# ICR 84x
# Image Code Reader

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

**SICK**
Sensor Intelligence.
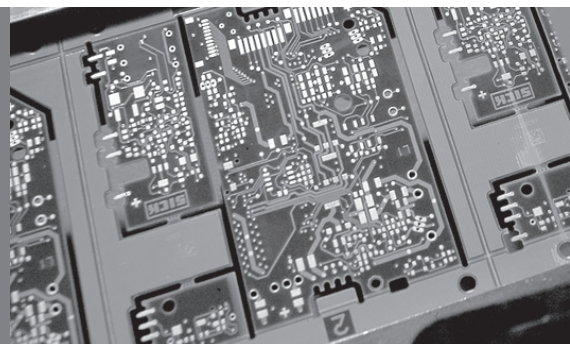
## Software versions

| Software/Tool | Function | Version |
|---|---|---|
| ICR 84x | Firmware | V 1.90 0000 |
| CLV Setup | Operating software (Windows-based) | V 4.2 P658 |
| CLV Setup Help | Online help (HTML) | V 4.2 P658 |

**The ICR 84x is exclusively intended for use in an industrial environment.
In case of use in residential areas, RF interference may occur.**

**Copyright**

Copyright © 2005
SICK AG Waldkirch
Auto Ident, Reute Plant
Nimburger Strasse 11
79276 Reute
Germany

**Trademarks**

Windows 95™/98™, Windows NT™, Windows 2000™, Windows XP™ and Internet Explorer™ are registered trademarks or trademarks of the Microsoft Corporation in the USA and other countries.

**Latest manual version**

For the latest version of this manual (PDF), see **www.sick.com**.

## ICR 84x Image Code Reader

# Quick Finder

## 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**) at a reading distance of 80 mm (3.15 in) (standard device). Available reading area 40 mm x 32 mm (1.58 in x 1.26 in).
3.  Install the CDB 420 or CDM 420 Connection Module.
4.  Connect the ICR to the CDB 420 or CDM 420 Connection Module.
5.  Install the reading pulse sensor.
6.  Connect the sensor to the "Sensor 1" switching input in the CDB 420 or CDM 420.
7.  Connect the host to the "host interface" in the CDB 420 or CDM 420.
8.  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.
9.  Switch on the PC and start Windows™ (minimum requirement: Windows 95™).
10. 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.
11. 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)
12. Start "CLV Setup". To initiate communication, select the Ethernet interface (OPTIONS/ INTERFACE). CLV Setup establishes communication with the ICR (standard IP address).
13. Upload the parameter set of the ICR (displayed on the tab pages).
14. Start the CLV Assistant and carry out the following steps consecutively: CONNECTION ASSISTANT, ETHERNET ASSISTANT, SCANNER ADJUSTMENT, and DATAMATRIX AUTOSETUP.
15. To check the image online, launch the IMAGEFTP program in parallel with the SCANNER ADJUSTMENT step.
16. Scanner Adjustment: Represent the 2-D code statically in the red illumination field (pulsed) of the ICR. In IMAGEFTP, make sure that the image is of a good quality in the image memory.
17. DataMatrix AutoSetup: prepare AutoSetup and, when prompted, start the reading trigger. Represent the 2-D code statically again in the red illumination field. When doing so, retain the reading distance you adjusted previously.
18. Start DataMatrix AutoSetup. If successful, exit the Assistant after the final check. If not, repeat AutoSetup.
19. 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. Make sure that data is transferred properly to the ICR.
20. 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.

The ICR can now be operated with the **application-specific** settings.

**I-4**                              8 010 961/0000/10-05-2005

## Contents

## Table of Contents

## Abbreviations

| | |
|---|---|
| **CAN** | **C**ontroller **A**rea **N**etwork (standardized field-bus system with a message-oriented data transfer protocol) |
| **CDB** | **C**onnection **D**evice **B**asic. |
| **CDM** | **C**onnection **D**evice **M**odular. |
| **DOF** | **D**epth **o**f **F**ield |
| **DSP** | **D**igitar **s**ignal **p**rocessor |
| **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 |
| **MTBF** | **M**ean **T**ime **B**etween **F**ailure |
| **PLC** | **P**rogammable **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 |

## Tables

## Figures

# 1    Notes on this document

## 1.1    Purpose

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

- ICR 840 standard

The device is available

- with side reading window
- with front reading window

**The Image Code Reader reads 2-D codes (DataMatrix ECC 200) using an image recording and processing system. To do so, the device provides a rectangular reading area in the reading plane. Currently, only images of stationary objects can be reliably evaluated.**

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 ICR 84x 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 Image 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.

       8 010 961/0000/10-05-2005

# 2 Safety information

## 2.1 Authorized users

For the ICR to function properly and safely, it must be installed and setup 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 which are not moved.

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.

### 2.3.1      RF interferences

**The ICR 84x is exclusively intended for use in an industrial environment.**
**In case of use in residential areas, RF interference may occur.**

### 2.3.2      Electrical installation

**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.

### 2.3.3      LED illumination for reading area

**The ICR 84x is classified in LED class 1.**

Under normal and sensible conditions, the accessible beam of the LED illumination is not hazardous. Blinding, impairment of ability to see color, or other irritations, however, cannot be excluded.

➢ The entire glass window acts as a LED outlet aperture.

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

➢ Do not open the housing.
   (Opening the housing does not deactivate the laser diodes).

