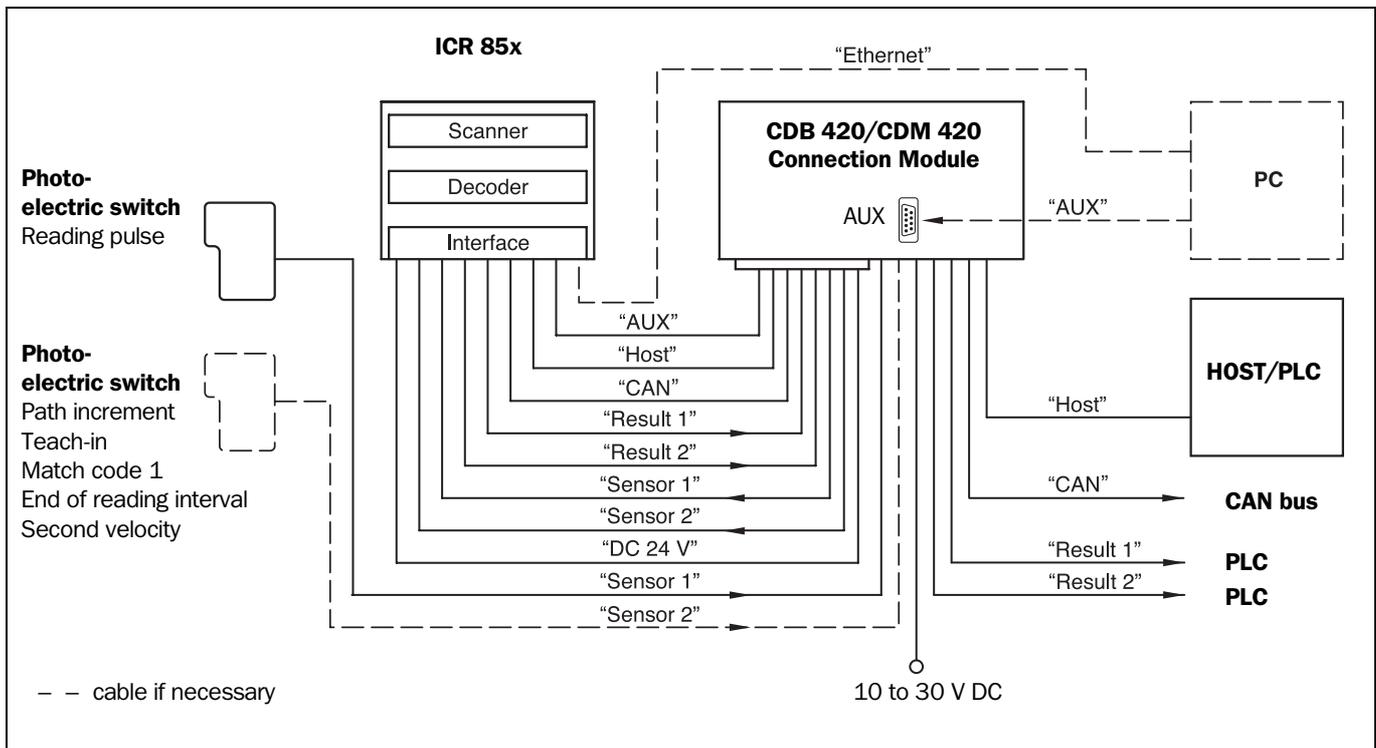


Fig. 5-1: Block diagram: Connection of the ICR to the CDB 420 or CDM 420 Connection Module



Connect and configure the CDB 420 or CDM 420 Connection Module as described in the “CDB 420 Connection Module“ Operating Instructions (order no. 8 010 001, German/English version) respectively in the “CDM 420 Connection Module“ Operating Instructions (order no. 8 010 004, German/English version).

Note Diagrams showing you how to connect the CDB 420 and CDM 420 Connection Modules are also available in the “CLV Connect“ PC program. This software is available on the “Manuals & Software“ CD, which is included in the scope of delivery of the ICR. The software can also be downloaded from the SICK home page (www.sick.com) at “Service&Support/Downloadpool“. It can be called up using a standard HTML browser (e.g. Internet Explorer™).

Optional modules for building-in into the **CDB 420**:

- CMC 400 Connection Module Cloning for saving the parameters of the ICR externally

Optional modules for building-in into the **CDM 420**:

- CMP 400 Power Supply Module in optional cover for supplying the ICR without heater directly from an AC power line
- CMC 400 Connection Module Cloning for saving the parameters of the ICR externally
- CMD 400 Connection Display Module in optional cover for representation of reading results and reading diagnosis data
- CMF 400 Bus Modules (field bus gateways) for connecting the CLV to Profibus DP or DeviceNet

For detailed descriptions about functions and installation see the corresponding Fitting/Operatings Instructions (see [Chapter 10.11 “Supplementary documentation“, Page 10-43](#)).

5.3 Pin assignments

5.3.1 Cable plug

Pin	Signal	Function
1	10 to 30 V DC	Power supply
2	RxD (aux)	Auxiliary interface (receiver)
3	TxD (aux)	Auxiliary interface (transmitter)
4	Sensor 2	Switching input, variable function
5	GND	Ground
6	RD+ (RS 422/485)	Host interface (receiver)
7	RD- (RS 422/485); RxD (RS 232)	Host interface (receiver)
8	TD+ (RS 422/485)	Host interface (transmitter)
9	TD- (RS 422/485); TxD (RS 232)	Host interface (transmitter)
10	CAN H	CAN bus (IN/OUT)
11	CAN L	CAN bus (IN/OUT)
12	Result 1	Switching output, variable function
13	Result 2	Switching output, variable function
14	Sensor 1	Switching input for external reading pulse
15	SensGND	Common ground for all inputs
–	–	Shield

Table 5-3: Pin assignment of the 15-pin D-Sub HD plug

5.3.2 RJ 45 socket 10baseT (Ethernet)

Pin	Signal	Function
1	TX+	Transmitter+
2	TX-	Transmitter-
3	RX+	Receiver+
6	RX-	Receiver-
4, 5, 7, 8	n.c.	Not connected

Table 5-4: Pin assignment of the 8-pin RJ 45 10baseT socket

5.4 Electrical installation preparations

5.4.1 Requirements for the host interface

The host interface of the ICR can be operated as an RS 422/485 or an RS 232 interface. [Table 5-5](#) shows the recommended maximum cable lengths as a function of the selected data transfer rate.

Interface type	Transmission rate	Distance from host
RS 232	Up to 19,200 bd	Max. 10 m (32.8 ft)
	38,400 to 57,600 bd	Max. 3 m (9.84 ft)
RS 422/485 ¹⁾	Max. 38,400 bd	Max. 1,200 m (3,937 ft)
	Max. 57,600 bd	Max. 500 m (1,640 ft)

1) with suitable line termination according to specifications

Table 5-5: Maximum cable lengths between the ICR and host

- Recommendation** ➤ To prevent interference, do not lay the cable parallel with power supply and motor cables over long distances, e.g. in cable ducts.

5.4.2 Power supply

The ICR requires a power supply of 10 to 30 V DC (functional extra-low voltage) in accordance with the standard IEC 364-4-41. The functional extra-low voltage can be generated by using a safety isolating transformer pursuant to IEC 742. The ICR has a typical power consumption of 8.5 W (when switching outputs are not connected).

The ICR is supplied with 10 to 30 V DC via the CDB 420 or CDM 420 Connection Module. If an optional CMF 400 fieldbus gateway or a CMD 400 Connection Module Display is additionally used in the CDM 420, the ICR is supplied with **18** to 30 V DC.

If the CMP 400 Power Supply Module is used in the CDM 420, a mains voltage of 100 to 250 V AC/50 to 60 Hz is required.

Power-up delay

The selected device number (default setting: 1) affects the power-up delay of the device. This is useful if a large number of ICRs (e.g. in the CAN scanner network) are to be supplied from one power source. [Fig. 5-6, Page 5-6](#) contains a list of the available intervals.

Device number GN	Power-up delay	Device number GN	Power-up delay
1; 11; 21; 31	0 ms	6; 16; 26	2 000 ms
2; 12; 22	400 m	7; 17; 27	2 400 ms
3; 13; 23	800 ms	8; 18; 28	2 800 ms
4; 14; 24	1 200 ms	9; 19; 29	3 200 ms
5; 15; 25	1 600 ms	10; 20; 30	3 600 ms

Table 5-6: Power-up delay as a function of the device number GN

**Tip**

The device number can be selected on the DEVICE CONFIGURATION tab in the CLV Setup program.

5.4.3 Non-SICK power supply unit/connections without the SICK connection module

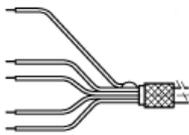
If a non-SICK power supply unit is used instead of the CDB 420 or CDM 420, it must provide a functional extra-low voltage in accordance with the standard IEC 364-4-41 and a continuous power output of at least 10 W.

The output circuit must be reliably electrically isolated from the input circuit. Do do so, use a safety isolating transformer pursuant to IEC 742.

The minimum wire cross-section for the power supply (pin 1/pin 5) must be at least 0.15 mm² (approx. 26 AWG).

- Use the cable no. 6 010 137 with 15-pin D-Sub HD cable socket and open end to connect the ICR.

The color assignment of the wires is shown in [Table 5-7](#).



Pin	Signal	Wiring color
1	10 to 30 V DC	Red
2	RxD (aux)	Purple
3	TxD (aux)	Yellow
4	Sensor 2	Red/black
5	GND	Black
6	RD+ (RS 422/485)	Light blue
7	RD- (RS 422/485); RxD (RS 232)	Blue
8	TD+ (RS 422/485)	Turquoise
9	TD- (RS 422/485); TxD (RS 232)	Green
10	CAN H	Gray
11	CAN L	Pink
12	Result 1	Brown
13	Result 2	Orange
14	Sensor 1	White
15	SensGND	White/black
–	Shield	White/green

Table 5-7: Wiring color assignment of cable no. 6 010 137 (open end)

Note The wiring color assignment shown above only applies for the upper cable, not for the connection cable with the cable plug which runs to the ICR housing.

5.5 Performing electrical installation

5.5.1 Overview of connection procedure

- Connecting the power supply
- Connecting the host interface
- or –
- Connecting the CAN interface
- Connecting the auxiliary interface (connecting the PC for parameterization)
- Connecting the Ethernet interface and the PC to Ethernet for image output (recommended)
- Connecting the “Sensor 1” and “Sensor 2” switching inputs
- Connecting the “Result 1” and “Result 2” switching outputs

5.5.2 Tools

- Tool
- Digital measuring device (current/voltage measurement)

5.5.3 Connecting the power supply

If the ICR is powered via the CDB 420 or CDM 420 Connection Module, the power supply does not have to be wired separately.

1. Ensure that the power supply to the CDB 420 or CDM 420 is switched off.
2. Connect the 15-pin cable plug on the ICR to the corresponding device socket on the CDB 420 or CDM 420 and screw it tightly. The connection cable can be extended by 2 m (6.56 ft) using the extension cable no. 6 010 075.

The data and functional interfaces of the ICR are connected to the connection module.

– or –

External power supply unit:

- Connect the power supply to the red wire (pin 1, +V_s) and the black wire (pin 5, GND) of the cable no. 6 010 137 (see also [Table 5-7](#)).

5.5.4 Connecting the host interface

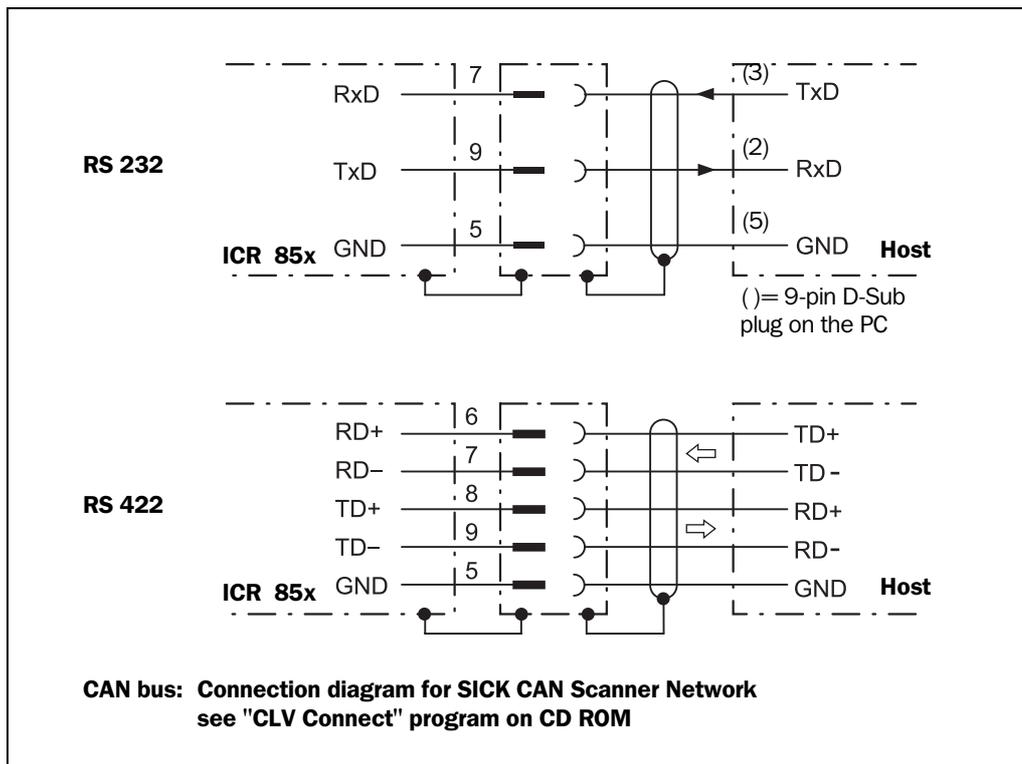


Fig. 5-2: Connections of the host interface



Risk of damage to the interface module

Electrical components in the ICR can be damaged if the host interface is connected incorrectly.

- Connect the host interface as shown in [Fig. 5-2](#).
- Check the connections carefully before you switch on the ICR.
- Connect the host interface on the ICR to the host using shielded cables (EMC requirements). Ensure that the maximum cable lengths are not exceeded ([Table 5-5](#), [Page 5-5](#)).

In the default setting, the ICR communicates with the host via the host interface using the values shown in [Table 5-8](#).

Parameter	Value
Physical design	RS 232
Data transmission rate	9,600 bd
Data bits	8
Parity	None
Stop bits	1
Protocol	SICK (start character: STX, stop character: ETX, no request for repeat: none, timeout: 50 ms)

Table 5-8: Communication parameters for the host interface (default setting)



For connecting the host interface via the CDB 420 or CDM 420 Connection Module, see the “CDB 420 Connection Module“ *Operating Instructions (order no. 8 010 001, German/English version)* respectively the “CDM 420 Connection Module“ *Operating Instructions (order no. 8 010 004, German/English version)*.

Terminating the RS 422 interface

The interface can be terminated in the CDB 420 or CDM 420 Connection Module. See “CDB 420 or CDM 420 Connection Module“ *Operating Instructions*.

Activating the RS 422 interface



The RS 422 interface can be activated with the CLV Setup program:

1. Select the HOST INTERFACE tab.
2. Choose the “RS 422/485“ option from the HARDWARE drop-down list under DATA FORMAT.
3. Perform a download to the ICR.
This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
4. Confirm the dialog box by selecting the PERMANENT save option.

The ICR now uses the RS 422 version of the host interface.

Tip The communication parameters can be changed, if necessary, on the HOST INTERFACE tab. To do so, change the values under DATA FORMAT and INTERFACE PROTOCOL.

5.5.5 Connecting the CAN interface

For information on the connection and parameterization of the ICR for use in a SICK-specific CAN scanner network or in a CANopen network, see the “*Application of the CAN interface“ Operating Instructions (no. 8 009 180, English version)*.

5.5.6 Connecting the Ethernet interface

The Ethernet interface has four functions:

- Fast image output of the scanned code to the PC via FTP.
To carry out this function, choose the ETHERNET and IMAGE ACQUISITION tabs in CLV Setup or use the Setup Assistant.
- The read result can be output via TCP/IP instead of via the host interface.
To carry out this function, choose the HOST INTERFACE tab in CLV Setup.
- The auxiliary interface data (read result + reading diagnosis data) can be output via TCP/IP instead of via the host interface.
To carry out this function, choose the AUXILIARY INTERFACE tab in CLV Setup.
- Access to the ICR for parameterization with CLV Setup.

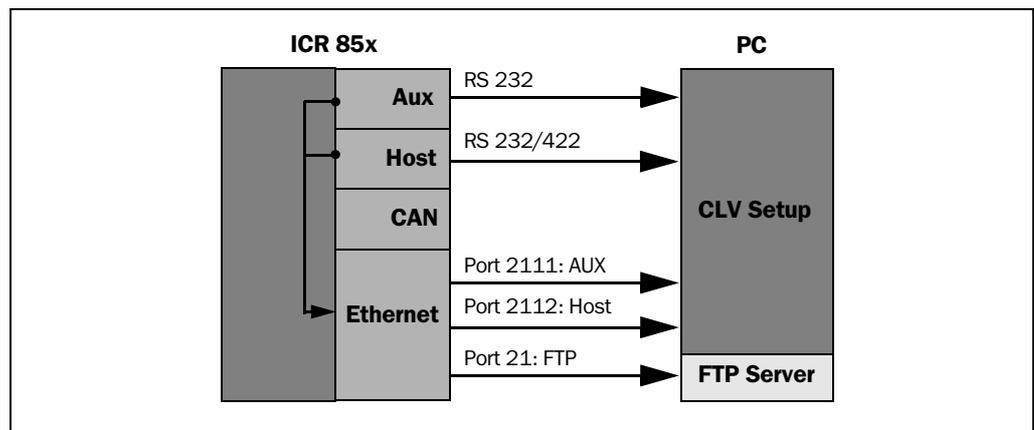


Fig. 5-3: Block diagram: Function of the Ethernet interface

- Note** If auxiliary interface communication is routed via the Ethernet interface by making the appropriate parameter settings (see above), the physical auxiliary interface (RS 232) is disabled.
- If host interface communication is routed via the CAN or Ethernet interface by making the appropriate parameter settings (see above), the physical host interface (RS 232/RS 422) is disabled.
- If the PC is connected to the ICR via the Ethernet interface for parameterization purposes, however, the auxiliary interface and host interface of the ICR remain active (without diversion).

Recommendation To reduce electromagnetic emissions, attach a ferrite filter to the cable near the ICR in the snap-in folding housing.

In the default setting, the ICR communicates with the values listed in [Table 5-9](#).

Parameter	Value
Data transmission rate	10 Mbit/s (cannot be changed)
IP address	192.168.0.1
IP gateway address	0.0.0.0
IP mask	255.255.255.0
IP port (Host)	2112
IP port (Aux)	2111
FTP port	21, FTP client disabled

Table 5-9: Ethernet interface communication parameters (default setting)

[Table 3-3, Page 3-8](#) describes the function of the two LEDs on the connection socket.

Connection:

The Ethernet interface works parallel to the host interface without any additional required activation. It is connected to the network with a standard data cable (patch cable). When connected to a PC (point-to-point connection), on the other hand, a crossover line is required (see [Table 5-2, Page 5-2](#)).

- Connect the Ethernet socket of the ICR to the Ethernet socket using a patch cable. If the green “Ready” LED at the socket of the ICR lights up, the physical connection has finished successful.

Required settings in the PC and ICR (manually):

1. Select the **IP address and subnet mask of the PC** in the “Network“ dialog box under “Control Panel“ in Windows.
Depending on the Windows version and the network architecture, administration rights may be necessary here.
2. Define the **IP address and subnet mask of the ICR** with CLV Setup:
Enter the corresponding values on the ETHERNET tab.
Perform a download to the ICR with the PERMANENT save option!
3. Restart the ICR.
4. Select INTERFACE under OPTIONS in the menu bar.
5. Activate the TCP/IP protocol of the PC in the INTERFACE OPTIONS dialog box.
Enter the IP address selected on the “Ethernet“ tab in the IP ADDRESS section.
Close the dialog box with “OK“.

**Setting the addresses/mask using the Setup Assistant under CLV Setup:**

See [Chapter 6.3.2 “Configuring the ICR for the application with the Setup Assistant“, Page 6-4](#).

Note When using the Ethernet Assistant there are some restrictions:

- A firewall installed on the host (PC) can block the telegrams between the host and the ICR.
- If the subnet mask of the IP configuration of the ICR is set to 255.255.255.255, the ICR will receive telegrams but cannot send any telegram.
- There is no forwarding of telegrams to an other subnet which is connected with the subnet of the ICR by a router.

5.5.7 Connecting the PC

The ICR is operated and configured with the PC-based “CLV Setup“ program. In order to do so, you must connect the device to the PC via the auxiliary interface by default. Alternatively you can use the Ethernet interface. Unlike the host interface, the auxiliary interface has a fixed data format and a fixed data transfer rate. [Fig. 5-4](#) shows how the auxiliary interface is connected. The cable length must not exceed 10 m (32.8 ft)

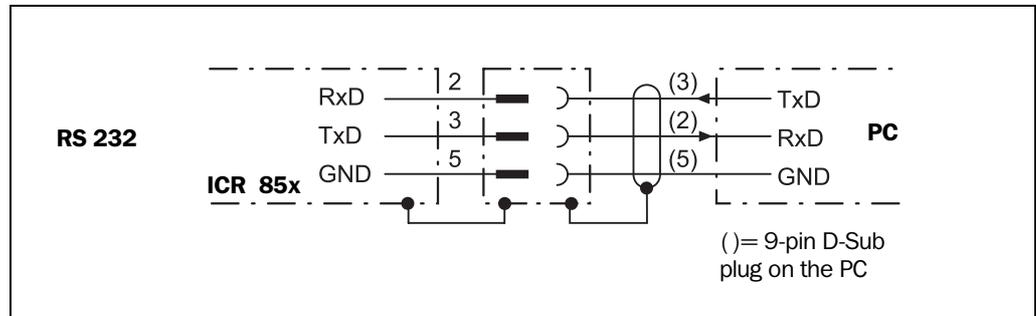


Fig. 5-4: Connection of the auxiliary interface

1. Switch off the PC and power supply to the SICK CDB 420 or CDM 420 connection module.
2. Connect the PC to the internal, 9-pin "Aux" plug of the connection module.
To do so, use a 3-core RS 232 data cable (null modem cable), e.g. no. 2 014 054 (RxD and TxD crossed).

– or –

With the SICK Connection Module:

Connect the PC as shown in [Fig. 5-4](#).

3. Switch on the PC and power supply to the SICK connection module.
4. Set the communication parameters (see [Chapter 10.3.3 "Starting "CLV Setup""](#), [Page 10-6](#)).



Tip

In the default setting, the auxiliary interface outputs the reading result in “Reading Diagnosis“ mode.

You can change the operating mode to MONITOR HOST INTERFACE, AUXILIARY INPUT or CODE STATISTICS FOR RDT 400 on the AUXILIARY INTERFACE tab in the CLV Setup program.

5.5.8 Connecting the “Sensor 1” switching input

If a reading procedure is to be triggered on the ICR by an external sensor, the reading pulse sensor must be connected to the “Sensor 1” switching input. The trigger type is selected in the default setting of the ICR. Fig. 5-5 shows the connections for the “Sensor 1” switching input. Table 5-10 contains the characteristic data for this input.

- Connect the reading pulse sensor as shown in Fig. 5-5.

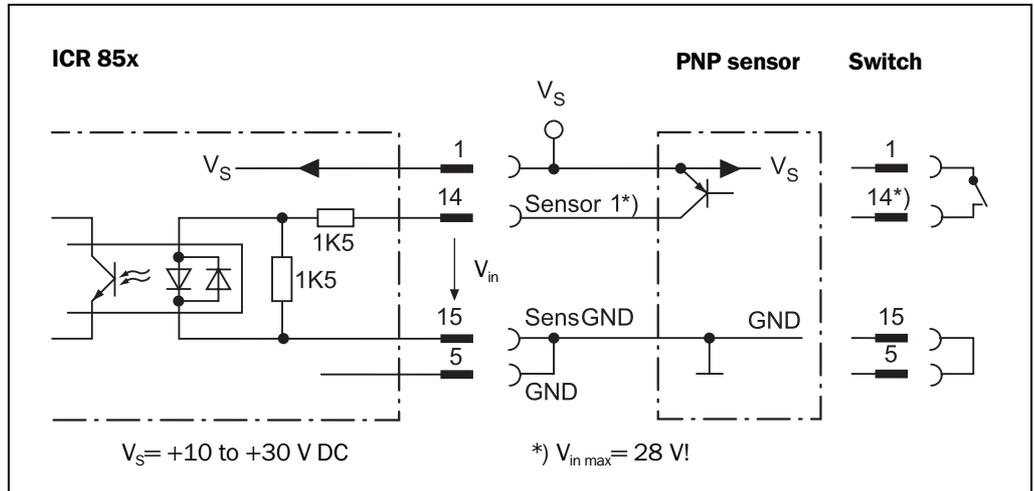


Fig. 5-5: Connections of the “Sensor 1” switching input

Switching mode	Current at the input starts the reading interval on the ICR. (default setting: not inverted (active high), debouncing time: 10 ms, start delay: 0 ms, stop delay: 0 ms)
Characteristics	<ul style="list-style-type: none"> – Optodecoupled, non-interchangeable – Can be connected to PNP output on a sensor
Electrical values	Low: $-1\text{ V} \leq V_{in} \leq +1\text{ V}$ High: $+8\text{ V} \leq V_{in} \leq +28\text{ V}$ $-0.3\text{ mA} \leq I_{in} \leq +0.3\text{ mA}$ $+1.4\text{ mA} \leq I_{in} \leq +18\text{ mA}$

Table 5-10: Characteristic data of the “Sensor 1” switching input



Tip

You can change the switching mode (polarity, debouncing time, start/stop delay and response for first pulse after power-up) of the “Sensor 1” switching input on the DEVICE CONFIGURATION tab in the CLV Setup program.

- Edit SENSOR 1 section and click the READING TRIGGER PARAMETERS button. Edit dialog box. Download all changes to ICR.



Note

For connecting the “Sensor 1” switching input via the CDB 420 or CDM 420 Connection Module, see the “CDB 420 Connection Module“ Operating Instructions (order no. 8 010 001, German/English version) respectively the “CDM 420 Connection Module“ Operating Instructions (order no. 8 010 004, German/English version).

An external pulse is not required for “Percentage Evaluation“ mode.

5.5.9 Connecting the “Sensor 2” switching input

The input has the following functions:

- Path increment input
- Trigger source for teaching in the match code 1
- External trigger source for end of the reading interval
- Input of signal for second velocity

“No function” is selected by default.

The characteristic data is identical to that for the “Sensor 1” input ([Table 5-10, Page 5-13](#)).

- Connect switch or incremental sensor as shown in [Fig. 5-6](#).

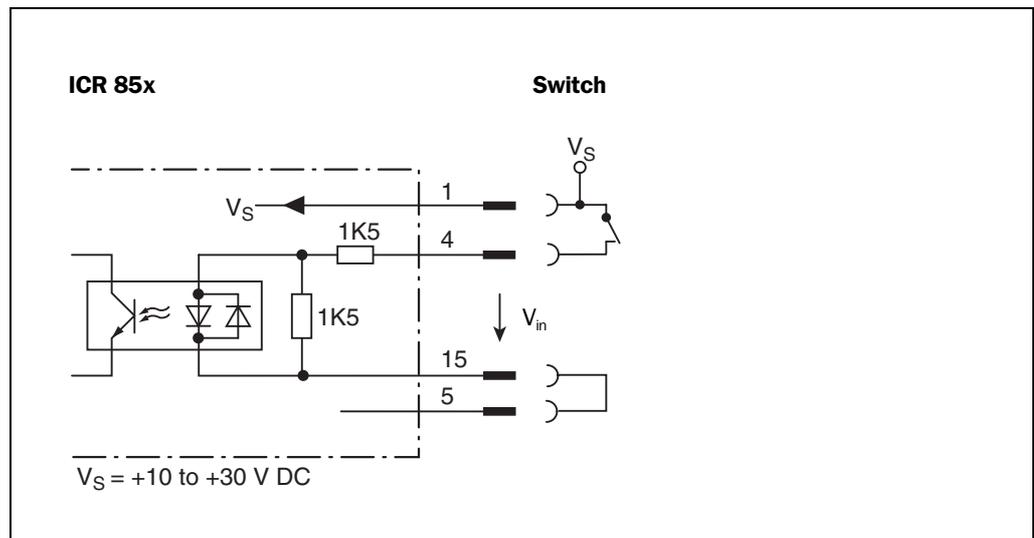


Fig. 5-6: Connections of the “Sensor 2” switching input



For connecting the “Sensor 2” switching input via the CDB 420 or CDM 420 Connection Module, see the “CDB 420 Connection Module” *Operating Instructions (order no. 8 010 001, German/English version)* respectively the “CDM 420 Connection Module” *Operating Instructions (order no. 8 010 004, German/English version)*.



Tip

The switching mode (polarity, debouncing time and stop delay) and the function assigned to the “Sensor 2” input can be modified on the DEVICE CONFIGURATION tab in the CLV Setup program.

- Select the desired option in the SENSOR 2 section (FUNCTION drop-down list) and edit further parameters.
Download all changes to ICR.

The connections and procedure for teaching in match code 1 are described in [Chapter 10.7.1 “Triggering the Teach-in match code 1 via the “Sensor 2” switching input”, Page 10-27](#).

5.5.10 Connecting the “Result 1” and “Result 2” switching outputs

The two switching outputs can be assigned different functions for outputting result statuses independently of each other. If the assigned event occurs during the reading process, the corresponding switching output becomes live at the end of the reading pulse for the selected pulse duration. The pulse duration is identical for both outputs.

The “Result” LED is linked to the “Result 2” output and lights up in “Reading” mode for the selected pulse duration and function of the result status display (default setting: “Good Read”, 100 ms).

Fig. 5-7 shows an example of how the “Result 1” switching output can be connected. Table 5-11 describes the characteristic data for the outputs. This data is identical for both outputs.

- Connect the outputs as shown in Fig. 5-7.

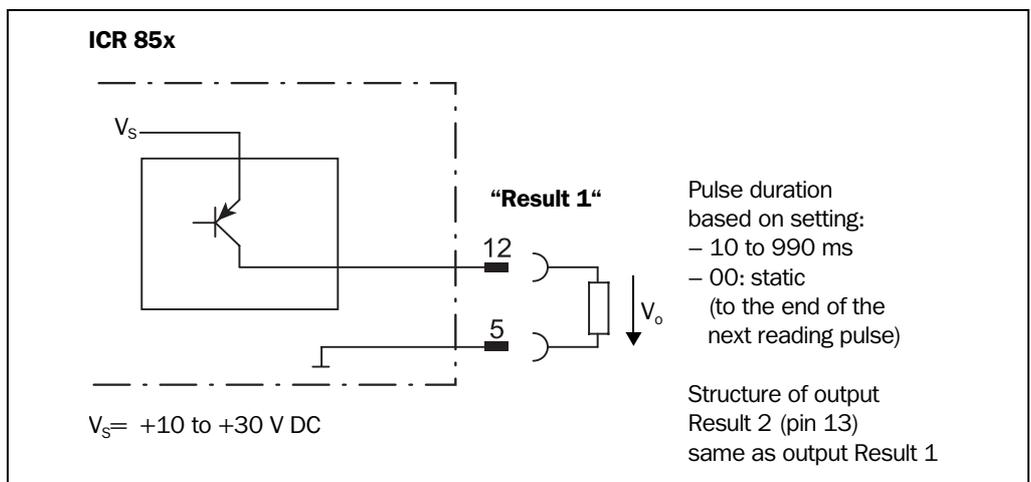


Fig. 5-7: Connection of the “Result 1” switching output

Switching mode	PNP-switching with respect to the power supply V_s
Characteristics	– Short-circuit-proof + temperature protected – not electrically isolated from V_s
Function assignment (default setting)	Result 1: “Device Ready (static)”, polarity: not inverted Result 2: “Good Read”, polarity: not inverted Pulse duration: 100 ms
Electrical values	$(V_s - 1.5 \text{ V}) \leq V_o < V_s$ at $I_o \leq 100 \text{ mA}$

Table 5-11: Characteristic data of the “Result 1” and “Result 2” switching outputs

Note If the “Device Ready” function is chosen, the ICR outputs a static pulse in Reading mode.



For connecting the switching outputs via the CDB 420 or CDM 420 Connection Module, see the “CDB 420 Connection Module” Operating Instructions (order no. 8 010 001, German/English version) respectively the “CDM 420 Connection Module” Operating Instructions (order no. 8 010 004, German/English version).



Tip

The output function, pulse duration (timer) and polarity of the signals can be changed on the DEVICE CONFIGURATION tab in the CLV Setup program.

- Click the RESULT OUTPUT PARAMETERS button.
Edit dialog box.
Download all changes to ICR.

- Recommendation** ➤ To check the switching functions using a high-impedance digital voltmeter, power the outputs to prevent incorrect voltage statuses from being displayed.
This prevents incorrect voltage values/switching statuses from being displayed.

6 Operation

6.1 Overview of the startup procedure

- Test reading: Start up the ICR with the factory default setting.
With this configuration, the ICR can be operated without being connected to a PC.
- Configure the ICR for the application using the Setup Assistant:
Connect the PC (see [Chapter 5.5.7 “Connecting the PC”, Page 5-12](#) respectively [Chapter 5.5.6 “Connecting the Ethernet interface”, Page 5-10](#)) and install the CLV Setup program (see [Chapter 10.3 “Installation and operating instructions for the PC-based “CLV Setup” program”, Page 10-3](#)).

6.2 Default setting

[Table 6.2, Page 6-1](#) shows an overview of the factory default setting of the ICR. The default parameters are such that the ICR can be put into operation for 2-D code reading (DataMatrix ECC 200) either straight away or following a few minor adjustments. A PC is not required for startup with the default setting.

The values of the default setting are stored permanently both in the ICR (ROM) and in the CLV Setup database. They can be loaded into the RAM of the ICR or displayed on the tabs of CLV Setup at any time.



Displaying and printing out complete default setting in CLV Setup:

1. Choose FILE and SAVE AS, and enter a file name in the dialog box that appears.
CLV Setup saves the current settings in a configuration file “*.scl”.
2. Click  in the toolbar.
CLV Setup loads the default setting from its internal database and displays it on the tabs.
3. Click  in the toolbar.
The PRINT FILE dialog box is then displayed.
4. If desired, a comment can be entered in the input field for the header of the printout.
Confirm the dialog box with “OK”.
The PRINT dialog box for configuring the printer is then displayed.
5. Edit the dialog box accordingly and confirm.

CLV Setup prints out the complete default setting in the form of a table. The header contains the company and user names that were entered during the CLV Setup installation routine.

6.2.1 Default setting

Typ	ICR 850 (Standard)	ICR 852 (High Density)	ICR 855 (High Speed)
Decoder	2-D decoder		
Active codes types	DataMatrix ECC 200 (square data field, white background, conveyor direction forwards)		
Symbol length/Code length	free		
Min./max. code position	0/100 CP		
Scanning frequency for bar codes	540 Hz	565 Hz	7078 Hz
Resolution (min. cell size/min. bar width)	0.2 mm (7.9 mil)/0.35 mm (13.8 mil)		
Max. object velocity	0.2 m/s (39.4 ft/min)	0.2 m/s (39.4 ft/min)	2.5 m/s (492 ft/min)
Reading pulse source	Start: "Sensor 1" switching input (active high); end: "Sensor 1" switching input		
Delay	Start of reading interval: no delay; end of reading interval: no delay		
"Sensor 1" switching input	Start and end of reading pulse (level: active high), debouncing 10 ms		
"Sensor 2" switching input	No function		
Switching outputs	Not inverted; pulse duration: 100 ms		
Status output function	Result 1: "Device Ready" (static), Result 2: "Good Read"		
Beeper	Status output function: "Good Read", beeper "ON"		
Output of the reading result	Host Interface (RS 232/422)		
Device number	1		
Host interface (type)	RS 232		
Protocol	NAK ; start character: STX, stop character: ETX		
Transfer rate	9,600 Bd		
Data format	8 data bits, no parity, 1 stop bit		
Output format	Header: empty, reading data: bar code contents, terminator: empty, Error string: reading data + NOREAD		
Output sorting	In accordance with code position		
Output time	Reading result: immediate		
Test string	Not activated		
Ethernet interface	TCP/IP: IP address: 192.168.000.001, IP mask: 255.255.255.000, IP port Aux: 2111 (server), IP port Host: 2112 (server) MAC address: see type plate on the ICR		
Auxiliary interface	RS 232, 9,600 bd, 8 data bits, no parity, 1 stop bit (values cannot be changed)		
Function	Reading diagnosis		

Table 6-1: Extract: Default setting of the ICR parameter values

6.3 Quick start

6.3.1 Starting up the ICR for test reading with the factory default setting

For simple test reading, a PC need not be connected when the ICR is operated with the factory default setting. No read result will be displayed.

Note In the default setting, the ICR **only** reads DataMatrix ECC 200 codes (free symbol length, square data field, white background, conveyor direction forwards).

1. Connect the ICR to the SICK CDB 420 or CDM 420 Connection Module.
2. Connect the reading pulse sensor (e.g. photoelectric reflex switch) to the "Sensor 1" switching input of the ICR via the CDB 420 or CDM 420 (see [Chapter 5.5.8 "Connecting the "Sensor 1" switching input", Page 5-13](#)).

3. Switch on the power supply to the CDB 420 or CDM 420.
 After the ICR has been started and has successfully completed the self-test, it outputs a tone and then two consecutive tones shortly afterwards when the Reading mode is initiated. The "Device Ready" LED lights up. The "Result 1" ("Device Ready") output switches.

4. Start the reading pulse: block the light path of the photoelectric switch or close the switch. The "Laser On" LED lights up. The ICR switches the laser diodes on and the red illumination line which illuminates the reading field appears.

5. For 2-D code reading, move the sample from [Fig. 6-1](#) **evenly** through the red illumination line using the conveyor system (constant speed) at following reading distances:

- | | |
|-------------------|---|
| ICR 850: | 100 mm (3.94 in) for side reading window |
| | 110 mm (4.33 in) for front reading window |
| ICR 852, ICR 855: | 60 mm (2.36 in) for side reading window |
| | 70 mm (2.75 in) for front reading window |

Movement direction according to the ICR: forwards (see graphic on the left side).



6. End the reading pulse: unblock the light path of the photoelectric switch or open the switch.

The "Laser On" LED extinguishes and the ICR switches off the red illumination line. The ICR confirms that the bar code was read successfully by outputting a tone via the beeper. The "Result" LED lights up for duration of 100 ms. The "Result 2" ("Good Read") output switches for the duration of 100 ms.

The ICR can now be operated with the factory default setting.

The device can be switched off without the configuration data being lost, as no changes have been made to the parameter set.



Fig. 6-1: 2-D code sample (DataMatrix ECC200; cell size 0.5 mm (19.7 mil))



Fig. 6-2: Bar code sample (code 39; module width 0.35 mm (13.8 mil); print ratio 2:1)

6.3.2 Configuring the ICR for the application with the Setup Assistant

To configure the ICR with the Setup Assistant a PC must be connected to the ICR and the “CLV Setup” software installed on the PC. To use the optional image output function of the ICR (recommended), an Ethernet connection to the ICR must be established and the “ImageFTP” PC program (supplied with the ICR) is required.

Features of the Setup Assistant

The Setup Assistant is a separate program started from CLV Setup. It provides a step-by-step, interactive guide to configuring the ICR.

The Assistant attempts to establish communication with the ICR, determine the required parameter values for reading an application-specific DataMatrix code, and transfer these values to CLV Setup for subsequent ICR parameterization (reading trigger, data output). Once communication has been established, the Assistant uploads the recent parameter values from the ICR (initial commissioning: default setting), which are also copied automatically to CLV Setup.

The Setup Assistant provides the following features:

- **Connection Assistant**
(Establishes the communication via the auxiliary interface or via Ethernet)
- **Ethernet Assistant**
(Scans the network and assigns the IP address to the ICR).
The ICR images can only be output for a general reading check if communication takes place via the fast Ethernet connection.
- **Scanner Adjustment**
(Fixed reading distance: adjusts exactly the DOF of the ICR for the code)
- **DataMatrix AutoSetup**
(Prepares and starts the “ImageFTP” program for displaying the image, performs Auto-Setup)
- **Display of the determined parameter values**
(You can carry out a final check before the values are transferred to CLV Setup)

Note If the Setup Assistant is started from CLV Setup, CLV Setup is locked. When all the steps in the Assistant have been completed or if the Assistant has been terminated, the system automatically returns to CLV Setup. If the Assistant is terminated, no parameter values will be changed in the ICR or in CLV Setup.

If DataMatrix AutoSetup has been successful, the Assistant transfers (among other things) the following parameter values permanently to the ICR and to CLV Setup (after user confirmation):

- Fixed symbol size
- Minimum cell size
- Printing procedure
- Object velocity
- Code background
- Direction of movement of code (reading direction)

The ICR now only decodes the DataMatrix codes that match the determined values.

If the direction of movement of the code changes after AutoSetup has been performed, the relevant parameters need to be changed manually in CLV Setup and downloaded to the ICR.

The “ImageFTP” program can be started in CLV Setup or in the Assistant and runs as a server under Windows, independent of the Assistant and CLV Setup.

Preparations:

1. Connect the ICR to the SICK CDB 420 or CDM 420 Connection Module.
2. Connect the reading pulse sensor (e.g. photoelectric reflex switch) to the "Sensor 1" switching input of the ICR via the CDB 420 or CDM 420 (see [Chapter 5.5.8 "Connecting the "Sensor 1" switching input", Page 5-13](#)).
3. Switch on the power supply to the CDB 420 or CDM 420.
The ICR beeps when it has been started and the self-tests have been successfully completed. It beeps twice when reading mode is initiated. The "Device Ready" LED lights up.
4. Connect the PC to the ICR (see [Chapter 5.5.6 "Connecting the Ethernet interface", Page 5-10](#)).
When the green "Ready" LED at the RJ-45 socket of the ICR lights up, a physical connection has been successfully established.
5. Install the CLV Setup program on the PC (see [Chapter 10.3 "Installation and operating instructions for the PC-based "CLV Setup" program", Page 10-3](#)) and start the program.

Starting the Setup Assistant and calling up the Connection Assistant

1. In the program window of CLV Setup, click  in the tool bar or choose CLV ASSISTANT in the TOOL menu.
The Assistant displays the following dialog box:

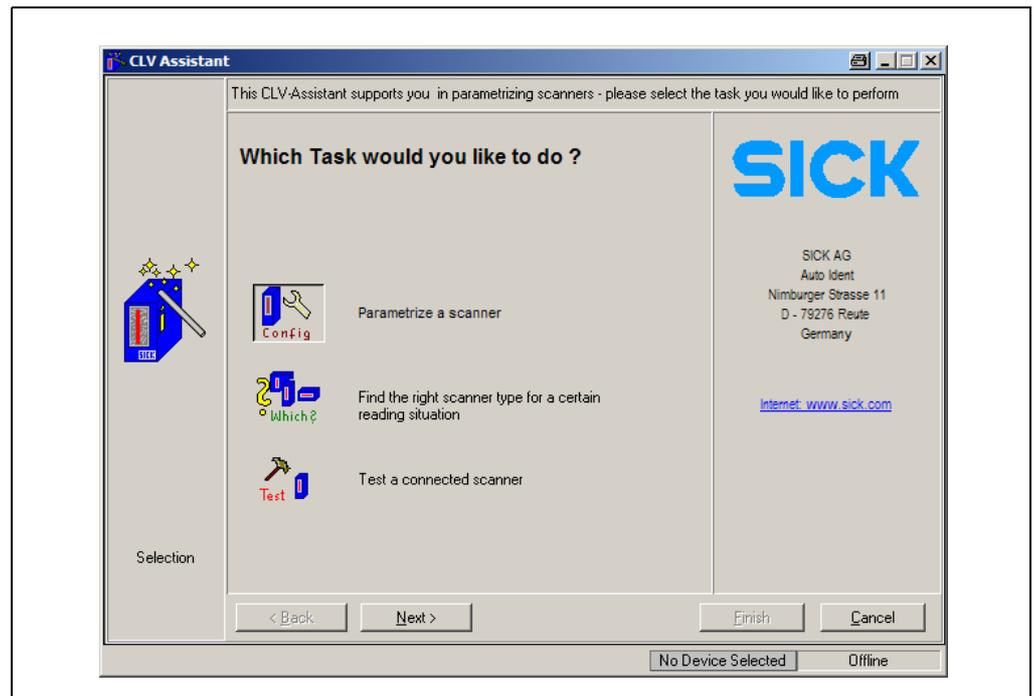


Fig. 6-3: CLV Assistant: Starting up window

The program window of CLV Setup is minimized.