➢ Observe the laser protection specifications (latest version).

**Radiation power**

The LEDs of the illumination operate at a wavelength of $\lambda = 617$ nm $\pm 15$ nm (visible red light) with a pulse duration of max. 5 ms. The energy in the human eye is $< 1,7$ J/m$^2$. The product is classified in LED class 1 in accordance with EN 60825-1 and IEC 60825-1 (for publication date, see the warning sign on the device).

**Warning labels**

The warning label (*Fig. 2-1, Page 2-3*) in three languages is located on the wide side of the housing (see *Fig. 3-1, Page 3-5*).

Fig. 2-1:     Black-yellow signed warning labels found on the ICR

**If the ICR is installed in a machine/panel with the result that the warning labels 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 LED radiation.**

Activation and deactivation of the LEDs when reading is controlled by the reading pulse (trigger source).

A timer (illumination timeout) automatically deactivates the LEDs 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:
"Illumination safety timeout"
The reading interval must be terminated by resetting the trigger signal. The LEDs activated again by the next reading pulse.

The illumination timeout can be set in the range of 1 min to 25 h or deactivated (see *Table 6-3, Page 6-25*).

**The Illumination LEDs are periodically activated in the operating mode "Percentage Evaluation" and are always activated in the pulse mode "Free Running" in Reading mode.**

## 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 typically 7 W (max. 10 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

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 84x 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 84x 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 10-40*.

### 3.1.2        Variants

The ICR is available in the following variants:

| Type (red light) | Part No. | Category | Host interface type | Reading window |
|---|---|---|---|---|
| ICR 840-0020 | 1 027 176 | Standard | RS 232/422/485, Ethernet | Front |
| ICR 840-1020 | 1 028 254 | | RS 232/422/485, Ethernet | Side |

Table 3-1: ICR 84x 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 (15 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 15 to 30 V DC (functional extra-low voltage pursuant to IEC 364-4-41) and at least **12 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 intervall, e. g. a photoelectric reflex switch.

5. If an external field illumination is necessary: a suitable light source to be connected to the "Result 1" switching output.

6. To delay the external reading pulse using a track controll: a suitable incremental encoder.

7. A higher-level computer (host) with a data interface of type RS 422/485 or RS 232.

8. 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 10-44*).

9. 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:**

10. 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™).

**3-2**                       8 010 961/0000/10-05-2005

11. 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.

12. 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.

13. 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 scanner:**

- CMOS sensor of newest technology (1.3 Mega pixel)
- Fixed focus
- Front reading window, variant: side reading window
- Reading range (DOF) 58 to 106 mm (2.29 to 4.18 in), standard type
- Reading area (dependent of the reading distance), 40 mm x 32 mm (1.58 in x 1.26 in), at reading distance 80 mm (3.15 in), standard type
- Resolution 0.15 to 2.0 mm (5.9 to 78.7 mil), standard type
- Image refresh rate/decoding frequency 25 Hz at highest resolution
- Function to adjust on the code print quality
- Variable active evaluation range of the image buffer, thereby higher image refresh rate

**Safety and user-friendly features:**

- Robust, compact metal housing, max. IP 65, CE certification
- LED class 1, illumination diodes 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)
- 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 fixed 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 as well as for triggering or direct powering an external field illumination

**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



Side reading window            Front reading window

**Key:**

① D-Sub HD cable plug, 15-pin

② Tapped blind holes M5,
   8 mm (0.31 in) deep

③ Reading window with lens and
   illumination LEDs

④ RJ 45 10baseT socket for Ethernet
   connection with LEDs

⑤ Sound opening of the
   beeper (covered)

⑥ LEDs  (status indicators)

⑦ Laser warning labels

⑧ Connection cable
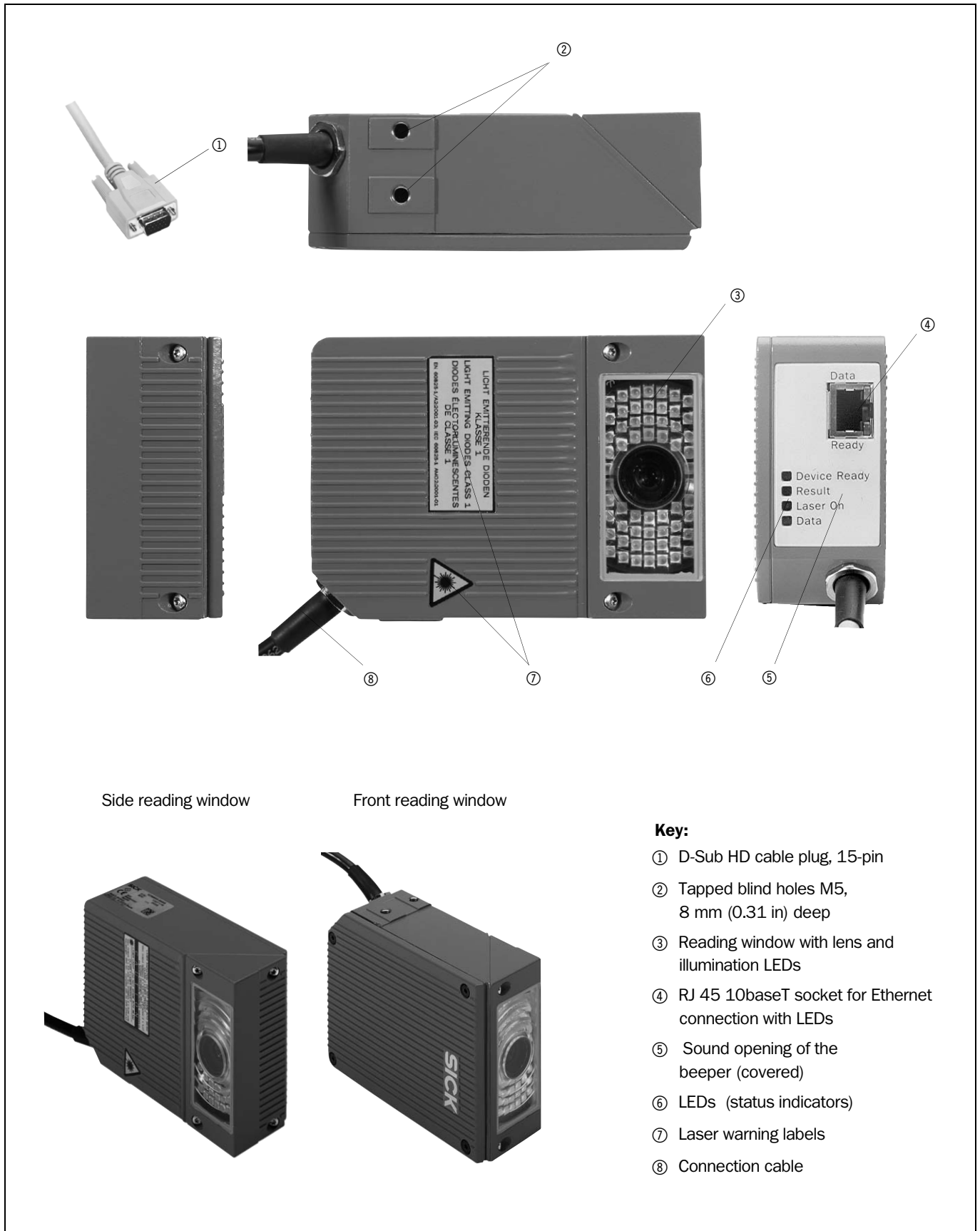
Fig. 3-1:    Design of the ICR

## 3.2    Method of operation

The ICR uses an image recording and processing system (CMOS matrix sensor with 1280 x 1024 pixels) to scan 2-D codes and bar codes with a rectangular reading area. To do so, LEDs integrated in the housing illuminate the area to be read. The LEDs generate a red illumination field (pulsed) with a configurable flash duration. To start a reading cycle, the ICR switches on the illumination. It absorbs the light reflected from the reading area (*Fig. 3-2*) through the lens as gray values of an image area, which are stored in an electronic image memory (image refresh rate: 25 Hz at full memory utilization).

To prevent distorted images in the image buffer memory, the object with the code must remain stationary while the image is being recorded.



Fig. 3-2:    Reading area of the ICR in the focus position (standard type)

The reading area (surface), which is mapped in sharp focus by the ICR in its image memory, depends on the reading distance and, depending on the resolution, must be within the reading area (DOF). *Fig. 9-4, Page 9-5* shows the available reading area.

If the appropriate configuration settings are made to reduce the image buffer memory area (image geometry) used for the evaluation, this increases the potential image refresh rate. The refresh rate with the VGA resolution (640 x 480 pixels) is 60 Hz, for example. The ICR automatically adjusts the flash frequency. With a maximum of two working areas, a maximum of just two separate strips in the image field can be evaluated.

As 2-D-codes or bar codes are detected in the image data, the ICR's decoding algorithms determine the code(s) 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.
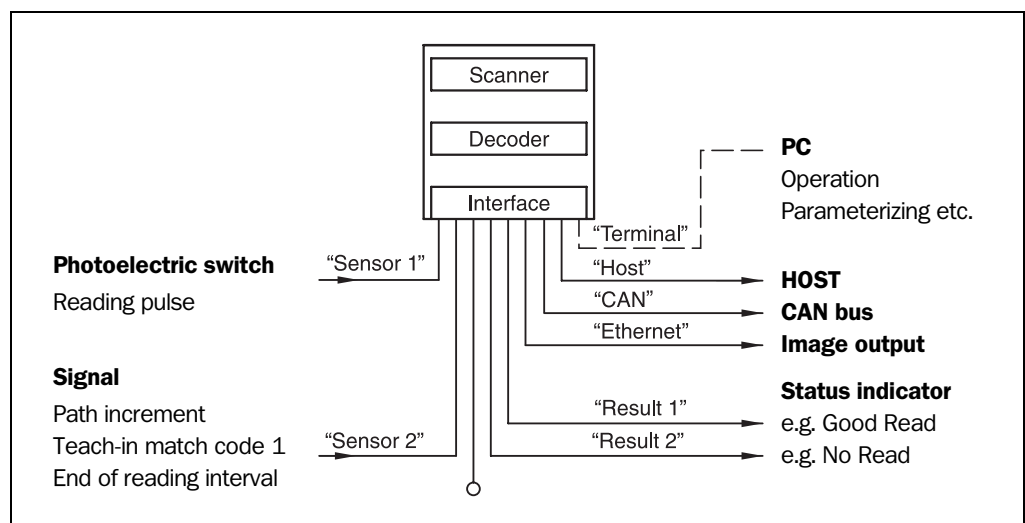


Fig. 3-3:    Block diagram: functions of the ICR

       8 010 961/0000/10-05-2005

The ICR is equipped with three decoders:

- The decoder for 2-D codes
- The SMART decoder (**S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology) 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 buffer 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 area, 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 a 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. Using the "Result 1" output, an external field illumination can additionally be triggered or directly powered (max. 100 mA) by the ICR.