2. Confirm the default option "Parametrize a scanner".
To do so, click NEXT.
The dialog box of the **Connection Assistant** is then displayed ([Fig. 6-4, Page 6-6](#)).

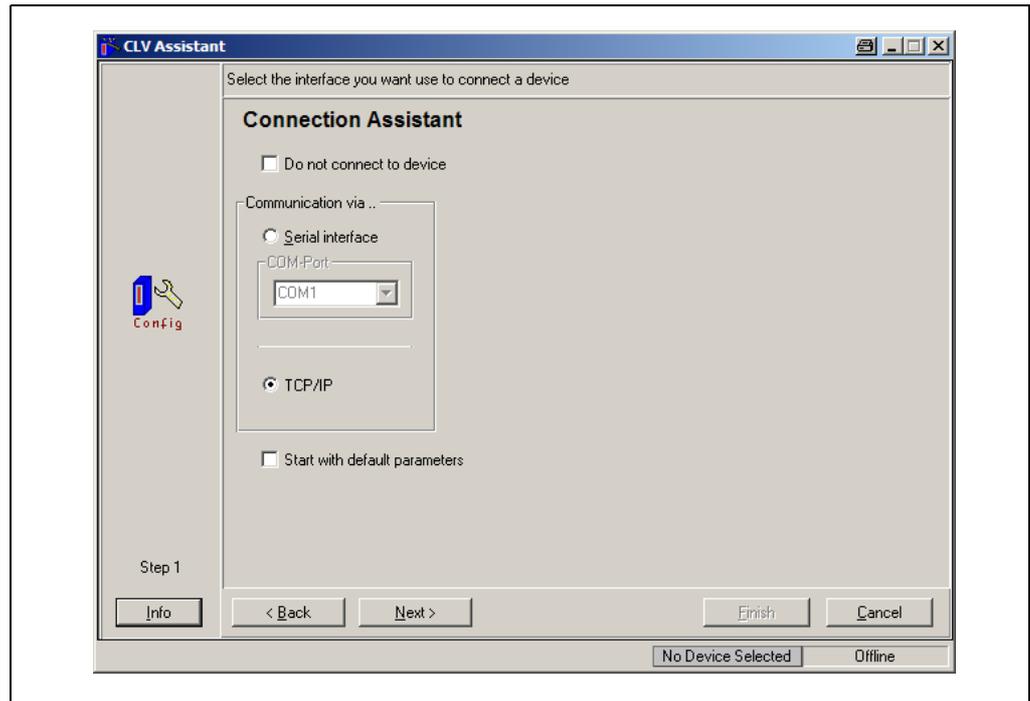


Fig. 6-4: CLV Assistant: "Connection Assistant" dialog box

3. Activate the "TCP/IP" option in the COMMUNICATION VIA... group.
(Do **not** click the control box START WITH DEFAULT PARAMETERS, otherwise CLV Setup will restore the default settings in the ICR. This means that the parameter values of a former successful Ethernet connection will be deleted.)
4. Click NEXT.
The dialog box of the **Ethernet Assistant** is then displayed:

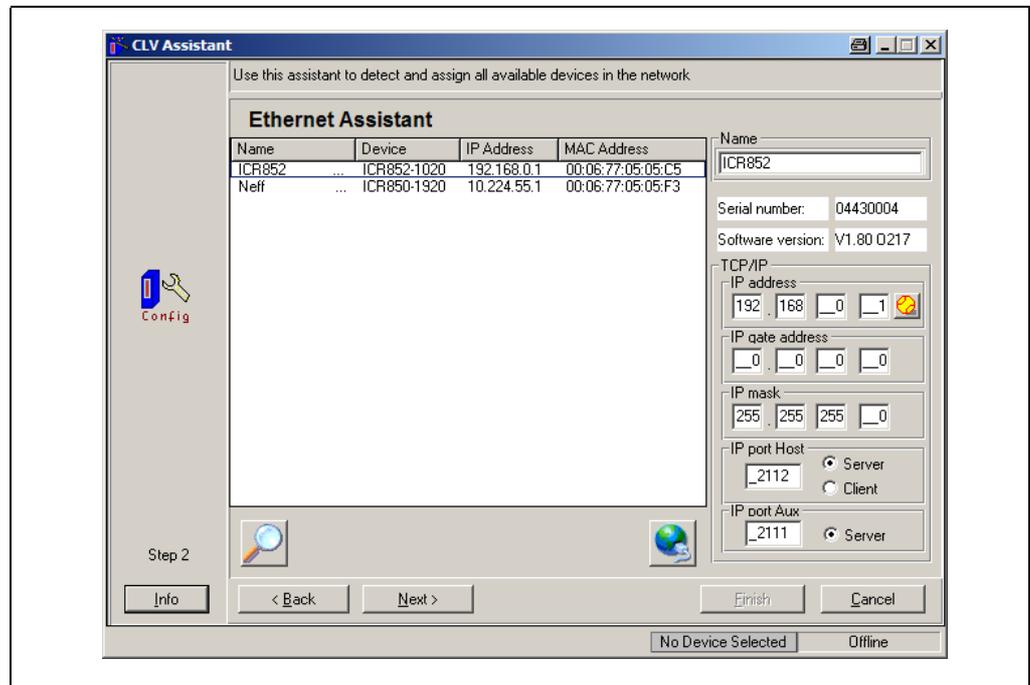


Fig. 6-5: CLV Assistant: "Ethernet Assistant" dialog box after an ICR has been detected in the network (here: IP address in the default setting of the ICR)

5. The Assistant uses the **UDP protocol** to scan the Ethernet for nodes and displays the result.
(To restart the Netscan, click  at the bottom left)
6. Identify the required device (if necessary, compare the displayed MAC address with the MAC address on the type plate on the ICR) and select the corresponding device in the dialog box.

Assigning a new address to the ICR:

7. Under "TCP/IP" on the right, overwrite the IP address and the IP mask of the default ICR setting in accordance with the user-side conditions in the Ethernet.
To jump from one input field to another, use the tabulator key.
8. Click  (Assign) at the bottom right.
The Assistant downloads the new settings permanently to the ICR.
The ICR is then reset.
9. The Assistant now scans the Ethernet for nodes using the **TCP/IP protocol** and displays the result.
10. Reselect the device and check whether the required IP address/mask has been successfully assigned to the ICR (*Fig. 6-6*).

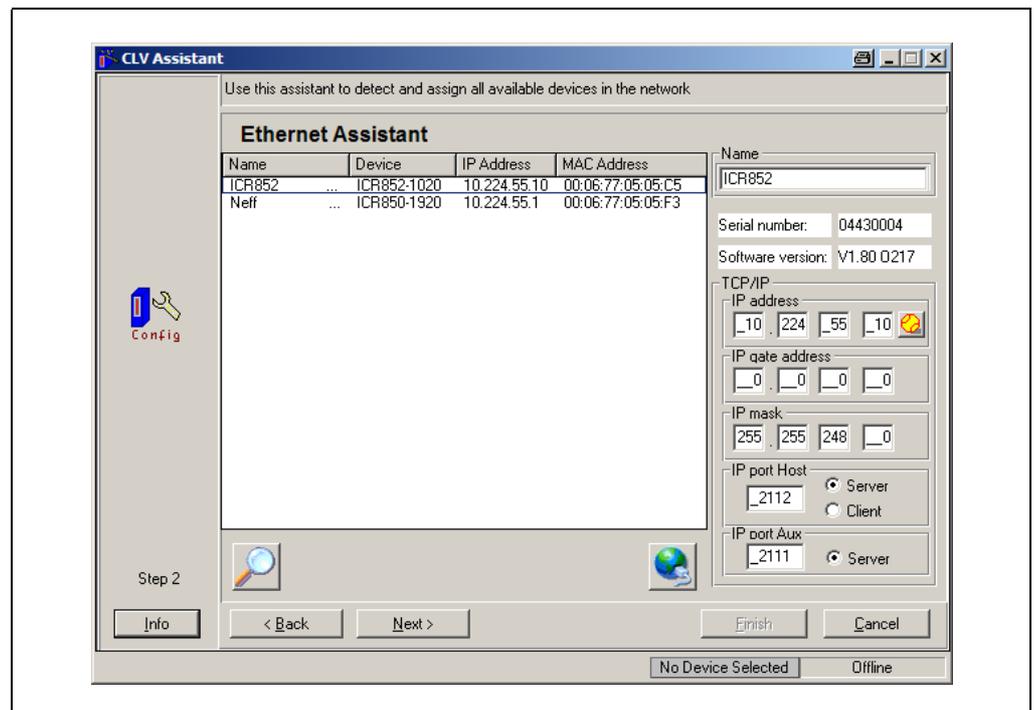


Fig. 6-6: CLV Assistant: "Ethernet Assistant" dialog box after a new IP address/mask has been assigned to the ICR (here: 010.224.055.010/255.255.248.000)

11. To establish TCP/IP communication with the ICR, click NEXT.
The Setup Assistant then displays a dialog box showing whether or not communication is successful (*Fig. 6-7, Page 6-8*). (In this software version, the Assistant always displays the dialog box for the serial data interface (RS 232) instead of the Ethernet communication).

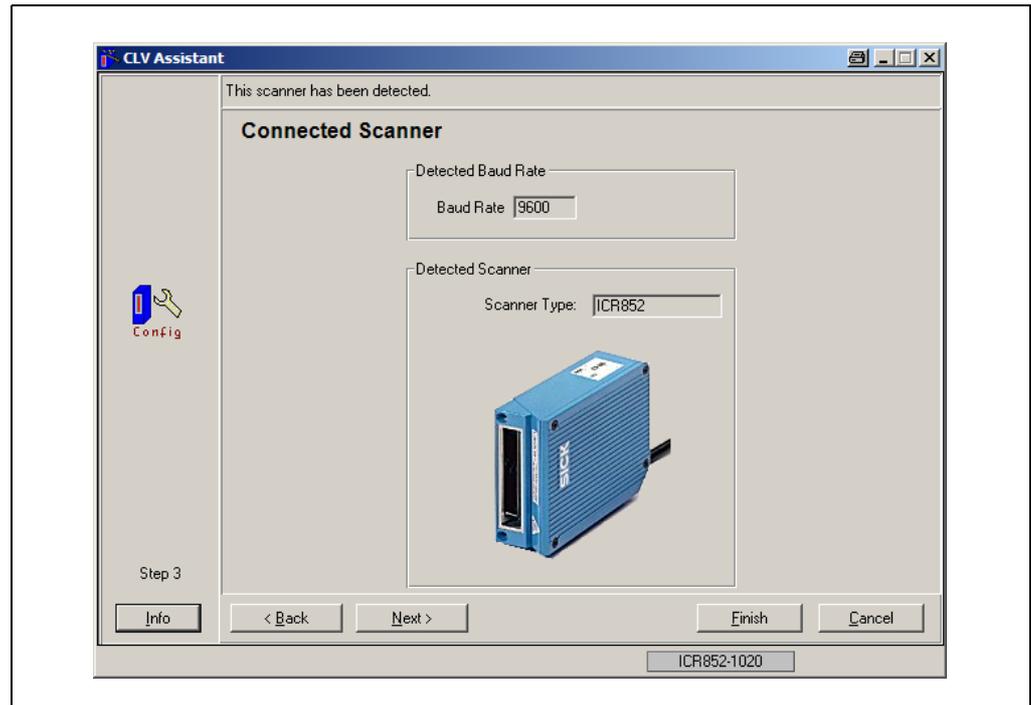


Fig. 6-7: CLV Assistant: Dialog box confirming that communication with the ICR via Ethernet (TCP/IP) is successful

Adjusting the reading distance

12. Adjust the ICR to the reading plane (code) using the enclosed distance tool (type dependent). The entire width of the reading window must be parallel with the reading plane (see also [“Distance tool”, Page 4-5](#)). Remove the distance tool.
13. Take the enclosed special print “Test pattern for adjusting the reading distance of ICR 85x” (no. 8 010 754). Choose the correct test pattern (type dependent) for the ICR ([Fig 6-8](#)). Cut out the test pattern with scissors, if necessary. Do not bend or fold the pattern. The pattern must lie flat in the reading plane.

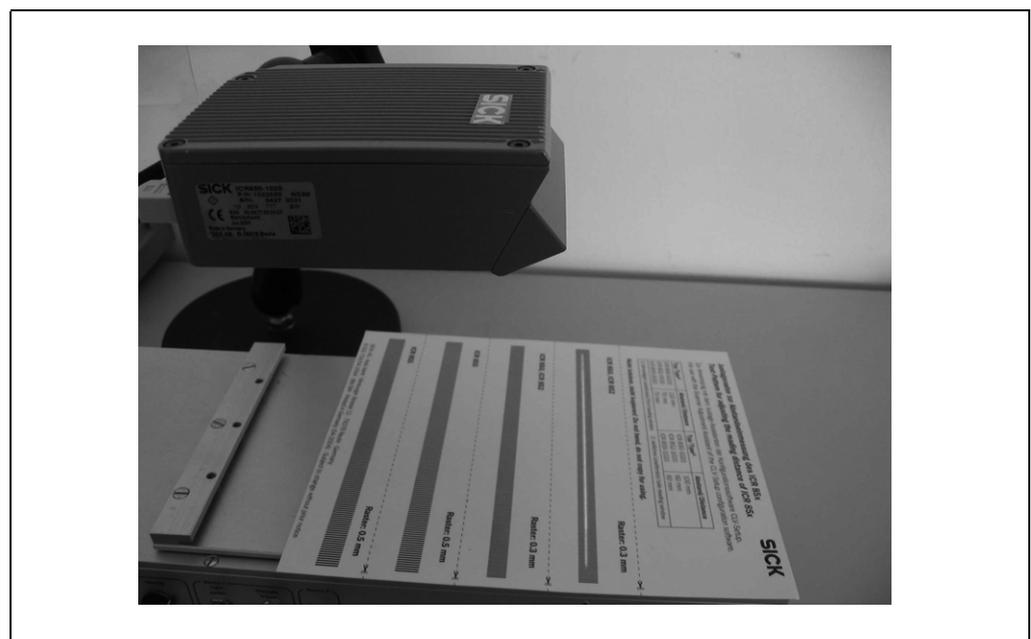


Fig. 6-8: Scanner adjustment: Adjusting the reading distance with the test pattern no. 8 010 754

- In the Setup Assistant (Fig. 6-7, Page 6-8) click NEXT.
The **Scanner Adjustment** dialog box is then displayed:

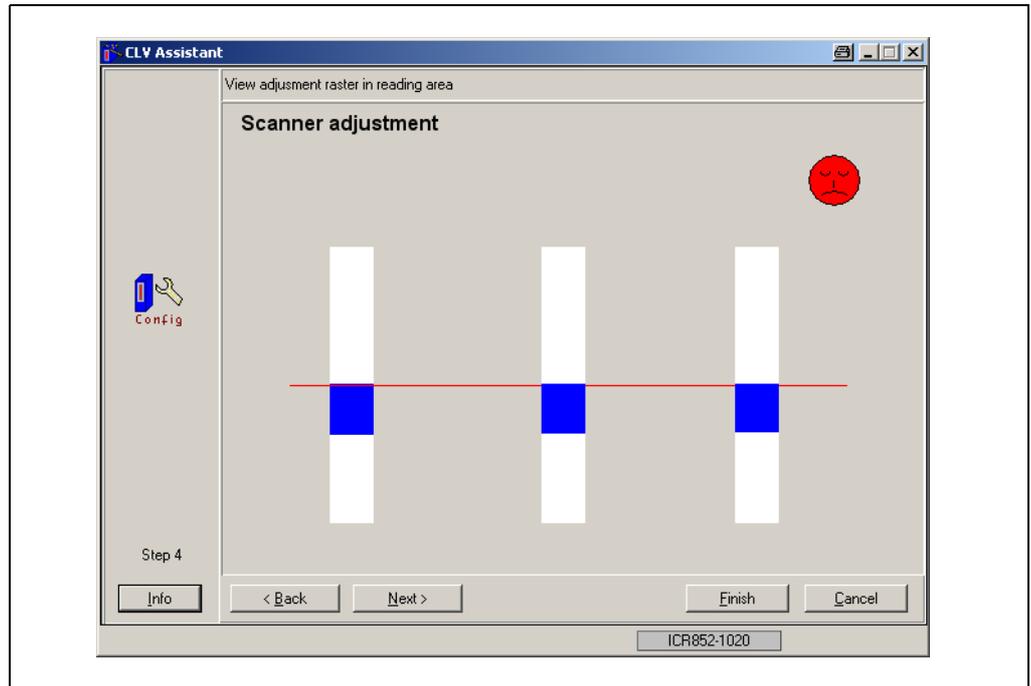


Fig. 6-9: CLV Assistant: "Scanner adjustment" dialog box

- The ICR measures the distance of the test pattern in front of the reading window continuously. The three blue bars indicate the alignment of the ICR on the left and right-hand side as well as in the middle of the red illumination line (Fig. 6-10). If a bar is displayed above the red separation line, the distance is too large. If a bar is displayed under the line, the distance is too small.

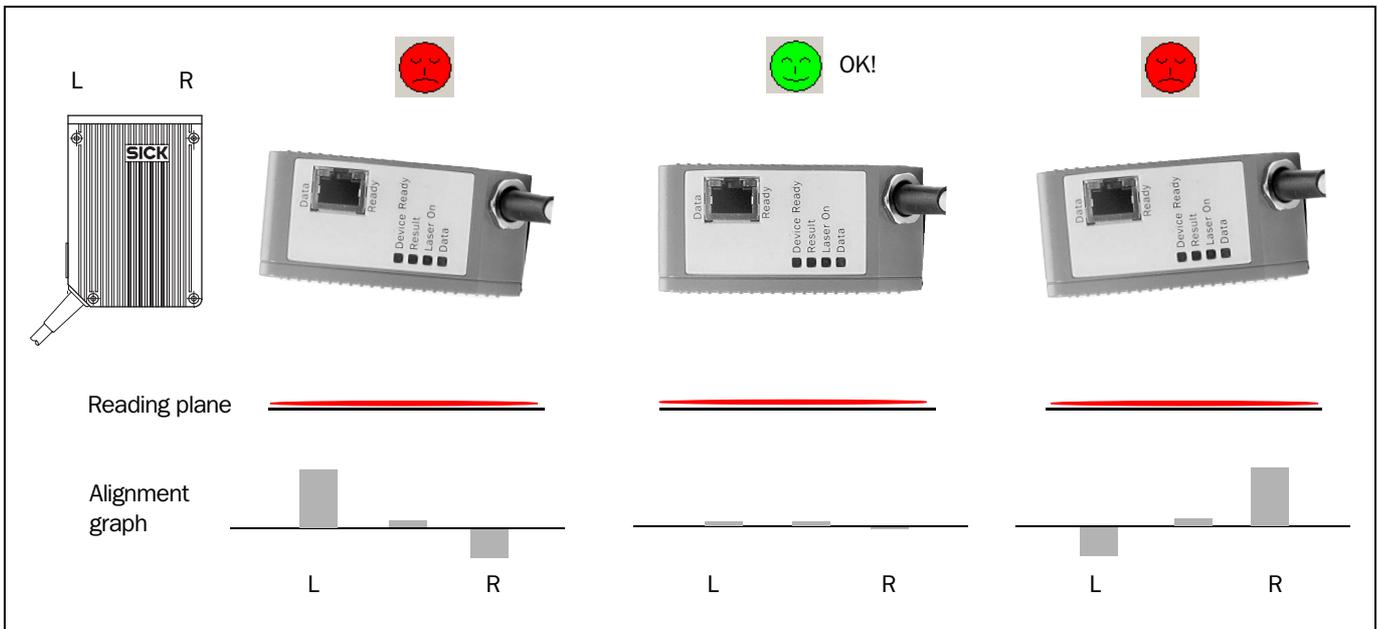


Fig. 6-10: Adjusting the ICR in the reading plane

- Modify the distance between the ICR and the test pattern until all the three blue bars have been minimized. If the alignment is successful, the red smiley changes to a green smiley.

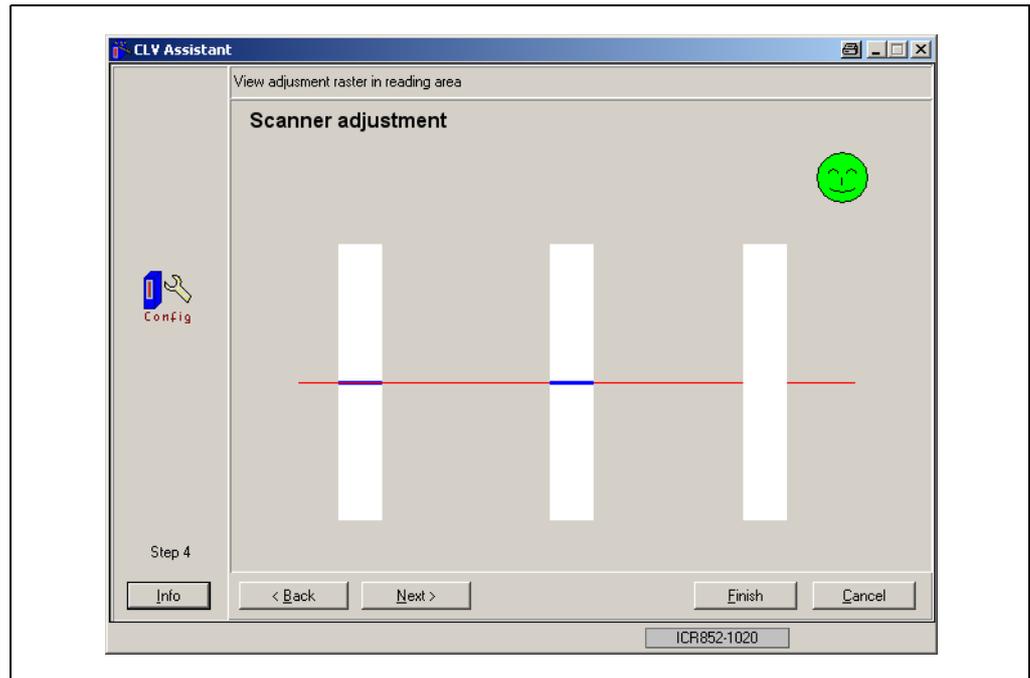


Fig. 6-11: CLV Assistant: Display for the successful scanner adjustment

17. Fix the ICR onto the bracket.

18. Click NEXT.

The **DataMatrix AutoSetup** dialog box is then displayed:

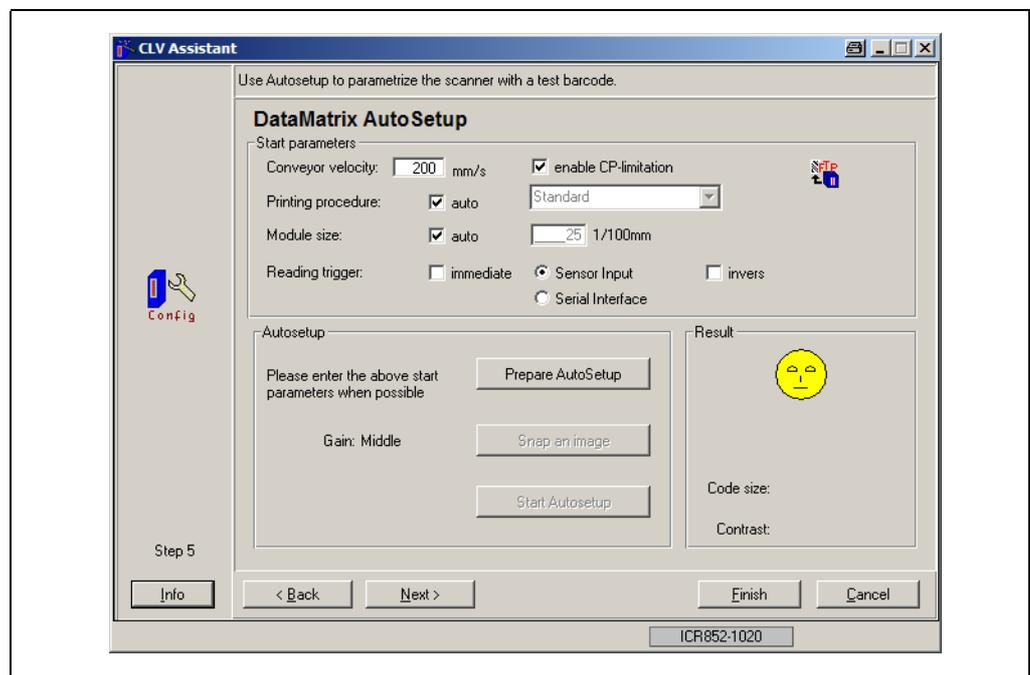


Fig. 6-12: CLV Assistant: “DataMatrix AutoSetup“ dialog box (part 1)

19. Enter known values in the STARTING PARAMETERS group for the AutoSetup (the velocity of the scanned DataMatrix codes may deviate 50 % to + 200 % from the entered value.)

- Click (activate) the ENABLE CP LIMITATION checkbox if the code is always on the same place on the objects.
- For the reading trigger, choose SENSOR INPUT.

Starting the PC program “ImageFTP“

1. To start the “ImageFTP“ program for outputting the images recorded in the ICR, click  in the STARTING PARAMETERS group of the “DataMatrix AutoSetup“ dialog box. The “Select IP address“ dialog box is then displayed:



Fig. 6-13: ImageFTP: “IP address“ dialog box

2. Select the local PC address and confirm the dialog box with APPLY. The program window of ImageFTP is then displayed:

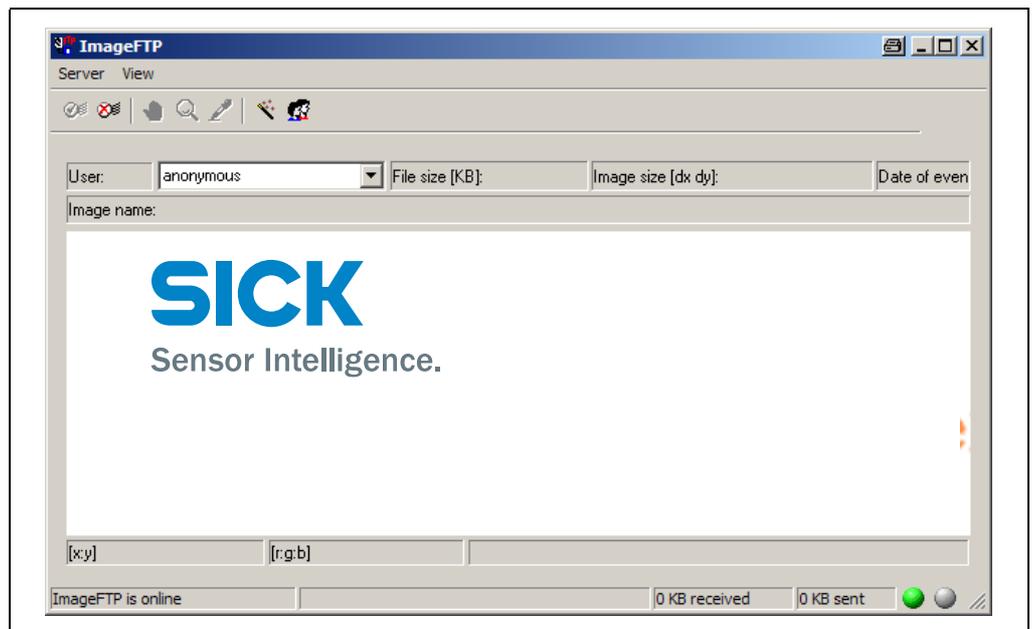


Fig. 6-14: ImageFTP: Program window

ImageFTP can only display images saved as BMP and JPEG data format.

If the **FTP connection** is started in the **Assistant**, the PC runs as server and the **ICR automatically as client**. The program displays the actual connection status in the status line at the bottom of the window (green = OK). In the standard reading mode, the client function must first be assigned manually to the ICR with CLV Setup.

Note If any problems occur while images are being transferred from the ICR to the PC, the communication procedure between client and server can be logged with the SERVER TRACE option in the VIEW menu.

3. In the USER section select ANONYMOUS.
4. Click  in the tool bar or select USER ACCOUNTS in the SERVER menu. The following dialog box is then displayed:

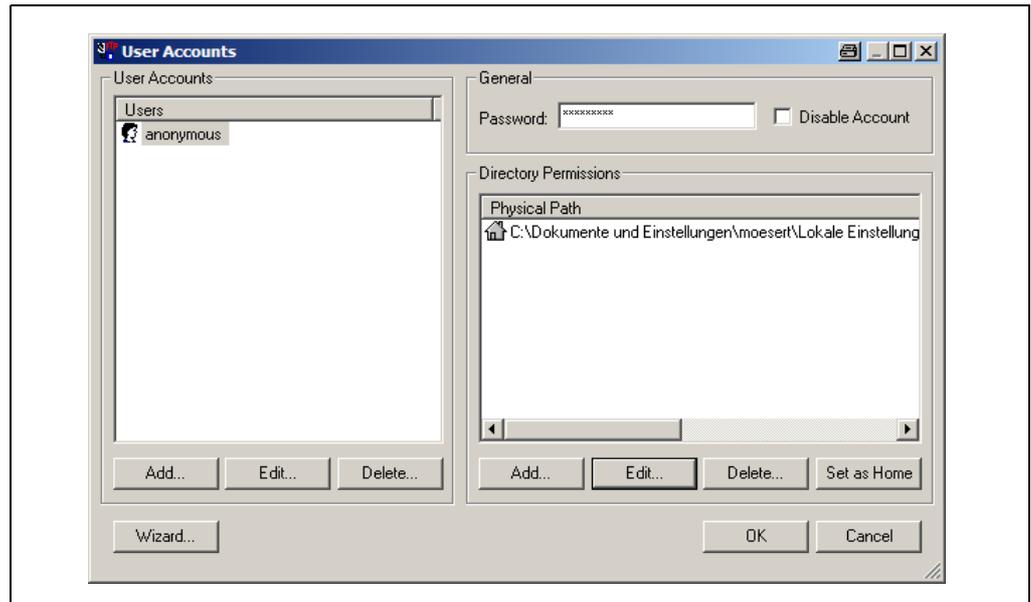


Fig. 6-15: ImageFTP: “User accounts” dialog box

(Pass word for the default entry “anonymous”: anonymous.)

- In the DIRECTORY PERMISSIONS group, select the proposed PHYSICAL PATH and choose EDIT. The “Edit Directory” dialog box for entering the permissions for the “anonymous” account is then displayed:

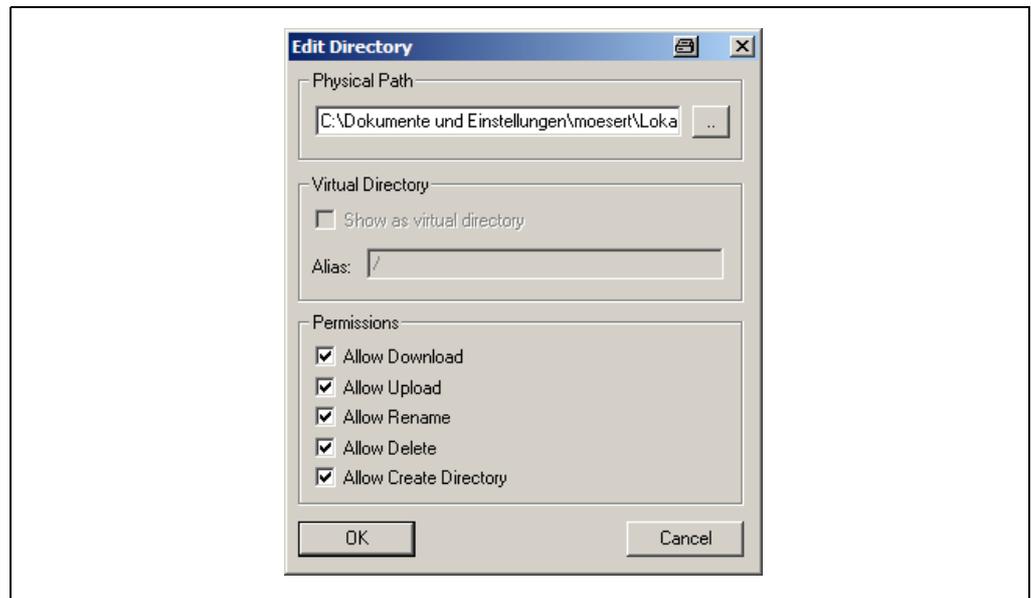


Fig. 6-16: ImageFTP: “Edit Directory” dialog box

- In the PHYSICAL PATH section, click  and select the directory in which you want to save the transferred images.
- Confirm with OK.
ImageFTP returns to the “User Accounts” dialog box.
- Confirm with OK.
- If necessary, select IMAGE in the VIEW menu in the program window of ImageFTP. The next image to be displayed will be scaled automatically to the size of the program window. Move the program window to a free place on the screen so that it is parallel to the DataMatrix AutoSetup dialog box.

Output criteria during using the DataMatrix AutoSetup:

In the default setting, the ICR outputs the image memory content as followed:

- Greyscale bitmap, saved on the PC in the sub-directory “GRAY“ under the directory selected in ImageFTP
- Scaling 8 (file size approx. 130 KB)
- File name: Cxxx.bmp, xxx= cyclic number 1 to 10 (to Modulo 10), after 10 image files the first file will be overwritten again
- Reading diagnosis data (generated XML files that are assigned to the corresponding bit-maps, saved in the sub-directory “DIAG“)

The image output parameters correspond to those in the default setting in standard reading mode with CLV Setup (IMAGE ACQUISITION tab).

Note To display the reading diagnosis data in the image, select VISUALIZATION in the VIEW menu of ImageFTP.

The following dialog box is then displayed:

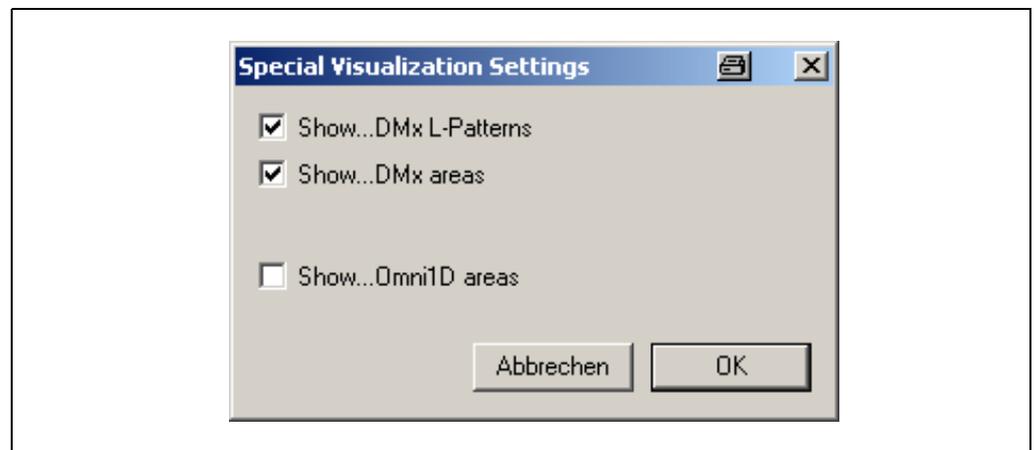


Fig. 6-17: ImageFTP: “Visualization“ dialog box

- For DataMatrix code, click SHOW DMX L PATTERN and SHOW DMX AREAS.
- Confirm the dialog box with OK.

Performing the DataMatrix AutoSetup

1. Click PREPARE AUTOSETUP in the DataMatrix AutoSetup dialog box ([Fig. 6-18, Page 6-14](#)).
The Assistant downloads the start parameters to the ICR.
2. Click SNAP AN IMAGE.
The Assistant requests the trigger for the ICR.

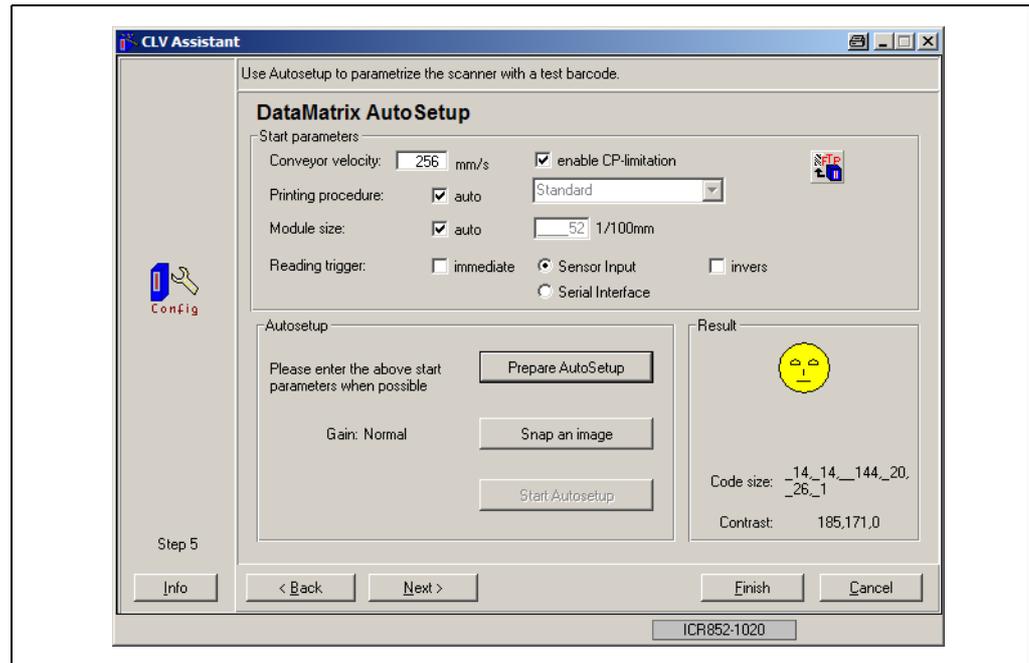


Fig. 6-18: CLV Assistant: "DataMatrix AutoSetup" dialog box (part 2)

3. Start the reading pulse: block the light path of the photoelectric switch or close the switch.
The ICR switches the laser diodes on and the red illumination line that illuminates the reading field appears. The ICR starts recording the information from the reflected light of the red illumination line as grey scale values in the image memory, one time with high frequency in 4,000 consecutive lines. With a small offset, the ICR starts decoding simultaneously.
A 2-dimensional grey-scale image is built up from the high frequency scans in the image buffer memory. When the image memory is full, the ICR automatically stops reading.
4. Move the application-specific DataMatrix code through the red illumination line with **constant** speed using a conveyor system.
Make sure that the entire DataMatrix code is moved across the red illumination line. The code must be recorded completely in the image memory. The movement direction of the code referred to the ICR (along the ICR) is free during the AutoSetup.
5. Stop the reading pulse: the ICR automatically stops reading and switches off the red illumination line.
6. Check the image in ImageFTP. The DataMatrix code must clearly be visible with sufficient clarity and be undistorted (Fig. 6-19).

Note In standard reading mode, the ICR writes the line data continuously to its image memory when the read cycle is started and starts the evaluation. If the 4,000 lines are full, the ICR overwrites the lines that were written first (circular buffer). When the read result is output at the end of the reading cycle, the 4,000 lines are read backwards starting from the time at which the read cycle ended. When "Output immediately" is set, the ICR outputs the read result if the code was successfully decoded before the reading cycle ended.

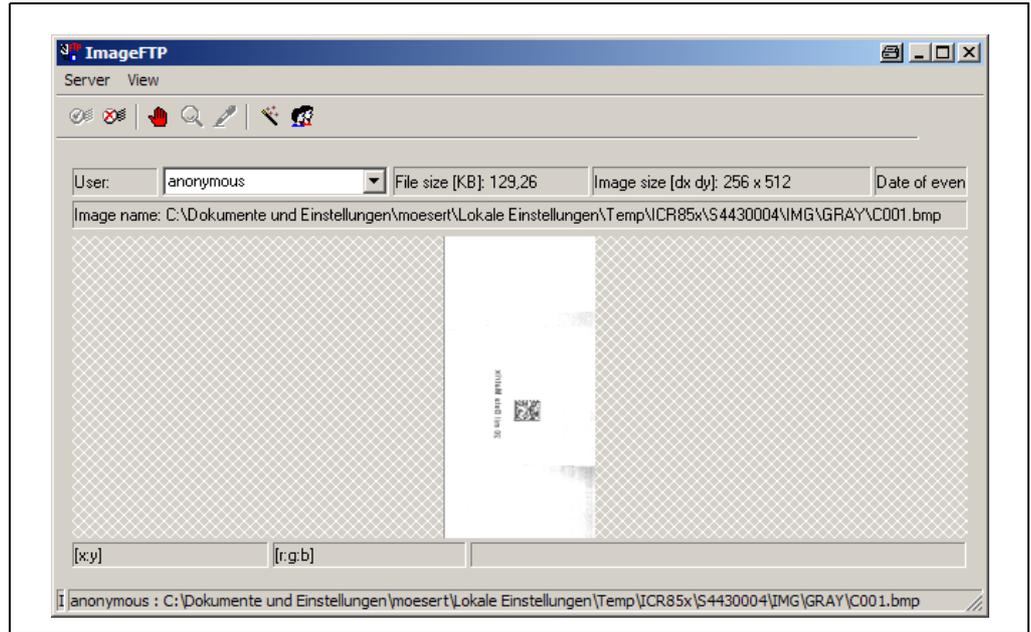


Fig. 6-19: ImageFTP: Image output before starting the AutoSetup

7. If OK, click START AUTOSETUP in the CLV Assistant.
The ICR tries to detect a DataMatrix code in the recorded image.
This can take some seconds.
8. If successfully detected, the Assistant displays the data content of the code and the code size in the RESULT group right under the green smiley.