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.

**Product description**

## 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. 3-4*) are located on the rear of the device toward the bottom. *Table 3-2, Page 3-9* shows the meaning of the LEDs in the different operating modes/functions.



Device Ready

Result

Laser On

Data

Fig. 3-4:    LEDs

8 010 961/0000/10-05-2005

**Product description**

ICR 84x Image Code Reader
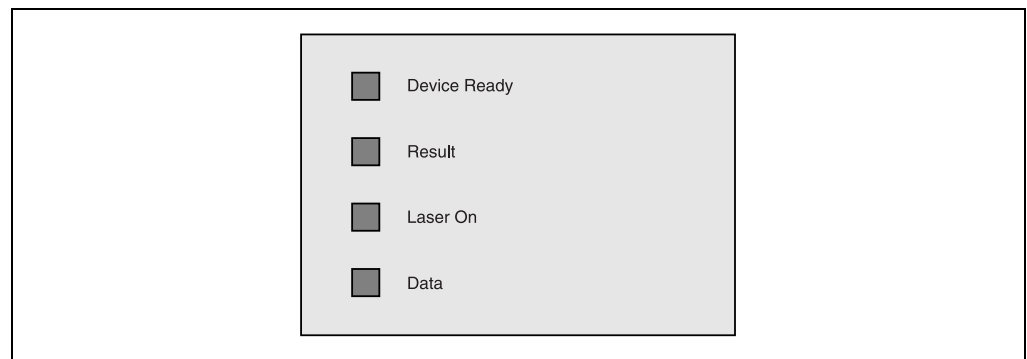
| Operating mode | LED | Indication | Function |
|---|---|---|---|
| Start | Device Ready | *Orange* | • Lights up after power-up if the self-test was successful and the wait time for reading the profile bar codes (not suitable for ICR) has expired. |
| | Laser On | *Orange* | • Lights up while the laser diodes for reading the profile bar codes (not suitable for ICR) are active. |
| Reading mode | Device Ready | *Orange* | • Lights up constantly<br><br>• Extinguishes with new operating mode/function |
| | Laser On | | • Lights up when the laser diodes are active (The laser diodes are activated/deactivated by reading pulse).<br><br>• Lights up constantly in the pulse mode Free Running, as the laser diodes are always active. |
| | Result | *Orange* | LED is connected to the "Result 2" switching output. It indicates the selected result status for the set pulse duration of the output.<br><br>• Lights up after a good read (default setting: Good Read)<br><br>• 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. |
| | Data | *Orange* | • Flickers while the ICR transfers data to the host on the host interface. |
| Percentage Evaluation | Laser On | *Orange* | • Lights up constantly (Free Running mode) |
| | Result | *Orange* | Behavior depends on the reading quality:<br><br>• Extinguishes if reading rate < 30 %<br><br>• Flashes twice a second if reading rate is 30 % to 70 %<br><br>• Flashes five times a second if reading rate is 70 % to 90 %<br><br>• 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 | *Green* | Indicates the physical Ethernet connection |
| Data | *Yellow* | Lights up when the ICR receives or sends addressed data via Ethernet |

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

8 010 961/0000/10-05-2005 **3-9**

### 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 | • Signals that the self-test after power-up was successful |
| **Reading mode** | Beep Beep | • 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 | • Confirms a successful read (good read; default setting) and the reading result output |
| **Exceeding the illumination timeout** | Beep Beep Beep | • Signals that the illumination LEDs have been deactivated after the illumination 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.

# 4      Installation

## 4.1      Overview of installation sequence

- Selecting the installation location for the ICR
- Aligning the ICR with the code (adjusting the reading distance)
- Mounting the ICR
- Installing 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 84x 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)

  **– or –**

  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

- 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
- Tool
- Protractor

### 4.2.4    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 connected to the Ethernet network.

**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**                   8 010 961/0000/10-05-2005

### 4.2.5 Mounting accessories

The ICR is mounted with two tapped blind holes (M5) located on the bottom narrow side of the device. *Fig. 4-1* shows the position of the threaded hole.
The dimensions of the IRC housing are shown in *Fig. 9-1, Page 9-3*.



All dimensions in mm (in)
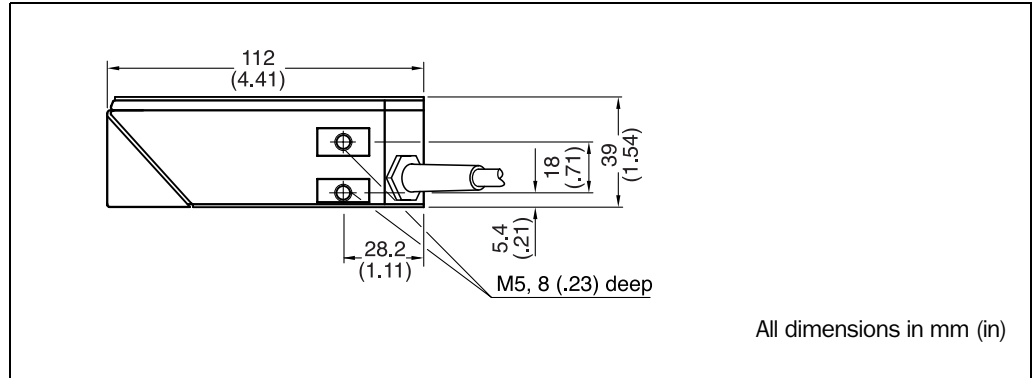
Fig. 4-1:    Position of the securing threads on the ICR

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. 4-2* shows a mounting example.