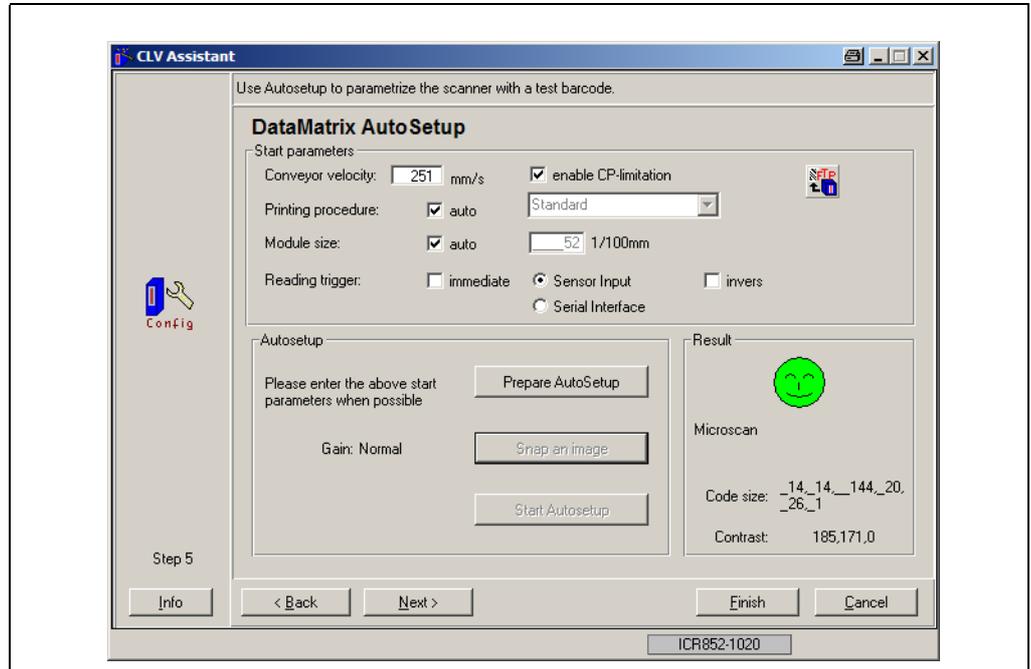


Fig. 6-20: CLV Assistant: "DataMatrix AutoSetup" dialog box after successful reading

9. Click NEXT.
The Assistant now displays the steps that were carried out and the values determined (Fig. 6-21, Page 6-16). These parameter values are permanently saved in the ICR.

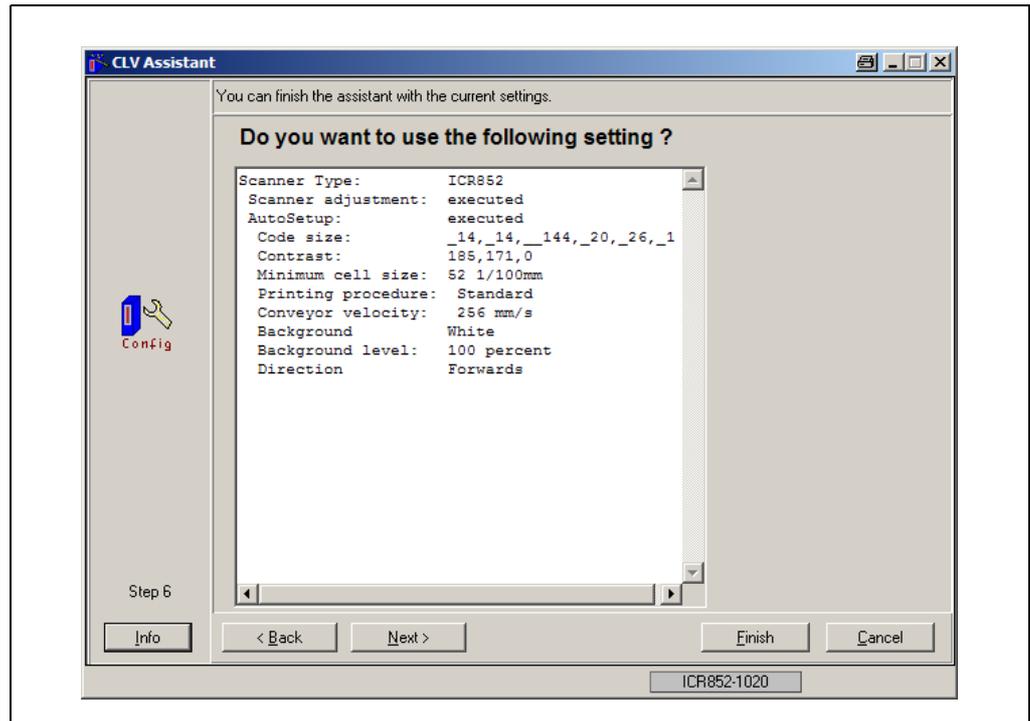


Fig. 6-21: CLV Assistant: Display of the performed steps and determined values

10. Click NEXT.

The Assistant transfers the values to CLV Setup and closes.

The Ethernet connection is interrupted (“No Connection“ displayed in red).

The ICR is ready for operation with the settings generated by AutoSetup.

11. You can check the values in CLV Setup on the READING CONFIGURATION and DATAMATRIX tabs. The data only needs to be downloaded to the ICR if any other parameters (reading trigger, data output) are changed manually.

12. To restart the communication with the ICR, double-click the IP address/port displayed in the status line at the bottom left (grey frame).

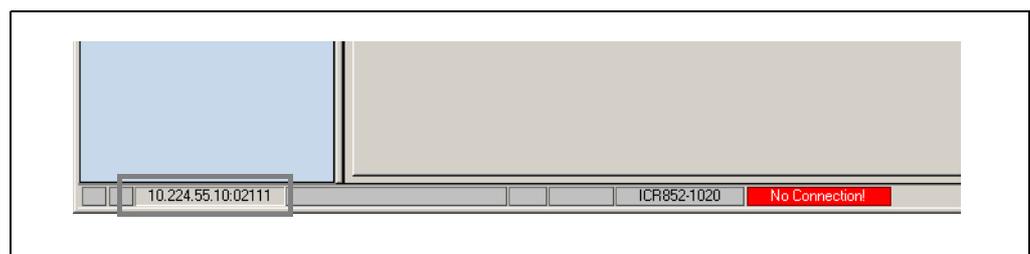


Fig. 6-22: CLV Setup: Status line with IP address/port of the Ethernet connection

13. The INTERFACE OPTIONS dialog box is then displayed:

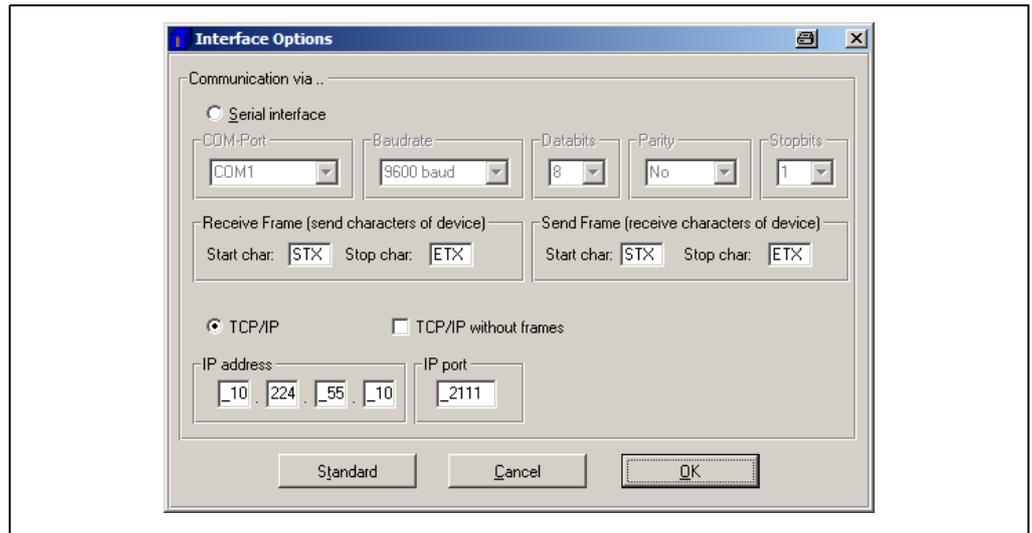


Fig. 6-23: CLV Setup: “Interface Options“ dialog box line with IP adress/port of the Ethernet connection

14. Click OK.

CLV Setup restarts the communication with the ICR.

15. If the ICR again reads the DataMatrix code successfully, ImageFTP displays the reading diagnosis data when enabled for outputting.

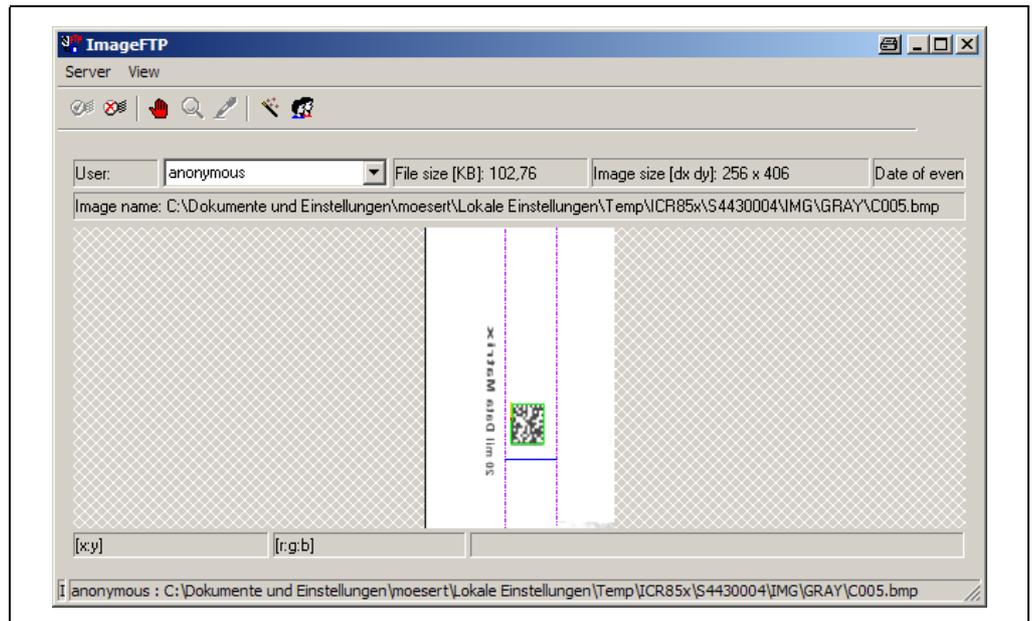


Fig. 6-24: ImageFTP: Image output, with the markings for CP limitations (violet), the 2-D symbol (green) and the position of the DataMatrix decoder at the end of reading pulse (blue)

ImageFTP displays the following markings for the DataMatrix code:

- Violet line (dot and dash line): detected CP limitations (limitation of the evaluation range in the image memory)
- Green line: detected DataMatrix code (Good Read)
- Yellow line: L-pattern of the codes
- Red line: areas with DataMatrix codes
- Blue line (vertical): position of the DataMatrix decoder at the end of the reading pulse

For further markings, also for bar codes, see [Chapter 6.5.3 “Image Acquisition”, Page 6-37](#).

6.4 Configuration (Parameterizing)

The ICR is configured locally in accordance with the application at hand. The read, evaluation and output characteristics can be parameterized as required. The factory default settings or an application-specific parameter set of the ICR are in effect before changes are made.

The ICR offers two configuration methods:

- Configuration via the Setup Assistant and the "CLV Setup" program (parameter values are set via the serial interface) (see [Chapter 6.3.2 "Configuring the ICR for the application with the Setup Assistant", Page 6-4](#))
- Configuration via command strings (parameter values are set via the serial interface) (see [Chapter 10.5 "Configuring the ICR with command strings", Page 10-24](#))

In Parameter Mode, the ICR outputs only a reading result when using the Setup Assistant.



6.4.1 Configuring the ICR with the user interface of CLV Setup

To be able to use "CLV Setup", a PC must be connected and the program installed on it. The procedure for connecting the PC to the ICR is described in Section [Chapter 5.5.7 "Connecting the PC", Page 5-12](#) respectively [Chapter 5.5.6 "Connecting the Ethernet interface", Page 5-10](#). Installation and startup of "CLV Setup" and operation of the user interface are described in the appendix (Section [Chapter 10.3 "Installation and operating instructions for the PC-based "CLV Setup" program", Page 10-3](#)).

Transferring parameter sets between CLV Setup and the ICR

Upload

When the ICR is being parameterized, CLV Setup runs in the **offline mode**. To be able to modify the current parameter set of the ICR, this first has to be loaded to CLV Setup from the ICR. This procedure is referred to as an **upload** ("Upload from ICR" in the ICR 85x menu or [F3] key) during which CLV Setup always loads a complete copy of the current ICR parameter set. This parameter set remains unchanged until it is overwritten by CLV Setup.

With the help of the **context menu** (right mouse button), only the parameter just edited can be loaded ("Upload parameter") or from version 3.6 all parameters of one tab or one dialog box ("Upload parameters of this view") from the ICR's memory (RAM).

Download

Changes made to the current parameter set in CLV Setup do not take effect until the parameter set has been transferred to the ICR. CLV Setup always sends a copy of the complete parameter set to the ICR, i. e. all of the existing parameter values in the ICR are overwritten. The procedure for transferring and saving the parameter values in the ICR is referred to as a **download** ("Download to ICR" in the ICR 85x menu or [F4] key).

With the help of the **context menu** (right mouse button), only the parameter just edited ("Download parameter") or from version 3.6 all parameters of one tab or one dialog box ("Download parameters of this view") will be **temporarily** loaded into the ICR's memory (RAM). To finish the parametrization done by this way all parameters must be download again to the CLV with the **"Permanent"** option.

Loading complete parameter set from the ICR (Upload)

- Click  in the toolbar or press [F3] key.

CLV Setup loads the current ICR parameter set from the RAM of the ICR to its database and displays the values on the tabs.

The “Device Ready“ LED is extinguished during the upload.

If the “CLV Setup“ program does not recognize the parameters transferred during the upload, it outputs a warning. Unknown parameters can be edited on the EXTRAS tab by following the conventions for command strings. When the parameter set is saved, these parameters are also taken into account.

Transferring the complete parameter set to the ICR and saving it (Download)

1. Click  in the toolbar or press [F4] key.

The “Device Ready“ LED is extinguished.

CLV Setup copies the parameter set to the RAM of the ICR.

The DOWNLOAD PARAMETERS dialog box with the save options is then displayed.

PERMANENT: CLV Setup copies the parameter set to the RAM **and** to the EEPROM of the ICR.

TEMPORARY: CLV Setup copies the parameter set to the RAM only. The changes are lost when the ICR power supply is switched off.

2. Confirm the dialog box with the desired save option.

The “Device Ready“ LED lights up again.

The new parameter set is stored in the ICR either permanently or temporarily dependent of the selected option.

Saving the parameter set in CLV Setup

1. To save the modified parameter set as a new configuration file in CLV Setup or to overwrite an existing file, select the menu FILE and the menu item SAVE AS. The SAVE AS dialog box is then displayed.
2. Enter the file name in the dialog box (file extension “*.scl“) and confirm the entry.

The new parameter set is now saved in CLV Setup in the subdirectory “data“.

6.4.2 Function of tabs in CLV Setup (overview)



Reading Configuration

This tab (and additional dialog boxes) are used to set the following:

- Minimum cell size and module width for 2-D codes and/or bar codes
- Evaluation range of the reading field (CP value)
- Object velocity
- Printing procedure of the code to be read
- Adapting to the quality of the code
- Quiet zone (start/stop ratio) for bar codes



Device Configuration

This tab (and additional dialog boxes) are used to set the following:

- Device number
- Source of the reading pulse
- Delay of start/end of reading pulse
- Polarity and debouncing of "Sensor 1" switching input
- Output time of the reading result for Good Read/No Read referred to the start of the reading pulse
- Laser timeout
- Functional assignment of the "Sensor 2" switching input, polarity and debouncing
- Functional assignments of the "Result 1" and "Result 2" switching outputs
- Functional assignment and activity of the beeper
- Code comparison (match code)



Code Configuration

This tab (and additional dialog boxes) are used to set the following:

- Activation of the decoder for 2-D codes/1-D codes (bar codes)
- For 2-D codes (DataMatrix ECC 200): Reading direction of the ICR referred to the conveyor direction, symbol size, shape of data fields, error correction
- For bar codes: type of active decoder (SMART and/or standard decoder, omnidirectional decoder)
- Activation of evaluation routines for individual code types (multiple reads)
- Minimum and maximum number of codes to be read/output
- Check of min. number and max. number of codes read
- Activation of comparison of code position for the separation of identical bar codes

Recommendation To enhance the reading reliability with fast applications, only activate those code types and code lengths that are actually relevant.



Host Interface

This tab (and additional dialog boxes) are used to set the following:

- Destination of result output
- Active physical interface (RS 232 or RS 422/485)
- Data format and transfer rate
- Data transfer protocol
- Start and stop characters of the interface protocol

Ethernet

This tab is used to set the following:

- ICR: IP address, IP gateway address, IP mask and IP port; PC: server address
- ICR: Operating mode of FTP client



Data Strings

This tab (and additional dialog boxes) are used to set the following:

- Data output format of the reading result (host, CAN or Ethernet interface)
- Constants and reading diagnosis data in the header and terminator
- Arrangement of the constants and reading diagnosis data with the reading data in the data string
- Output format for no reads and contents of the error string
- Test string function
- Output sequence and sort criteria for reading more than one code per reading pulse
- Activation and structure of format mask

CAN interface

This tab (and additional dialog boxes) are used to set the following:

- Operating mode of the CAN interface
- Data transmission rate
- Type of logical data network of connected ICRs
- Use of switching inputs/outputs of the ICR as CANopen Digital I/O

Image acquisition

This tab (and additional dialog boxes) are used to set the following:

- Acquisition time of the image referred to the reading procedure
- Image file name
- Image format and quality

Note To use the image acquisition additional software is required on the PC (function: FTP server)

Fieldbus Gateway

This tab (and additional dialog boxes) are used to set the following:

- Data interface of the ICR to be connected to the gateway in the CDM 420
- Type of fieldbus
- Special fieldbus parameters



Auxiliary Interface

This tab is used to set the following:

- Operating mode of the auxiliary interface



Extras

This tab is used to edit parameters that were not recognized by CLV Setup after an upload.

Note The online “CLV Setup Help“ contains a detailed description of the functions of the parameters and their valid entries (for calling up help, see [Chapter 10.3.8 “Online help program “CLV Setup Help“”, Page 10-10](#)).

6.4.3 Parameterization guide

Overview of parameterization procedure

- a) Parameterizing the optical reading characteristics
- b) Setting up reading pulse
- c) Parameterizing the laser timeout
- d) Parameterizing the evaluation characteristics of the decoder
- e) Parameterizing the output characteristics (data, result status)
- f) Defining the function of the auxiliary interface

When the ICR is started up for the first time, the **factory default setting** is in effect.

The following parameters must then be set:

a) Parameterizing optical reading characteristics

For 2-D codes (DataMatrix ECC 200):

- Minimum cell size ⇒ READING CONFIGURATION tab ⇒ READING PARAMETERS 2-D section
- Parameterizing (if necessary):
 - Contrast improvement ⇒ READING CONFIGURATION tab ⇒ IMAGE PROCESSING section ⇒ CODE PROPERTIES PARAMETERS button ⇒ Background
 - Elimination of masking by the code surface ⇒ READING CONFIGURATION tab ⇒ IMAGE PROCESSING section ⇒ CODE PROPERTIES PARAMETERS button ⇒ Surface
 - For ink-jet printing: Compensation of poor dot size ⇒ READING CONFIGURATION tab ⇒ IMAGE PROCESSING section ⇒ CODE PROPERTIES PARAMETERS button ⇒ Deviation of dot size

See also [Chapter 10.4.1 “Adaptation of the reading characteristics“, Page 10-14](#)

For bar codes:

- Minimum bar width ⇒ READING CONFIGURATION tab ⇒ READING PARAMETERS 1-D section
- Parameterizing (if necessary):
 - Bar saturation ⇒ READING CONFIGURATION tab ⇒ IMAGE PROCESSING section ⇒ CODE PROPERTIES PARAMETERS button ⇒ 1D-Codes Foreground

See also [Chapter 10.4.1 “Adaptation of the reading characteristics“, Page 10-14](#)

General:

- Evaluation range of the illumination line ⇒ READING CONFIGURATION tab ⇒ MINIMUM AND MAXIMUM CODE POSITION section
- Object velocity ⇒ READING CONFIGURATION tab ⇒ IMAGE PROCESSING section
- Codelabel quality ⇒ READING CONFIGURATION tab ⇒ IMAGE PROCESSING section ⇒ Printing procedure

b) Parameterizing reading pulse source

Action	Settings in CLV Setup
Parameterize reading trigger: one external sensor – or –	<ul style="list-style-type: none"> ⇒ DEVICE CONFIGURATION tab ⇒ SENSOR 1 section <ul style="list-style-type: none"> – Debouncing – Invert Input (if necessary) ⇒ READING TRIGGER PARAMETERS button Start: <ul style="list-style-type: none"> ⇒ START OF READING INTERVAL section <ul style="list-style-type: none"> – Sensor Input ⇒ START DELAY section <ul style="list-style-type: none"> – Time controlled: value <i>or</i> – Track controlled: value (with connected increment encoder) ⇒ DELAY CONTROLLING section <ul style="list-style-type: none"> – Time controlled delaying <i>or</i> – Track controlled delaying ⇒ FIRST TRIGGER SENSOR section <ul style="list-style-type: none"> – Edge <i>or</i> – Level Stop: <ul style="list-style-type: none"> ⇒ END OF READING INTERVAL section (No Read) <ul style="list-style-type: none"> – Trigger Source <i>or</i> – Timer: Timeout (referred to beginning of reading interval) ⇒ STOP DELAY section <ul style="list-style-type: none"> – Auto <i>or</i> – User defined <ul style="list-style-type: none"> – Time controlled: value <i>or</i> – Track controlled: value (with connected increment encoder) Output of reading result referred to beginning of reading interval: <ul style="list-style-type: none"> ⇒ RESULT OUTPUT section (Good Read) <ul style="list-style-type: none"> – End of reading interval <i>or</i> – Immediate output <i>or</i> – End of next reading interval Note: Connect the external sensor to "Sensor 1" switching input!

Table 6-2: Guide: Parameterizing the reading trigger and output of reading result

Action	Settings in CLV Setup
Parameterize reading trigger: two external sensors – or –	⇨ DEVICE CONFIGURATION tab ⇨ SENSOR 1 section <ul style="list-style-type: none"> – Debouncing – Invert Input (if necessary) ⇨ READING TRIGGER PARAMETERS button Start (sensor 1): ⇨ START OF READING INTERVAL section <ul style="list-style-type: none"> – Sensor Input ⇨ START DELAY section <ul style="list-style-type: none"> – Time controlled: value ⇨ DELAY CONTROLLING section <ul style="list-style-type: none"> – Time controlled delaying ⇨ FIRST TRIGGER SENSOR section <ul style="list-style-type: none"> – Edge <i>or</i> – Level Stop (sensor 2): ⇨ END OF READING INTERVAL section (No Read) <ul style="list-style-type: none"> – Trigger source ⇨ DEVICE CONFIGURATION tab ⇨ SENSOR 2 section <ul style="list-style-type: none"> – Assignment <ul style="list-style-type: none"> – Reading trigger stop – Debouncing: value – Invert Input (if necessary) Output of reading result referred to beginning of reading interval: ⇨ RESULT OUTPUT section (Good Read) <ul style="list-style-type: none"> – End of reading interval <i>or</i> – Immediate output <i>or</i> – End of next reading interval Note: Connect external sensor 1 (start) to "Sensor 1" switching input and sensor 2 (stop) to "Sensor 2" switching input!

Table 6-2: Guide: Parameterizing the reading trigger and output of reading result (contd.)

Action	Settings in CLV Setup
Parameterize reading trigger: command strings – or –	⇨ DEVICE CONFIGURATION tab ⇨ READING TRIGGER PARAMETERS button Start: ⇨ START OF READING INTERVAL section – Serial Interface Stop: ⇨ END OF READING INTERVAL section (No Read) – Trigger source <i>or</i> – Timer: Timeout (referred to beginning of reading interval) Trigger characters: ⇨ SERIAL INTERFACE section – Standard Trigger <i>or</i> – Single character ⇨ Using single character: start and stop characters Output of reading result referred to beginning of reading interval: ⇨ RESULT OUTPUT section (Good Read) – End of reading interval <i>or</i> – Immediate output <i>or</i> – End of next reading interval
Parameterize reading trigger: free-running with timeout	⇨ DEVICE CONFIGURATION tab ⇨ READING TRIGGER PARAMETERS button Start: ⇨ START OF READING INTERVAL section – Free-running with Timeout Stop (generated by reading trigger source): ⇨ END OF LABEL/FREE-RUINNING section – Timeout: value Output of reading result referred to beginning of reading interval: ⇨ RESULT OUTPUT section (Good Read) – End of reading interval <i>or</i> – Immediate output <i>or</i> – End of next reading interval Note: No laser timeout function (defined switching off of laser diode due to too long active reading gate) available in this trigger mode.

Table 6-2: Guide: Parameterizing the reading trigger and output of reading result (contd.)

c) Parameterizing laser timeout (for trigger source "Sensor input"/"Ser. interface")

Action	Settings
1. Select the duration for the laser timeout – or –	⇒ DEVICE CONFIGURATION tab ⇒ READING TRIGGER PARAMETERS button ⇒ LASER TIMEOUT section – Duration
2. Deactivate the laser timeout (laser diode is always active when pulsing, regardless of the pulse duration)	⇒ LASER TIMEOUT section – Click (deactivate) the ACTIVE checkbox

Table 6-3: Guide: Parameterizing the laser timeout

d) Parameterizing evaluation characteristics**For 2-D codes (DataMatrix ECC 200):**

- Rectangular data field ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ DATA FIELDS section
- Positive/negative code printing ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ BACKGROUND section
- Improvement of code recognition ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ OPTIMIZATION PARAMETERS button ⇒ DECODER RETRY ON... section
- Interruptions in code printing ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ OPTIMIZATION PARAMETERS button ⇒ TOLERATE L-PATTERN ERRORS section
- Contrast level ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ OPTIMIZATION PARAMETERS button ⇒ SYMBOL CONTRAST section

See also [Chapter 10.4.1 "Adaptation of the reading characteristics", Page 10-14](#)

Optimization (time-critical applications)

- Defining code size ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ SYMBOL SIZE section
- Direction of code movement ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ DIRECTION section

Requirement for additional optimizations: high code quality

- Error correction restriction ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ PERMISSIBLE ERROR CORRECTION section
- Suppression of further decodings ⇒ CODE CONFIGURATION tab ⇒ 2D-SYMBOLOGIES section ⇒ EDIT button ⇒ OPTIMIZATION PARAMETERS button ⇒ DECODER RETRY ON... section

See also [Chapter 10.4.2 "Optimization of the reading characteristics for time-critical applications", Page 10-20.](#)

For bar codes:

- Selecting decoder type ⇒ CODE CONFIGURATION tab ⇒ 1-D DECODER section
- Activating code type ⇒ CODE CONFIGURATION tab ⇒ 1D-SYMBOLOGIES section ⇒ EDIT button
- Multiple reads ⇒ CODE CONFIGURATION tab ⇒ 1D-SYMBOLOGIES section ⇒ EDIT button
- Positive/negative code printing ⇒ CODE CONFIGURATION tab ⇒ 1D-SYMBOLOGIES section ⇒ 1-D BACKGROUND section

General:

- Activate code comparison ⇒ DEVICE CONFIGURATION tab ⇒ MATCH CODE PARAMETERS button
- Mode for teaching in match code 1 via the “Sensor 2“ switching input ⇒ DEVICE CONFIGURATION tab ⇒ SENSOR 2 section ⇒ Assignment
- Set output time for the reading result ⇒ DEVICE CONFIGURATION tab ⇒ READING TRIGGER PARAMETERS button ⇒ READ RESULT OUTPUT section (Good Read) and END OF READING INTERVAL section (No Read).

Separation of identical bar codes (same code type/identical contents)

No. of codes per object	Moving conveyor object
1. Number $n = 1$	⇒ CODE CONFIGURATION tab ⇒ CODE POSITION section – Deactivate “Compare“!
2. Number $n > 1$: – Same code type – Contents different or identical	⇒ CODE POSITION section – Activate “Compare“! ⇒ NUMBER OF CODES section – Minimum – Maximum
3. Number $n > 1$: – Code type different – Contents different or identical	⇒ CODE POSITION section – Deactivate “Compare“! ⇒ NUMBER OF CODES section – Minimum – Maximum

Table 6-4: Guide: Settings to be made for the evaluation of identical codes

e) Parameterizing output characteristics**Result status:**

- Setting the function of the result status output of the “Result 1“ and “Result 2“ switching outputs:
⇒ DEVICE CONFIGURATION tab ⇒ RESULT OUTPUT PARAMETERS button
- Defining function of result status output and activity of beeper:
⇒ DEVICE CONFIGURATION tab ⇒ BEEPER section and RESULT OUTPUT PARAMETERS button
- Check: success of multiple reads ⇒ DATA STRINGS tab ⇒ STATUS 5 OUTPUT section
- Check: min. and max. number of codes ⇒ CODE CONFIGURATION tab ⇒ NUMBER OF CODES section

Main data interface (general):

- Destination of the reading result ⇒ HOST INTERFACE tab ⇒ DESTINATION OF RESULT DATA STRINGS section
- Sorting of the reading result ⇒ DATA STRINGS tab ⇒ OUTPUT SEQUENCE SORT section
- Masking of the reading result ⇒ DATA STRINGS tab ⇒ FORMAT MASK section

Host Interface:

- Physical interface ⇒ HOST INTERFACE tab ⇒ DATA FORMAT section
- Communication parameters ⇒ HOST INTERFACE tab ⇒ DATA FORMAT section
- Protocol ⇒ HOST INTERFACE tab ⇒ INTERFACE PROTOCOL section

Function of the CAN interface (alternative):

See “Application of the CAN Interface“ Operating Instructions (no. 8 009 180, English version)

Function of the Ethernet interface (alternative):

- ICR: IP address, IP gateway address, IP mask and IP port
- PC: server address

Data output string of host, CAN or Ethernet interface:

- Selecting contents of the header and terminator ⇒ DATA STRINGS tab ⇒ OUTPUT FORMAT section
- Providing code contents with reading diagnosis data ⇒ DATA STRINGS tab ⇒ OUTPUT FORMAT section ⇒ READING DATA section
- Setting up wrong read format ⇒ DATA STRINGS tab ⇒ READING DATA IN CASE OF ERROR, CHARACTER COUNT and ERROR STRING sections
- If necessary, parameterize/activate test string ⇒ DATA STRINGS tab ⇒ TEST STRING section

f) Parameterizing auxiliary interface

- AUXILIARY INTERFACE tab

6.5 Operating modes and outputting the reading result

The following ICR operating modes/functions can be selected in CLV Setup:

Standard operating mode

- Reading mode

For startup

- Percentage Evaluation

For adapting device to application

- Parameterizing (configuration)
(see [Chapter 6.4.1 “Configuring the ICR with the user interface of CLV Setup”, Page 6-18](#))
- Teach-in match code 1/activating match code comparison with “Sensor 2” switching input (see [Chapter 10.7.1 “Triggering the Teach-in match code 1 via the “Sensor 2” switching input”, Page 10-27](#)).

For monitoring purposes/correcting faults

- Image acquisition (Ethernet interface)
- Displaying and editing operating data
- Reading diagnosis
- Monitor host interface
- Auxiliary input
- Self-test
- Monitor (communication between CLV Setup and ICR)

6.5.1 Reading mode (standard operating mode)

The ICR performs a self-test after it has been switched on. The start of Reading mode is confirmed with two consecutive, low tones from the beeper.

In the default setting, the “Sensor 1” switching input is the (external) trigger source of the reading pulse. The ICR only reads 2-D codes. The ICR outputs the reading result at the end of the reading pulse, in the default setting, via the host and auxiliary interfaces. Depending of the configuration, the “Result 1” and “Result 2” switching outputs become live for the predefined pulse length when defined events occur during the reading process (e. g. Good Read).

The reading result of the **auxiliary interface** can be displayed in the CLV Setup Terminal Emulator. For this, the auxiliary interface of the ICR must be in “Reading Diagnosis” mode. This mode is selected for the default setting. The reading result of the auxiliary interface has a fixed, invariable format.

The data communication of the **auxiliary interface** can also be routed via the Ethernet interface. The physical auxiliary interface (RS 232) will then be disabled. See [Chapter 5.5.6 “Connecting the Ethernet interface”, Page 5-10](#).

Note For **bar code** reading, the corresponding bar code type must be activated for evaluation beforehand (all bar code types are deactivated in the default setting).

The Reading mode can be called up by choosing VIEW in the menu bar or via the Terminal Emulator.



Displaying the reading result in the Terminal Emulator

Reading 2-D Codes (DataMatrix ECC200):

1. Click  in the toolbar.
The Terminal Emulator dialog box is then displayed.
2. Click READING MODE under DEVICE MODE.
3. Activate the reading pulse.
The “Laser On“ LED lights up. The red illumination line appears.
4. Move the 2-D code sample from [Fig. 6-1, Page 6-3](#) through the red illumination line using the conveyor system **evenly** (constant speed during reading!).
Reading distances:
ICR 850: 100 mm (3.94 in) for side reading window
 110 mm (4.33 in) for front reading window
ICR 852, ICR 855: 60 mm (2.36 in) for side reading window
 70 mm (2.75 in) for front reading window
5. Terminate reading pulse.
The “Laser On“ LED is extinguished. The ICR switches off the illumination line.
The ICR outputs a tone via the beeper and the reading result is displayed in the window of the Terminal Emulator. The “Result“ LED lights up for a duration of 100 ms (default setting).

Reading bar codes:

1. Select the CODE CONFIGURATION tab.
2. Click the desired code type in the 1D-SYMBOLOGIES group (in this case: CODE 39).
3. Perform a download to the ICR.
To do so, click the desired code type again with the right mouse button and choose DOWNLOAD PARAMETER in the context menu.
CLV Setup copies the parameter to the ICR temporarily.
The selected bar code type is activated for reading until the ICR is switched off.
4. Click  in the toolbar.
The Terminal Emulator dialog box is then displayed.
5. Click READING MODE under DEVICE MODE.
6. Activate the reading pulse.
The “Laser On“ LED lights up. The red illumination line appears.
7. Align the red illumination line with the corresponding bar code sample from [Fig. 6-2, Page 6-3](#) in such a way that the illumination line is at a right angle with the code lines and so that it stretches over the entire code. The bar code need not be moved through the illumination line. Reading distances:
ICR 850: 100 mm (3.94 in) for side reading window
 110 mm (4.33 in) for front reading window
ICR 852, ICR 855: 60 mm (2.36 in) for side reading window
 70 mm (2.75 in) for front reading window
8. Terminate reading pulse.
The “Laser On“ LED is extinguished. The ICR switches off the illumination line. The ICR outputs a tone via the beeper and the reading result is displayed in the window of the Terminal Emulator. The “Result“ LED lights up for a duration of 100 ms (default setting).
[Fig. 6-25, Page 6-31](#) shows an example of the “Good Read“ reading result output for 2-D codes and [Fig. 6-27, Page 6-33](#) shows an example of the “Good Read“ reading result output. The structure of the “No Read“ reading result is identical for 2-D codes and bar codes, and is displayed in [Fig. 6-27](#).

The reading result is composed of the data contents of the code and the reading diagnosis data.

Note The ICR only outputs several codes in the reading result via the **host interface** if the parameterized “minimum and maximum number of codes” is > 1 , and several codes have been presented. The number of codes to be read/output per reading interval can be selected on the CODE CONFIGURATION tab in the NUMBER OF CODES group.

The reading result of the **host interface** can also be displayed in the Terminal Emulator. [Chapter 6.5.6 “Monitor Host Interface”, Page 6-41](#) describes the procedure and the structure of the read result in the default setting.

1. Output of reading result: 2-D code (DataMatrix ECC 200)

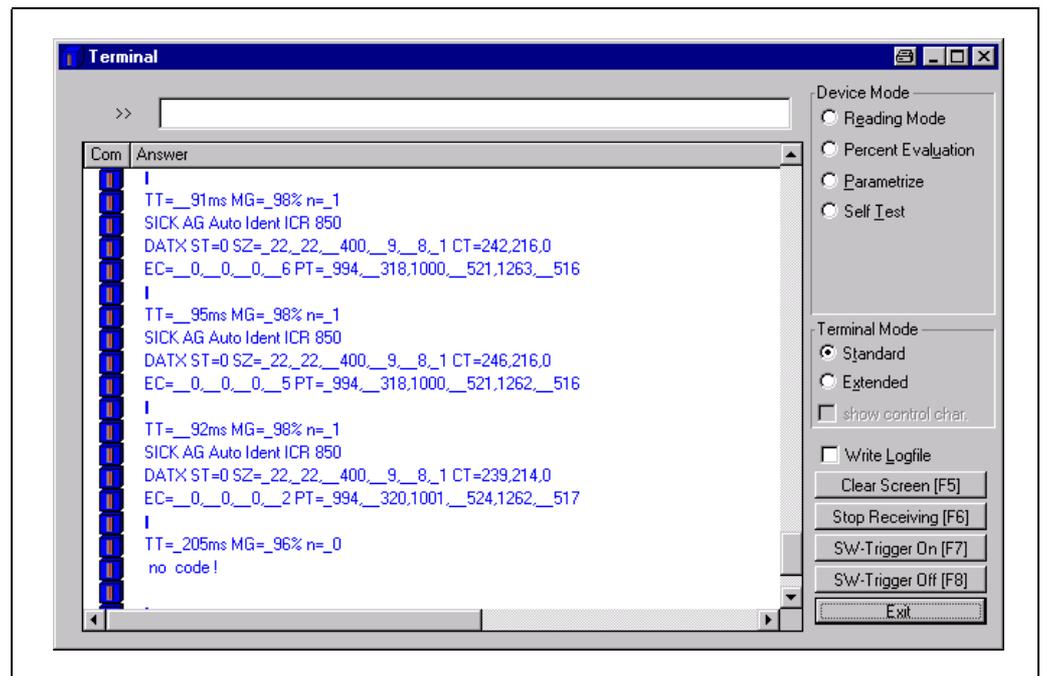


Fig. 6-25: CLV Setup: Output of the reading result of the auxiliary interface for 2-D codes in the Terminal Emulator

Structure of the reading result for Good Read (successful reading)

TT= _91 ms MG= _98 % n= _1

SICK AG Auto Ident ICR 850

DATX ST= 0 SZ= _22, _22, _400, _9, _8, _1 CT=242,216,0

EC= _0, _0, _0, _6 PT= _994, _318, 1000, _521, 1263, _516

with:

1st line: **TT** = Reading interval time

MG = Long-term mean value of identification quality

n = Number of recognized code labels

2nd line: **SICK AG Auto Ident ICR 850**= data content of the 2-D codes

3rd line: **DATX** = ID: DataMatrix ECC 200

ST = Read status (ST = 0: Good Read)

SZ = Symbol size (format: aaa, bbb, ccccc, ddd, eee, ff)

aaa = Number of lines in bits

bbb = Number of columns in bits

- cccc = Number of data bits in the code for simple data field
 ddd = Average size of a cell in the movement direction (scans)
 eee = Average size of a cell in the line direction (pixels)
 ff = Number of data fields for a DataMatrix
- CT** = Contrast (format: aaa, bbb, c)
 aaa = Min./max. contrast in the code (8-bit grayscale value)
 bbb = Set contrast in the code for bit scanning (8-bit grayscale value)
 c = Code inverted (0: no, 1: yes)
 1 = white code on black background
- 4th line: **EC** = Error Correction (Format: aaa, bbb, ccc, ddd)
 aaa = Number of error-correction code words used (persuant to Reed Solomon)
 bbb = Percent ratio of the number of error-correction words used to the total number of available error-correction code words in the code (persuant to Reed Solomon)
 ccc = Number of weak bits for error correction (bits)
 ddd = Total number of weak bits in the symbol in image memory
- PT** = Position of the symbol in the image field of the image memory, measured in pixels (Format: aaaa, bbbbbb, cccc, ddddd, eeee, fffff)
 aaaa = x position P 1
 bbbbbb = y position P 1
 cccc = x position P 2
 ddddd = y position P 2
 eeee = x position P 3
 fffff = y position P 3

Fig. 6-26 shows the definition of the position of the symbol in the image field.

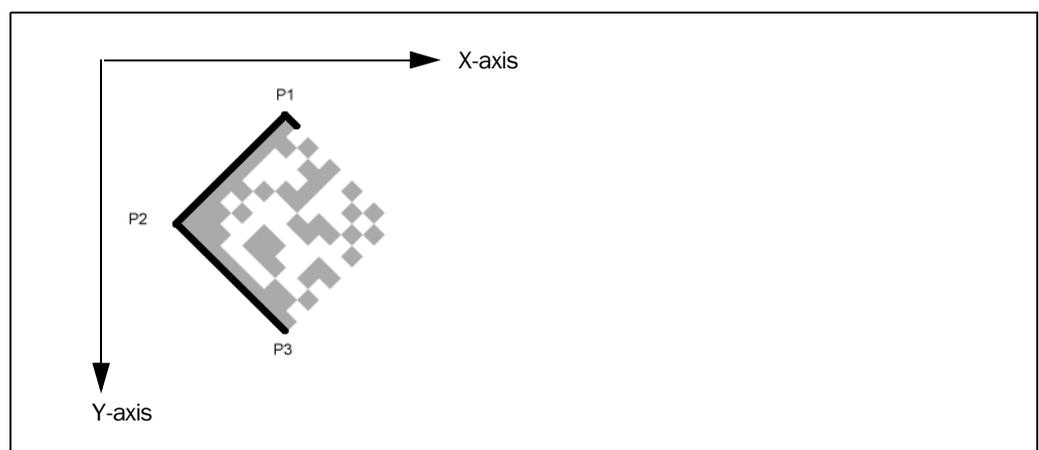


Fig. 6-26: Position of the symbol in the image field of the image memory

2. Output of reading result: Bar code

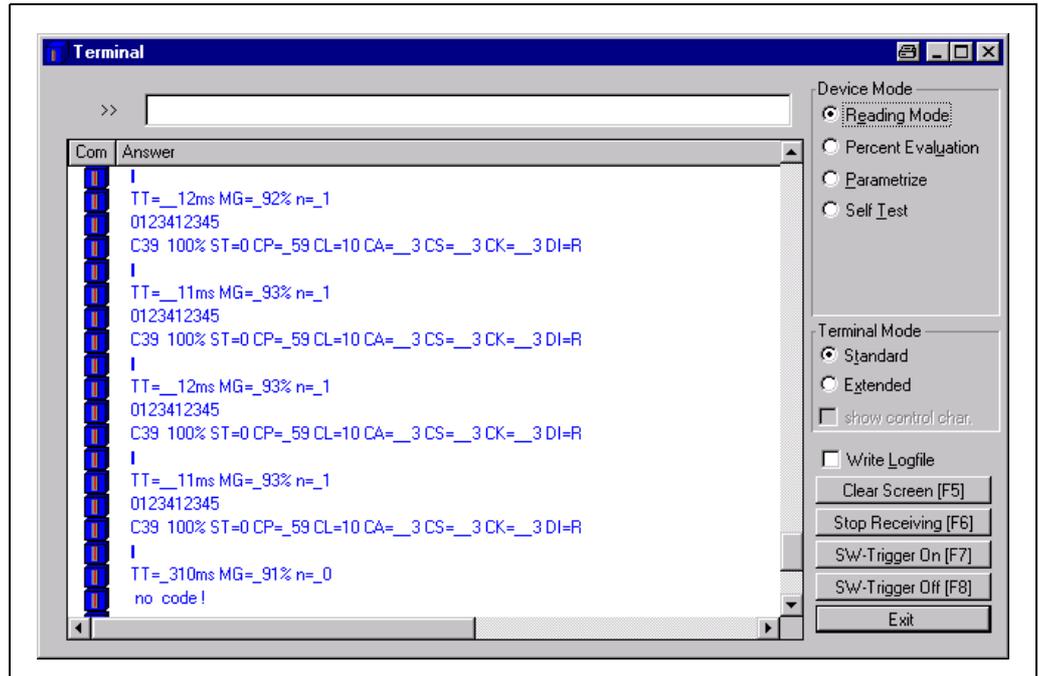


Fig. 6-27: CLV Setup: Output of the reading result of the auxiliary interface for bar codes in the Terminal Emulator

Structure of the reading result for Good Read (successful reading)

TT=_12 ms MG=_92 % n=_1

0123412345

C39 100% ST=0 CP=_59 CL=10 CA=_3 CS=_3 CK=_3 DI=R

with:

- 1st line: **TT** = Reading interval time
- MG** = Long-term mean value of identification quality
- n** = Number of recognized code labels
- 2nd line: **0123412345** = Data content of the bar code
- 3rd line: **C39** = ID: Code type code 39
- 100 %**= Identification quality
- ST** = Read status (ST = 0: Good Read)
- CP** = Code position
- CL** = Code length (character count)
- CA** = Scanning expenditure
- CS** = Code security
- CK** = Code continuity
- DI** = Decoding direction,
F = in counting direction of the CP,
R = against counting direction of the CP

3. Output of reading result: No Read

The structure of the reading result for No Read is identical for 2-D codes and bar codes.

TT=_235 ms MG=_69 % n=_0
no code!

with:

- 1st line: **TT** = Reading interval time
MG = Long-term mean value of identification quality
n = Number of recognized code labels
- 2nd line: **no code** = No code found!

Triggering the reading pulse via the Terminal Emulator



In the default setting, the “Sensor 1“ switching input is the trigger source of the reading pulse. The reading pulse can also be triggered directly via the terminal emulator of CLV Setup for test purposes. To do so, a different trigger source must be selected temporarily in the ICR.

1. Choose the DEVICE CONFIGURATION tab.
 2. Click the READING TRIGGER PARAMETERS button.
The READING TRIGGER PARAMETERS dialog box is then displayed.
 3. Click the SERIAL INTERFACE radio button in the START OF READING INTERVAL group.
 4. Perform a download to the ICR.
To do so, click the SERIAL INTERFACE option again with the right mouse button and choose DOWNLOAD PARAMETER in the context menu.
CLV Setup copies the parameter temporary to the ICR.
The serial interface has been activated as the trigger source of the reading pulse and is ready to receive appropriate commands (until the ICR is switched off).
 5. Click  in the toolbar.
The Terminal Emulator dialog box is then displayed.
 6. Click READING MODE under DEVICE MODE.
 7. Click the SW-TRIGGER ON button or press [F7].
CLV Setup sends a start command to the ICR.
The “Laser On“ LED lights up. The red illumination line appears.
 8. Move the 2-D code sample from [Fig. 6-1, Page 6-3](#) through the red illumination line using the conveyor system **evenly** (constant speed during reading!).
Reading distances:
ICR 850: 100 mm (3.94 in) for side reading window
110 mm (4.33 in) for front reading window
ICR 852, ICR 855: 60 mm (2.36 in) for side reading window
70 mm (2.75 in) for front reading window
- Note** To read a bar code, proceed as described in [“Displaying the reading result in the Terminal Emulator“, Page 6-30](#).
9. Click the SW-TRIGGER OFF button or press [F8].
CLV Setup sends a stop command to the ICR.
The “Laser On“ LED is extinguished. The ICR switches off the illumination line.
The ICR outputs a tone via the beeper and the reading result is displayed in the window of the Terminal Emulator. The “Result“ LED lights up for a duration of 100 ms (default setting).

6.5.2 Percentage Evaluation

Note This function is only available for **bar codes**.

In Percentage Evaluation mode, the quality of the reading of bar codes which are brought statically into the reading field of the ICR is assessed (no conveyor movement).



The ICR performs 100 scans in the Free running mode and evaluates the reading quality. It outputs the reading result continuously every 2 s via the **auxiliary interface**. The reading results can be displayed in the Terminal Emulator of CLV Setup. The "Result 1" and "Result 2" switching outputs do not become live in the Percentage evaluation mode.

The data communication of the **auxiliary interface** can also be routed via the Ethernet interface. The physical auxiliary interface (RS 232) will then be disabled. See [Chapter 5.5.6 "Connecting the Ethernet interface", Page 5-10](#).

Only the standard decoder must be set temporarily for the percentage evaluation (activated in the default setting).

The Percentage Evaluation mode can be called up by choosing VIEW in the menu bar or via the Terminal Emulator.

1. Select the CODE CONFIGURATION tab.
2. Click the STANDARD radio button in the 1D-SYMBOLOGIES/1D-DECODER group.
3. Perform a download to the ICR.
To do so, click the STANDARD option again with the right mouse button and choose DOWNLOAD PARAMETER in the context menu.
CLV Setup copies the parameter temporary to the ICR.
The ICR then uses the standard decoder (until the ICR is switched off).
4. Click  in the toolbar.
The Terminal Emulator window is then displayed.
5. Click PERCENT EVALUATION under DEVICE MODE.
The "Device Ready" LED is extinguished. The red illumination line appears.
The ICR initiates the percentage evaluation and outputs the reading results continuously. An example is shown in [Fig. 6-28](#).
6. Align the red illumination line with the bar code sample from [Fig. 6-2, Page 6-3](#) in such a way that the illumination line is at a right angle with the code lines and so that it stretches over the entire code. The bar code need not be moved through the illumination line.
Reading distances:
ICR 850: 100 mm (3.94 in) for side reading window
 110 mm (4.33 in) for front reading window
ICR 852, ICR 855: 60 mm (2.36 in) for side reading window
 70 mm (2.75 in) for front reading window
7. Monitor the reading results in the window of the Terminal Emulator ([Fig. 6-28, Page 6-36](#)).
The behavior of the "Result" LED also indicates the reading quality:
 - LED is extinguished if reading quality is < 30 %
 - LED flashes twice per second if the reading quality is 30 % to 70 %
 - LED flashes five times per second if the reading quality is 70 % to 90 %
 - LED is lit continuously if the reading quality is > 90 %

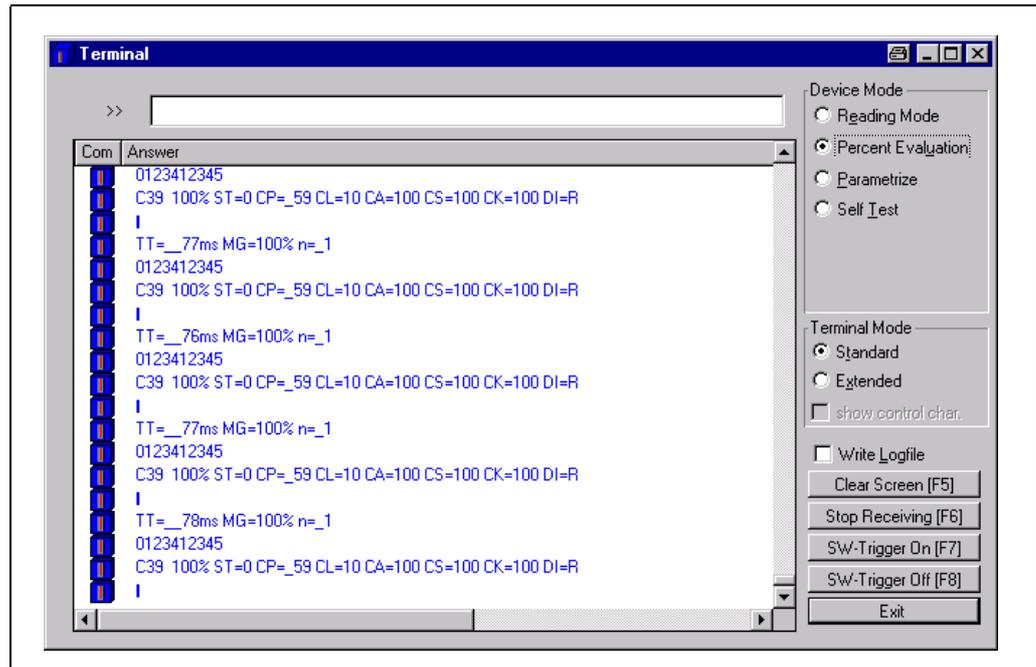


Fig. 6-28: CLV Setup: Display of the percentage evaluation of the auxiliary interface for bar codes in the Terminal Emulator

The output format of the reading result is the same as that of the Reading mode. [Fig. 6-27, Page 6-33](#) explains the structure and function of the reading diagnosis data.

Note The match code cannot be programmed (teach-in) in the Percentage Evaluation mode. The code is entered on the DEVICE CONFIGURATION tab. The match code 1 can also be programmed using the teach-in method.

Quality check of 2-D code reading

The quality of 2-D code reading can be checked with the four data fields of the “EC“ reading diagnosis data. See also [“1. Output of reading result: 2-D code \(DataMatrix ECC 200\)“, Page 6-31](#).

The smaller the number of error-correction code words and weak bits which use the ICR for decoding support, the greater the code quality.

When the code quality is high enough, the evaluation time of the ICR can be optimized by selecting the corresponding parameter values in order to increase reading performance.

See [Chapter 10.4.2 “Optimization of the reading characteristics for time-critical applications“, Page 10-20](#).

6.5.3 Image Acquisition

Depending of the configuration, the ICR tries to detect 2-D codes/bar codes in its image memory content during the decoding procedure. For reading result on Good Read, the ICR outputs the data content of the codes. To allow No Reads to be analyzed more quickly during Setup/reading mode, the ICR outputs its image memory content on request. In this way, you can simply check whether the ICR has scanned the code(s). You can also check the quality of the image in the memory. The repeated acquisition can be automated. Since large amounts of data are transferred from the ICR to the PC in a short amount of time, this function is only available on the **Ethernet interface**.

In the default setting, the Image Acquisition is disabled. Image Acquisition for 2-D codes, however, runs via the Setup Assistant (DataMatrix AutoSetup and ImageFTP). The settings used here by the ICR are described in Section [“Output criteria during using the DataMatrix AutoSetup:”, Page 6-13](#).

Prerequisites For the Image Acquisition and the image output in **reading mode** the following are required:

- Data connection between ICR and the PC via Ethernet
- The ICR is defined as an FTP client
- Correct server address (PC)
- “ImageFTP“ program (server) running on the PC
- Defined image acquisition criteria (cyclical or by conditions in the reading procedure)

When requested, the ICR transfers the image memory content to the PC either as greyscale bitmap (BMP), as a graphical file (JPEG) or as a run length coded binary bitmap (bar codes). The image quality can be selected (BMP: scaling, JPEG: quality). The ICR can also transfer reading diagnosis data in XML files. ImageFTP displays this data as colored lines in the grey-scale bitmaps or JPEGs.

The ICR outputs the image either with each reading pulse or in compliance with a selectable condition (e. g. Good Read, No Read etc.). The file name generation procedure can be set.

Preparing Image Acquisition



1. If you have not already done, connect the PC to the ICR via the Ethernet (see [Chapter 5.5.6 Connecting the Ethernet interface, Page 5-10](#)).
The green “Ready“ LED at the RJ-45 socket of the ICR lights up when the physical connection has been successfully established.
2. In CLV Setup, select INTERFACE in the OPTIONS menu.
3. Choose COMMUNICATION VIA TCP/IP radio button in the dialog box and enter the valid IP address of the PC, if necessary.
CLV Setup establishes communication with the ICR.
4. Select the ETHERNET tab.
5. Activate the ENABLE check box in the FTP CLIENT group and enter the valid IP address of the PC in the SERVER ADDRESS group.
6. Select the IMAGE ACQUISITION tab.
7. Set the criteria for the automated output in the ACQUISITION group.
8. Define the required image format in the IMAGE FORMAT group.
The run length coded binary bitmap is used for displaying bar codes.
High quality (JPEG) or high scaling (BMP) requires a longer data transfer time to the PC.
If necessary, enable the output of the reading diagnosis data.
9. Define the generating procedure for the data file name in the IMAGE FILE NAME section.
10. Download all of the data to the ICR.

Starting the image acquisition

1. Start the “ImageFTP” program.
 To do so, click  in the tool bar of CLV Setup.
 The program window of ImageFTP is then displayed.

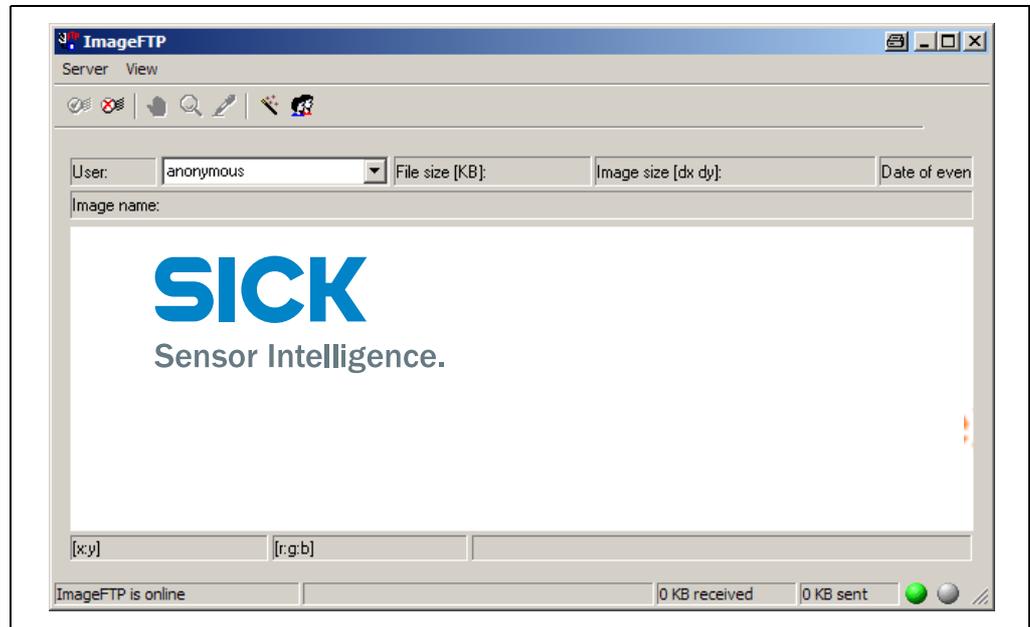


Fig. 6-29: ImageFTP: Program window

The icon buttons in the tool bar have the following functions:

Symbol	Function
	Stops the FTP server
	Starts the FTP server
	Freezes the image that is currently displayed
	Zooms in on the image (once it has been frozen)
	Starts the color analysis (RGB) of the area in the image to which the head of the pipette is pointed (once the image has been frozen)
	Starts the Assistant for setting the user accounts
	Opens the dialog box for displaying the user accounts properties

Table 6-5: ImageFTP: Functions of the icon buttons

2. In ImageFTP, define the directory for saving the image files as described in [Section “Starting the PC program “ImageFTP”, Page 6-11.](#)
 ImageFTP saves JPEGs in the sub-directory “JPEG“, grey tone bitmaps in the sub-directory “BMP“, and run length coded binary bitmaps in the sub-directory “BIN“. The XML files with reading diagnosis data are saved in the sub-directory “DIAG“.
3. To display the reading diagnosis data, choose VISUALIZATION in the VIEW menu.
4. When 2-D codes are read, activate the SHOW DMX L PATTERN and SHOW DMX AREAS check boxes. When bar codes are read, only activate the SHOW OMNI1D AREAS check box.

ImageFTP displays the reading diagnosis data in the image with the following lines/colors:

Reading diagnosis data	Line design	Color
For bar codes:		
CP limitation	-----	violet
Areas with codes	—————	red
Position of the omni decoder at reading pulse end	- - - - -	blue
Position of the SMART decoder at reading pulse end	—————	blue
Good Read	—————	green
For DataMatrix codes:		
CP limitation	-----	violet
L-pattern	—————	yellow
Areas with codes	—————	red
Position of the 2-D decoder at reading pulse end	—————	blue
Good Read	—————	green

Table 6-6: ImageFTP: Colors for displaying the reading diagnosis data

5. Start the reading pulse.
The “Laser On“ LED lights up. The red illumination line appears.
6. Move the DataMatrix code **evenly** through the red illumination line using the conveyor system (constant speed during reading) at following reading distances:
ICR 850: 100 mm (3.94 in) for side reading window
 110 mm (4.33 in) for front reading window
ICR 852, ICR 855: 60 mm (2.36 in) for side reading window
 70 mm (2.75 in) for front reading window
1. Stop the reading pulse.
The “Laser On“ LED extinguishes. The ICR switches off the red illumination line. ImageFTP displays the image memory content of the ICR.

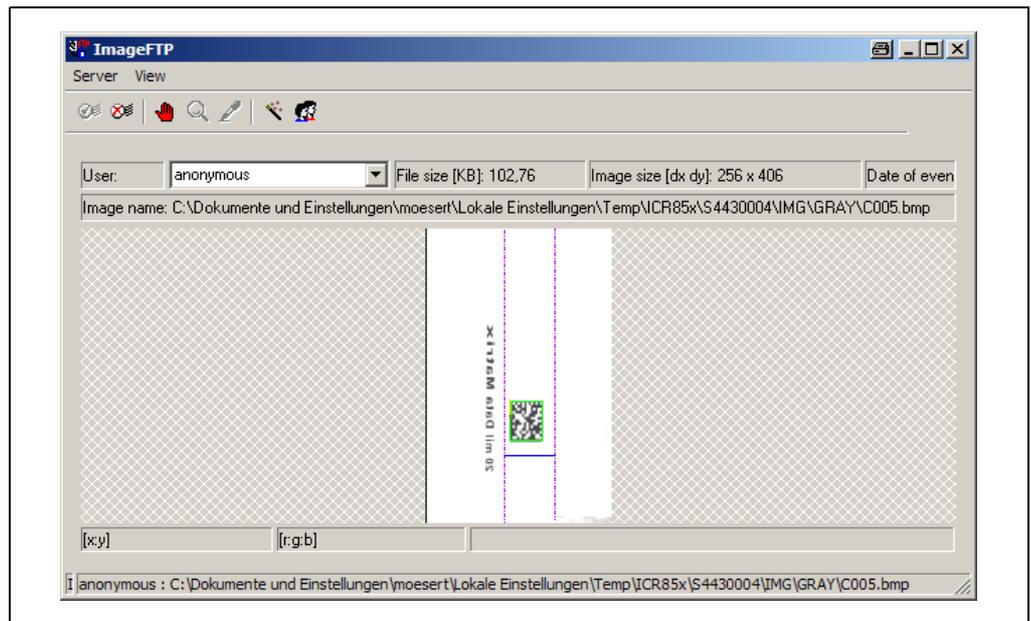


Fig. 6-30: ImageFTP: Image output, with the marks for CP limitations (violet), the 2-D symbol (green) and the position of the DataMatrix decoder at the end of reading pulse (blue)



6.5.4 Displaying and editing operating data

This function enables statistical operating data, which the ICR maintains in the form of counters during the reading procedure, to be displayed and reset.

The ICR does not output a reading result in this mode.

1. Click  in the toolbar.
The ICR cancels Reading mode. The “Device Ready” LED is extinguished.
The OPERATING DATA dialog box appears (Fig. 6-31).
2. After checking/resetting the desired counters, click “OK” to confirm any changes made.
The ICR returns to Reading mode. The “Device Ready” LED lights up.

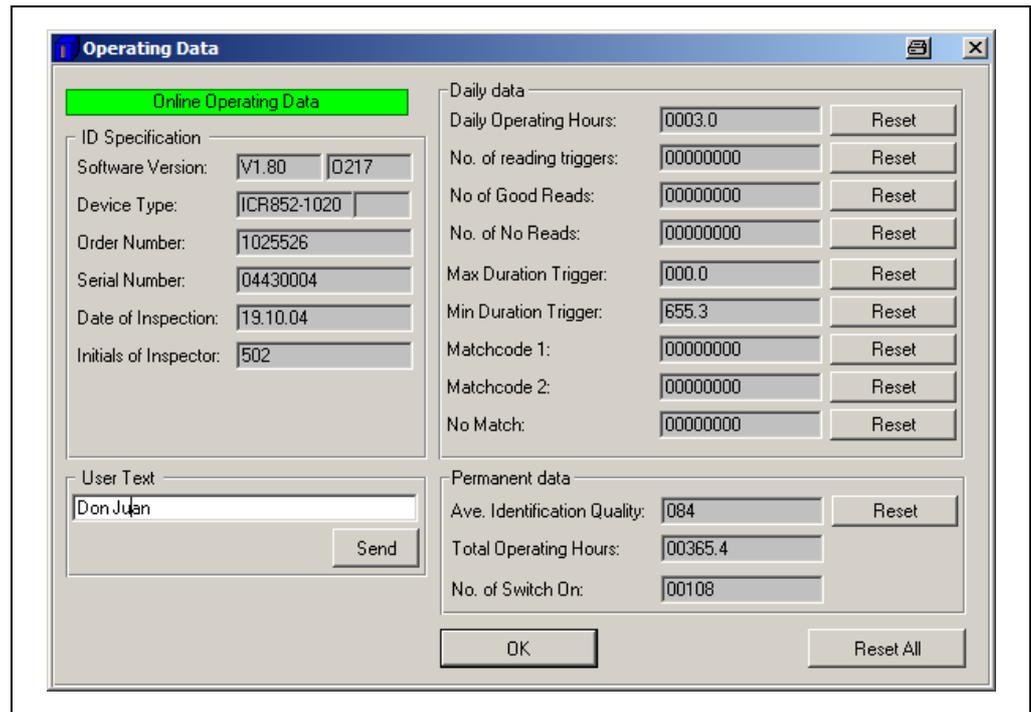


Fig. 6-31: CLV Setup: “Operating Data” dialog box

6.5.5 Reading diagnosis

Function of the **auxiliary interface**. In this mode, the ICR outputs the data contents of all read codes with the accompanying reading diagnosis data via the auxiliary interface. Codes which are considered incomplete according to the evaluation criteria, and which are therefore incorrect, are output as well. The number of codes output can, therefore, be higher than the number of those that were sent via the host interface in the reading result. In the default setting, this mode is selected for the auxiliary interface. Fig. 6-25, Page 6-31 and Fig. 6-27, Page 6-33 shows the relevant output format of the auxiliary interface for 2-D codes and bar codes.

The data communication of the **auxiliary interface** can also be routed via the Ethernet interface. The physical auxiliary interface (RS 232) will then be disabled. See Chapter 5.5.6 “Connecting the Ethernet interface”, Page 5-10.

In the default setting, the ICR does not output any reading diagnosis data via the host interface.

If the reading diagnosis is to remain inactive, this can be set via the AUXILIARY INTERFACE tab.



1. In the AUXILIARY INTERFACE drop-down list, select READING DIAGNOSIS.
2. Perform a download to the ICR. This is done by clicking  in the toolbar. The DOWNLOAD PARAMETER dialog box is displayed.
3. Confirm the dialog box by selecting the PERMANENT save option. The auxiliary interface is now set to the “Reading Diagnosis“ mode.

6.5.6 Monitor Host Interface

Function of the **auxiliary interface**. In this mode, the ICR outputs the data traffic of its host interface via the auxiliary interface. Protocol driver handshakes and protocol-specific data, such as start and stop characters, are suppressed here (Table 6-7). Each data string is displayed on a separate line on the screen.

Direction of data	Output format	Representation on screen
ICR receives from host	<STX> I data <CR> <LF> <ETX>	I data
ICR sends to host	<STX> 0 data <CR> <LF> <ETX>	0 data

Table 6-7: “Monitor Host Interface“ function

The data communication of the **auxiliary interface** can also be routed via the Ethernet interface. The physical auxiliary interface (RS 232) will then be disabled. See Chapter 5.5.6 “Connecting the Ethernet interface“, Page 5-10.



“Monitor Host Interface“ is activated via the AUXILIARY INTERFACE tab.

1. In the AUXILIARY INTERFACE drop-down list, choose MONITOR HOST INTERFACE.
2. Perform a download to the ICR.
To do so, click the MONITOR HOST INTERFACE option again in the list with the right mouse button and choose DOWNLOAD PARAMETER in the context menu.
CLV Setup copies the parameter temporary to the ICR.
The auxiliary interface then operates in “Monitor Host Interface“ mode until the ICR is switched off again.

Note On Good Read, the CLV only outputs the number of read bar codes being defined for maximum on the CODE CONFIGURATION tab, in the NUMBER OF CODES section.



Displaying the data traffic of the host interface in the Terminal Emulator

The data traffic of the host interface can be displayed in the Terminal Emulator of CLV Setup. Fig. 6-32 shows an example of how the reading result can be output.

1. Choose the serial interface as the external trigger source for the reading pulse. See “Triggering the reading pulse via the Terminal Emulator“, Page 6-34.
2. Click  in the toolbar. The Terminal Emulator window is then displayed.
3. Click READING MODE under DEVICE MODE.
4. Click the SW-TRIGGER ON button or press [F7]. The red illumination line of the ICR appears.
5. Move the 2-D code sample from Fig. 6-1, Page 6-3 through the red illumination line using the conveyor system **evenly** (constant speed during reading!).
Reading distances:
ICR 850: 100 mm (3.94 in) for side reading window
110 mm (4.33 in) for front reading window
ICR 852, ICR 855: 60 mm (2.36 in) for side reading window
70 mm (2.75 in) for front reading window

- Note** To read a bar code, proceed as described in *“Displaying the reading result in the Terminal Emulator”, Page 6-30.*
- Click the SW-TRIGGER OFF button or press [F8].
The ICR switches off the illumination line.
CLV Setup outputs the reading result in the Terminal Emulator.
Example: “SICK AG Auto Ident ICR 850”.

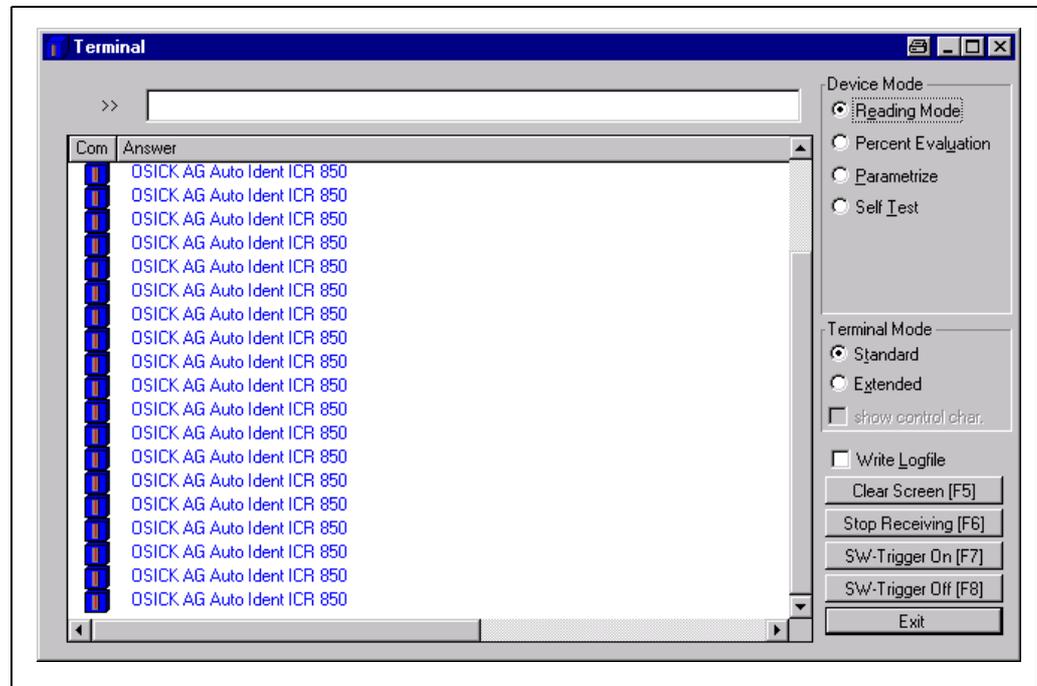


Fig. 6-32: CLV Setup: Output of the reading result of the host interface in the Terminal Emulator (in this case: O = Output)

- Note** Large amounts of data received at high speeds via the host interface and high data transfer rates may cause the flow of host interface traffic to no longer be completely displayed on the auxiliary interface (display “ ... “).
This is caused by the slower data transfer speed of the auxiliary interface (9,600 bd).
In the default setting, the ICR sends the following in the data output string of the host interface:

- Good Read: data contents of the code
- No Read: NOREAD string

The “Header“ and “Terminator“ blocks are empty, the bar code contents are not separated by reading diagnosis data and/or constants.



Tip

The structure of the data output string of the host interface can be configured via the DATA STRINGS tab:

Up to 10 elements, consisting of constants (letters, digits, control characters) and/or reading diagnosis data, can be entered in the "Header", "Reading data" and "Terminator" blocks.

- Choose the DATA STRINGS tab.
- Click the HEADER field.
The dialog window EDIT PARAMETER: TFH is displayed.
- Click the desired constants or placeholders for the reading diagnosis data.
The selected elements appear in the input field at the top the dialog box in the order in which they were selected.

4. Confirm the dialog box with “OK”.
The selected elements are displayed in the HEADER field.
5. Proceed in a similar manner for the terminator.
6. The constants or placeholders for reading diagnosis data can be placed freely before or after the barcode contents in the READING DATA field. The selected arrangement is the same for all output bar code contents.
7. Perform a download to the ICR. This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
8. Confirm the dialog box by selecting the PERMANENT save option.
The ICR outputs the selected elements in the data output string of the host interface with the next reading result.

6.5.7 Auxiliary input

Function of the **auxiliary interface**. In this mode, the ICR accepts a code input to the auxiliary interface (via keyboard or hand scanner with decoder). It sends the code to the host in a separate data string via its host interface. No Reads can, therefore, be corrected by transmitting missing codes subsequently.

[Chapter 10.7.2 “Auxiliary input via the auxiliary interface”, Page 10-33](#) describes this function and the associated procedure in greater detail.

6.5.8 Self-test

After the ICR has been switched on, it performs a self-test before it is initialized with the parameter set. The test can be called up explicitly at any time via CLV Setup. During the self-test, the ICR checks that its hardware components are functioning correctly. A final message via the auxiliary interface provides information on the test result. The ICR does not output a reading result during the test routine.



1. Click  in the toolbar.
The Terminal Emulator window is then displayed.
The ICR is in Reading mode.
2. Click SELF TEST under DEVICE MODE.
The “Device Ready“ LED is extinguished. The ICR cancels the Reading mode and starts the test routine. After a few seconds, the ICR outputs the encoded test result in the form of a code number ([Fig. 6-33, Page 6-44](#)).

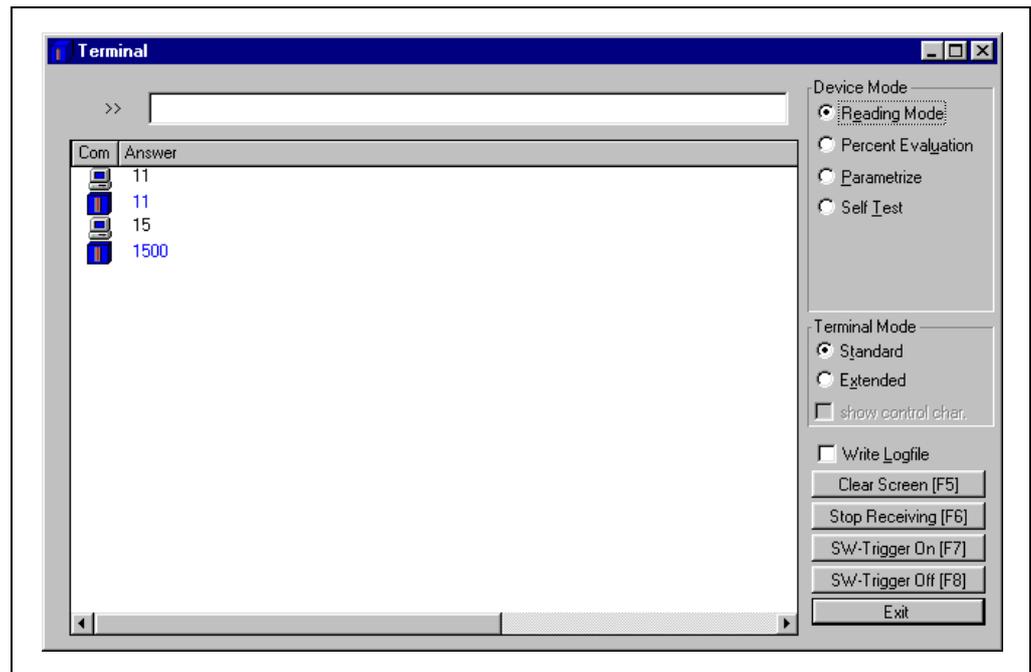


Fig. 6-33: CLV Setup: Displaying the self-test result in the Terminal Emulator

- To return to Reading mode, click the READING MODE radio button or close the Terminal Emulator.

The ICR returns to Reading mode. The “Device Ready“ LED lights up.

The code number “1500“ means that the self-test was completed successfully and that no faults were diagnosed.

[Chapter 8.3 “Error messages“, Page 8-2](#) lists the error key together with the associated corrective measures.

6.5.9 Performing device functions of ICR in the dialog box



CLV Setup enables a number of ICR functions to be executed interactively. CLV Setup prompts the user to carry out specific actions and provides information on the progress of the function being executed.

The following functions are available:

- Match code Teach-in
- Analyze scanner network (only if the CAN interface is used)
- Activate factory defaults in device
- In the menu bar, select the desired function from ICR 85x, DEVICE FUNCTIONS.

– or –

Press the [F2] key.

The DEVICE FUNCTIONS dialog box is then displayed.

Select the desired function from the EXECUTE menu.

CLV Setup starts the function and, where appropriate, prompts the user to carry out the necessary actions.

[Fig. 6-34](#) shows an example of the dialog box that appears after Matchcode Teach-in has been started.



Fig. 6-34: CLV Setup: Dialog box for executing Matchcode Teach-in

6.6 ICR messages

The ICR outputs encoded system and error messages via the terminal interface to report user actions or events in the reading process. When the system is started, the ICR also outputs system messages in plain text (English). If configured accordingly, the ICR transfers the error status ST in the data output string of the host interface.

6.6.1 Displaying messages

In the 4th field from the left in the status bar at the bottom of the screen, CLV Setup displays system and error messages that occur at the terminal interface of the ICR. These are recorded in a file, which is continuously updated. The messages have the following format:

- System message: "CLV SYS-Message: xxx"
- Error message: "CLV SYS-Failure: xxx"

The additional system messages in plain text can be displayed in the terminal emulator if CLV Setup and the terminal emulator are started before the ICR is connected.

Additional system messages:

When the system is started, these system messages inform the user whether the starting process was successful. No further measures are normally required. [Fig. 6-35](#) shows an example.

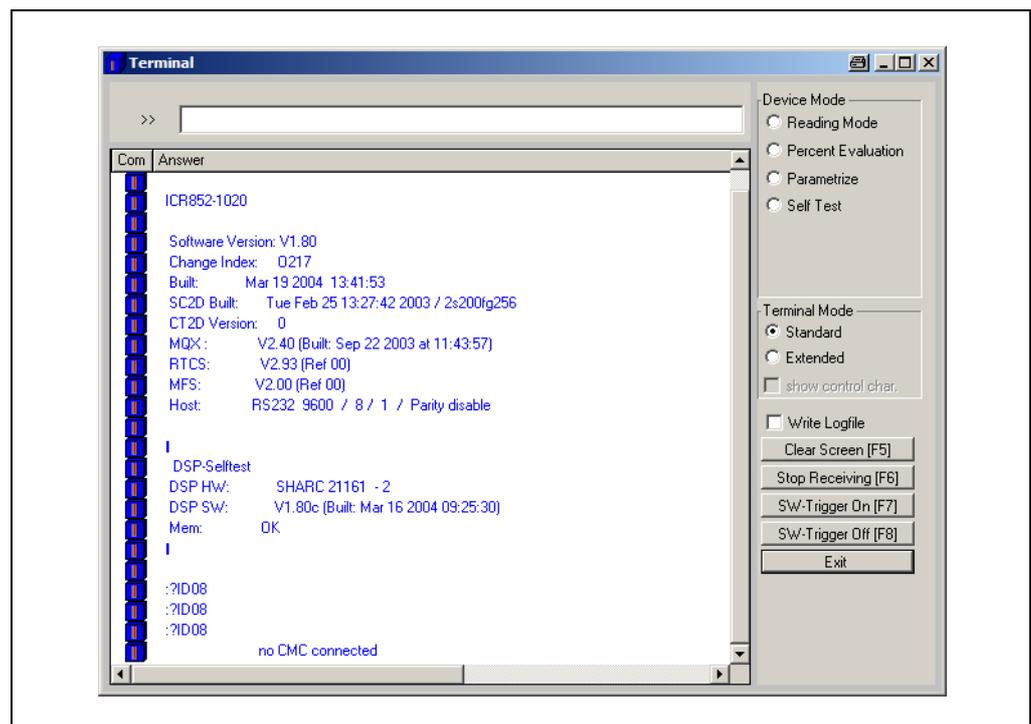


Fig. 6-35: CLV Setup: Displaying the system messages in the Terminal Emulator when starting the ICR

[Chapter 10.2 "System messages", Page 10-2](#) explains the meaning of the messages.

6.6.2 Error messages

Error messages indicate the following types of error:

- a device defect
- incorrect parameter settings
- errors during data transmission to the host

[Table 8.3, Page 8-2](#) lists the messages with the associated corrective measures.

Note To call up the most recent error to occur in the CLV, enter command "2?SF" in the command line of the terminal emulator.

6.7 Switching the ICR off

1. If the parameter set was modified in CLV Setup or was only stored temporarily in ICR via a download ("Temporary" option or via context menu (right mouse button)), the parameter set must be stored permanently in the ICR by choosing the PERMANENT storage option.
2. Save parameter set as a "*.scl" configuration file in CLV Setup.
3. Switch off the power supply of the CDB 420 or CDM 420 or pull the plug of the ICR from the connection module.

The last parameter set stored permanently in the ICR remains valid.

Archiving the parameter set:

We recommend that you print out the configuration file in order to archive the parameter set.

1. Click  in the toolbar.
The PRINT FILE dialog box is then displayed.
2. Enter a comment in the input field to assign the printout to the ICR.
Confirm the dialog box with "OK".
The PRINT dialog box for configuring the printer is then displayed.
3. Edit the dialog box accordingly and confirm.
CLV Setup prints out the current configuration file in the form of a table.

Notes:

7 Maintenance

7.1 Cleaning during operation

To ensure optimum reading performance, the reading window of the ICR must be clean at all times.

For this reason, we recommend that you check the reading window at regular intervals, particularly if the device is operated under extreme conditions (dust, abrasions, humidity, fingerprints).

No maintenance required to keep this product in compliance with laser class 2.



Laser beam can cause blindness.

The ICR uses two Class 2 red-light lasers. Looking directly at the laser beam can seriously damage your eyesight.

- As with sunlight, never look directly into the laser beam.
- Switch off the device while it is being cleaned.
- Never look directly into the reading window while the device is in operation.



Damage to the reading window

The reading window is made of glass. Scratches and streaks on the window will reduce the reading performance.

- Use a mild, non-scouring detergent.
- Never use scratching or scouring motions to clean the reading window.

Cleaning reading window

- Clean the reading window at regular intervals with a mild, non-scouring detergent, e.g. an antistatic glass cleaning fluid. [Fig. 7-1](#) shows the areas that require cleaning.

Use a soft, lint-free cloth.

- If necessary, clean the LEDs on the rear of the device.

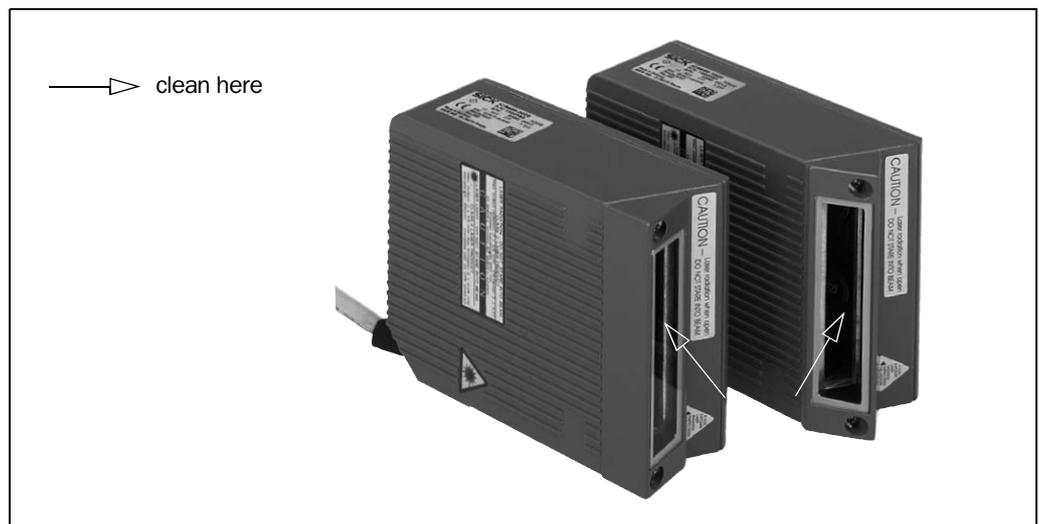


Fig. 7-1: Cleaning the reading window

Note Don't open the device. The producer warranty will be forfeited if the device is opened.

Cleaning other optical surfaces:

- If an external reading pulse generator with a sensor (e.g. photoelectric reflex switch) is used, make sure to clean the relevant optical surfaces (Fig. 7-2). Contamination on these surfaces can cause switching errors.

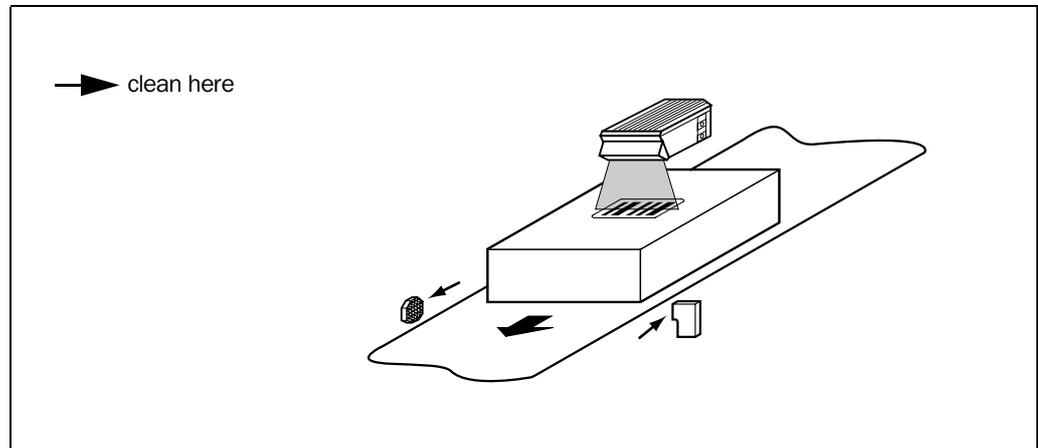


Fig. 7-2: Cleaning the external optical sensor (reading pulse generator)

Incremental encoder

If an incremental encoder is used, check the correct position on the conveyor.

- Ensure that the incremental encoder always contact the conveyor so that the friction wheel turns without slipping.

7.2 Maintenance

The ICR does not require any maintenance except the described cleaning measures. Its self-monitoring functions ensure fault-free operation over long periods of time.

Any faults or malfunctions are listed as error codes in the error memory. They can be requested using command strings.

7.3 Disposal

Irreparable devices or devices that are no longer required are to be disposed of in an environmentally-friendly manner:

1. Always observe the applicable national waste disposal regulations.
2. Remove the ICR housing.
3. Remove the electronic modules and the connection cable.
4. Remove the glass panel from the reading window and send it to be recycled.
5. Send the chassis and cover (zinc) to be recycled.
6. Send the electronic modules and connection cable for disposal as special waste.

At present SICK AG does not take back devices which have become unusable or irreparable.