The slots in the mounting bracket allow a turning freedom of ±15° for the fine adjustment of the ICR.
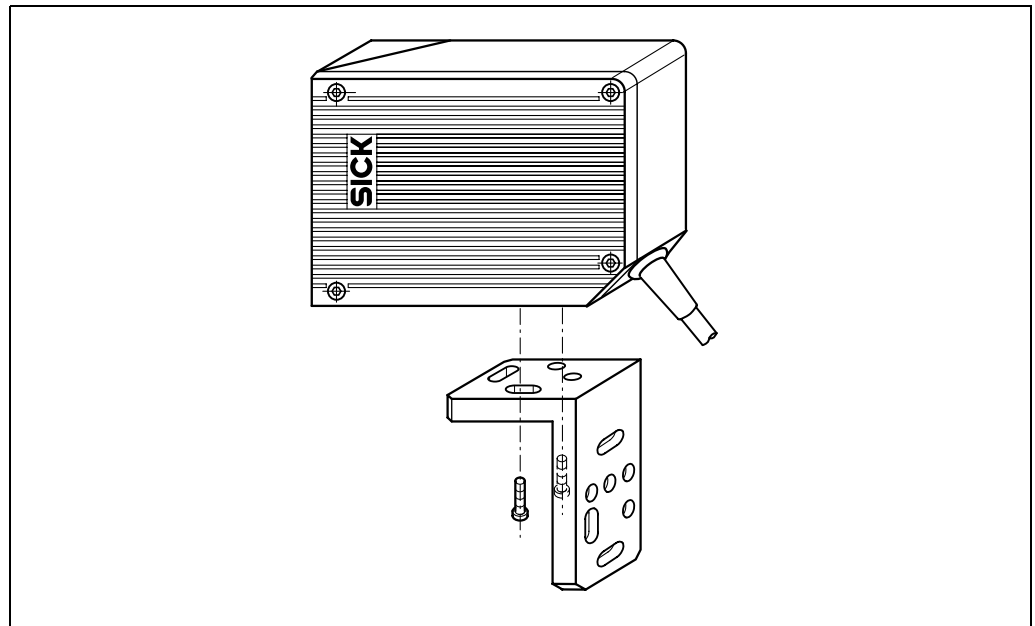


Fig. 4-2:    ICR installation options using the mounting bracket no. 2 025 491

The dimensions of the mounting bracket are shown in *Chapter 10.10 "Dimensional drawings of the accessories", Page 10-43*.

### 4.2.6    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. 4-3* shows how the reading area is aligned with the code on the object.
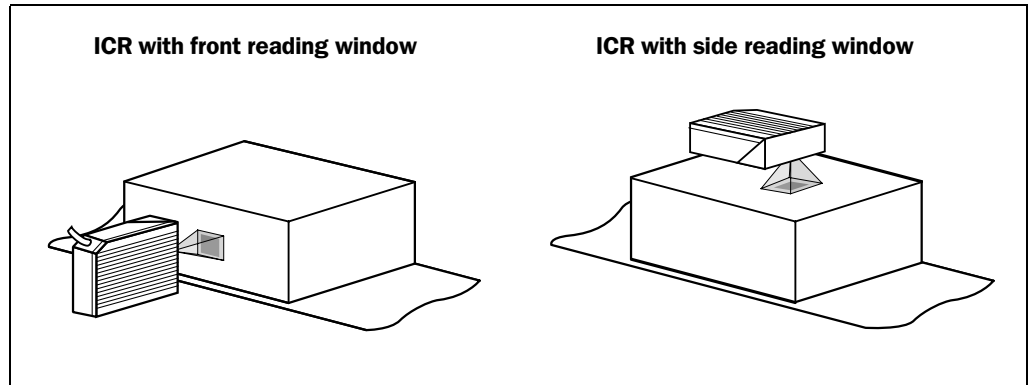


Fig. 4-3:    Alignment of the ICR reading area with the code

#### 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 9-4* .

*Fig. 4-4* shows the exact definition of the reading distance from the reading window.
The reading distance of the standard device in the focus position is 80 mm (3.15 in).
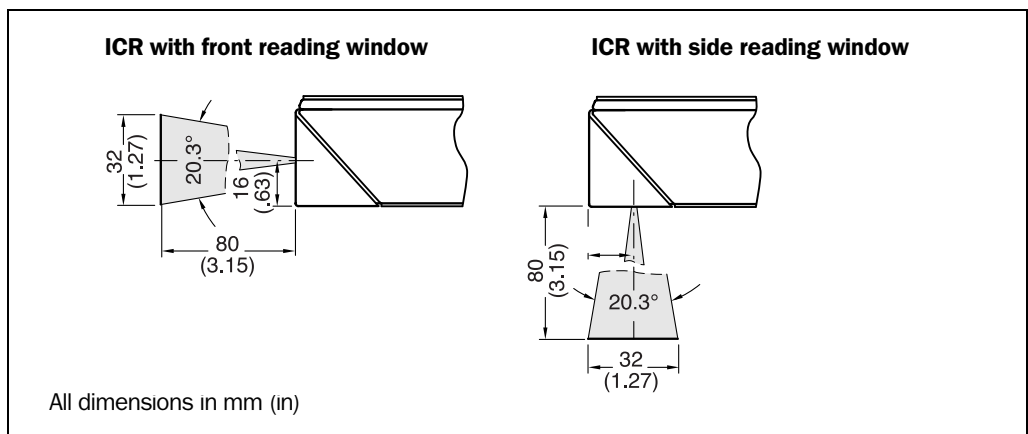