8 Troubleshooting

8.1 Overview of errors and malfunctions which could occur

8.1.1 Installation errors

- ICR positioned incorrectly in reading distance
- ICR aligned incorrectly with the object carrying the code (e.g. masking)
- Reading pulse sensor positioned incorrectly (e.g. internal reading interval starts too late or stops too soon)

8.1.2 Electrical connection errors

- Interfaces on the ICR connected incorrectly (wiring error in the CDB 420 or CDM 420)

8.1.3 Parameterization errors

- Functions not adapted to local conditions, e.g. communication parameters of the host interface set incorrectly
- Technical limits of device not taken into consideration, e.g. resolution-specific depth of field

8.1.4 Malfunctions during operation

- Laser timeout for laser diodes of illumination line elapsed
- Device error (hardware/software)

8.2 Monitoring errors and malfunctions

The ICR is self-monitoring:

- After the power supply has been switched on, the ICR automatically carries out a self-test, in which it checks important hardware components, before it is initialized (parameter set loaded and device functions initialized). The self-test can be repeated at any time by cancelling Reading mode.
For calling up, see [Chapter 6.5.8 "Self-test", Page 6-43](#).
- If the ICR detects an error during the self-test or at any other time, it outputs the error status $ST = 3$ via the host interface. Prerequisite: the error status is enabled for transmission. By default, transfer is blocked.
The ICR displays the diagnosed errors in encoded form as a number combination in the fourth field from the left on the bottom on the status line of the CLV Setup user interface via the auxiliary interface ([Table 8-1, Page 8-2](#)).
- During operation, the ICR constantly monitors the operation of its laser diodes. In addition, a watchdog circuit responds to error statuses.
- A timer automatically deactivates the laser diodes in Reading mode ("Sensor input" and "Serial interface" trigger mode) if the reading interval has not ended after 10 minutes (default setting). However, it does not end the reading interval. In this case, the ICR outputs the following message to the auxiliary interface: "Laser safety timeout".
The reading pulse must be terminated by resetting the pulse signal. The next reading pulse switches on the laser diodes and, thus, the illumination line again.

8.3 Error messages

The ICR outputs coded error messages (as number combinations) via the **auxiliary interface** only. [Table 8-1](#) lists the messages.

Displaying messages:

To display the messages on the PC screen, proceed as follow in CLV Setup:

- Click  in the toolbar.

The Terminal Emulator window is then displayed.

CLV Setup logs the error messages automatically in a file (sys_msg.log).

Message	Meaning	Possible cause	Remedy
“ICR SYS-Error: 048ID890x“ ¹⁾ with x: 1 Error SPI interface 5 SC2D configuration failed 6 SC2D parametrization failed 7 ADC9840 parametrization failed 8 CT2D parametrization failed 9 laser current measurement failed	The ICR has diagnosed a system error. The “Device Ready“ LED does not light up, rather it extinguishes. The ICR attempts to restart the system.	Device defect	If this system error occurs again after the ICR is restarted: Contact the SICK Service department.
“ICR SYS-Error: 048ID8902“ EEPROM read failed ¹⁾	The ICR cannot download the parameter set which is permanently stored in the EEPROM to the memory (RAM).	Device defect	Contact the SICK Service department.
“ICR SYS-Error: 048ID8903“ EEPROM write failed ¹⁾	The ICR cannot write the current parameters in the RAM to the EEPROM.	Device defect	Contact the SICK Service department.
“ICR SYS-Error: 048ID8904“ EEPROM device too small for eeMap parameter ¹⁾	The EEPROM is too small.	Device defect	Contact the SICK Service department.
“ICR SYS-Error: 048ID8109“ Error DSP boot ¹⁾	The ICR can not boot the DSP	Device defect	Contact the SICK Service department.
“ICR SYS-Error: 048ID810A“ Error DSP memory test ¹⁾	Error when proofing the DSP.	Device defect	Contact the SICK Service department.
„ICR SYS-Error: 048ID8401“ Start of reading mode after initialization failed ¹⁾	After switching on and initializing, the ICR can not start reading mode.	Device defect	Contact the SICK Service department.
1) ID: parametrized adress of ICR			

Table 8-1: Error message output to the auxiliary interface

8.4 ST error status in the reading result of a bar code

Value	Meaning	Possible cause	Remedy
0	“Good Read“	–	Not applicable.
1	Incorrect check digit	The check digit calculated by the ICR during the reading process does not match that printed in the bar code.	Check whether the check digits in the bar code which were generated by the print process are correct.
2	No code of the enabled code type found according to the evaluation criteria.	<ul style="list-style-type: none"> No code in the ICR's reading range during the reading pulse Code type/length in the ICR not enabled for decoding Reading window obstructed/dirty 	<ul style="list-style-type: none"> Synchronize the pulse of the ICR with the entry of a code into the reading area. Correct the code configuration parameters. Check the reading window.
3	Device defect	Device defect	Call up the self-test! (see Chapter 6.5.8 “Self-test”, Page 6-43). If result \neq 000: Contact the SICK Service department.
5	Required number of successful multiple reads for the bar code not reached.	<ul style="list-style-type: none"> Conveyor speed of the object is too high Scanning frequency is too low Ladder-type arrangement for bar code relative to the conveyor direction: code height (bar length) too poor Print quality too poor 	<ul style="list-style-type: none"> Check the conveyor speed. Adapt the “Object velocity” parameter in the ICR. Check the code height. Check the print quality.
7	The source of the reading result is the auxiliary input via the auxiliary interface.	The code was not scanned by the reading function of the ICR, but was entered subsequently with the auxiliary function of the auxiliary interface and sent to the host in a separate data string.	–
9	The “OUTPUT FILTER” function is also activated for the code comparison. The ICR has detected valid codes. However, these do not match the active match code(s).	The scanned object does not have a code that matches the specified match code.	–
A	The CHECK MAX. NUMBER OF CODES function is active. The number of valid codes detected by the ICR in Reading mode exceeds that specified under NUMBER OF CODES: MAXIMUM. Instead of the code contents, it outputs the defined error string in the quantity defined under NUMBER OF CODES: MINIMUM	One object in a set of objects with a constant number of codes, for example, contains more codes than defined in the application.	This message is used to indicate errors on the objects (e.g. check whether objects are homogeneous: mix with incorrect objects).
D	The “Code 32“ evaluation option is activated for Code 39. The ICR is attempting to interpret 6-digit C39 bar codes as C32 bar codes (output as 9-digit decimal values).	The read 6-digit bar code is not a C32 bar code. The ICR outputs the defined error string instead.	–

Table 8-2: Meaning of the ST error status in the reading result

Value	Meaning	Possible cause	Remedy
F	The CHECK MIN. NUMBER OF CODES function is active. The number of valid codes detected by the ICR in Reading mode is less than that specified under NUMBER OF CODES: MINIMUM. Instead of the code contents, it outputs the defined error string in the quantity defined under NUMBER OF CODES: MINIMUM	One object in a set of objects with a constant number of codes, for example, contains fewer codes than defined in the application.	This message is used to indicate errors on the objects (e.g. check whether objects are homogeneous: mix with incorrect objects).

Table 8-2: Meaning of the ST error status in the reading result (contd.)

8.5 Troubleshooting

The following are required for troubleshooting purposes using the tables below:

- These operating instructions
- Tool
- A digital measuring device (ammeter/voltmeter)
- A PC running “CLV Setup“
- A 3-core RS 232 data cable (null modem cable), pins 2 and 3 crossed, e.g. no. 2 014 054

8.5.1 General malfunction: ICR not ready

Prerequisite CDB 420 or CDM 420 Connection Module is supplying the correct voltage to the ICR (10 to 30 V DC)

Fault	Possible cause	Remedy
The “Device Ready“ LED is not lit. The “Result 1“ switching output (default setting: “Device Ready“) is not outputting a pulse.	After switching on the power supply: <ul style="list-style-type: none"> • The ICR is not supplied with operating voltage (10 to 30 V DC) • The ICR diagnosed a device error during the self-test During operation: <ul style="list-style-type: none"> • The ICR is not in “Reading mode“ • The ICR has deactivated the laser diodes of the illumination line 10 min. (default setting) after the start of the current reading pulse (pulse mode: sensor input/serial interface) 	<ul style="list-style-type: none"> • Check the wiring (correct seating of the cable plug of the ICR on the CDB 420 or CDM 420 Connection Module). Measure voltage at pin 1 and pin 5. • Switch the ICR off and on again. Does the LED light up? If not, contact the SICK Service department. • Return to Reading mode using the CLV Setup program. (see Chapter 6.5.1 “Reading mode (standard operating mode)“, Page 6-29). • Terminate reading pulse. Check the reading pulse function. Parameterize new pulses or laser timeout duration using the CLV Setup user interface (see Chapter 6.4.3 “Parameterization guide“, Page 6-22).

Table 8-3: Troubleshooting: Restoring operation (Reading mode)

8.5.2 Malfunctions in Reading mode: Reading pulse errors

Prerequisite The “Device Ready“ LED lights up. If not, see [Table 8-3, Page 8-5](#).

Fault	Possible cause	Remedy
<p>1. Pulse mode: “sensor 1“ input (external sensor).</p> <p>The ICR cannot be pulsed:</p> <ul style="list-style-type: none"> – the “Laser On“ LED does not light up – the red illumination line does not appear 	<ul style="list-style-type: none"> • Sensor not connected or connected to incorrect switching input • If sensor supplied by ICR: sensor not connected to ground potential • Incorrect reading pulse source parameterized on the ICR • Polarity of the Sensor 1“ switching input inverted • Incorrect debouncing of the “Sensor 1“ switching input parameterized on the ICR • Incorrect delay of the “Sensor 1“ switching input parameterized on the ICR • Photoelectric switch not aligned with the reflector (photoelectric proximity switch/ inductive sensor not dampened) • The object does not pass the reading pulse sensor for trigger start with the conveyor running 	<ul style="list-style-type: none"> • Connect sensor to “Sensor 1“ switching input. Check sensor wiring (see Chapter 5.5.8 “Connecting the “Sensor 1“ switching input“, Page 5-13). Measure output signal on sensor. • Insert jumper between pin 5 and pin 15. (CDB 420: switch S3 “SGND-GND“, CDM 420: switch S6 “SGND-GND“) • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button, START OF READING INTERVAL group: “Sensor input“ selected? (active high: reading pulse starts when power applied) • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, SENSOR 1 group: NOT INVERTED selected? (Active high: current at input starts reading interval, active low: reading interval starts when power removed) • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, SENSOR 1 group: debouncing: selected value too small/large? • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button, START DELAY group: Values set by mistake? Time controlled: selected value too high? Track controlled: incremental encoder connected to “Sensor 2“ input, ICR parameterized correctly? • Align sensor. Check functioning. • Install the reading pulse sensor in front of the ICR in conveyor direction. See also Chapter 4.4.2 “Installing the external reading pulse sensor“, Page 4-12

Table 8-4: Troubleshooting: Reading pulse errors in Reading mode

Fault	Possible cause	Remedy
<p>2. Pulse mode: Serial Interface</p> <p>The ICR cannot be pulsed:</p> <ul style="list-style-type: none"> – the “Laser On“ LED does not light up – the red illumination line does not appear 	<ul style="list-style-type: none"> • Incorrect reading pulse source parameterized on the ICR • Incorrect commands use • The ICR is not receiving any command strings to start the reading interval on the data interface. 	<ul style="list-style-type: none"> • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button. In the START OF READING INTERVAL group: is serial interface selected? SERIAL INTERFACE group: Is trigger type correct? • Use correct commands. Standard trigger: Start: <START>21<STOP> Stop: <START>22<STOP> – or – defined single characters (DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button, SERIAL INTERFACE section). • Check data connection to host. Check in the CLV Setup program: Select the HOST INTERFACE tab. DATA FORMAT group: are the correct interface type (hardware) and data format selected? INTERFACE PROTOCOL group: are the correct start and stop characters selected? Use the CLV Setup program to check the host command strings: Select the AUXILIARY INTERFACE tab. Select the MONITOR HOST INTERFACE function (see Chapter 6.5.6 “Monitor Host Interface”, Page 6-41). Download temporarily to the ICR.

Table 8-4: Troubleshooting: Reading pulse errors in Reading mode (contd.)

Fault	Possible cause	Remedy
<p>3. ICR does not respond to an external signal that ends the reading pulse (Pulse mode: sensor input(s), serial interface)</p>	<p><i>Trigger mode: one external sensor</i></p> <ul style="list-style-type: none"> • Incorrect end of reading pulse parameterized on the ICR • Signal/no signal from the sensor at the "Sensor 1" input <p><i>Trigger mode: two external sensors</i></p> <ul style="list-style-type: none"> • If "Sensor 2" switching input is selected as trigger source for end of reading interval: no sensor connected or polarity inverted • The object does not pass the reading pulse sensor for trigger stop with the conveyor running • Laser timeout exceeded. 	<ul style="list-style-type: none"> • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button. END OF READING INTERVAL group: is "Trigger Source" selected? • Check wiring of the sensor: (see Chapter Fig. 5-5: "Connections of the "Sensor 1" switching input", Page 5-13) • Connect sensor to "Sensor 2" switching input. Check sensor wiring (see Chapter 5.5.9 "Connecting the "Sensor 2" switching input", Page 5-14). Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, SENSOR 2 group: Assignment: is „Reading trigger stop" selected, is "not inverted" (active high) selected? (Active high: current at input stops reading interval, active low: reading interval stops when power removed) • Install the sensor for stopping the reading pulse in front of the sensor for starting the reading pulse in conveyor direction. • See remedy in Table 8-3, Page 8-5.
<p>4. ICR stops reading with delay after the end of reading pulse (Pulse mode: sensor input(s), serial interface)</p>	<p><i>Trigger mode: one external sensor</i></p> <ul style="list-style-type: none"> • Stop delay for "Sensor 1" parameterized incorrectly <p><i>Trigger mode: two external sensors</i></p> <ul style="list-style-type: none"> • Debouncing for "Sensor 2" switching parameterized incorrectly • Stop delay for "Sensor 2" parameterized incorrectly 	<ul style="list-style-type: none"> • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button. STOP DELAY group: Values set by mistake? Time controlled: selected value too high? Track controlled: incremental encoder connected to "Sensor 2" input, ICR parameterized correctly? • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, SENSOR 2 group: correct the values for debouncing. Download to the ICR. • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button. STOP DELAY group: Values set by mistake? Time controlled: selected value too high?

Table 8-4: Troubleshooting: Reading pulse errors in Reading mode (contd.)

8.5.3 Malfunctions in Reading mode: Result output errors

Prerequisite The “Device Ready“ LED lights up. If not, see [Table 8-3, Page 8-5](#).
The reading pulse is functioning correctly. If not, see [Table 8-4, Page 8-6](#).

General malfunctions

Fault	Possible cause	Remedy
<p>No Read:</p> <p>1. The “Result“ LED (default setting: “Good Read“) does not light up at the end of the reading pulse.</p> <ul style="list-style-type: none"> – The “Result 2“ switching output (default setting: “Good Read“) does not output a pulse – The ICR outputs the status ST = 2 in the reading result of the host interface (if ST is enabled for output in the Reading data on the DATA STRINGS tab; this is not selected in the default setting) – The ICR outputs the system message “no code“ via the auxiliary interface (Terminal Emulator of CLV Setup) 	<ul style="list-style-type: none"> • Read not successful, since there was no code in the reading field during the reading pulse • Code presented at incorrect reading distance • Red illumination line positioned incorrectly • Evaluation range of the illumination line in the image memory was incorrectly limited (CP values) • Code is in total reflection zone • Scanning frequency is too low 	<ul style="list-style-type: none"> • Synchronize read with presence of an object in reading field (see Table 8-4, Page 8-6). • Check: reading distance of code in specified reading range? (ICR 850 with side reading window: 100 mm (3.94 in), ICR 850 with front reading window: 110 mm (4.33 in). ICR 852, 855 with side reading window: 60 mm (2.36 in), ICR 852, 855 with front reading window: 70 mm (2.75 in)). See Chapter 9.3.2 “Reading ranges of ICR – preliminary –“, Page 9-3 • Align ICR. Is the code in the center of the illumination line? Check in the CLV Setup program: check reading quality. For 2-D codes (DataMatrix ECC 200): Check the reading diagnosis data “EC“ (see Chapter “1. Output of reading result: 2-D code (DataMatrix ECC 200)“, Page 6-31). • For bar codes call up PERCENTAGE EVALUATION (see Chapter 6.5.2 “Percentage Evaluation“, Page 6-35). • Check in the CLV Setup program: Select the READING CONFIGURATION tab. Are the min. and max. code position values correct? • Optimize ICR alignment (illumination line should strike the code at an angle of approx. 15°). Check in the CLV Setup program: check reading quality. For 2-D codes (DataMatrix ECC 200): Check the reading diagnosis data “EC“ (see Chapter “1. Output of reading result: 2-D code (DataMatrix ECC 200)“, Page 6-31). • For bar codes call up PERCENTAGE EVALUATION (see Chapter 6.5.2 “Percentage Evaluation“, Page 6-35). • Check in the CLV Setup program: Select the READING CONFIGURATION tab, IMAGE PROCESSING group: Object velocity of the ICR adjusted to the conveyor speed? See Chapter 10.4.1 “Adaptation of the reading characteristics“, Page 10-14.

Table 8-5: Troubleshooting: Result output errors in Reading mode (general malfunctions)

Fault	Possible cause	Remedy
<p>Good Read:</p> <p>2. The ICR is not transferring any reading results to the host</p> <ul style="list-style-type: none"> – It does output the code contents via the auxiliary interface, however (Terminal Emulator of CLV Setup) 	<ul style="list-style-type: none"> • Wiring fault in data connection • Host interface on CDB 420 or CDM 420 Connection Module configured incorrectly • Host interface in ICR parameterized incorrectly • No Read format for output suppressed (permitted in default setting) 	<ul style="list-style-type: none"> • Check wiring as shown in Fig. 5-2, Page 5-8. • Check configuration in the CDB 420 or CDM 420 (switch setting, wiring). • Check in the CLV Setup program: Select the HOST INTERFACE tab, DESTINATION OF RESULT DATA STRINGS group: “Asynch. Host Interface“ selected? DATA FORMAT group: Are the correct interface type (hardware) and data format selected? Check settings in INTERFACE PROTOCOL group. • If not set intentionally, select the DATA STRINGS tab, READ DATA IN CASE OF ERROR group: Select “Reading information and error string“ in the drop-down list.
<p>Good Read:</p> <p>3. The ICR does not output all read codes, but rather it replaces the code contents partially or completely with the error string (default setting: NOREAD)</p>	<p><i>The number of codes to be read is 1:</i></p> <ul style="list-style-type: none"> • Min. and max. number of codes parameterized to > 1 (default setting = 1) <p><i>The number of codes to be read is > 1:</i></p> <ul style="list-style-type: none"> • Specified min. and max. number of codes are not reached or are exceeded • Output of error string for ST=5 activated • Sorting based on code length list activated • Code comparison (match code) and output filter for host interface activated 	<ul style="list-style-type: none"> • Check in the CLV Setup program: Select the CODE CONFIGURATION tab, NUMBER OF CODES group: min. and max. no. of codes = 1? • Objects have too many or too few codes during reading process. • Number of multiple reads was not reached. • Length of read codes does not correspond with the set lengths. • Read codes do not correspond with the match code.
<p>Good Read:</p> <p>4. The ICR outputs the data contents of the bar code incorrectly, incompletely or modified via the host interface.</p>	<ul style="list-style-type: none"> • The data format of the host interface is parameterized incorrectly in the ICR • Format mask is activated 	<ul style="list-style-type: none"> • Check in the CLV Setup program: Select the HOST INTERFACE tab, DATA FORMAT group. Are the values correct? • In the CLV Setup program: Enter the value 00 (zero) in the input field of the FORMAT MASK group. Download to the ICR.
<p>No Read:</p> <p>5. The ICR transfers the status ST = 3 to the host in the reading result (if ST is enabled for output in the Reading data field on the DATA STRINGS tab; this is not selected in the default setting).</p>	<p>The ICR has diagnosed a device error in the self-test</p>	<p>Switch the ICR off and on again. Does the “Device Ready“ LED light up? If not, contact the SICK Service department.</p>

Table 8-5: Troubleshooting: Result output errors in Reading mode (general malfunctions) (contd.)

Malfunctions when reading 2-D codes (DataMatrix ECC 200)

See also [Chapter 10.4.1 “Adaptation of the reading characteristics”, Page 10-14](#) and [Chapter 10.4.2 “Optimization of the reading characteristics for time-critical applications”, Page 10-20](#).

Fault	Possible cause	Remedy
<p>No Read: The “Result“ LED (default setting: “Good Read“) does not light up at the end of the reading pulse.</p> <ul style="list-style-type: none"> – The “Result 2“ switching output (default setting: “Good Read“) does not output a pulse. – The ICR outputs the status ST = 2 in the reading result of the host interface (if ST is enabled for output in the Reading data on the DATA STRINGS tab; this is not selected in the default setting). – The ICR outputs the system message “no code“ via the auxiliary interface (Terminal Emulator of CLV Setup). 	<ul style="list-style-type: none"> • 2-D code is not moved or is moved at an uneven speed through the red illumination line during the reading pulse • Parameterized resolution lower than required • Insufficient contrast between dark cells and light background • Surface texture of the code causes masking • For ink-jet printing: The individual points of the code do not touch sufficiently • Finder pattern is visibly corrupted due to print errors • Code consists of rectangular data fields • Code printed negatively (light on dark background) 	<ul style="list-style-type: none"> • Ensure even transport speed of the conveyor system • In the CLV Setup program: Select the READING CONFIGURATION tab and enter the correct value for “Minimum cell size 2D“ in the READING PARAMETERS 2D group. Download to the ICR. • Select the READING CONFIGURATION tab and click the CODE PROPERTIES PARAMETERS button. Improve the contrast with the “Background“ slider. Download to the ICR! If there is no improvement: Select the CODE CONFIGURATION tab and click the EDIT button in the 2D-SYMBOLOGIES group. Click the OPTIMISATION PARAMETERS button. Enter the value 10 in the “Decoder retry on weak contrast for xx cells“ input field. Download to the ICR! Increase the value if necessary. • Select the READING CONFIGURATION tab and click the CODE PROPERTIES PARAMETERS button. Reduce masking with the “Surface“ slider. Download to the ICR! • Compensate for the insufficiently small dots with the “Deviation of dot size“ slider. Download to the ICR. • Select the CODE CONFIGURATION tab and click the EDIT button in the 2D-SYMBOLOGIES group. Click the OPTIMISATION PARAMETERS button. Click the “Tolerate finder errors“ checkbox. Download to the ICR. • Select the CODE CONFIGURATION tab and click the EDIT button in the 2D-SYMBOLOGIES group. In the DATA FIELDS group, click the “Allow rectangular data fields“ option. Download to the ICR. • In the CLV Setup program: Select the CODE CONFIGURATION tab and click the EDIT button in the 2D-SYMBOLOGIES group. Select the “Black“ option in the BACKGROUND group. Download to the ICR!

Table 8-6: Troubleshooting: Result-status output errors in Reading mode (reading 2-D codes)

Malfunctions when reading bar codes

Fault	Possible cause	Remedy
<p>No Read:</p> <p>1. The "Result" LED (default setting: "Good Read") does not light up at the end of the reading pulse.</p> <ul style="list-style-type: none"> – The "Result 2" switching output (default setting: "Good Read") does not output a pulse – the ICR outputs the status ST = 2 in the reading result of the host interface (if ST is enabled for output in the Reading data on the DATA STRINGS tab; this is not selected in the default setting) – the ICR outputs the system message "no code" via the auxiliary interface (Terminal Emulator of CLV Setup) 	<ul style="list-style-type: none"> • Bar code type not activated for reading • Parameterized resolution lower than required • Parameterized number of multiple reads not reached • The bar code is tilted excessively with respect to the illumination line • The reading angles at which the bar code appears to the ICR are too large • Evaluation criteria for bar code not set correctly 	<ul style="list-style-type: none"> • All bar code types are deactivated in the default setting. In CLV Setup program: Select the CODE CONFIGURATION tab and find the 1D-SYMBOLOGIES group. Click the checkbox of the desired code type. Click the relevant EDIT button. Make the settings on the tab of the selected code type. Download to the ICR! • In the CLV Setup program: Select the READING CONFIGURATION tab and enter the correct value for "Minimum bar width 1D" in the READING PARAMETERS group Download to the ICR. • Extend the reading pulse, reduce the number or increase the scanning frequency. • In the CLV Setup program: Select the CODE CONFIGURATION tab and find the 1D-DECODER group. Select the SMART decoder. Download to the ICR. • In the CLV Setup program: Select the CODE CONFIGURATION tab and find the 1D-DECODER group. Select the Standard decoder. Download temporarily to the ICR. Start PERCENTAGE EVALUATION. Observe the reading quality (reading quality > 70 %!). Realign ICR if necessary. If ok, choose SMART decoder. Download to the ICR! • In the CLV Setup program: Select the CODE CONFIGURATION tab and find the 1D-SYMBOLOGIES group. Enable all code types (except Pharmacode), set code lengths to FREE. Download temporarily to the ICR. Start PERCENTAGE EVALUATION. Code type and length are displayed in the reading result. Enable recorded code type in the 1D-SYMBOLOGIES group and disable all other types. Enter the code length under FIXED on the code type tab. Download to the ICR.

Table 8-7: Troubleshooting: Result-status output errors in Reading mode (reading bar codes)

Fault	Possible cause	Remedy
<p>No Read:</p> <p>1. The “Result“ LED (default setting: “Good Read“) does not light up at the end of the reading pulse.</p> <p>- continued -</p>	<ul style="list-style-type: none"> • Bar code quality inadequate • Bar code printed negatively (light on dark background) 	<ul style="list-style-type: none"> • Check: Is the print contrast adequate? In CLV Setup program: Select the READING CONFIGURATION tab and click the CODE PROPERTIES PARAMETERS button. Improve the contrast with the “1D-Codes Foreground“ slider. Download to the ICR. Check: Are sufficient blank zones present? Is the print contrast adequate? Are the specified print tolerances exceeded? Check in the CLV Setup program: Select the READING CONFIGURATION tab and find the QUIET ZONE group: Is “Start/Stop auto“ selected? Perform test read with a reference code in good condition. • In the CLV Setup program: Select the CODE CONFIGURATION tab and click the „Black“ option in the 1D BACKGROUND field in the 1D-SYMBOLOGIES group. Download to the ICR.
<p>2. The ICR outputs the data contents of the bar code incorrectly, incompletely or modified via the host interface.</p>	<p>The ICR suppresses the last character in the bar code</p>	<p>Check in the CLV Setup program: Select the CODE CONFIGURATION tab. In the 1D-SYMBOLOGIES group, click the EDIT button for the relevant code: Is Transmit Check Digit activated? Change if necessary. Download to the ICR.</p>

Table 8-7: Troubleshooting: Result-status output errors in Reading mode (reading bar codes) (contd.)

8.5.4 Malfunctions in Reading mode: Errors when outputting the result status

Prerequisite The “Device Ready“ LED lights up. If not, see [Table 8-3, Page 8-5](#).

Fault	Possible cause	Remedy
<p>1. The switching outputs “Result 1“ (default setting: Device Ready) and “Result 2“ (default setting: Good Read) do not output a pulse.</p>	<ul style="list-style-type: none"> • The event of the assigned function for outputting the result status does not occur during the reading process • Incorrect switching mode parameterized in ICR 	<ul style="list-style-type: none"> • Not applicable. • Check in the CLV Setup program: Check by choosing the DEVICE CONFIGURATION tab. Click the RESULT OUTPUT PARAMETERS button. Are the outputs set to “Not Inverted Output“? Change if necessary. Download to the ICR.
<p>2. The beeper is not confirming the output of the reading result (default setting: “Good Read“)</p>	<p>Beeper deactivated</p>	<p>Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab and find the BEEPER group: is “On“ selected?</p>

Table 8-8: Troubleshooting: Errors in the result status output in Reading mode

8.5.5 Malfunctions: Configuration errors (parameterization)

Errors when using the Setup Assistant

Prerequisite The “Device Ready“ LED lights up. If not, see [Table 8-3, Page 8-5](#).

Fault	Possible cause	Remedy
Scanner Adjustment: The reading distance cannot be measured.	<ul style="list-style-type: none"> • Reading distance outside the technical limits. • Test pattern with incorrect resolution used. • ICR not parallel to the reading plane. 	<ul style="list-style-type: none"> • Use the enclosed distance tool. • Select correct test pattern. • Align the ICR. Minimize the three bars in the dialog box by changing the position of the ICR.
DataMatrix AutoSetup: The ICR cannot decode the code from the content of its image memory.	<ul style="list-style-type: none"> • The set object velocity differs excessively from the actual velocity. • Reading distance has changed after adjustment. • The code has not passed through the reading line when the 4,000 lines were read once to the IRC. 	<ul style="list-style-type: none"> • Adjust the object velocity in the Assistant and repeat all three AutoSetup steps. • Re-adjust the reading distance. Perform Scanner Adjustment and repeat AutoSetup. • Record the image again and restart AutoSetup

Table 8-9: Troubleshooting: Errors when using the Setup Assistant

8.5.6 Malfunctions: Errors when using the image outputting in reading mode

Prerequisite The “Device Ready“ LED lights up. If not, see [Table 8-3, Page 8-5](#).

Fault	Possible cause	Remedy
ImageFTP does not display the image memory contents of the ICR.	<ul style="list-style-type: none"> • The ICR is not triggered. • Image acquisition parameterized incorrectly in the ICR. • Ethernet connection: The PC (server) has an incorrect FTP address. • Ethernet connection: The ICR has not been defined as an FTP client. • ImageFTP: the server has been stopped or the image has been frozen. 	<ul style="list-style-type: none"> • Trigger the ICR accordingly. • Check in the CLV Setup program: Select the IMAGE ACQUISITION tab and find the ACQUISITION group: output activated? If condition is selected, does this occur during the read process? IMAGE FORMAT group: is at least one image type selected? • Check in the CLV Setup program: Select the ETHERNET tab and find the SERVER ADDRESS group: enter the address. This must not be the same as the TCP/IP address. • ETHERNET tab, FTP CLIENT group: active? • In the program window, restart the server or enable the current image

Table 8-10: Troubleshooting: Errors when using the image transfer via the Ethernet interface

8.6 SICK support

If a system error occurs repeatedly or if you cannot correct an error using the above measures, the ICR may be defective. The ICR contains no user-serviceable parts.

Please contact our local SICK office or subsidiary:

- The telephone numbers and email addresses are listed on the *back page* of this manual.
For postal addresses see also **www.sick.com**.
- Do not send the device to the SICK service without first contacting us.

Notes:

9 Technical data

9.1 Data sheet for ICR 85x Image Code Reader

Type	ICR 850 (Standard)	ICR 852(High Density)	ICR 855 (High Speed)
Front reading window	ICR 850-0020	ICR 852-0020	ICR 855-0020
Side reading window	ICR 850-1020	ICR 852-1020	ICR 855-1020
Focus	Fixed focus		
Laser diode (wavelength)	Red light ($\lambda = 650 \text{ nm}$)		
MTBF of laser diode	20,000 h		
Laser class	Class 2 (to EN 60825-1/21 CFR 1040.10), shutoff of laser diode after 10 min ¹⁾		
Scanning/decoding frequency	100 Hz to 15 kHz	100 Hz to 15 kHz	100 Hz to 45 kHz
Resolution	0.2 to 0.5 mm (7.9 mil to 19.7 mil)	0.1 to 0.25 mm (3.97 mil to 9.8 mil)	0.35 ... 1 mm (13.8 mil to 39.4 mil)
Reading ranges	see Fig. 9-2, Page 9-3	see Fig. 9-3, Page 9-4	see Fig. 9-4, Page 9-4
Print contrast (PCS)	$\geq 60 \%$		
Ambient light compability	2,000 lux (on 2-D code/bar code)		
Number of 2-D codes per scan	1 to 20		
Number of 2-D codes per reading interval ²⁾	1 to 50		
2-D code types	DataMatrix ECC 200		
No. of bar codes per scan	1 to 20 (standard decoder), 1 to 6 (SMART decoder)		
No. of bar codes per reading interval ²⁾	1 to 50 (autodiscriminating)		
Bar code types (SMART decoder) ³⁾	Code 39, Code 128, Codabar, EAN, EAN 128, UPC, 2/5 Interleaved		
Bar code length	Max. 50 characters ⁴⁾ (max. 4,000 character across all bar codes per reading interval)		
Print ratio	2:1 to 3:1		
Number of multiple reads (bar code)	1 to 99		
Visual indicators	4 x LEDs (status indicators)		
Acoustic indicator	Beeper, can be deactivated and assigned function for result status indication		
Reading pulse	"Sensor 1" switching input (option: additionally „Sensor 2“)/ serial interface/ free running		
Start/stop delay	0 to 10,000 ms ("Sensor" switching input/serial interface)		
"Host" data interface	RS 232, RS 422/485, variable data output format		
Data transfer rate	300 to 57,600 bd		
Protocols	SICK standard		
Physical configurations	Standalone		
"CAN" data interface	10 Kbit/s to 1 Mbit/s, CANopen protocol, CAN scanner network		
"Ethernet" data interface	10 Mbit/s; TCP/IP and FTP		
"Aux" data interface	RS 232, 9,600 bd, 8 data bits, no parity, 1 stop bit, fixed output format		
Switching inputs	2 ("Sensor 1", "Sensor 2") – Optodecoupled, $V_{\text{imax}} = 28 \text{ V}$, non-interchangeable, can be connected to PNP output – "Sensor 1" (reading pulse): variable debouncing time (min. 3 ms) – "Sensor 2" (variable function): variable debouncing time (min. 3 ms)		
Switching outputs	2 ("Result 1", "Result 2") – PNP, $I_{\text{omax}} = 100 \text{ mA}$, short-circuit-proof, variable pulse duration (static, 10 to 990 ms) – Variable output function for result status		
Electrical connection	15-pin D-Sub HD connector, cable length 0.9 m (2.95 ft) Ethernet connection: RJ 45 socket 10baseT		

Table 9-1: Technical specifications of ICR 85x

Type	ICR 850 (Standard)	ICR 852(High Density)	ICR 855 (High Speed)
Operating voltage/power consumption	10 to 30 V DC pursuant to IEC 364-4-41/ 8.5 W (355 mA at 24 V DC)		
Housing	Zinc die-cast, does not represent a problem in paint shops		
Enclosure rating	Device IP 65 (pursuant to DIN 40 050), Ethernet connection IP 30 when connected		
Protection class	Class 3 (pursuant to VDE 0106/IEC 1010-1)		
EMC/ vibration / shock tested	Accord. to EN 61000-6-2, EN 61000-6-4/to IEC 68-2-6 Test FC/to IEC 68-2-27 Test EA		
Weight	Approx. 900 g (31.75 oz) with connection cable		
Operating/storage temperature	0 to +40 °C/ -20 to +70 °C (+32 to +104 °F/-4 to +158 °F)		
Max. rel. humidity	90 %, non-condensing		
Colour	SICK blue (RAL 5012)		

1) (Default setting); in Reading mode with the "Switching input sensor " and "Serial interface" pulse types
 2) Reading interval: time window generated internally for evaluating the code
 3) Standard decoder for bar codes: also Pharmacode and RSS
 4) SMART decoder for bar codes: Code 39: max. 30 characters; Codebar: max. 30 characters; Code 128, EAN 128: max. 48 characters (max. 96 "half characters")

Table 9-1: Technical specifications of ICR 85x (contd.)

9.2 ICR 850 dimensional drawing

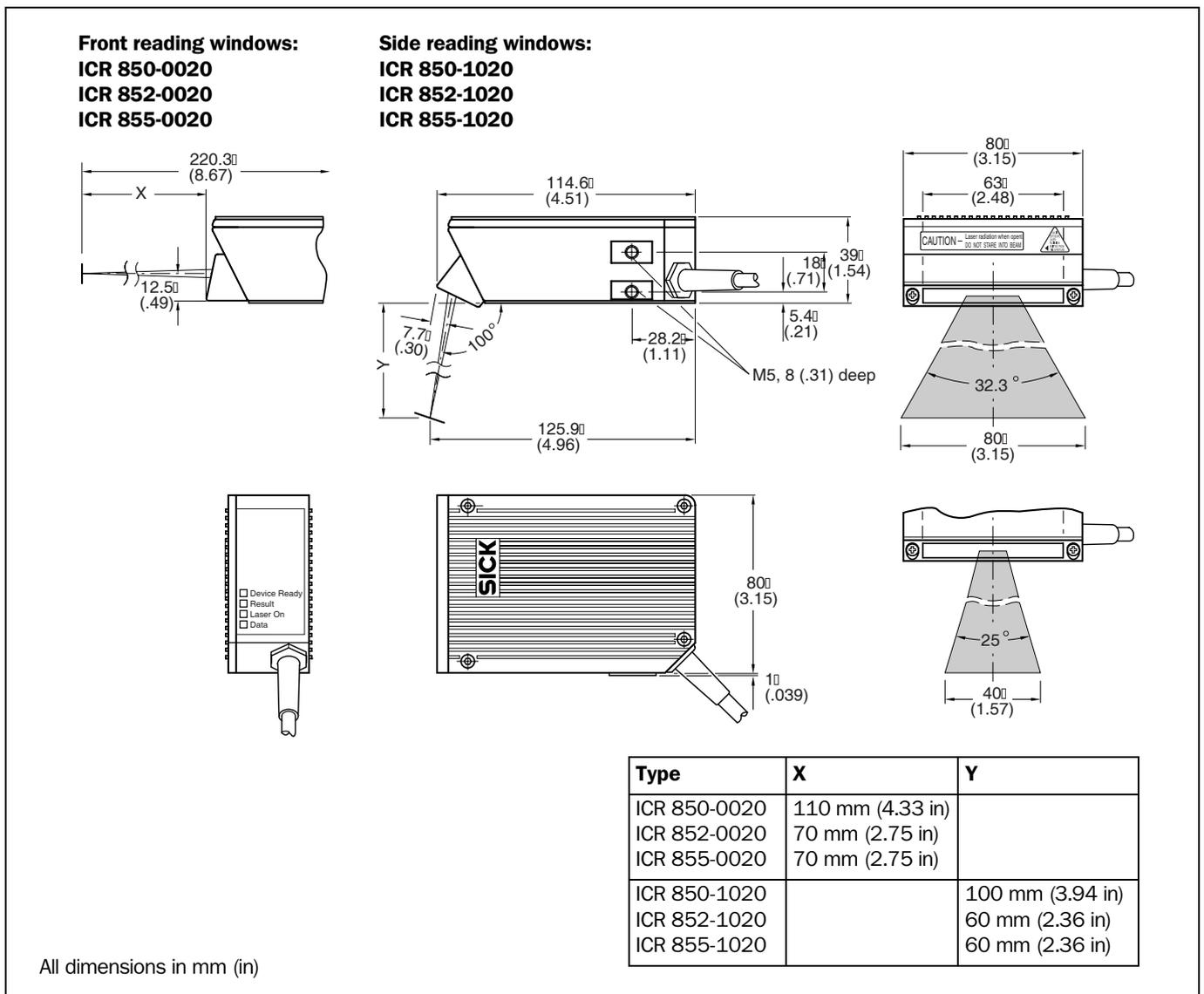


Fig. 9-1: Dimensions of the ICR

9.3 Specification diagram

9.3.1 Reading conditions for the diagram

Test code	Code 128/DataMatrix ECC 200
Print ratio	2:1
Print contrast	Bar codes: > 90 % DataMatrix: Grade A pursuant to ISO/IEC 10622
Tilt	Typical $\pm 30^\circ$ and resolution 0.17 to 0.5 mm (6.7 mil to 19.7 mil)
Ambient light	< 2,000 lux
Good read rate	> 75 %

Table 9-2: Reading conditions for specification diagram

9.3.2 Reading ranges of ICR – preliminary –

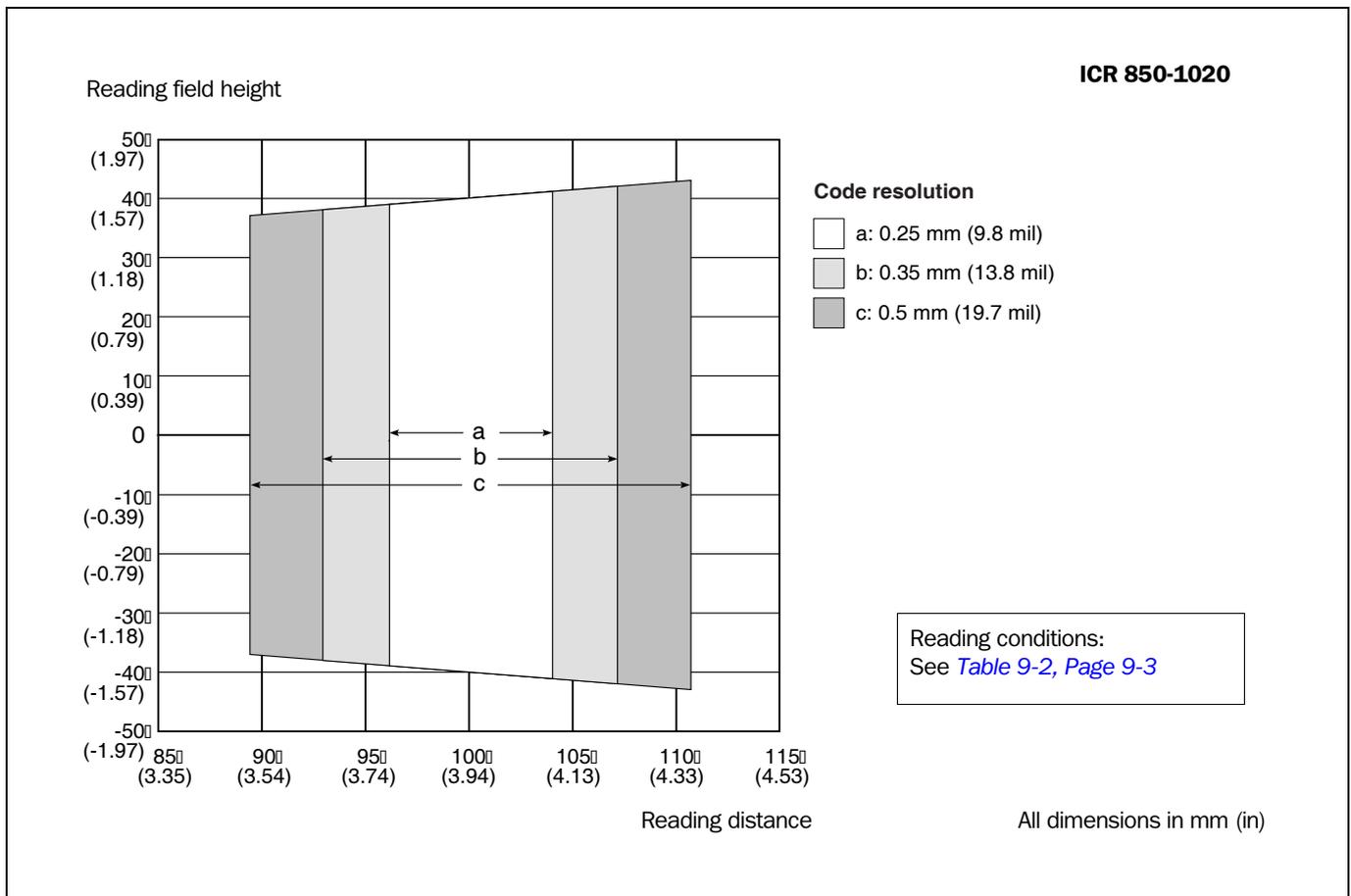


Fig. 9-2: ICR 850-1020: Reading ranges

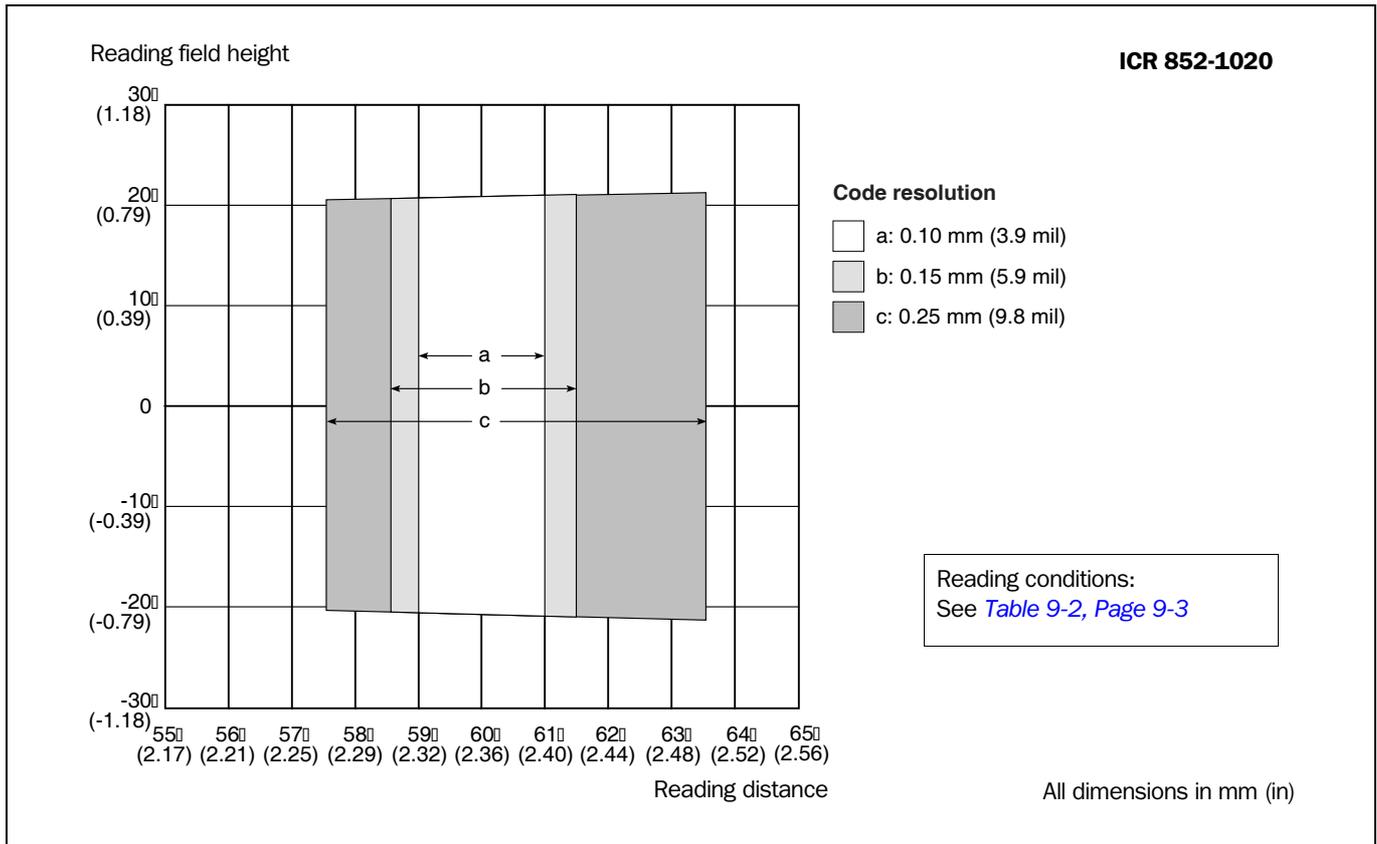


Fig. 9-3: ICR 852-1020: Reading ranges

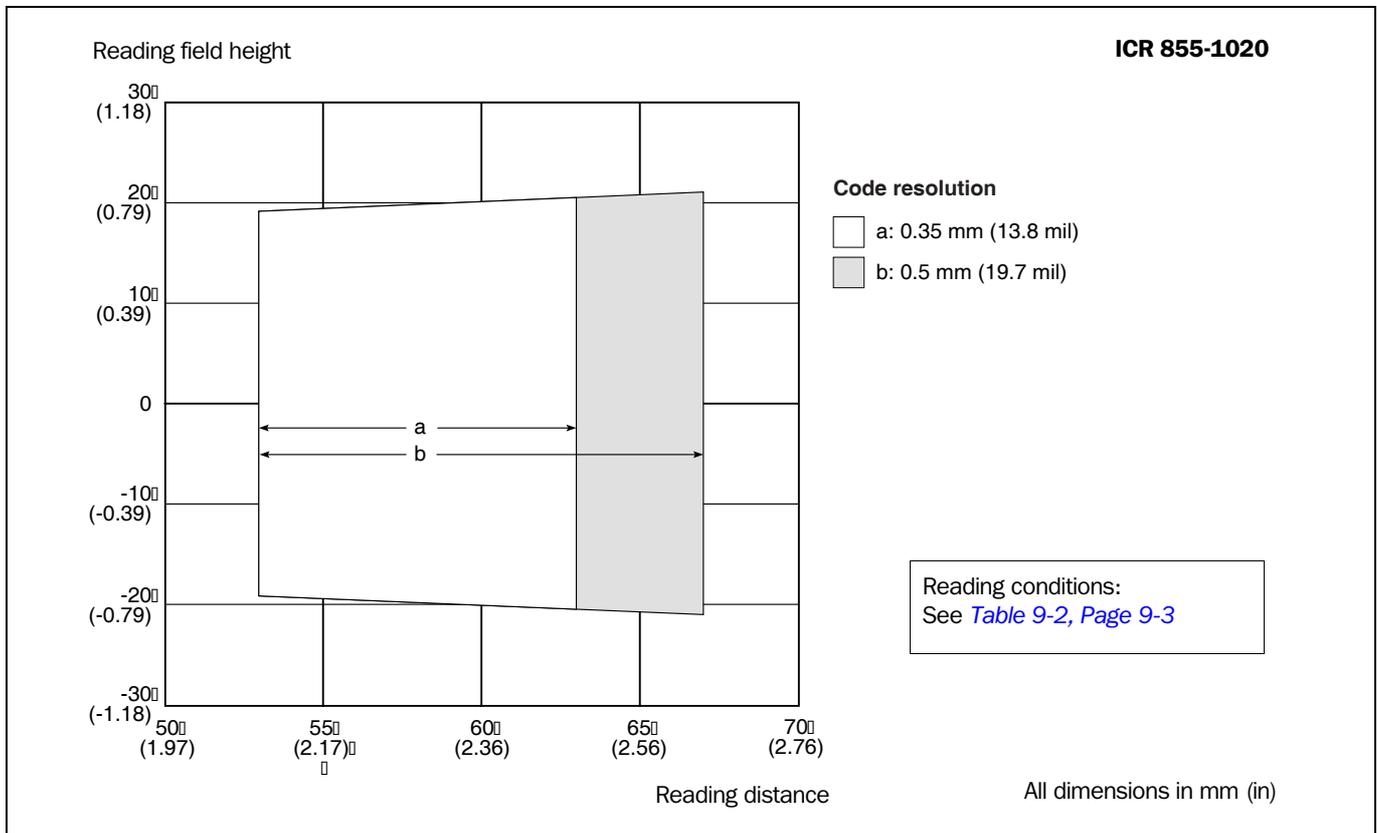


Fig. 9-4: ICR 855-1020: Reading ranges

10 Appendix

10.1 Appendix overview

The Appendix contains the following additional information:

- System messages
- Installation and operating instructions for the PC-based “CLV Setup“ program
- Settings for reading 2-D codes (DataMatrix ECC 200)
- Configuring the ICR with command strings
- Calculating parameter values for setting the ICR
- Auxiliary tables
- Special applications and procedures
- Replacing an ICR (transferring the parameter set)
- Available accessories
- Dimensional drawings of the accessories
- Supplementary documentation (overview)
- Glossary
- Copy of the EC Declaration of Conformity
- Index
- Scannable sample bar codes and 2-D codes

10.2 System messages

The ICR outputs all system messages in plain text via the auxiliary interface. The messages are in English and can be displayed in the Terminal Emulator of the CLV Setup.

(See [Chapter 6.6.1 “Displaying messages”, Page 6-46](#)).

Message	Meaning
“ICR 85x SoftwareVersion VX.XX Change Index: 0000 Built: ... SC2D Built: ... Host: RS 232 ...“ ...	The software version and revision is displayed when the power supply is switched on.
“no code“	In Reading/Parameter Evaluation mode, the ICR indicates that no codes matching the parameterized evaluation conditions were detected during the reading interval (error status ST = 2 output on the host interface).
“laser safety timeout“	The ICR has deactivated the laser diodes 10 min. (default setting) after the start of a reading pulse. The reading pulse is still active, even though the ICR is no longer reading. The reading pulse is to be terminated by resetting the pulse signal. The laser diode is activated again with the next reading pulse.

Table 10-1: System messages of the ICR

10.3 Installation and operating instructions for the PC-based “CLV Setup” program



The scope of delivery of the ICR includes a CD ROM (“Manuals & Software”) containing the “CLV Setup” program.

The following is required to run the program: a PC with at least an 80486 running at 66 MHz, 16 MB RAM, CD ROM drive, serial interface, mouse (recommended) and Windows 95™/98™, Windows NT4.0™, Windows 2000™ or Windows XP™.

Approximately 25 MB of hard disk space is required to install CLV Setup (V 4.10) and approximately 20 MB to install CLV Setup Help (V 4.10).

Note For the latest version of the software, see www.sick.com.

10.3.1 Preparing for installation

1. Make sure you have the CD ROM (“Manuals & Software”) at hand.
2. Connect the ICR to the CDB 420 or CDM 420 Connection Module (see [Chapter 5.5.3 “Connecting the power supply”, Page 5-7](#)).
3. Connect the PC to the auxiliary interface of the ICR using a 3-core RS 232 data cable (null modem cable) (CDB 420 or CDM 420: connect the PC to the internal, 9-pin “Aux” plug). See [Chapter “Table 3-3, Page 3-8 describes the function of the two LEDs on the connection socket.”, Page 5-10](#).

– or –

Connect the PC to the Ethernet interface of the ICR.

See [Chapter 5.5.6 Connecting the Ethernet interface, Page 5-10](#).

4. Switch on the power supply to the CDB 420 or CDM 420.
After the ICR has been started and has successfully completed the self-test, it outputs a tone and then two consecutive tones shortly afterwards when the Reading mode is initiated. The “Device Ready” LED lights up.
5. Switch on the PC and start Windows.

10.3.2 Performing installation

The CLV Setup installation program creates a main directory called “CLV”, a series of subdirectories and the necessary links. Using the included uninstaller, CLV Setup can be completely removed from the PC. As of version V2.6, CLV Setup will only be available and further developed as a 32-bit application.

Note The following instructions describe how to install the software on Windows XP™. These instructions may differ depending on the operating system you are using (for example, administrator rights are required to install the software on Windows XP™).

Initial installation

CLV Setup program:

1. Shut down all the applications running in Windows.
2. Insert the CD ROM into the CD ROM drive.
3. If the auto run function is enabled, the start page (table of contents) of the CD ROM is automatically displayed in your browser.
4. Select the SOFTWARE folder on top left.
5. Select CLV, ICR, OPS SETUP SOFTWARE in the listing.
A table with CLV Setup information is displayed.
6. Select DOWNLOAD under SOFTWARE FILE.

7. In the FILE DOWNLOAD dialog box select the option to install directly from the CD ROM. Confirm with OK. The software is automatically saved in the "Programs\CLV" directory on your hard disk.
– or –
Select the option to save the software locally on your local hard disk and confirm with OK.
In the FILE DOWNLOAD dialog box select the desired target directory on your hard disk. The "CLVSetupxx.exe" file is then saved at this location (xx = version number).
Select OPEN in the dialog box to start the file.
8. The installation program starts and guides you through the installation with screen messages. The program asks you for your user name and company name. This information appears as a header in printouts. "CLV Setup" and CLV Assistant are installed. The software will be entered in the Windows start menu under "Programs\CLV Setup".
9. Please read the Readme file, as it contains the latest information and problems regarding CLV Setup.
10. Then confirm the final installation message by clicking "OK".

Online-Hilfe CLV Setup Help:

1. Return to the start page of the CD ROM with the opened folder "Software".
 2. Select CLV, CLV HELP SOFTWARE in the listing.
A table with CLV Help information is displayed.
 3. Select DOWNLOAD under SOFTWARE FILE.
 4. In the FILE DOWNLOAD dialog box select the option to install directly from the CD ROM. Confirm with OK. The software is automatically saved in the "Programs\CLV" directory on your hard disk.
– or –
Select the option to save the software locally on your local hard disk and confirm with OK.
In the FILE DOWNLOAD dialog box select the same target directory as selected for CLV Setup on your hard disk.
The "CLVHelp.exe" file is then saved at this location.
 5. After downloading the software, select OPEN in the dialog box to start the software. The software is installed in the sub directory "Help" of the main directory "CLV".
CLV Help will also be entered in the Windows start menu under "Programs\CLV Setup".
- Restart the PC.
Some Windows DLL files are possibly updated.

The "CLV Setup" program, the CLV Assistant and the online "CLV Setup Help" are installed and ready.

The program logs all of the files that are installed to the "install.log" file. This list is used by the uninstaller to remove CLV Setup and must not be deleted if you want to use the uninstaller at some time in the future.

Updating program

There are two options for installing a new version of CLV Setup:

- You can install the new version and still keep the old version (parallel installation)
- or –
- You can install the new version over the old version (overwrite)

Installing new version and retaining old version:

If you want to install the new version and still keep the old version of CLV Setup, follow the procedure described under Initial installation. When the program asks you for the target directory, you must specify a **new directory**. Both versions of the software are then available but may not be started simultaneously.

The configuration files "*.scl" (scanner configuration), "*.npj" (network project), "*.opj" (OTS project) or "*.rpj" (redundant OTS project) of the old version can be used in the new version and contain the ICR parameter sets as well as project data if several scanners had been organized logically by projects. In order to do so, copy the configuration files from the "data" directory of the old version to the "data" directory of the new version.

Installing new version over old version:

Before you can install the new version of the software, you must remove the files of the old version – with the exception of the configuration files "*.scl" (scanner configuration), "*.npj" (network project), "*.opj" (OTS project) or "*.rpj" (redundant OTS project). They contain the ICR parameter sets as well as project data if several scanners had been organized logically by projects.

The uninstaller of the old version removes the program files. Using the uninstaller you can remove all of the files (with the exception of the configuration files) or only selected files. The default setting is a complete uninstall (the configuration files are not deleted). With the custom uninstall, the files are listed and only selected files are uninstalled. If you choose this uninstall method, ensure that the main directory containing the configuration files "*.scl" is not deleted. We recommend that you move these files to another main directory and copy them back to the "data" directory later.

1. From the Windows Start menu, select PROGRAMS and the uninstaller for CLV Setup. The uninstaller starts and guides you step by step through the uninstall procedure.
2. Select the uninstall method (complete or custom).
3. Install the new version of CLV Setup as described under "Initial installation". Select the same directory.

The new version of CLV Setup is installed. The configuration files of the old version can be used again.

10.3.3 Starting “CLV Setup“

The “CLV Setup“ program is launched with the following default settings:

Communication	COM 1 (RS 232), 9,600 bd, 8 data bits, 1 stop bit, no parity
Transmit control character	Start: STX, Stop: ETX
Receive control character	Start: STX, Stop: ETX
Unit of measure	Metric (depending on the selected installation)
Browser	user dependent
Language	As selected for the installation
Company name	As entered for the installation
User name	As entered for the installation
Establish connection to ICR automatically	At startup: Yes On scanner selection: Yes When the Terminal Emulator is started/closed: Yes
Initial screen	Yes
Storage confirmation prompt	Yes
Last type selected	CLV 41x
File storage location	“data“ (configuration files for ICR)

Table 10-2: Default settings in CLV Setup (extract)

Data communication via the auxiliary interface (RS 232):

1. Switch on the PC and start Windows
2. Choose CLV Setup from the Start menu.
The introductory dialog box is displayed after the identifier for the SICK software.
3. Confirm the initial screen with “OK“.
CLV Setup then checks whether an ICR is connected to the **COM 1** port on the PC and whether the communication parameters on the PC match those on the ICR. If this is the case, the “Connected“ status is displayed with the ICR specification on the bottom, right-hand side in the status bar. The detected device type is displayed in the toolbar in the DEVICE drop-down list (in this case: ICR 850).

The software then loads the internal device description of the ICR and the defaults settings of the parameter values from its database and displays these on the tabs. The software then copies the current parameter set from the memory (RAM) of the ICR. This is displayed on the tabs instead of the default settings.

You can edit the current parameter set on the tabs. The default values are displayed when the device is used for the first time.

Troubleshooting

If CLV Setup cannot establish a connection with the ICR, it displays „No connection“ in the status field on the bottom, right-hand side. There are two possible causes for this. The ICR is not connected or the communication parameters of the ICR do not match those of the PC. In this case, CLV Setup enters the device type of the device it last communicated with in the DEVICE drop-down list on the toolbar. The default setting is CLV 41x the first time CLV Setup is started. The software then loads the internal device description for this type and the default settings of the parameter values from its database and displays these on the tabs.

1. Connect the PC to the auxiliary interface (port) of the ICR using a 3-core RS 232 data cable (null modem cable) (CDB 420 or CDM 420: connect the PC to the internal, 9-pin "Aux" plug). See [Chapter 5.5.7 "Connecting the PC", Page 5-12](#).
2. Click  (AutoBaud detect) in the toolbar or select the menu item AUTOBAUD DETECT from the Options menu.
CLV Setup scans the serial interface by varying the communication parameters and sends a telegram to the ICR repeatedly. As soon as a reply from the ICR is detected, CLV Setup conveys the values found for the communication parameters.
[Fig. 10-1](#) shows an example of the AutoBaud detect result display.
CLV Setup displays "Connected" in the status bar on the bottom, right-hand side.
3. Confirm the AUTO DETECT dialog box with "OK".
CLV Setup displays the detected ICR type in a separate dialog box and asks you whether you want to upload the current parameter set from the ICR.
4. Confirm the dialog box with "Yes".
CLV Setup then copies the current parameter set from the RAM of the ICR to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

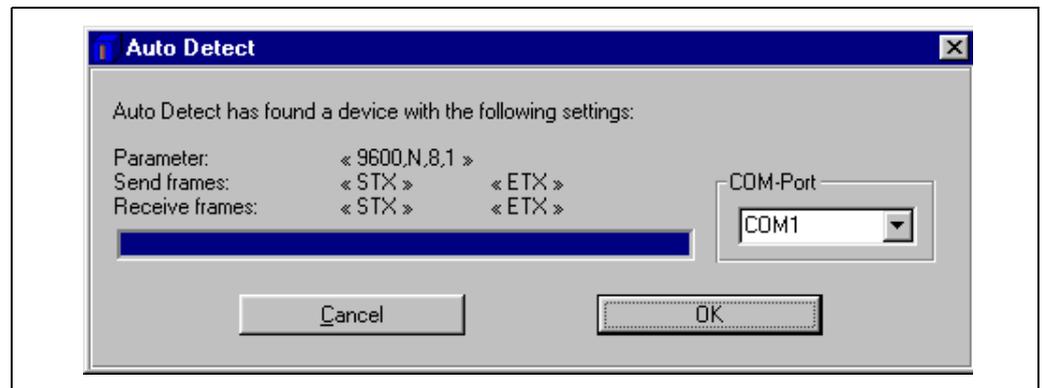


Fig. 10-1: CLV Setup: Results of the AutoBaud detect function

– or –

2. Select the menu item SERIAL INTERFACE under OPTIONS in the menu bar.
CLV Setup shows the current settings of the communication parameters of the PC in the COM PARAMETERS dialog box.
3. Ensure that the communication parameters of the PC and ICR are identical (**connected COM port, 9,600 bd, 8 data bits, 1 stop bit, no parity**)
4. Confirm the dialog box with "OK".
CLV Setup attempts to communicate with the ICR again.
If it is successful, it displays "Connected" in the status bar on the bottom, right-hand side.
5. Click  in the toolbar.
CLV Setup then copies the current parameter set from the RAM of the ICR to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

Data communication via the Ethernet interface:

1. Connect the PC with the Ethernet interface of the ICR.
If the green "Ready" LED at the socket of the ICR lights up, the physical connection has finished successful.

2. Enable TCP/IP communication.
Configure the IP addresses of the ICR and the PC.
See [Chapter 5.5.6 Connecting the Ethernet interface, Page 5-10](#).

10.3.4 CLV Setup user interface

The graphical user interface (GUI) of CLV Setup is largely self explanatory. The online CLV Setup Help function provides a description of how to use the program under the menu item HELP TO CLV SETUP in the navigation tree. [Fig. 10-2](#) shows the user interface.

The programm window of the user interface comprises the following elements:

- Title bar that displays the program name, current configuration file and status (e.g. "No File")
- Menu bar with pull-down menus
- Toolbar with buttons for triggering various functions
- Drop-down list (top right) for selecting the device type
- Frame for displaying the navigation tree of the tabs (on left-hand side)
- Frame for displaying the 11 tabs for ICR 85x (Reading Configuration, Device Configuration etc.) on right-hand side. The numbers of displayed tabs depends on the selected items in the navigation tree on the left side. The parameters on the tabs are grouped according to their function. Some of these parameters open further dialog boxes.
- A status bar (at the bottom of the window) with two display fields for the communication activities between CLV Setup and the ICR, display of interface parameters of the PC, error display field (system errors) of the ICR, device specification field and status display for the connection to the ICR.

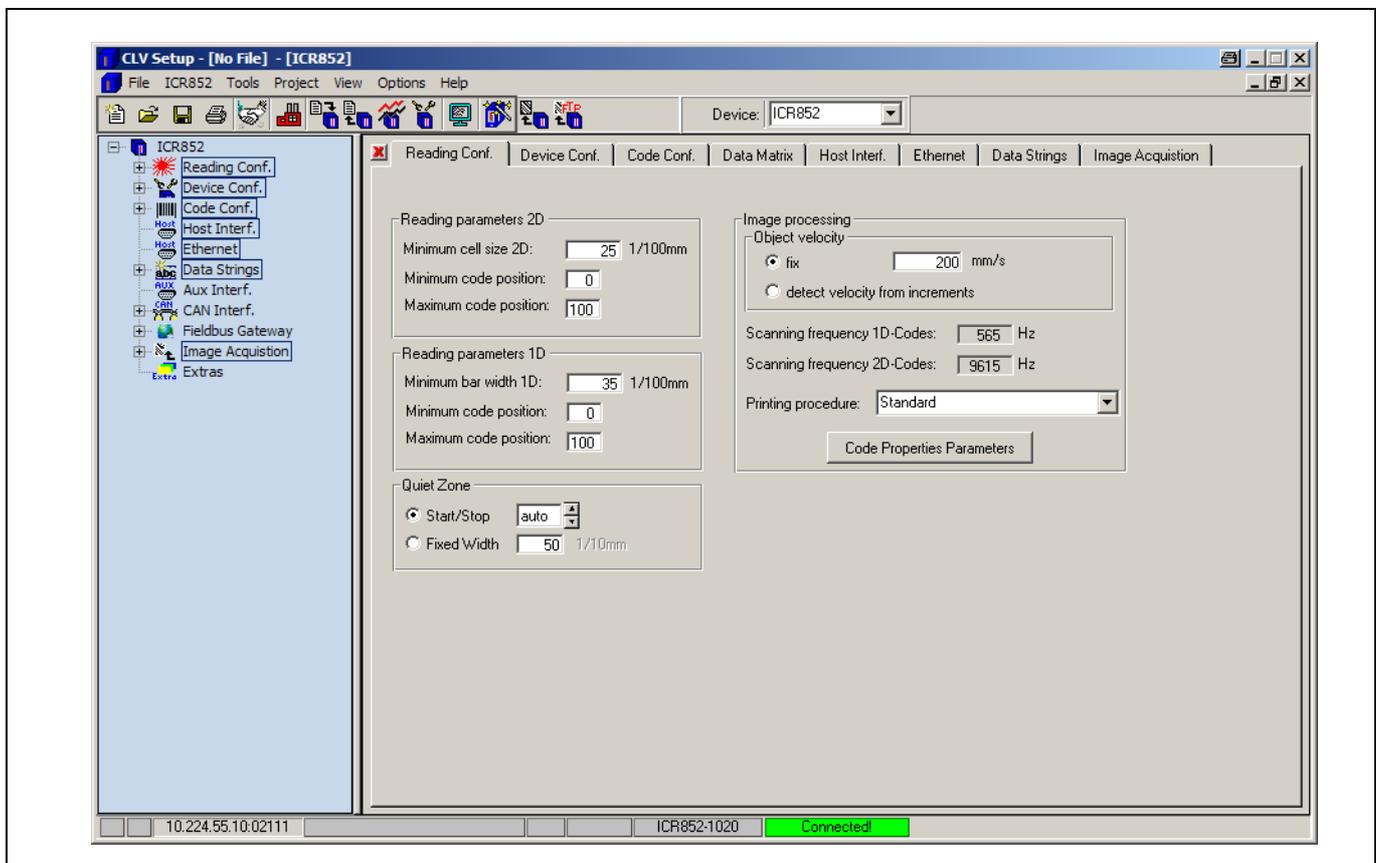


Fig. 10-2: User interface of the "CLV Setup" software

10.3.5 Functions

The CLV Setup program (from V 4.1) features functions to carry out the following:

- Loading the default setting of the parameter set from the database of CLV Setup
- Automatic communication attempt with the ICR when the program is started
- Automatic software compatibility check in the ICR
- Uploading and displaying parameter set stored in the ICR
- Changing the parameter/parameter values on the tabs
- CLV Assistant for simplified parameterization
- Downloading the changes to the parameter set in the ICR
- Saving the changes to the parameter set as a configuration file “*.scl”
- Printing the configuration files
- Exporting the configuration files in RTF format
- Exporting the command strings contained in the profile bar codes in ASCII format
- Printing the parameter set in the form of profile bar codes
- Organizing several scanners logically by projects
- Online access to the ICR via a Terminal Emulator (selecting operating mode, starting operating functions, logging file for communication between the ICR and CLV Setup, extended terminal mode, e.g. for displaying ICR messages)
- AutoBaud detect for automatic communication establishment with the ICR
- Selecting the COM port of the PC for adapting the data transfer parameters
- Monitor the data communication of the ICR host interface
- Selecting the display language
- Selecting the units of measure
- Displaying the last 10 configuration files that were processed
- Saving the device type that was selected last
- Automatic storage confirmation prompt when changes are made to the configuration file
- Wizards for individual functions
- Clearing the optional CMC 400 parameter memory in the CDB/CDM Connection Module
- Image output of the read code via the Ethernet interface (ICR only)
- Setting switches in the “CLVmain.ini” file for starting the program
- Hot keys [F keys] for essential functions (program operation without a mouse)
- Starting program with SCL file as argument
- Macro player for recording and playing a macro file
- Context-sensitive help via the [F1] key

10.3.6 Hot keys

- [F1] Start "CLV Setup Help" online
- [F2] Open dialog box to execute device functions
- [F3] Upload complete set of parameters from CLV
- [F4] Download complete set of parameters to CLV
- [F5] Open configuration file
- [F6] Save configuration file

- [F7] Load default setting of CLV from CLV Setup database
- [F8] Start AutoBaud Detect
- [F9] Load operating data from CLV to be displayed and reset
- [F10] Open Terminal Emulator

10.3.7 Opening and closing tabs

After starting the user interface, CLV Setup displays those tabs in the frame on right-hand side whose names are framed in the navigation tree on left-hand side. The first tab covers the other tabs in the sequence but their marks are still visible on the top of the tabs. If you click some buttons on a tab in the fore-ground, several sub dialogs will also be opened as tabs and added to the first tab. In the frame, all tabs on the right will then be shifted more to the right side.

To scroll the tabs, use the sliding control elements at the left corner on top of the frame which are displayed by CLV Setup.

You can open and close the tabs in the following way:

In the navigation tree:

- Opening:
Double-click the desired entry or put the mouse cursor on the entry and select "Show dialog" in the context menu using the right mouse button.
To display several entries under a branch, click the corresponding "+" symbol.
To hide displayed sub entries, click the corresponding "-" symbol.
- Closing:
Put the mouse cursor on the desired entry and select "Hide dialog" in the context menu using the right mouse button.

In the frame for displaying tabs:

- Opening:
Click on the desired mark on the top of the tab. If necessary, scroll the tabs.
- Closing:
To close the tab in the fore-ground, click on the red cross at the left corner on the top.

Pressing the left mouse button, the left frame with the navigation tree can be move from the program window to a separate position on the screen. If the navigation tree has been closed, it can be reopened using the VIEW menu.



10.3.8 Online help program "CLV Setup Help"

The online help program "CLV Setup Help" assists you in operating the "CLV Setup" software. The help program runs in an HTML browser (e.g. Microsoft Internet Explorer™). You can call up context-sensitive help on each parameter as well as a description of its function.

1. Press the [F1] key.
The browser is launched automatically and displays the help topic.
2. If the program cannot find a browser, it asks you to specify the storage location on the hard disk.
Enter the name of the executable file and the path in the dialog box.
3. Use the [Alt]+[Tab] keys to switch between the CLV Setup and CLV Setup Help applications and prevent several browser windows from being opened.
4. To display an overview of the help function, select HELP, CONTENTS from the CLV Setup menu bar.

5. In the left frame click on the desired entry in the navigation tree.
CLV Setup Help then displays the associated help text in the right-hand frame and jumps to the parameter heading.

10.3.9 Transferring parameter sets between CLV Setup and the ICR

See [Chapter 6.4.1 "Configuring the ICR with the user interface of CLV Setup", Page 6-18.](#)

10.3.10 Unknown parameters



Uploading from ICR

If the "CLV Setup" program does not recognize the parameters or parameter values of the ICR transferred during the upload, it outputs a warning message. Causes for unknown parameters/values are e.g.: The ICR is a special device or the version of CLV Setup is older than the software of the ICR. CLV Setup displays the unknown parameters in the window on the EXTRAS tab. The parameters are displayed in the form of command strings and can be edited using the command string conventions. In this way, upward compatibility with the ICR is ensured. When the parameter set is saved as a configuration file in CLV Setup, these parameters/values are also taken into account as with a download to the ICR.

Downloading to the ICR

If the ICR does not accept individual parameters or parameter values in the parameter set downloaded with CLV Setup, it outputs a separate warning for each parameter on the screen. This is due to the fact that one of the CLV Setup software versions is newer than the software in the ICR, and it contains new parameters/values arising from the continued development of this ICR type. The effected ICR contains an older software version which does not recognize these parameters/values, however.

We recommend that you check the effects of warnings in the ICR as follows:

1. Check whether the ICR functions correctly after the parameter set is downloaded.
2. Click  in the toolbar.
CLV Setup loads the default settings from the database.
3. Click  in the toolbar.
CLV Setup uploads the problem parameter set from the ICR.
4. Click  in the toolbar.
CLV Setup prints out the problem parameter set when you confirm the dialog box.
5. Open the previous configuration file "*.scl" for the ICR.
6. Click  in the toolbar.
CLV Setup prints out the problem parameter set when you confirm the dialog box.
7. Compare the two parameter sets.
To restore the previous status, correct individual parameters in the problem parameter set if necessary and download them to the ICR again.

Opening configuration files "*.scl"

Every time it loads configuration files, CLV Setup checks whether it recognizes all the parameters/values.

If the program detects an error, it outputs a warning and enters the problem parameter/value in the window on the "EXTRAS" tab.

10.3.11 Logging file in Terminal Emulator



The Terminal Emulator can log the communication between CLV Setup and the ICR. CLV Setup stores the data transmitted in both directions with the following identifiers:

CLV -->: ICR sending to CLV Setup

--> CLV: ICR receiving from CLV Setup

1. Click  in the toolbar.
The Terminal Emulator window is then displayed.
2. Click the empty checkbox in front of the WRITE LOGFILE option on the right.
The SAVE LOG FILE AS... dialog box is then displayed.
3. Enter a file name with the extension “.log“ and exit the window with SAVE.
CLV Setup saves the file in the “data“ subdirectory and records communication in the log file.
4. To terminate logging, click the checkbox in front of the WRITE LOGFILE radio button again or close the Terminal Emulator.

10.3.12 Starting CLV Setup with an INI file as an argument

When the program is started, CLV Setup can also be transferred the name of an INI file as a parameter. To do so, enter “/INI“ in front of the file.

Example:

“CLVmain32.exe\data\Set 1_85x.scl /INI user.ini“

CLV Setup is launched with the initialization data contained in the “user.ini“ file and loads the configuration file “Set1_85x.scl“ from the “data“ directory straight away.

The “user.ini“ file must be stored in the same directory as “CLVmain32.exe“.

You can use this method to link CLV Setup to several different configurations on your Windows desktop.

In this way, for example, you can prevent CLV Setup from attempting to establish a connection when an ICR is not connected.

10.3.13 The CLV Assistant

The CLV Assistant provides the Connection Assistant, the Ethernet Assistant, the Scanner Adjustment and the DataMatrix AutoSetup.

10.4 Settings for reading DataMatrix ECC 200

The parameter values for reading are selected in the default setting of the ICR in such a way that the largest possible bandwidth is covered by applications.

If reading with the parameter values of the default setting is not successful, appropriate adjustments can be made to improve the image quality in the ICR (before decoding) in accordance with [Chapter 10.4.1 “Adaptation of the reading characteristics”, Page 10-14](#).

To optimize the reading characteristics, especially for time-critical applications, the evaluation parameters can be further restricted in accordance with [Chapter 10.4.2 “Optimization of the reading characteristics for time-critical applications”, Page 10-20](#). This accelerates the output of the reading result in the “immediate” output mode, as the decoder requires less computation time.



For all changes to the parameter set using CLV Setup, proceed as follows:

1. Change parameter value(s) as desired.
2. Download to the ICR with the TEMPORARY save option.
3. Repeat reading with modified parameter value(s).
4. Change additional parameter values if necessary.
5. If reading is successful, download to the ICR with the PERMANENT save option.

Note We recommend checking the content of the image memory (ICR) using ImageFTP. See also [Chapter 6.5.3 Image Acquisition, Page 6-37](#).

The adjustments cover the following settings (starting from default settings):

Improving the image quality:

- Minimum cell size (resolution)
- Object velocity
- Design of data field and print type (code print positive or negative)
- Properties of the code print
- Error correction
- Minimum code contrast

Optimization of reading characteristics:

- Setting the symbol size
- Conveyor direction of the symbol
- Expenditure of the error correction
- Limitation of the image field

10.4.1 Adaptation of the reading characteristics

Minimum cell size and object velocity

1. Select the READING CONFIGURATION tab.

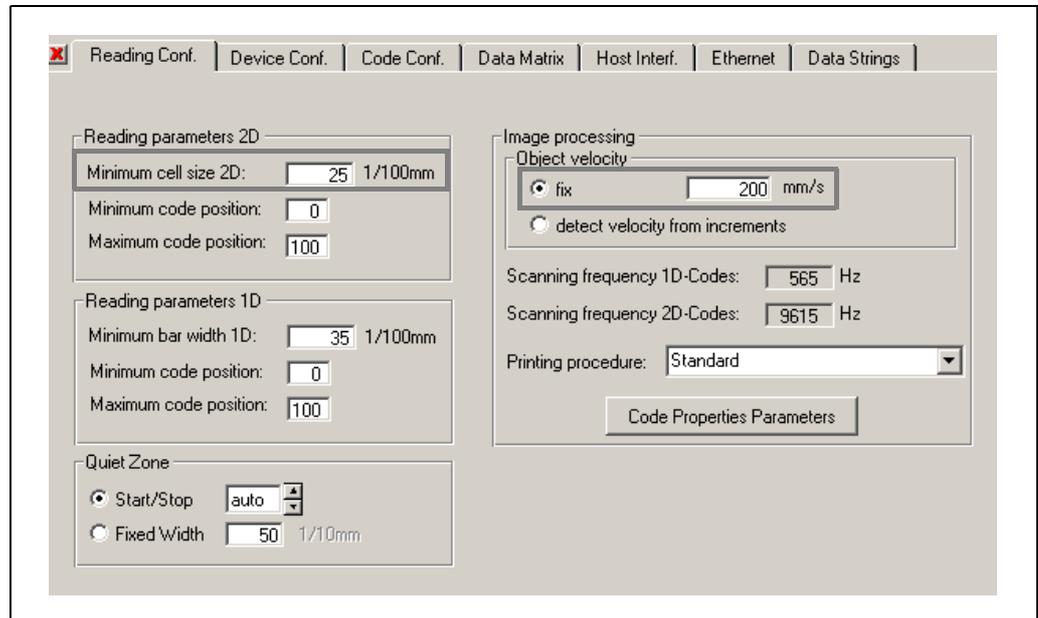


Fig. 10-3: CLV Setup: "Reading Configuration" tab

2. Adapt the following parameter values if necessary:

"Reading parameters" group: Minimum cell size 2-D

The setting of the minimum cell size is important for the reading quality:

If the ICR has to read symbols with different cell sizes, set here the smallest size which exist in the symbols.

- Adapt minimum cell size to the code to be read. The minimum cell size must be somewhat lower than the cell size in the code print.

"Image processing" group: Object velocity

The decoder accepts absolute conveyor speeds which deviate from the selected average object velocity as follows: $-30\% < \text{value} < +30\%$.

The maximum value depends on the set cell size ([Table 10-3](#)).

Parameter	ICR 850	ICR 852	ICR 855
Minimum cell size	0.2 mm (7.9 mil)	0.1 mm (3.97 mil)	0.35 mm (13.8 mil)
Minimum object velocity	0.004 m/s (0.24 m/min) (0.79 ft/min)	0.004 m/s (0.24 m/min) (0.79 ft/min)	0.04 m/s (2.4 m/min) (7.9 ft/min)
Maximum object velocity at cell size 0.10 mm (3.97 mil)	not specified	0.31 m/s (18.6 m/min) (61 ft/min)	not specified
Maximum object velocity at cell size 0.25 mm (9.8 mil)	0.63 m/s (37.8 /min) (124 ft/min)	0.9 m/s (54 m/min) (177.2 ft/min)	not specified
Maximum object velocity at cell size 0.35 mm (13.8 mil)	1.25 m/s (75 m/min) (246 ft/min)	1.3 m/s (78 m/min) (256 ft/min)	3.9 m/s (234 m/min) (767.7 ft/min)

Table 10-3: Maximum object velocity

Parameter	ICR 850	ICR 852	ICR 855
Maximum object velocity at cell size 0.50 mm (19.7 mil)	1.8 m/s (108 m/min) (354.3 ft/min)	1.8 m/s (108 m/min) (354.3 ft/min)	3.9 m/s (234 m/min) (767.7 ft/min)
Maximum object velocity at cell size 1.00 mm (39.4 mil)	3.7 m/s (222 m/min) (728.3 ft/min)	not specified	11.6 m/s (696 m/min) (2,283.4 ft/min)

Table 10-3: Maximum object velocity (contd.)

The ICR derives the required scanning frequency from the selected value (for bar codes, this is approx. one fifth of the scanning frequency for 2-D codes).

Example:

For object speed of 0.3 m/s (59 ft/min), the conveyor speed may be between 0.21 m/s (41.3 ft/min) and 0.39 m/s (76.8 ft/min) without having to reparameterize the ICR.

➤ Adapt the object speed to the specified conveyor speed.

Note The conveyor speed must be constant during reading (image capture).

Design of data field and print type

3. Select the CODE CONFIGURATION tab.

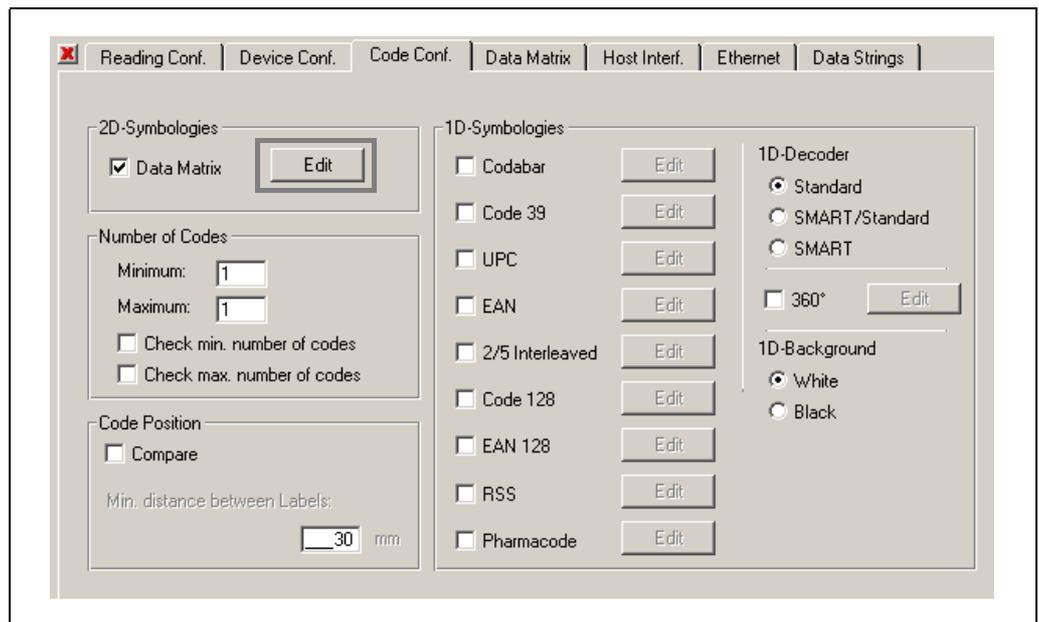


Fig. 10-4: CLV Setup: "CODE CONFIGURATION" tab

4. Click the EDIT button in the 2D-SYMBOLOGIES group.
The DATAMATRIX tab opens.

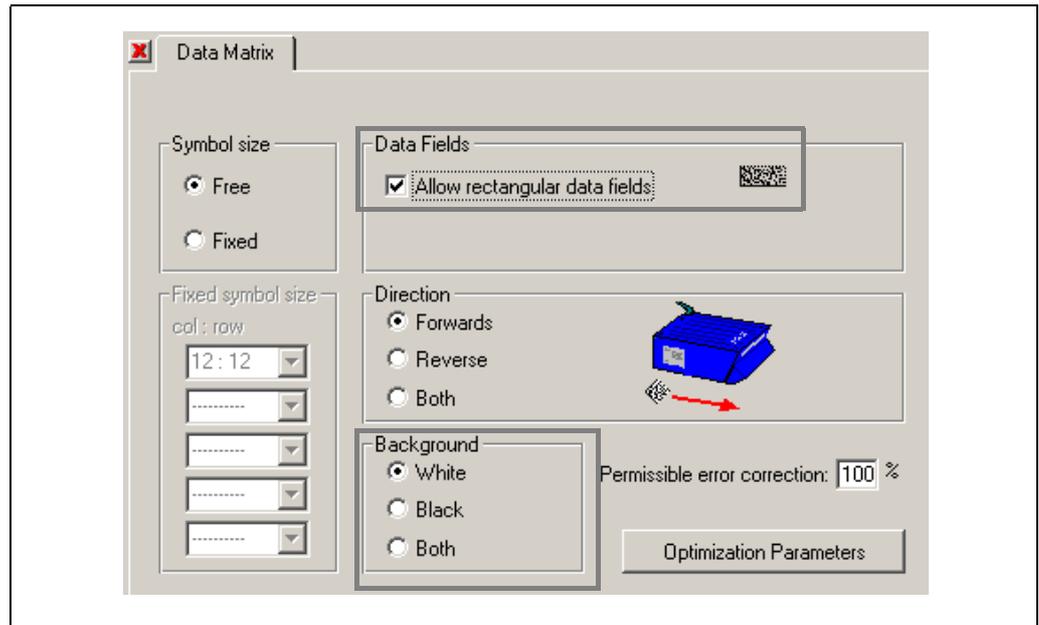


Fig. 10-5: CLV Setup: "DATAMATRIX" tab

- Adapt the following parameter values if necessary:

"Data Fields" group: Allowing rectangular data fields

- Activate the checkbox if rectangular symbols are also to be read with the Symbol size set to Free.