Fig. 4-4:    Definition of the reading distance

**Note**   The size of the available reading area (surface), which is mapped in sharp focus by the ICR in its image memory, depends on the reading distance. See *Fig. 9-4, Page 9-5*.

                 8 010 961/0000/10-05-2005

**Angular alignment of the ICR**

The alignment of the ICR is optimum when the code is in the center of the reading area (*Fig. 4-3*). All possible reading angles that can occur between the reading area and the code must be taken into consideration (*Fig. 4-5* and *Table 4-2*).
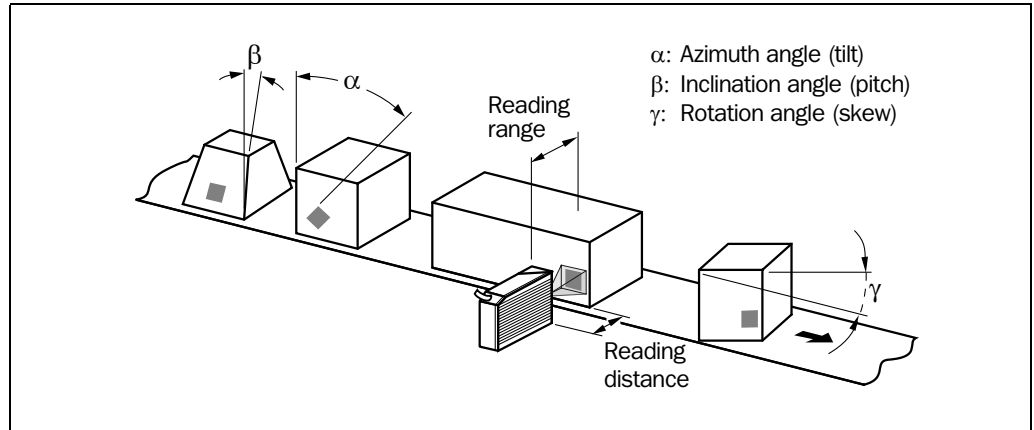


Fig. 4-5:     Reading angles between the reading area and the code

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

| Angle | Limit value |
|---|---|
| Azimuth $\alpha$ (tilt) | 360° |
| Incline $\beta$ (pitch) | Max. ±45° (depending on the cell size and symbol size) |
| Rotation $\gamma$ (skew) | Max. ±45° (depending on the cell size and symbol size) |

Table 4-1: Permissible reading angle between the reading area 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 $\alpha$ (tilt) | Max. ±45° (in scanning axis and in focus position 100 mm (3.94 in) for module width 0.2 to 0.5 mm (7.9 to 19.7 mil)) |
| Incline $\beta$ (pitch) | Max. ±45° (depending on the module width) |
| Rotation $\gamma$ (skew) | Max. ±45° (depending on the module width) |

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

**Note**    The length of readable bar code is reduced with respect to the decodable length as a result of the distance-dependent dimensions of the reading area (surface) (see examples in *Table 9-2, Page 9-2*).

**Preventing surface reflections**

The ICR can be installed parallel to the object surface.
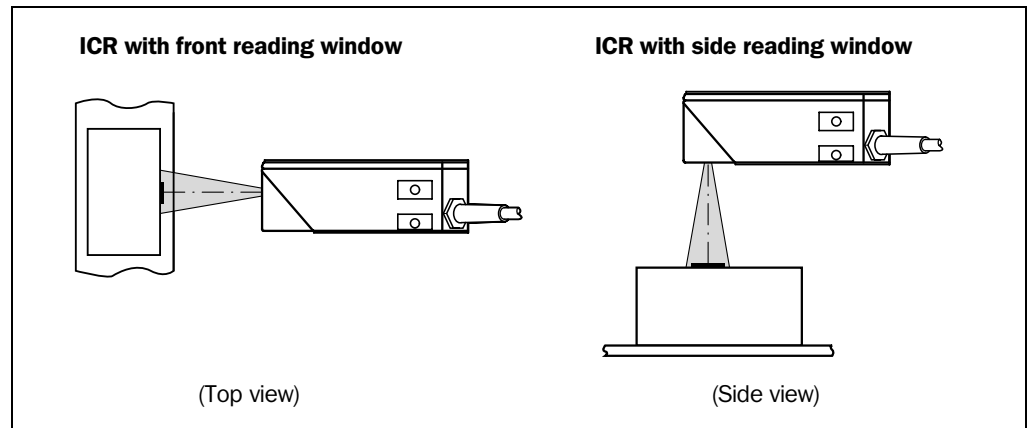


Fig. 4-6:    Installing the ICR parallel to the object surface

### 4.2.7    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.

*Fig. 4-7* shows the count direction of the code position along the reading window.