"Background" group:

- If the code to be read is printed negatively (white on black), click the BLACK radio button.

The setting BOTH allows mixed operation.

Properties of the code print

- Select the READING CONFIGURATION tab ([Fig. 10-3, Page 10-14](#)).
- Click the CODE PROPERTIES PARAMETERS button.
The CODE PROPERTIES PARAMETERS dialog box is then displayed ([Fig. 10-6, Page 10-17](#)).

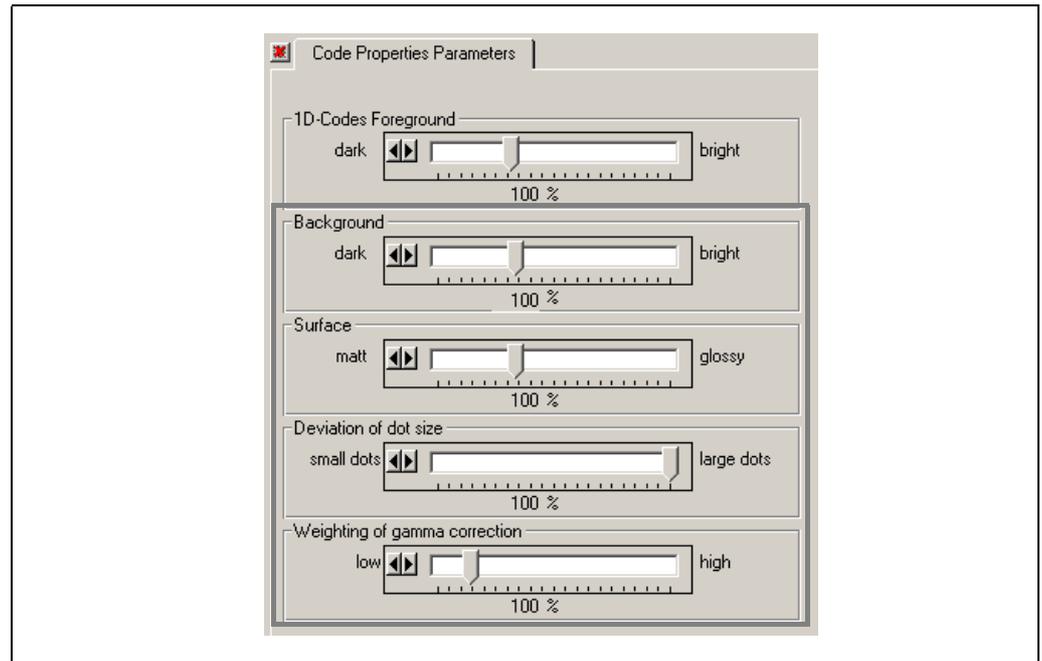


Fig. 10-6: CLV Setup: “Code Properties Parameters“ tab

8. Adapt the following parameter values if necessary:

“Background“ slider:

The slider affects the brightness of the detected background and provides better contrast to the cells in the code print when reading 2-D codes.

- For codes with a dark background which are to be read, move the slider incrementally in the DARK area until reading is successful.

For negatively printed codes (white on black), carry out this step for the foreground with the same slider accordingly.

“Surface“ slider:

The slider minimizes interfering noise in the image processing caused by reflections from the code surface when reading 2-D codes.

- For high-gloss code surfaces, move the slider incrementally in the GLOSSY area until reading is successful.

“Deviation of dot size“ slider:

The slider is used specially to adapt the ICR to codes created with ink-jet printers (for 2-D code reading). For this printing procedure, the individual dots are often printed so small that the individual dots don't touch each other. Cells and bars are thus not solid and cover a surface.

Use the slider to enter the dimension of the deviation from the ideal dot:

- 100 % corresponds to dots which touch each other at the edges.
- 50 % corresponds to dots which are a dot-width apart from each other.

- Depending on the codes to be read, move the slider incrementally in the SMALL DOTS area until reading is successful.

“Weighting of gamma correction“ slider:

The slider increases or decreases non-linearly the image contrast. The noise will be decreased, the contrast in the “middle range“ of the grey tone will be increased.

Note **“1D-Codes Foreground“ slider:**

The setting is only relevant for bar code reading. The saturation of the dark bars can be adjusted using the slider.

- For bar codes with insufficient contrast between the bars and the background or for gray bars, move the slider incrementally in the BRIGHT area until reading is successful.

Error correction

9. Select the CODE CONFIGURATION tab (*Fig. 10-4, Page 10-15*).
10. Click the EDIT button in the 2D-SYMBOLOGIES group.
The DATAMATRIX tab opens.
11. Click the OPTIMIZATION PARAMETERS button.
The OPTIMIZATION PARAMETERS tab opens.

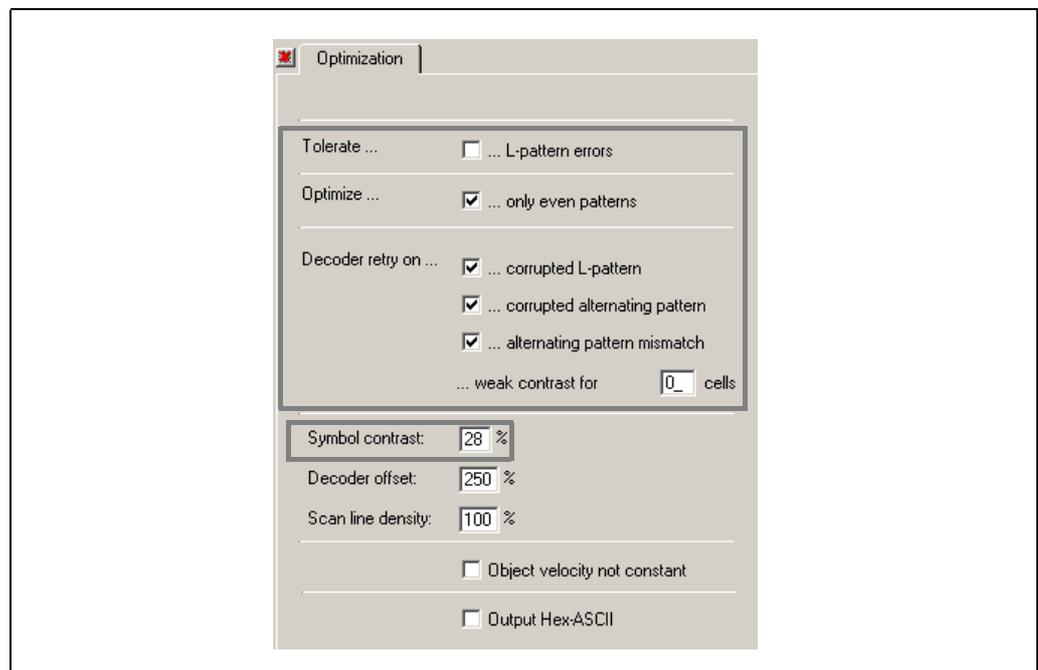


Fig. 10-7: CLV Setup: “Optimisation Parameters“ tab

12. Adapt the following parameter values if necessary:

Tolerate L-pattern errors:

The ICR can expand the search algorithm for detecting finder patterns for gaps in the code print of a code. The rest zone of the code must be at least five cell sizes in this case, however.

- Activate the checkbox if the ICR should accept faulty finders.

Optimize only even patterns:

- Click this checkbox if curved structures in the same size as the symbol appear in the image.

Decoder retry on ...

The parameters listed here are used to increase the reading rate for difficult reading conditions (poor code quality).

... corrupted L-pattern:

When evaluating the image memory, the ICR uses a more complex search algorithm.

... corrupted alternating pattern:

When evaluating the image memory, the ICR retries to determine the limit of the code data field.

... alternating pattern mismatch:

When evaluating the image memory, the ICR retries to determine the limit of the code data field with only one fixed symbol size.

- Activate the three checkboxes.

... weak contrast for:

For codes with weak contrast, the ICR can improve its reading performance by also using the “weak“ cells for decoding. Weak cells are those which were deemed not clearly identifiable due to their grayscale value in the image memory, with the default settings of the decoder in effect. The number of weak cells showing up in the image memory and the additional weak cells with the greatest contrast difference are output by the ICR as part of the reading diagnosis data EC in the reading result of the auxiliary interface (see [Fig. 6-25, Page 6-31](#)). The maximum number of cells which can be set is 10 (default setting: 0).

- Define the desired number of weak cells in the input field.

Symbol contrast:

The ICR only starts the evaluation of 2-D symbologies if the symbology contrast in the image buffer memory has reached a defined level. This level can be set.

The function helps to improve the decoder performance if there is a disturbing background around the 2-D label. The 2-D label must have a higher contrast regarding the contrast around the label, however.

- Increase the symbology contrast corresponding to the printed 2-D code label and check reading performance again.

10.4.2 Optimization of the reading characteristics for time-critical applications

Prerequisite High code quality (high contrast, coherent structure, error-free alternating pattern).

Setting the symbol size and conveyor direction

1. Select the CODE CONFIGURATION tab.

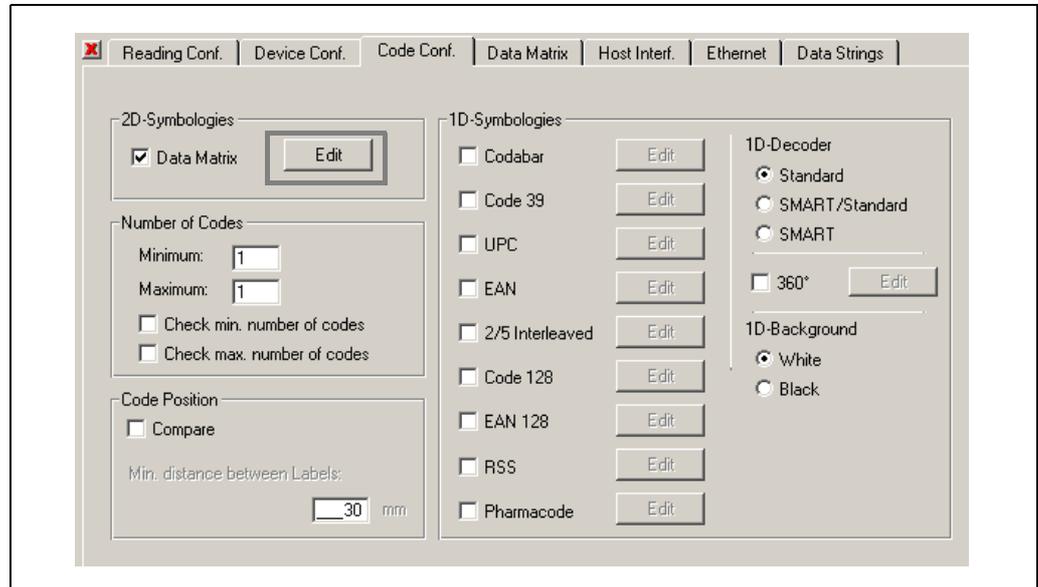


Fig. 10-8: CLV Setup: "CODE CONFIGURATION" tab

2. Click the EDIT button in the 2D-SYMBOLOGIES group.
The DATAMATRIX tab opens.

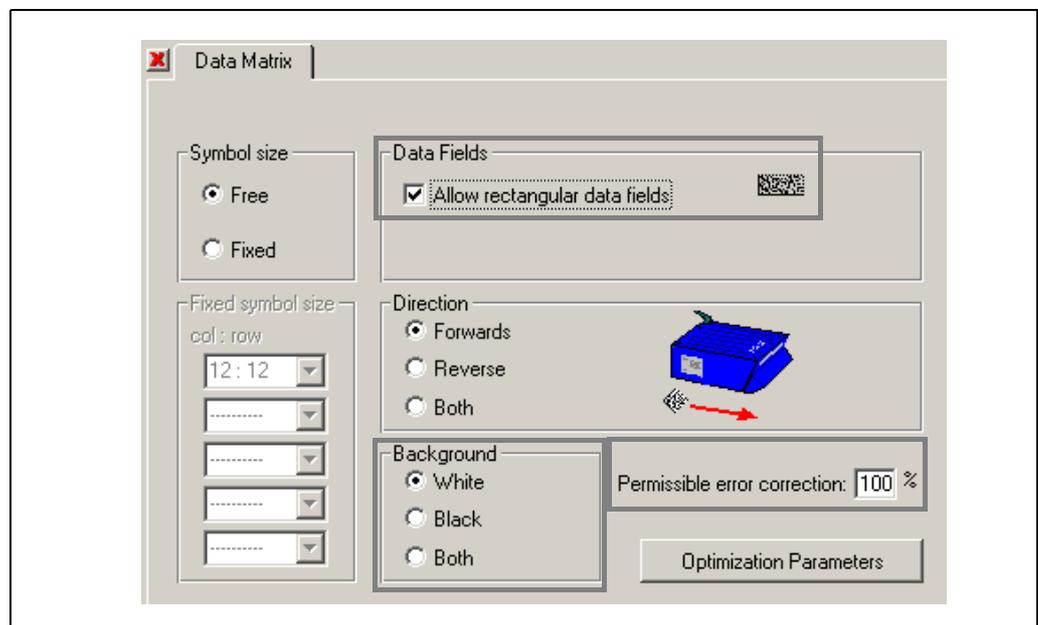


Fig. 10-9: CLV Setup: "DATAMATRIX" tab

3. Adapt the following parameter values:

Symbol size:

When the symbol size is set to free, the ICR reads all symbol sizes based on the specification of the DataMatrix ECC 200. In the DATA FIELDS group, additional evaluation characteristics can be defined if the symbol size is not square.

- Note** To increase reading performance, we recommend only permitting symbol sizes which are actually relevant for evaluation.
- If codes with between one and five different symbol sizes are to be read, click the FIXED radio button.
 - Select the individual symbol sizes in the drop-down lists of the input fields in the FIXED SYMBOL SIZE group.

Conveyor direction:

Depending on the direction in which the objects are conveyed through the illumination line (see *arrow under ICR*), the ICR forms the code image either correct or mirrored in the image memory. In the default setting, the ICR works with the relevant search algorithms in the direction “forwards”.

- If reading is carried out in only one or in both direction(s), click the corresponding radio button.

Permitted error correction:

In the default setting, 100 %, the ICR can use all additional error-correction data bytes (ECC data) available in the code without limitations as an aid when decoding. The number of data bytes actually used is thereby a standard for code quality (code print, compliance with tolerances etc.). The quality is higher as the number of used data bytes decreases. The ICR outputs this number in its absolute form as well as in a percentage ratio to the number of error-correction data bytes available in the code. This information is part of the reading diagnosis data “EC” in the reading result of the auxiliary interface (see [Fig. 6-25, Page 6-31](#)).

- Reduce the permissible error correction incrementally for higher code quality. Ensure that reading remains successful.

- Note** If the error correction exceeds the permissible percentage when reading a code, the code receives the ST=5 error status. In the default setting, it is output in the reading diagnosis via the auxiliary interface instead of the host interface.

Expenditure of the error correction

4. Click the OPTIMIZATION PARAMETERS button.
The OPTIMIZATION PARAMETERS tab opens ([Fig. 10-10, Page 10-22](#)).
5. Adapt the following parameter values if necessary:

Tolerate L-pattern errors:

The ICR can expand the search algorithm for detecting finder patterns for gaps in the code print of a code. The rest zone of the code must be at least five cell sizes in this case, however.

- Deactivate the checkbox.

Optimize only even patterns:

- Click this checkbox if curved structures in the same size as the symbol appear in the image.

Decoder retry on ...

The parameters listed here are used to increase the reading rate for difficult reading conditions (poor code quality).

... corrupted L-pattern:

When evaluating the image memory, the ICR uses a more complex search algorithm.

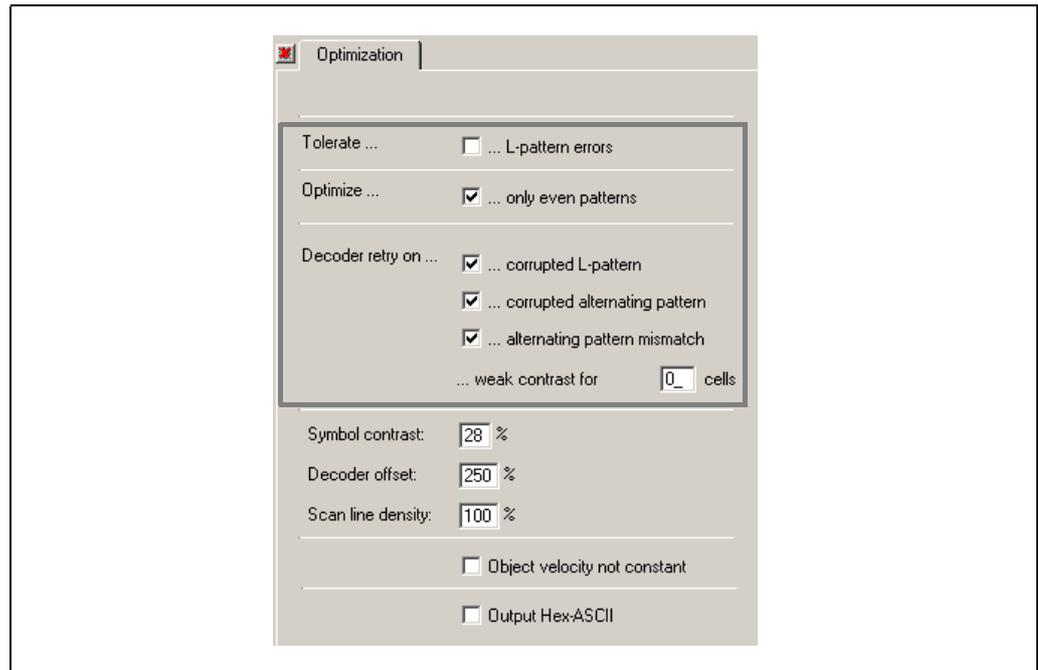


Fig. 10-10: CLV Setup: "Optimization Parameters" tab

... corrupted alternating pattern:

When evaluating the image memory, the ICR retries to determine the limit of the code data field.

... alternating pattern mismatch:

When evaluating the image memory, the ICR retries to determine the limit of the code data field with only one fixed symbol size.

- Deactivate the three checkboxes.

... weak contrast for:

For codes with weak contrast, the ICR can improve its reading performance by also using the "weak" cells for decoding. Weak cells are those which were deemed not clearly identifiable due to their grayscale value in the image memory, with the default settings of the decoder in effect. The number of weak cells showing up in the image memory and the additional weak cells with the greatest contrast difference are output by the ICR as part of the reading diagnosis data EC in the reading result of the auxiliary interface (see [Fig. 6-25, Page 6-31](#)). The maximum number of cells which can be set is 10 (default setting: 0).

- Set the number of weak cells to zero.

Limitation of the image field

6. Select the READING CONFIGURATION tab.

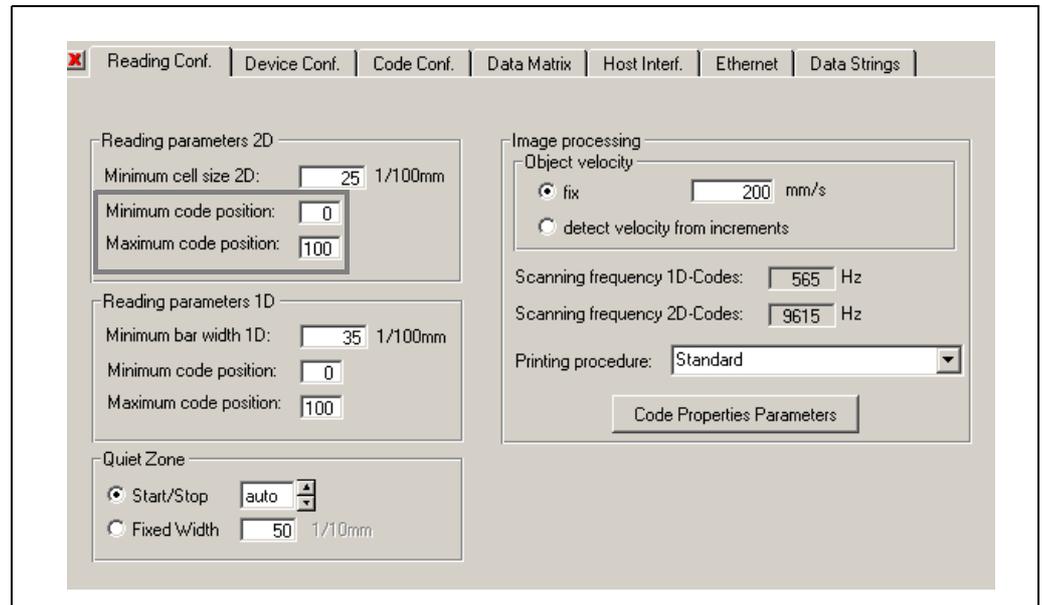


Fig. 10-11: CLV Setup: "Reading Configuration" tab

7. Adapt the following parameter values:

Reading parameters group: Min. and Max. code position (CP)

- When objects are fed through well and the code is in the same position on the objects, reduce the edges of the reading field accordingly. In the image memory, the ICR only needs to evaluate one reduced area. The count direction of the CP along the illumination line is shown in [Fig. 4-10, Page 4-8](#).

10.5 Configuring the ICR with command strings

The ICR can be parameterized and operated via the auxiliary interface and the host interface. Parameters that are not recognized by CLV Setup can also be used by following the conventions for command strings. This enables special devices, for example, to be parameterized and new ICR parameters to be configured which may not be recognized by the CLV Setup program if this is older than the software on the ICR. The CLV Setup user interface is based on the command language.

The command language accesses the ICR command interpreter directly. It must be used carefully. The commands sent to the ICR are executed immediately. Parameter values that have been changed by commands are initially only active in the current parameter set in the RAM of the ICR. Using a special command, the modified parameter set must also be copied to the EEPROM so that it can be stored permanently. Otherwise, the changes will be lost when the power supply is switched off.



The online mode of the Terminal Emulator in CLV Setup enables the ICR to be parameterized directly with command strings. [Fig. 10-12, Page 10-25](#) shows the initial screen of the Terminal Emulator with the command field and output window which shows how the PC and ICR communicate with each other.

1. Click  in the toolbar.
The Terminal Emulator window is then displayed. The ICR is in Reading mode.
2. Click PARAMETERIZE under DEVICE MODE.
The ICR cancels Reading mode. The “Device Ready“ LED is extinguished.
CLV Setup switches the ICR to the Parameterization mode by issuing an appropriate command.
In the Parameter mode, all commands begin with the number “3“.
3. Enter the desired command in the command field ① and press the [Return] key.
The command is then sent to the ICR.
With a few exceptions, the ICR replies to a command with correct syntax with an echo.
Example:
Entering “3?LT“ causes the ICR to output the parameter values of the reading pulse in encoded form in the output window ②.
4. Click the Reading Mode radio button to return to the READING MODE.
The “Device Ready“ LED lights up.

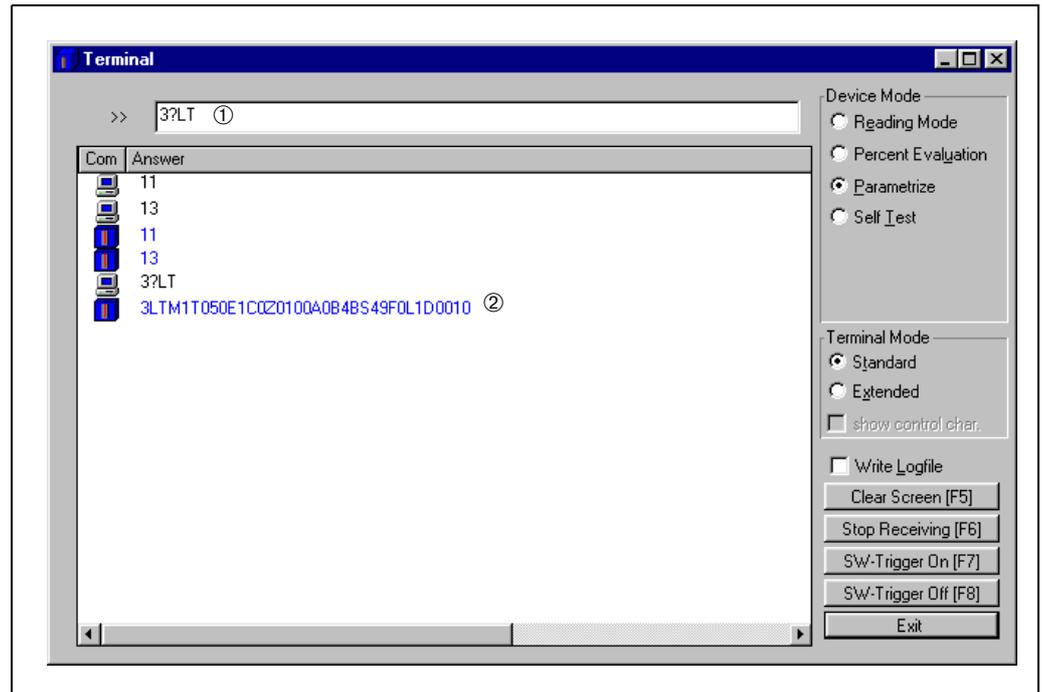


Fig. 10-12: CLV Setup: Entering commands in the Terminal Emulator

Note Changes that are made directly to parameter values in the ICR using command strings are only registered and displayed in CLV Setup after the current parameter set has been uploaded from the ICR.



A list of command strings is available on request.

Outputting command strings for all the parameter settings

You can output a list of all the parameter settings configured with CLV Setup in ASCII format. To do so, proceed as follows:

- In the menu bar, choose EXPORT PARAMETERS under ICR 85x.
Starting from the default settings, CLV Setup collects all the command strings required to parameterize the default configuration and customized settings.
The SELECT FILE NAME FOR PARAMETER EXPORT dialog box is displayed.
- Enter a file name and click the SAVE button.
CLV Setup saves the data as a text file in the directory shown.

You can open this text file using any Windows text editor.

If the commands are sent from the host/PLC to the CLV for configuration, note that "3 EEW" has to be sent as the last command to ensure that they are permanently transferred to the CLV (EEPROM).

10.6 Auxiliary tables

10.6.1 Calculating code length of a bar code

The code length of a bar code is the number of used characters in the printed code including the check digit (if present). This code length must be specified in CLV Setup.

If the code type of a bar code is known, the code length can be calculated by counting the bars and gaps. The relevant formulas are provided in [Table 10-4](#).

1. Count the bars and gaps as specified in [Table 10-4](#). Do not forget to include the start and stop characters.
2. Calculate the code length using the formula in the table.
3. Enter the value in CLV Setup as described in column 4 of the table.

Code type	Count	Calculation of code length ^{1) 2)}	Entry in CLV Setup
Code 39	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 10}{5}$	Calculated code length
2/5 Interleaved	Number of wide elements (bars and gaps)	$l_{\text{Code}} = \frac{\text{Number} - 1}{2}$	Calculated code length
EAN	Not applicable	13 characters (normal version) 8 characters (short version)	Activate 13-digit Activate 8-digit
UPC	Not applicable	12 characters (UPC A, normal version) 6 characters (UPC E, short version)	Activate version A Activate version E
Codabar	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 8}{4}$	Calculated code length
Code 128 (character set A)	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 10}{3}$	Calculated code length
EAN 128	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 10}{3}$	Calculated code length
Pharmacode	Number of bars	Number	Number = code length
<p>1. Check digit optional with Code 39, 2/5 Interleaved, Codabar. Check digit always integrated in printed bar code with EAN, UPC, Code 128, Code 93, EAN 128 (suppressed automatically when the ICR reading result is output)</p> <p>2. With only a few exceptions, every printed character to be decoded corresponds to an ASCII character. With Code 39 extended, Code 93, Code 128 and EAN 128, the number of characters in the data string of the ICR can be larger than the number of characters in the printed code because it comprises several character sets.</p>			

Table 10-4: Formulas for calculating the code length of a bar code

10.7 Special applications and procedures

10.7.1 Triggering the Teach-in match code 1 via the “Sensor 2” switching input

In Reading mode, the ICR compares up to two match codes with the codes it recorded in the reading pulse. The result status of the code comparison is signaled by the corresponding functional assignment via the “Result 1” and “Result 2” (“Result” LED) switching outputs and the beeper. The match codes can also be used as output filters for the host interface. In this case, when a “Good Read” occurs, the ICR only outputs those codes that have the same code type, code length, and data content as the match code(s).

A match code must be a code type which the ICR can evaluate and may contain a maximum of the following number of lines in the range 32 to 137 dec.:

- For 2-D codes (DataMatrix ECC 200), max. 1 556 data bytes
- For bar codes, max. 50 characters

Using the “Sensor 2” switching input, the ICR can:

- Teach in match code 1 via its optical interface (reading window) and store it permanently in the parameter set instead of entering it with the CLV Setup program. The code type, code length, and data content are entered in the parameter set
- Activate the code comparison. The status remains active until the power supply to the ICR is switched off

Before the match code can be read, a switch must be connected (see [Fig. 10-13](#)), the functional assignment of the switching input changed and Teach-in mode selected.

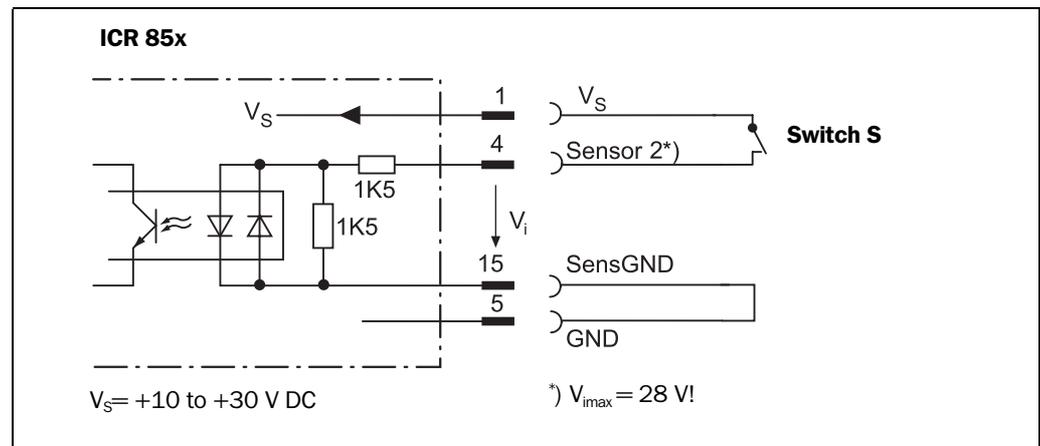


Fig. 10-13: “Sensor 2” configuration for triggering the teach-in match code 1

There are two modes for teaching in match code 1:

- Dynamic teach-in of match code 1:
Possible for bar codes with the SMART and standard decoders. The code type that corresponds to the match code must be activated for the evaluation in the ICR. The ICR must be pulsed manually so that it can read the match code. After the teach-in procedure has been successfully completed, the ICR still continues to output codes of all the code types that were previously enabled.
- Static teach-in of a bar code as match code 1 with/without Pharmacode:
The ICR only uses the standard decoder temporarily. It can also read a match code whose bar code type is implemented, but not yet enabled for evaluation. A reading pulse starts automatically at the start of the teach-in procedure. The ICR terminates the reading pulse once the teach-in procedure has been successfully completed.

In Reading mode, it only outputs bar codes which match the code type and length of match code 1.

All other bar code types are deactivated. To ensure that the match code is read reliably, the ICR temporarily sets the number of multiple reads to 30. The previous code configuration is kept if a match code is not detected during the teach-in procedure. Since the ICR can essentially interpret every bar code as a Pharmacode, the “static with Pharmacode“ variant should only be activated if this code is actually to be programmed (teach-in) as a match code. The Pharmacode in this case must comprise a minimum of 6 characters. Check whether the programmed Pharmacode is correct by uploading it from the ICR using the CLV Setup program!

With static teach-in, the ICR can optionally reset the daily operating data for each newly taught-in match code 1. This includes the following counters:

- Daily operating hours
- No. of reading intervals
- No. of good reads
- Max. reading interval duration
- Min. reading interval duration
- No. of no reads
- No. of match 1 (match code 1)
- No. of match 2 (match code 2)
- No. of no matches (neither match code 1 nor 2)

Once match code 1 has been programmed, the code comparison can also be activated with the CLV Setup program (either temporarily or permanently, depending on the download option). Activating the function with the program has a higher priority than with the “Sensor 2“ switching input. In this case, the switch must be open when the power supply to the ICR is switched on.

Match code 2 can only be defined and activated using the CLV Setup program or command strings, irrespective of the teach-in procedure.

Preparations for teach-in



1. Switch off the power supply to the CDB 420 or CDM 420 Connection Module.
2. Connect the switch in the CDB 420 or CDM 420 Connection Module at the “Sensor 2“ switching input of the ICR as shown in [Fig. 10-13, Page 10-27](#). Link the “SensGND“ and “GND“ signals.
3. **Open the switch!** (“Sensor 2“ switching input must be at zero current)
4. Connect the PC to the auxiliary interface of the ICR. For this purpose, connect a 3-core RS 232 data cable (null modem cable) to the internal 9-pin “Aux“ plug of the module (see [Chapter 5.5.7 “Connecting the PC“, Page 5-12](#)).
– or –
Connect the PC to the Ethernet interface of the ICR.
See [Chapter 5.5.6 Connecting the Ethernet interface, Page 5-10](#).
5. Switch on the power supply to the CDB 420 or CDM 420 Connection Module. After the ICR has been started and has successfully completed the self-test, it outputs a tone and then two consecutive tones shortly afterwards when the Reading mode is initiated. The “Device Ready“ LED lights up.
6. Start Windows and “CLV Setup“ on your PC (see [Chapter 10.3.3 “Starting “CLV Setup“, Page 10-6](#)).

7. Upload the parameter set that was last stored permanently on the ICR. CLV Setup displays the current values on the tabs.
8. If you have not already done so, save the parameter set as a configuration file “*.scl” in CLV Setup.

a) Dynamic teach-in procedure

Configuring the dynamic teach-in procedure:



- Accompanying measure: change the reading pulse for teach-in
1. Select the DEVICE CONFIGURATION tab.
 2. From the ASSIGNMENT drop-down list in the SENSOR 2 group, choose the MATCHCODE TEACH-IN option.
 3. Click the MATCH CODE PARAMETERS button.
The MATCH CODE PARAMETERS tab is then displayed.
 4. If necessary proceed as follows to activate the output filter in the CODE ACTIVE group:
 - Click the CODE #1 checkbox.
 - Click the FILTER FOR HOST OUTPUT checkbox.
 - Click the CODE #1 checkbox again.
The code comparison is now no longer permanently activated. The output filter, however, remains active.
 5. Select the DEVICE CONFIGURATION tab.
 6. Click the READING TRIGGER PARAMETERS button.
 7. Click the SERIAL INTERFACE radio button in the START OF READING INTERVAL group.
 8. Select the DEVICE CONFIGURATION tab.
 9. Click the RESULT OUTPUT PARAMETER button.
 10. In the dialog box under RESULT FUNCTIONS, choose the MATCH 1 option for Result 2 (LED “Result”) in the drop-down list.
 11. If 2-D codes (DataMatrix ECC 200) are being read, continue with Step 16.
 12. When reading bar codes, select the CODE CONFIGURATION tab.
 13. Activate the bar code type of the match code in the 1D-SYMBOLOGIES group.
 14. Click the corresponding EDIT button.
The tab of the selected code types is then displayed.
 15. In the CODE LENGTH group, click the FREE radio button.
 16. Perform a download to the ICR. This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
 17. Confirm the dialog box by selecting the PERMANENT save option.

Carrying out the dynamic teach-in procedure:

1. Click  in the toolbar.
The Terminal Emulator is launched. The ICR is in Reading mode.
2. **Close the switch** to connect the power supply to the “Sensor 2” switching input.
3. Click PARAMETERIZE under DEVICE MODE.
The ICR switches to Parameter mode.
4. Click READING MODE under DEVICE MODE.
The ICR returns to Reading mode and polls the condition of the “Sensor 2” switching input. It also activates code comparison at this time.

– or –

As an alternative to steps 3 and 4, switch the power supply to the connection module (ICR) off and on again. The ICR outputs two consecutive tones to indicate that it has switched to Reading mode.

5. **Open the switch** to interrupt the power supply to the “Sensor 2” switching input. The ICR activates teach-in mode for match code 1.
6. Click the SW-TRIGGER ON button or press [F7].
The ICR switches on the red illumination line, starts the reading interval and waits for the match code.
7. Present the match code at following reading distances:

ICR 850:	100 mm (3.94 in) for side reading window
	110 mm (4.33 in) for front reading window
ICR 852, ICR 855:	60 mm (2.36 in) for side reading window
	70 mm (2.75 in) for front reading window

 - Move the 2-D code sample through the illumination line using the conveyor system **evenly** (constant speed during reading!)
 - Keep bar code in the illumination line
8. Click the SW-TRIGGER OFF button or press [F8].
The ICR confirms that the read was successful by emitting a tone and then ends the reading interval. Match code 1 is now stored in the RAM.
9. **Close the switch** to reconnect the power supply to the “Sensor 2” switching input. The ICR saves match code 1 (code type, code length, and data content) permanently in the parameter set stored in the EEPROM.
It compares every bar code it reads with match code 1 until the power supply is switched off. In doing so, it outputs the result of the comparison via the “Result 2” output and “Result” LED with the predefined pulse length.
10. **Keep the switch closed.**
The ICR will activate teach-in mode again if you open the switch!

Replacing the match code:

To replace the current match code 1 with a new match code using the teach-in method, simply repeat Steps 5 to 9.

Checking the programmed match code in the ICR:

1. Switch the power supply of the connection module (of the ICR) off and on again.
2. Perform an upload from the ICR. This is done by clicking  in the toolbar.
3. Click the MATCH CODE PARAMETERS button on the DEVICE CONFIGURATION tab.
The MATCH CODE PARAMETERS tab is opened and shows the bar code type in the TYPE OF MATCH CODE group and the data content of match code 1 in the MATCH CODE group.

Resetting the reading pulse:

1. Select the DEVICE CONFIGURATION tab.
2. Click the READING TRIGGER PARAMETERS button.
3. Click the current option in the START OF READING INTERVAL group on the tab.
4. Perform a download to the ICR. This is done by clicking  in the toolbar.
5. Confirm the dialog box by selecting the PERMANENT save option.
The ICR then uses the reading pulse type that was set before the teach-in procedure.

For bar codes only! b) Static teach-in procedure for bar codes**Configuring the static teach-in procedure:**

1. Select the DEVICE CONFIGURATION tab.
2. Click the MATCH CODE PARAMETERS button.
The MATCH CODE PARAMETERS tab is then displayed.
3. Click the STATIC WITHOUT PHARMACODE, or STATIC WITH PHARMACODE to read a Pharmacode, in the METHOD OF TEACH-IN group.
4. If necessary, click the WITH COUNTER RESET option in the TEACH-IN group.
5. Select the DEVICE CONFIGURATION tab.
6. From the ASSIGNMENT drop-down list in the SENSOR 2 group, choose the MATCHCODE TEACH-IN option.
7. Select the MATCH CODE PARAMETERS tab.
8. If necessary proceed as follows to activate the output filter in the CODE ACTIVE group:
 - Click the CODE #1 checkbox.
 - Click the FILTER FOR HOST OUTPUT checkbox.
 - Click the CODE #1 checkbox again.
The code comparison is now no longer permanently activated. The output filter, however, remains active.
9. Select the DEVICE CONFIGURATION tab.
10. Click the RESULT OUTPUT PARAMETERS button.
11. On the tab under RESULT FUNCTIONS, choose the MATCH 1 option for Result 2 (LED “Result”) in the drop-down list.
12. Perform a download to the ICR. This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
13. Confirm the dialog box by selecting the PERMANENT save option.

Note Before you can use the static teach-in method, the parameter set in the RAM and EEPROM of the ICR must be identical. This is done with the PERMANENT saving option. If you select the TEMPORARY option instead, the ICR loads the default settings after the teach-in function has been carried out and the power supply switched off.

Performing the static teach-in procedure:

1. Click  in the toolbar.
The Terminal Emulator is launched. The ICR is in Reading mode.
2. **Close the switch** to connect the power supply to the “Sensor 2” switching input.
3. Click PARAMETERIZE under DEVICE MODE.
The ICR switches to Parameter mode.
4. Click READING MODE under DEVICE MODE.
The ICR returns to Reading mode and polls the condition of the “Sensor 2” switching input. It also activates code comparison at this time.

– or –

As an alternative to steps 3 and 4, switch the power supply to the connection module (ICR) off and on again. The ICR outputs two consecutive tones to indicate that it has switched to Reading mode.

5. **Open the switch** to interrupt the power supply to the “Sensor 2” switching input.
The ICR activates teach-in mode for match code 1.
The ICR switches on the red illumination line automatically, starts the reading interval and waits for the match code.

6. Keep the match code in the illumination line at following reading distances:

ICR 850:	100 mm (3.94 in) for side reading window
	110 mm (4.33 in) for front reading window
ICR 852, ICR 855:	60 mm (2.36 in) for side reading window
	70 mm (2.75 in) for front reading window

The ICR confirms that the read was successful by emitting a tone and then ends the reading interval. Match code 1 is now stored in the RAM.
7. **Close the switch** to reconnect the power supply to the “Sensor 2” switching input. The ICR saves match code 1 (bar code type, code length and data content) permanently in the parameter set stored in the EEPROM. It compares every bar code it reads with match code 1 until the power supply is switched off. In doing so, it outputs the result of the comparison via the “Result 2” output and “Result” LED with the predefined pulse length. If the ICR was not able to read the match code, the reading interval is terminated when the switch is closed. The previously set code configuration remains unchanged.
8. **Keep the switch closed.**
The ICR will activate teach-in mode again if you open the switch!

Replacing the match code:

To replace the current match code 1 with a new match code using the teach-in method, simply repeat steps 5 to 7.

Checking the programmed match code in the ICR:

Proceed as described in Steps 1 to 3 in *“a) Dynamic teach-in procedure”*, [Page 10-29](#).

Activating/deactivating the code comparison via the “Sensor 2” switching input

- Prerequisite: switching input “Sensor 2” is assigned the function MATCHCODE TEACH-IN

– Activating the code comparison function:

1. Close the switch before switching on the power supply to the ICR.
2. Switch on the supply voltage.
The ICR activates the code comparison function.
3. Do not open the switch while the ICR is starting up.

– Deactivating the code comparison function:

1. Switch off the power supply to the ICR.
2. Open the switch.
3. Switch on the supply voltage.
The ICR starts Reading mode without the code comparison.

Assigning result functions to the “Result 1”, “Result 2” (“Result” LED) switching outputs and beeper

The ICR can output the result of the code comparison in the following functions:

- No match (code does not match either match code)
- Match 1 (matches match code 1)
- Mismatch 1 (does not match match code 1)
- Match 2 (matches match code 2)*

- Mismatch 2 (does not match match code 2)^{*)}
- Match 1 or 2 (matches match code 1 or 2)
- Match 1 and 2 (matches match code 1 and 2)^{*)}

^{*)} only relevant if match code 2 is active



When configuring the Teach-in function for match code 1, define the following settings:

1. Select the DEVICE CONFIGURATION tab.
2. Click the RESULT OUTPUT PARAMETERS button.
3. On the tab, select the desired option for Result 1, Result 2 and beeper from the RESULT FUNCTIONS drop-down list.
4. Perform a download to the ICR. This is done by clicking  in the toolbar. Confirm the dialog box by choosing the PERMANENT storage option.

10.7.2 Auxiliary input via the auxiliary interface

If the ICR cannot scan a 2-D code/bar code in Reading mode (e.g. if there is no code on the object), the data content of the code can be sent subsequently to the host by using the AUXILIARY INPUT option. In this way, the sequence of reading results can be completed if necessary.