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.
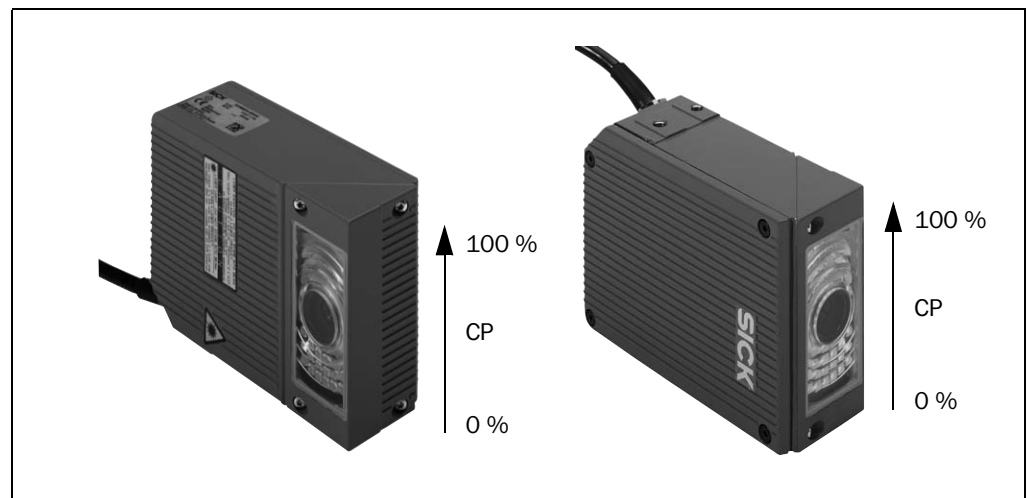


Fig. 4-7:    Count direction of the code position CP for bar codes along the reading window

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 6-30*).

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 6-32*).

When the ICR 840 is in the focus position (reading distance 80 mm ((3.15 in)), one pixel in the image memory is approx. 33 $\mu$, whereby 1% of the CP is approx. 0.4 mm lengthwise of the reading area.

**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.

CAUTION

---

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 nearly parallel with the code surface, when using a front reading window.

     Reading distance:
     The reading distance of the standard device in the focus position is 80 mm (3.15 in) in front of the reading window. See *Fig. 4-4, Page 4-4*.

     All of the possible reading angles must be taken into consideration (see *Fig. 4-5, Page 4-5*).
6.   If relevant to the evaluation, pay attention to the count direction of the code position if applicable (see *Fig. 4-7, Page 4-6*).
7.   Mark the bracket of the ICR on the base (supporting stand), drill the required holes and install the bracket on the base.

                       8 010 961/0000/10-05-2005

## 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. 4-8* 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 (**no conveyor movement**).



Code in the middle or at the end of the object being moved     Code at the beginning of the object being moved
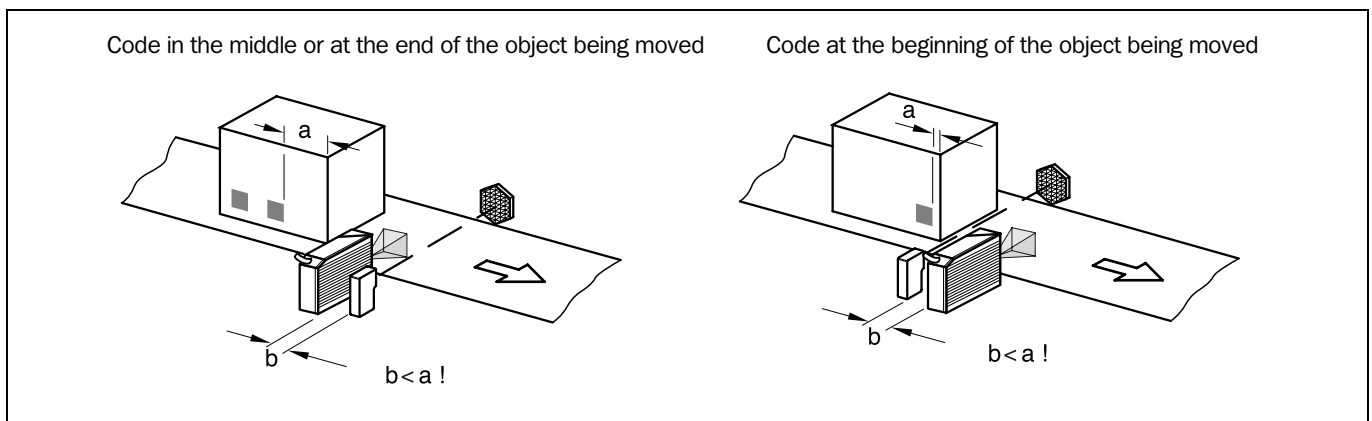
Fig. 4-8:     Line scanner: Installation example for the external reading pulse sensor

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.  Represent objects with 2-D codes to the ICR one after another (**no conveyor movement**).

9.  Check for proper reading pulse triggering and the reading result.

**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 for using a track controlled delay of the external reading trigger.

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*.