The auxiliary input function uses the auxiliary interface of the ICR exclusively and features two options:

- manual entry of the data content via the keyboard of a connected terminal or PC (Terminal Emulation function)
- entry of the bar code using a handheld reader. Forwarding to the ICR via an internal or external decoder of the device

[Fig. 10-14, Page 10-33](#) shows the flow of auxiliary input.

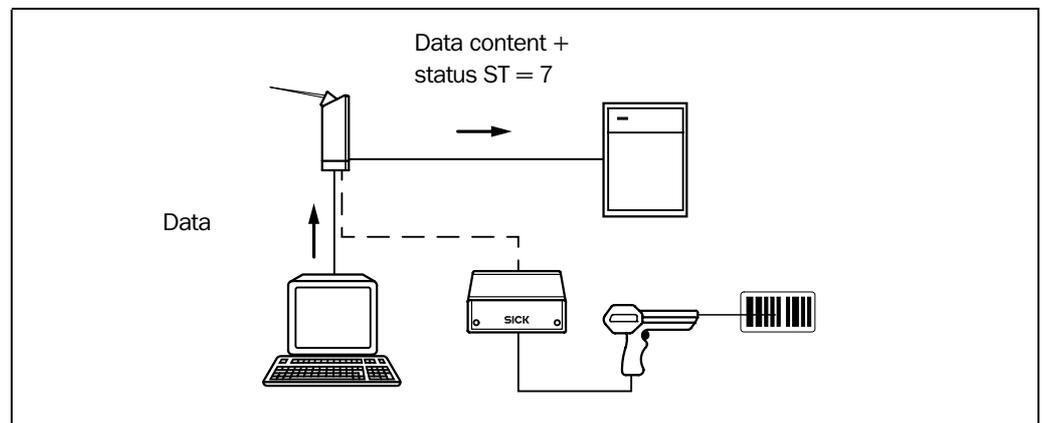


Fig. 10-14: Auxiliary input via the auxiliary interface of the ICR

The ICR sends the data content of the code that it receives via the auxiliary interface to the host in the same format as the other reading results on the host interface.

Each data string can contain data content with the following length:

- for a 2-D code (DataMatrix ECC 200), max. 1,556 data bytes
- for a bar code, max. 50 characters.

The ICR automatically enters the status $ST = 7$ if the error status has been enabled for transmission. The values of the other reading diagnosis data in the data string are of no significance.



To enable the ICR to receive the data content of the code via the auxiliary interface, you must switch the operating mode of the interface to “Auxiliary Input”.

1. Connect the PC to the **auxiliary interface** (port) of the ICR using a 3-core RS 232 data cable (null modem cable) (CDB 420 or CDM 420: connect the PC to the internal, 9-pin “Aux” plug). See [Chapter 5.5.7 “Connecting the PC”, Page 5-12](#).

– or –

Connect the PC to the Ethernet interface of the ICR.

See [Chapter 5.5.6 Connecting the Ethernet interface, Page 5-10](#).

2. Start “CLV Setup” on your PC.
(see [Chapter 10.3.3 “Starting “CLV Setup””, Page 10-6](#))
3. Choose the AUXILIARY INTERFACE tab.
4. Choose the AUXILIARY INPUT option from the drop-down list.
5. Perform a download to the ICR. This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
6. Confirm the dialog box by selecting the TEMPORARY save option.

The auxiliary interface is now temporarily set to the “Auxiliary Input” mode.

Entering a code using the Terminal Emulator in CLV Setup

1. Click  in the toolbar.
The Terminal Emulator window is then displayed.
The ICR is in Reading mode.
2. Click the EXTENDED radio button in the TERMINAL MODE group.
The start and stop characters used by the Terminal Emulator are displayed at the top of the screen, on the left and right of the text input field.
[Fig. 10-15, Page 10-35](#) shows the Terminal Emulator window in extended mode.
3. Use the drop-down lists to set the start and stop characters to NUL.
4. Enter the data content of the code (character string) via the keyboard.
Use the backspace key to correct input errors.
The data content may not contain control characters.
5. Press the [RETURN] or [ENTER] key.
The ICR then interprets all additional characters as a new data string.
CLV Setup transmits the character string to the ICR and deletes the entry in the text field. The ICR does not return an echo.
6. The ICR sends immediately the data received from the PC to the host via the host interface, independent of an active reading pulse.

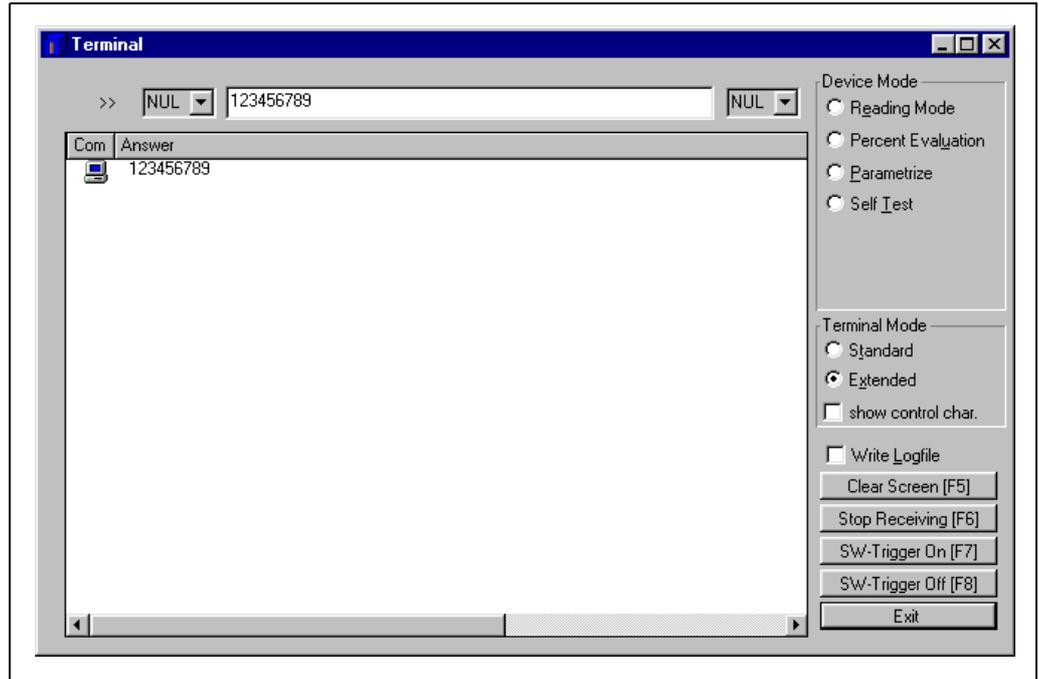


Fig. 10-15: CLV Setup: Auxiliary input via the Terminal Emulator

Entering a code using a terminal/PC keyboard

1. Connect the terminal /PC with Terminal Emulation program to the auxiliary interface on the ICR (via CDB 420 or CDM 420). For the pin assignment, see [Chapter 5.5.7 “Connecting the PC”, Page 5-12.](#)
2. Set the communication parameters and data output format as shown in [Table 10-5.](#)

Parameter	Value
Data transmission rate	9,600 bd
Data bits	8
Parity	none
Stop bits	1
Data output format	Data terminator e.g. 1234 CR

Table 10-5: Communication parameter settings for the terminal/PC for the auxiliary input

3. Enter the data content of the code via the keyboard.
The terminal transmits the individual characters to the ICR immediately.
Use the backspace key to correct input errors.
4. Terminate the data content with the control character <CR>.
The ICR then interprets all further characters as a new data string.
The ICR ignores other control characters. The data content itself must not contain any control characters.
5. The ICR sends immediately the data received from the PC to the host via the host interface, independent of an active reading pulse.

For bar codes only! Entering bar codes using a handheld scanner with integrated decoder

1. Connect the handheld scanner with decoder to the auxiliary interface of the ICR (via CDB 420 or CDM 420). For the pin assignment, see [Chapter 5.3 "Pin assignments", Page 5-4](#).
2. Set the data format and communication parameters on the handheld scanner as shown in [Table 10-5](#).
3. Read the code with the handheld scanner.
The ICR sends immediately the data received from the PC to the host via the host interface, independent of an active reading pulse.

If you connect a SICK Hand-held Scanner from the IT 38xx/46xx/48xx/58xx series, set the communication parameters and data output (data and terminator) as shown in [Table 10-6](#).

Parameter	Value
Data transmission rate	9,600 bd
Data bits	8
Parity	No
Stop bits	1
Data interface	RS 232
Prefix (Header)	Clear all Prefixes
Suffix (Terminator)	CR

Table 10-6: Communication parameter settings for the SICK Hand-held Scanner from the IT 38xx/46xx/48xx/58xx series

10.7.3 Connection to Profibus DP

See *"CMF 400-1001 Field Bus Gateway for Profibus DP" Operating Instructions (no. 8 010 462, English version)*

10.7.4 Connection to DeviceNet

See *"CMF 400-2101 Field Bus Gateway for DeviceNet" Operating Instructions (order no. 8 010 464, English version)*

10.7.5 Building up a CAN scanner network

See *"Application of the CAN interface" Operating Instructions (order no. 8 009 180, English version)*

10.8 Replacing an ICR (transferring the parameter set)

Replace an ICR and transfer the current parameter set to the new device by downloading the parameters from CLV Setup.

The parameter set can only be transferred between identical device types (e.g. from one ICR 85x to another ICR 85x etc.).

10.8.1 Transferring the parameter set using a download



To transfer the parameter set using a download, you must connect a PC running the CLV Setup software to the replacement device. The parameter set of the ICR that is to be replaced must be available as a configuration file in CLV Setup, otherwise the device must be parameterized from scratch.

1. Switch off the power supply of the CDB 420 or CDM 420 Connection Module (of the ICR).
2. Disconnect the ICR connector from the CDB 420 or CDM 420.
3. Remove the ICR from the bracket.
Before doing so, mark the position and alignment on the bracket/station.
4. Install, align, and connect the replacement device.
5. Connect the PC to the auxiliary interface of the ICR using a 3-core RS 232 data cable (null modem cable) (CDB 420 or CDM 420: connect the PC to the internal, 9-pin "Aux" plug). See [Chapter 5.5.7 "Connecting the PC", Page 5-12](#).

– or –

Connect the PC to the Ethernet interface of the ICR.

See [Chapter 5.5.6 Connecting the Ethernet interface, Page 5-10](#).

6. Switch on the power supply to the CDB 420 or CDM 420.
After the ICR has been started and has successfully completed the self-test, it outputs a tone and then two consecutive tones shortly afterwards when the Reading mode is initiated. The "Device Ready" LED lights up.
7. Switch on the PC and start Windows.
8. Start "CLV Setup".
If the communication parameters on the PC and ICR are identical, CLV Setup uploads the parameter set from the ICR and displays the values on the tabs.
9. Open the archived parameter set as a configuration file "*.scl" in CLV Setup and download it to the ICR.
10. Confirm the dialog box by choosing the TEMPORARY storage option.
11. Check whether the ICR reads the bar codes correctly.
Correct the parameter settings if necessary.
12. Finally, download the tested parameter set to the ICR and save it with the PERMANENT storage option.
The parameter set is transferred permanently to the replacement device.
13. Save the modified parameter set as a new configuration file in CLV Setup.

Troubleshooting

If the software version on the replacement device is older than the version on the old ICR (e.g. new device is from warehouse stock), the parameter set transferred may contain coded parameters or parameter values that cannot be interpreted by the older software. The new device, however, outputs an error message in CLV Setup for each of these parameters/values when the parameter set is downloaded.

- Check whether all of the parameter settings used are necessary to configure the ICR for the current reading application. If necessary, replace the software version in the new device.

If the software version on the new device is more recent than that on the old ICR, the default settings in the imported parameter set will include parameters that were not contained in the old version.

- Upload the parameter set in CLV Setup and check whether the new parameters are relevant for configuring the ICR for the current reading application. If necessary, change the parameter values and download the parameter set to the ICR again. Save the new parameter set as a configuration file in CLV Setup.

See also [Chapter 10.3.10 "Unknown parameters", Page 10-11](#).

10.9 Accessories

10.9.1 Installation accessories

Part No.	Description	Fig.
2 025 491	Mounting bracket with installation accessories	Fig. 10-16, Page 10-42

Table 10-7: Accessories: Installation accessories

10.9.2 Connection modules

Part No.	Type	Description	Design
1 023 885	CDB 420-001	Connection module for one ICR 85x, with: <ul style="list-style-type: none"> • 1 x 15-pin D-Sub HD device socket • 4 x plastic cable grips (dia. 4.5 to 10 mm (0.18 to 0.39 in)) • terminal strips (signal distributors) for wiring the data and functional interfaces • 1 x internal 9-pin D Sub "Aux" plug • 5 x LED (status indicators) • polycarbonate housing, enclosure rating max. IP 65 • operating temperature $-35^{1)}$ to $+40$ °C ($+32$ to $+104$ °F) • operating voltage 10 to 30 V DC 	
1 024 305	CDB 420-101	As CDB 420-001 but with: <ul style="list-style-type: none"> • 2 x plastic cable grips (dia. 4.5 to 10 mm (0.18 to 0.39 in)) • 2 x M12 plug connection (1 x plug, 1 x socket) 	
1 025 362	CDM 420-0001	Connection module for one ICR 85x, with: <ul style="list-style-type: none"> • 1 x 15-pin D-Sub HD device socket • 6 x plastic cable grips (dia. 4.5 to 10 mm (0.18 to 0.39 in)) • terminal strips (signal distributors) for wiring the data and functional interfaces • 1 x internal 9-pin D Sub "Aux" plug • 5 x LED (status indicators) • polycarbonate housing, enclosure rating max. IP 65 • operating temperature $-35^{1)}$ to $+40$ °C ($+32$ to $+104$ °F) • operating voltage 10 to 30 V DC, power consumption 0.5 W without ICR 	
1) Without any mounting or electrical installation work, otherwise -20 °C (-4 °F)			

Table 10-8: Accessories: Connection modules CDB 420/CDM 420

10.9.3 Extensions for connection modules

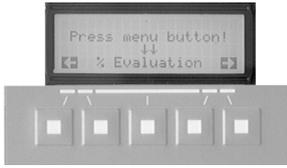
Part No.	Type	Description	Design
1 023 850	CMC 400-101	Parameter memory (Connection Module Cloning) as plug-in module for the CDB 420 or CDM 420 Connection Module. Storage of parameter set for ICR 85x (from firmware version V 1.70). Rotary code switches for activating the network mode of the ICR 85x. Operating temperature 0 to +40 °C (+32 to +104 °F), operating voltage 10 to 30 V DC via CDB 420 or CDM 420, power consumption 0.5 W.	
2 029 466	CDM 400	Display module (Connection Display Module), 4 x 20 digits (LCD) with keyboard in optional cover for the CDM 420 Connection Module. Representation of reading results, reading diagnosis data and messages from the ICR 85x (from firmware version V 1.34). Connection to the CDM 420 via ribbon cable. Operating temperature 0 to +40 °C (+32 to +104 °F), operating voltage 18 to 30 V DC via CDM 420, power consumption 1 W. Prerequisite: CMC 400-101 parameter memory for controlling the display.	
2 029 468	CMP 400	Power Supply Module (Connection Module Power) as plug-in module for the CDM 420 Connection Module. Power supply for ICR 85x from an AC power line. Input 100 to 250 V AC/50 to 60 Hz, output 24 V DC, max. 10.8 W (short-circuit proof). Connection to the CDM 420 via ribbon cable. Operating temperature 0 to +40 °C (+32 to +104 °F).	
1 026 241	CMF 400-1001	Field bus gateway (Connection Module Fieldbus) as plug-in module for the CDM 420 Connection Module. For connecting one ICR 85x (from firmware version V 1.70) to Profibus-DP (Slave) via RS 232 data interface. With 9-pin D Sub socket on front panel for bus connection (enclosure rating IP 20) and 5-core terminal strip for connecting 2 digital inputs and 2 digital outputs. Connection to the CDM 420 via connector, operating temperature 0 to +40 °C (+32 to +104 °F), operating voltage 18 to 30 V DC via CDM 420, power consumption 2 W.	
1 026 643	CMF 400-1101	as CMF 400-1001, but enclosure rating max. IP 65	—
1 026 242	CMF 400-2101	Field bus gateway (Connection Module Fieldbus) as plug-in module for the CDM 420 Connection Module. For connecting one ICR 85x (from firmware version V 1.70) to Device-Net (Slave) via RS 232 data interface. With shielded 5-pin M12 plug on front panel for bus connection (enclosure rating max. IP 65) and 5-core terminal strip for connecting 2 digital inputs and 2 digital outputs. Connection to the CDM 420 via connector, operating temperature 0 to +40 °C (+32 to +104 °F), operating voltage 18 to 30 V DC via CDM 420, power consumption 2 W.	
6 029 030	—	Profibus plug, IP 65, for CMF 400-1101	—

Table 10-9: Accessories: Extensions for connection modules CDB 420/CDM 420

10.9.4 Cables and plug-in connections

Part No.	Description	Wires	Length	Connection
6 010 075	Extension cable for data and functional interfaces, dia. 6.5 mm (0.27 in), shielded, with 15-pin D-Sub HD socket and plug	15	2 m (6.56 ft)	ICR 85x to CDB 420/CDM 420
6 010 137	Connection cable for data and functional interfaces, dia. 6.5 mm (0.27 in), with 15-pin D-Sub HD socket and one open end (stripped), shielded	15	2 m (6.56 ft)	ICR 85x to non-SICK power supply
2 014 054	RS 232 data cable (null modem cable), dia. 5 mm (0.2 in), shielded, with two 9-pin D-Sub sockets (pin 2 (Rx) and pin 3 (Tx) crossed)	3	3 m (9.84 ft)	PC to CDB 420/CDM 420
6 010 088	Data cable, dia. 6.6 mm (0.27 in), shielded, for connections up to 3 m (9.84 ft)	15 x 0.09 mm ² (28 AWG)	Bought to size	Free wiring
6 007 508	Data cable, dia. 8.5 mm, twisted pair, shielded	2 x 2 x 0.23 mm ² (24 AWG)	Bought to size	SICK network (RS 485)
6 009 438	D-Sub connector housing (metal) for 9-pin or 15-pin HD inserts			
6 007 335	D-Sub connector insert, 9-pin socket connector			
6 010 019	D-Sub connector insert, 15-pin HD socket connector			
6 010 020	D-Sub connector insert, 15-pin HD pin connector			
6 026 083	Ethernet data cable (patch cable), shielded, with two RJ 45 plugs (grey) to connect the ICR to the Ethernet	8	3 m (9.84 ft)	ICR to Ethernet (network)
6 026 084	Ethernet cross-over cable, shielded, with two RJ 45 plugs (red) to connect the ICR to the network card of the PC	8	3 m (9.84 ft)	ICR to PC

Table 10-10: Accessories: Cables and plug-in connections

10.9.5 Reading pulse generators



The SICK catalog "SENSICK Industrial Sensors" (order no. 8 006 530, English version) contains a large selection of photoelectric switches and photoelectric proximity switches as well as the associated accessories (brackets, connection cables).

10.9.6 Incremental encoder

Part No.	Description
2 022 714	Incremental encoder with friction wheel, resolution 10 mm (0.39 in) per pulse, max. 100 KHz, operating voltage 18 to 28 V DC, operating temperature 0 to +70 °C (+32 to +158 °F). With mounting bracket and accessories, connection cable 10 m (32.8 ft) with M12 socket and open end

Table 10-11: Accessories: Incremental encoder

10.9.7 Test pattern

Part No.	Description
8 010 754	Special print on card. Patterns with several resolutions to adjust the ICR 85x. Included in the scope of delivery.

Table 10-12: Accessories: Test pattern

10.10 Dimensional drawings of the accessories

10.10.1 Mounting bracket (for an ICR)

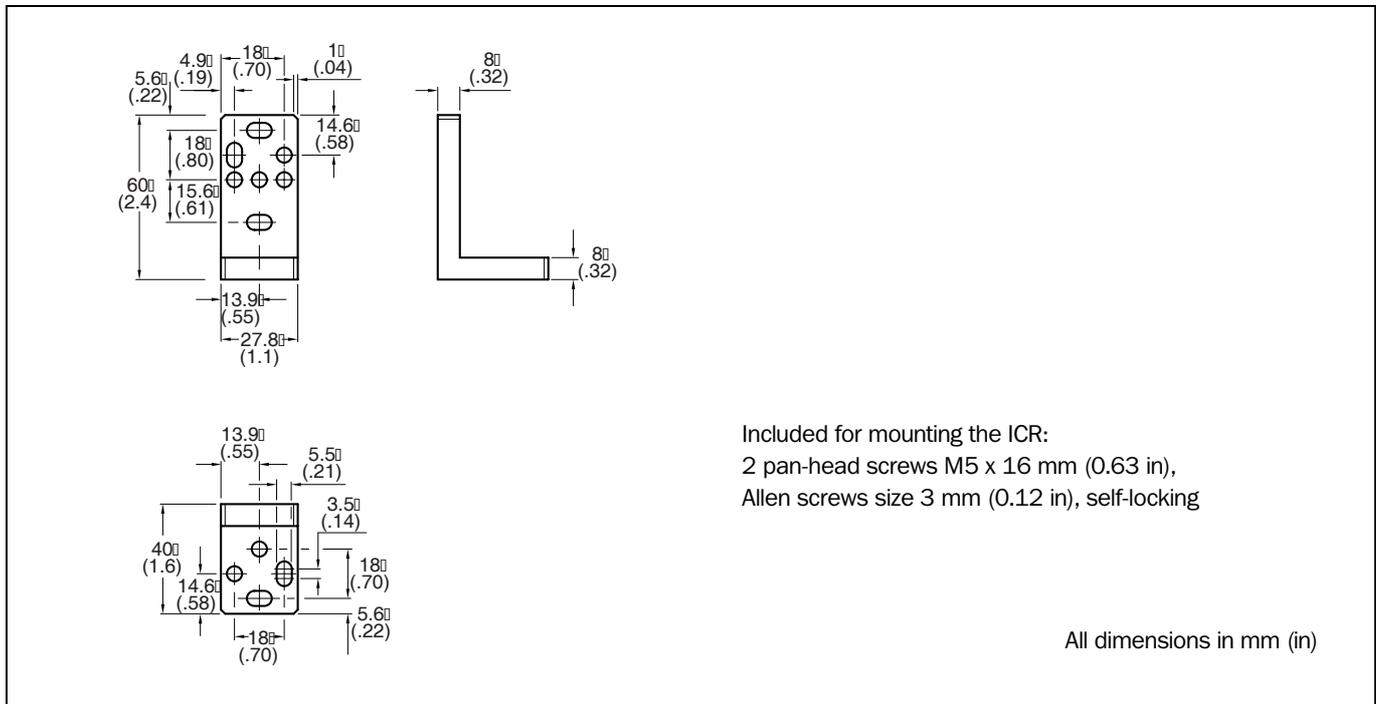


Fig. 10-16: Dimensions of the mounting bracket no. 2 025 491

10.11 Supplementary documentation

Part No.	Title	Language	Contents
8 010 001	“CDB 420 Connection Module“ Operating Instructions	German/ English	Description for connecting the ICR to the host/PLC/sensor via the CDB 420 Connection Module
8 010 004	“CDM 420 Connection Module“ Operating Instructions	German/ English	Description for connecting the ICR to the host/PLC/sensor via the CDM 420 Connection Module
8 010 002	“CMC 400 Connection Module Cloning“ Operating Instructions	German/ English	Description for setting up the module in the CDB 420 or CDM 420 Connection Module
8 010 372	“CMD 400 Connection Display Module“ Operating Instructions	German/ English	Description for setting up the module in the CDM 420 Connection Module
8 010 365	“CMP 400 Power Supply Module“ Operating Instructions	German/ English	Description for installing the module in the CDM 420 Connection Module
8 010 462	“CMF 400-1001 Field Bus Gateway for Profibus-DP“ Operating Instructions	English	Description for installing and setting up (configuration) the module in the CDM 420 Connection Module
8 010 464	“CMF 400-2101 Field Bus Gateway for DeviceNet“ Operating Instructions	English	Description for installing and setting up (configuration) the module in the CDM 420 Connection Module
8 009 180	“Application of the CAN interface“ Operating Instructions	English	Description of building a CAN scanner network (electrical connection, configuration of the ICR, functions) and the integration into a CANopen network.
On request	Commando strings	English	Description of the ICR command strings

Table 10-13: Supplementary documentation

10.11.1 CLV Connect (from version 1.9)

Diagrams showing you how to connect the CDB 420 and CDM 420 Connection Modules are also available in the “CLV Connect“ PC program. This software is available on the “Manuals & Software“ CD, which is included in the scope of delivery of the ICR. The software can also be downloaded from the SICK home page (www.sick.com) at “Service&Support/Downloadpool“. It can be called up using a standard HTML browser (e.g. Internet Explorer™).

10.12 Glossary

For additional terms, see also *Online help* “CLV Setup Help”.

1-D code (bar code)

Field of parallel, dark bars and light gaps which can be applied to the medium (base) by any of several printing procedures following a certain specification. A corresponding number and combination of bars and gaps (elements), which can be read by a machine, result in an alphanumeric character which can be read by the user. Since all of the encoded information, framed by start and stop characters, is available in one dimension and is usually scanned line-by-line, these bar codes are called linear codes. The various types of bar code differ in their selection of characters which can be encoded, structure (number of elements per character, character count, start/stop characters, check character), the information density and the print tolerances. The length of the code bars and gaps is irrelevant in terms of the information content, but is relevant for scansability.

2-D code

In a two-dimensional code, the information is arranged more densely, using dark and light cells (squares) in a matrix. The vertical and horizontal arrangement of the cells is determined using the data-content specification in reference to the middle and side edge reference points. For error-correction purposes when reading, a mathematical method provides the code with a redundancy feature (e.g. error-correction code words for DataMatrix ECC 200). The omnidirectional reading of 2-D codes is aided by image processing.

Aspect ratio

For bar codes, ratio of the code height (bar length) to the code length (number of characters). The SMART decoder can read bar codes with extremely small aspect ratios.

Auxiliary input

Special function of the ⇨ auxiliary interface. Used to enter code data subsequently in order to complete reading results sent to the host.

Auxiliary interface

Auxiliary interface (RS 232) on the ICR with fixed data output format. Used to connect the “CLV Setup“ program to the ICR so that it can operate and configure the device. Also used to output ⇨ system and error messages. Can be assigned various functions. The communication of the auxiliary interface can also be routed via the Ethernet interface (port 2111).

CAN interface

Used to establish a quick SICK-specific CAN scanner network with various functions (e.g. multiplexer, master/slave) or for integration into existing CAN networks in accordance with the CANopen protocol. In Remote mode, using CLV Setup, you also can access to the ICR for operating and parameterization via the CAN interface (network).

Capture range

Zone around a moving code created by the ICR using the increment management and code position comparison functions. Enables codes with identical content and code type to be separated.

CLV Setup

PC program which runs under Windows 95™/98™, Windows NT4.0™, Windows 2000™ and Windows XP™. Used for offline parameterizing (adjustment to the reading application at hand) and the online operation of the ICR. By ⇨ uploading and ⇨ downloading, the ⇨ parameter set to be processed is exchanged with the ICR.

CLV Setup Help

Online help function that provides support for using the “CLV Setup“ program. The help function contains explanations of the ICR parameters and their valid entries. Can be launched directly from CLV Setup in an HTML browser such as “Internet Explorer™“.

Code geometry

Length and height dimensions of the code.

Code position (CP value)

Position of the first dark bar in a detected bar code along the ⇨ red illumination line. Calculated by the ICR in the image memory and can be used, for example, to separate bar codes with identical data contents. The active evaluation range in the illumination line can be restricted for ⇨ decoding purposes by specifying the maximum and minimum CP value for the application.

Command strings, commands

ICR user interface - alternative to the “CLV Setup“ program. Basic, yet clearly structured command language for modifying the ICR parameter sets online. Accesses the ICR command interpreter directly. Special programming activities are required to use the command strings from the host. CLV Setup is based on the command strings.

Configuration file

File in the “CLV Setup“ program which archives the entire ⇨ parameter set of the ICR. Can be printed out in the form of a table.

Data forwarding

Option of forwarding data transmitted by the host transparently to a terminal via the ICR using an identifier. Data can also be forwarded in the opposite direction. Furthermore, this function also allows data received on one of the serial interfaces to be output again straight away on one of the same interfaces (echo). Application: forwarding reading results or reading pulse commands in pass-through mode, e.g. in a master/slave network.

Data output string

Structured data telegram ⇨ in the reading result output by the ICR on the ⇨ host, CAN or Ethernet interface (port 2112). The structure of the data string is flexible and can be adapted to a large extent to the subsequent data processing task. The data output format of the ⇨ auxiliary interface, on the other hand, cannot be changed.

Decoder, decoding

Code-type-specific evaluation routine for reconstructing the read code in electronic form in order to decode its data content.

Download

Method of transferring the ⇨ parameter set that was modified with the ⇨ CLV Setup program offline from the PC to the ICR. CLV Setup either always transfers a complete copy to the memory (RAM) of the ICR (DOWNLOAD TO CLV) or just the parameter previously processed using the context menu of the right mouse button (DOWNLOAD PARAMETER) or all parameters of the displayed tab (DOWNLOAD PARAMETERS OF THIS VIEW). You can overwrite the existing parameter set in EEPROM of the ICR by choosing the "Permanent" save option

Error messages

Messages in ⇨ plain text or coded (4-digit) that are used to identify a malfunction on the ICR in Reading mode. The messages are output via the auxiliary interface only. Exception: ST=3 (device error), which is also output on the host, CAN oder Ethernet interface (port 2112). The error messages can be displayed in the Terminal Emulator of the CLV Setup program if requested by the user.

Error status

Identifier output with the reading result by the ICR for errors that were diagnosed while the code was being read. The entry for the host interface is made in the "Reading data" field of the ⇨ data output string and must be enabled using the parameters (disabled by default in the ICR 85x).

Ethernet interface

Data interface with high transmission rate (10 Mbit/s).

ICR uses this to output the content of a reading pulse stored in the image memory via FTP for diagnosis if reading problems occur. It can also be used for parameterizing with CLV Setup (TCP/IP) instead of using the auxiliary interface (port 2111) or to output the reading result instead of using the host interface (port 2112).

Focus position

Distance of the focal point of the red illumination line (laser beam) in front of the reading window. Creates a distance-specific depth of field (DOF) via the optical components of the ICR, in which the bar code can be scanned.

Functional interfaces

Switching inputs and outputs on the ICR.

Good Read

The ICR detected a code or the required number of codes specified by the evaluation parameters during the ⇨ reading pulse.

Header

Data block in the reading result on the ⇨ host, CAN or Ethernet interface (port 2112). Used as a header in the ⇨ data output string for the subsequent data content of the bar codes. Contains up to 10 elements, consisting of reading diagnosis data and/or constants (control characters, letters, digits), depending on the configuration. The "Header" block is empty in the default setting of the ICR 85x.

Host interface

Main data interface on the ICR with configurable data output format. Used to output the ⇨ reading result in telegram form to the host/PLC. Integrates the ICR in the current SICK

network (RS 485) or builds a master/slave arrangement. Works as a gateway with the SICK-specific CAN scanner network. Can be physically switched to RS 232 or RS 422/485. The host interface supports various transfer protocols. It can also be used to parametrize the ICR with CLV Setup. The communication of the host interface can be routed via the Ethernet interface (port 2112).

Increment management

Used in certain applications to separate codes with identical contents that move during the reading procedure and assign them to the objects.

Master/slave configuration

Special arrangement for connecting up to max. 10 ICRs to one reading station (e.g. left/right read) using the CAN interface. Thanks to the master, the entire network appears as one device to the host.

Multiple read

Variable number of reads which must provide identical reading results of the same bar code before the ICR outputs the result.

No Read

The ICR failed to detect a code or the required number of codes specified by the evaluation parameters during the ⇒ reading pulse.

No Read format

Special, parameterizable data block as a substitute for codes, which were expected but not detected, in the data output string on the host, CAN or Ethernet interface (port 2112) for ⇒ no reads. Comprised of the reading data with/without a defined error string or suppressed completely. In the default setting the ICR outputs the reading data with the "NOREAD" error string as the no read format.

Parameter set

Data record used to initialize and activate the functions implemented in the ICR. With ⇒ downloading and ⇒ uploading, the parameter set is transferred from CLV Setup to the ICR or from the ICR to CLV Setup.

Percentage evaluation

Special operating mode in which the quality of the bar code reads (but not the bar codes) is assessed statistically. The bar codes must be stationary. The ICR carries out 100 reads and evaluates the reading quality. It then outputs the reading results on the ⇒ auxiliary interface every 2 sec. together with the ⇒ reading diagnosis data.

Plain text

Legible form of an ICR message. The ICR outputs special messages in coded form, e.g. the result of the self-test is represented as two digits.

Reading range (DOF)

Depth of field on both sides around the focal point of the red illumination line on the reading level. The extent of the reading range depends on the resolution and reading distance.

Reading data

Data block in the reading result of the ⇨ host, CAN or Ethernet interface (port 2112), which presents the code content. Contains up to 10 elements, consisting of reading diagnosis data, reading data and/or constants (control characters, letters, digits), depending on the configuration. The reading diagnosis data and constants be grouped around the code content as desired. These are used as separators between the data contents of several codes. The “Reading data“ field only contains the “code content“ block in the ICR 85x default setting.

Reading diagnosis data

Data directly derived from the reading procedure by the ICR. This data enables the quality of the 2-D code read to be assessed. The data is always output on the ⇨ auxiliary interface together with the reading result. Only output on the host, CAN or Ethernet interface (port 2112) if enabled on the DATA STRINGS tab in the CLV Setup program (disabled by default for ICR).

Reading field height

Length of the red illumination line that is available for detecting the code in the reading plane.

Reading interval

Timeslot in which the ICR activates the laser diode and attempts to detect valid bar codes from the information read. The reading interval may be shorter than the external reading pulse, depending on the selected output mode for the reading result.

Reading pulse

Pulse applied externally to the ICR to trigger the internal ⇨ reading interval. Can be supplied by a photoelectric reflex switch or a command from the host on the serial interface.

Reading result

Electronic representation of the data content of the read codes together with the ⇨ reading diagnosis data in one ⇨ data output string that is generated after the reading pulse has elapsed. The reading result on the auxiliary interface has a fixed format (content and output format); the reading result on the host, CAN or Ethernet interface (port 2112) can be configured separately for good reads and no reads. Special characters like reading diagnosis data, control characters and/or alphanumeric constants can also be added if necessary.

Result status output

Function of the “Result 1“ and “Result 2“ switching outputs and the beeper in Reading mode. Signals the status of the reading result without indicating its contents (e.g. “Good Read“). You can assign a status to each output/beeper on the DEVICE CONFIGURATION tab in the user interface of CLV Setup. The “Result“ LED is linked to the “Result 2“ output.

Sending point

Point at which the reading result is output with respect to the start of the ⇨ reading pulse and the internal ⇨ reading interval.

SMART decoder

Specially developed ⇨ decoder for reading bar codes with an extremely small code height (⇨ aspect ratio > 1:3) and for poor-quality or contaminated code prints.

Storage in ICR

The application-specific ⇨ parameter set can be stored temporarily or permanently in the ICR. If it is stored temporarily in the RAM, it is lost as soon as the power supply is switched off. Parameter sets that are stored permanently are transferred to the EEPROM in the ICR and remain active as the current data record when the power supply is switched off. The default setting is not affected by this and is stored in a read-only memory (ROM).

Standard decoder

Tried-and-tested ⇨ decoder from the CLV and ICR product family. Suitable for applications with an adequate code height, limited tilt, and high-quality code prints.

System messages

Messages in ⇨ plain text used to output the operating status of the ICR. The messages are output via the auxiliary interface only. The messages can be displayed in the Terminal Emulator of the CLV Setup program if requested by the user.

Teach-in

Method of programming the information required to adjust the ICR to the reading application in Parameter mode. Example: Teach-in of match code 1.

Terminator

Data block in the reading result of the ⇨ host, CAN or Ethernet interface (port 2112). Used to terminate the data content of the code. Contains up to 10 elements, consisting of reading diagnosis data and/or constants (control characters, letters, digits), depending on the configuration. The "Terminator" block is empty in the default setting of the ICR 85x.

Upload

Method of transferring the ⇨ parameter set from the ICR to the PC ⇨ using the CLV Setup program. CLV Setup either transfers a complete copy of the current parameter set from the memory (RAM) of the ICR (UPLOAD TO CLV) or just the parameter previously processed using the context menu of the right mouse button (UPLOAD PARAMETER) or all parameters of the displayed tab (UPLOAD PARAMETERS OF THIS VIEW). Displays the current parameter values on the tabs. Prerequisite for modifying the current parameter set.

User interface

Windows-based input interface of the "CLV Setup" program used for operating and configuring the ICR.

10.13 EC Declaration of Conformity

Fig. 10-17 shows the scaled down copy of the EC Declaration of Conformity (page 1).

- Complete copy of EC Declaration of Conformity on request.

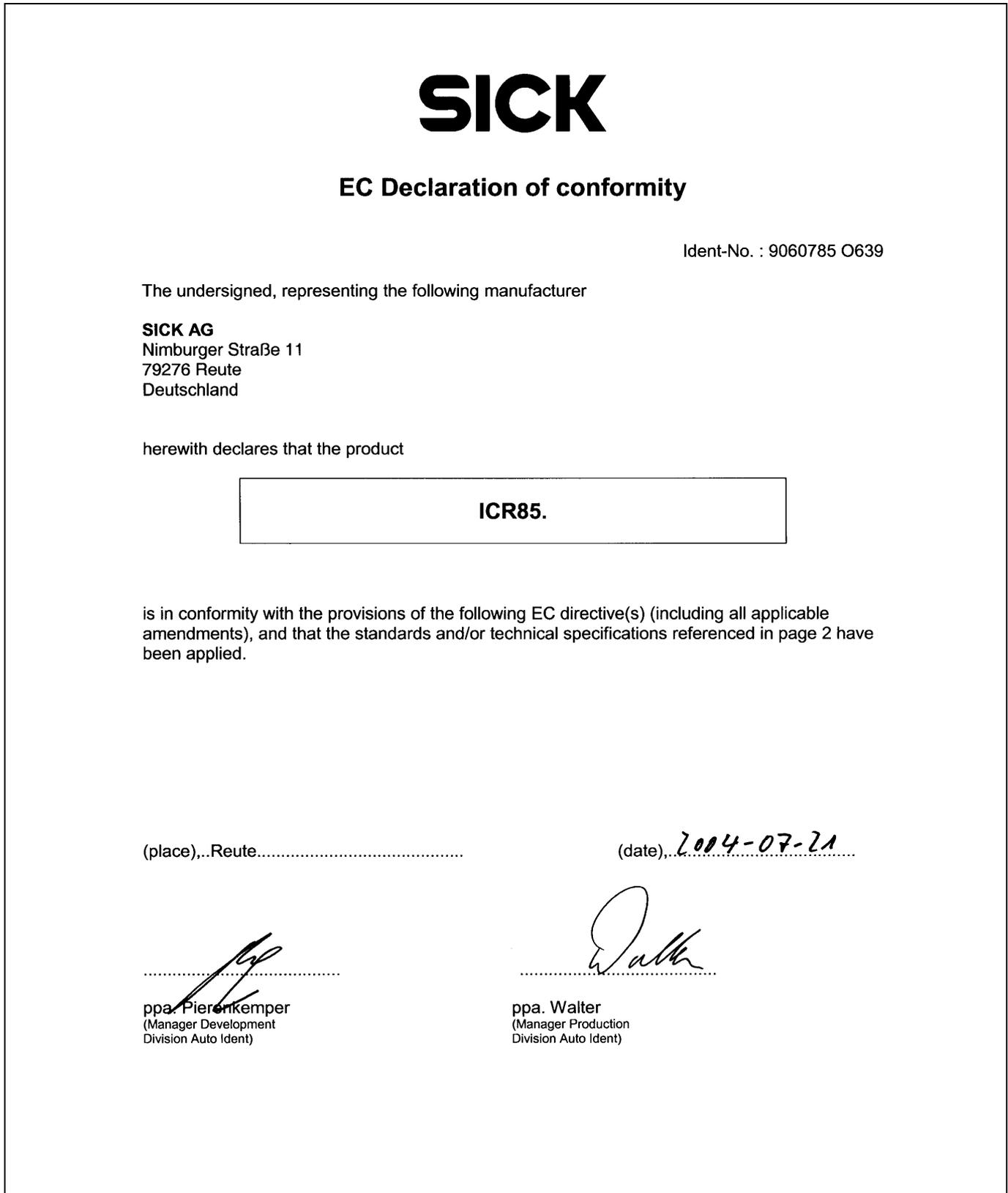


Fig. 10-17: Copy of the Declaration of Conformity (Page 1, scaled down)

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10.15 Code samples

10.15.1 1-D and 2-D code samples

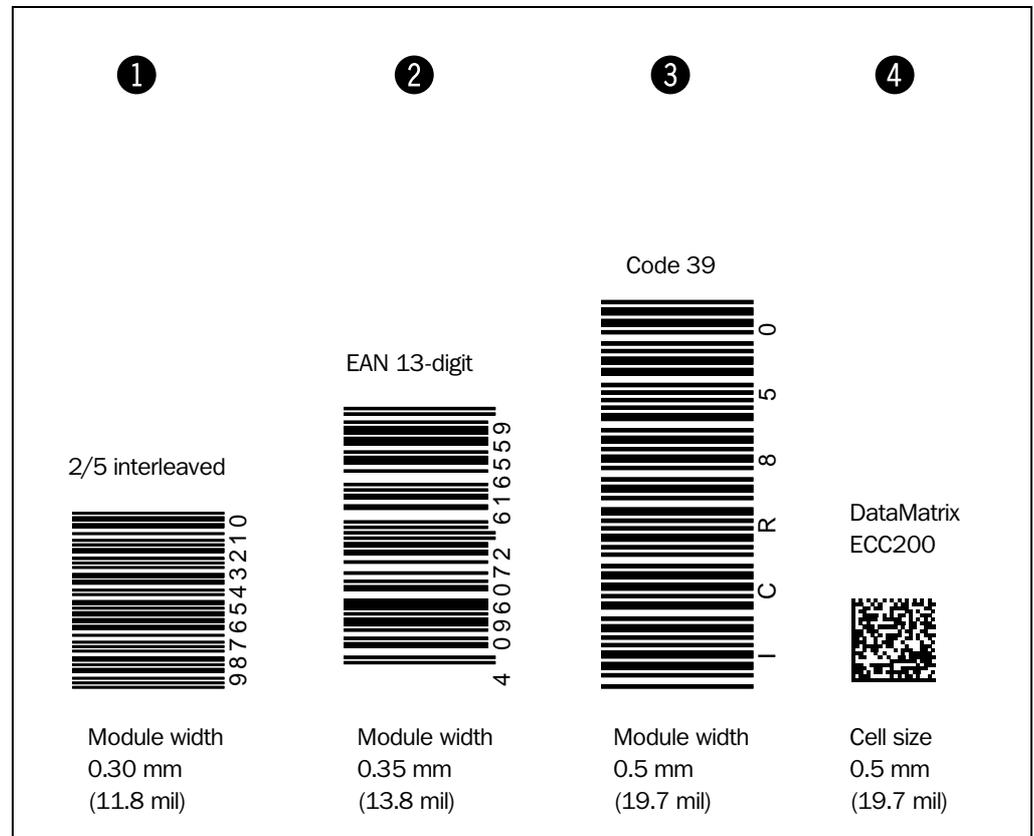


Fig. 10-18: Scannable 1-D codes with various module widths (print ratio 2:1)/2-D codes

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