**4-10**                       8 010 961/0000/10-05-2005

# 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.
- Optional: connecting the external illumination
- Connecting the power supply to the connection module

### 5.1.1    SICK Connection Modules (Overview)

| Connection Module | Design | Purpose |
|---|---|---|
| CDB 420-001<br>CDB 420-101 |  | – Connecting **one** ICR<br>– 1 x 15-pin D Sub HD socket, 4 x cable gland<br>  (CDB 420-101: 2 x cable gland, 2 x M12 plug<br>  connection (1 x plug, 1 x socket))<br>– Operating voltage 10 to 30 V DC,<br>  when using with the ICR 84x: **15 to 30 V DC**<br>– Enclosure rating max. IP 65<br>– Temperature range –35 to +40 °C<br>  (–31 to +104 °F) |
| CDM 420-0001 |  | – Connecting **one** ICR<br>– 1 x 15-pin D Sub HD socket,<br>  6 x cable gland<br>– Operating voltage 10 to 30 V DC,<br>  when using with the ICR 84x: **15 to 30 V DC**<br>– Enclosure rating max. IP 65<br>– Temperature range –35 to +40 °C<br>  (–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 10-40*.

## 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 mm$^2$ (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 10-42*.

### 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.
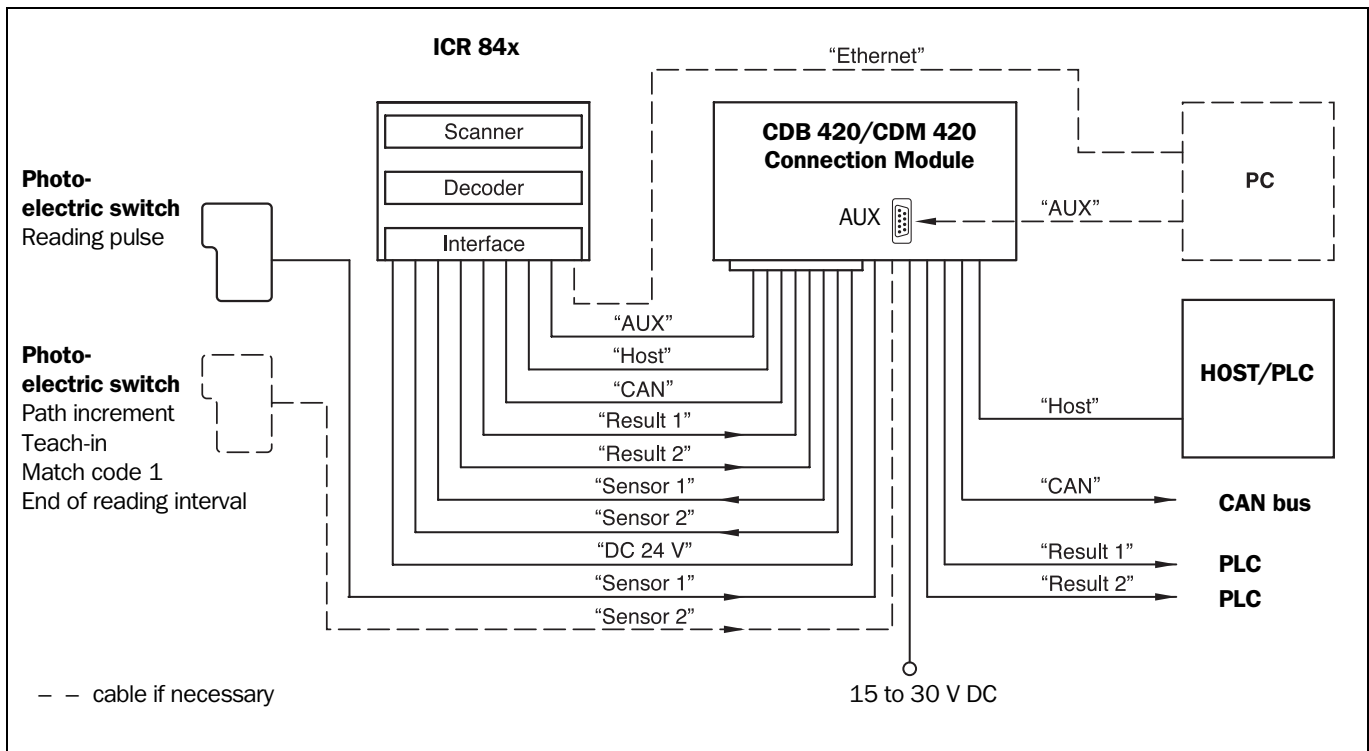


Fig. 5-1:    Block diagram: Connection of the ICR to the CDB 420 or CDM 420 Connection Module

         8 010 961/0000/10-05-2005

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** Diagramms 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$^{TM}$).

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 10-44*).

## 5.3     Pin assignments

### 5.3.1    Cable plug

| Pin | Signal | Function |
|-----|--------|----------|
| 1 | 15 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 15 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 typically 7 W, max. 10 W (when switching outputs are not connected).

The ICR is supplied with 15 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. *Table 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.

8 010 961/0000/10-05-2005       **5-5**

### 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 12 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 mm$^2$ (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*.
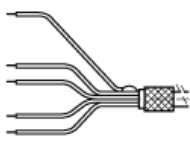
| Pin | Signal | Wiring color |
|---|---|---|
| 1 | 15 to 30 V DC | Red |
| 2 | RxD (aux) | Purple |
| 3 | TxD (aux) | Yellow |
| 4 | Sensor 2 | Red/black |
| 5 | GND | Black |
| 6 | RD+ (RS 422/485) | Light blue |
| 7 | RD– (RS 422/485); RxD (RS 232) | Blue |
| 8 | TD+ (RS 422/485) | Turquoise |
| 9 | 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
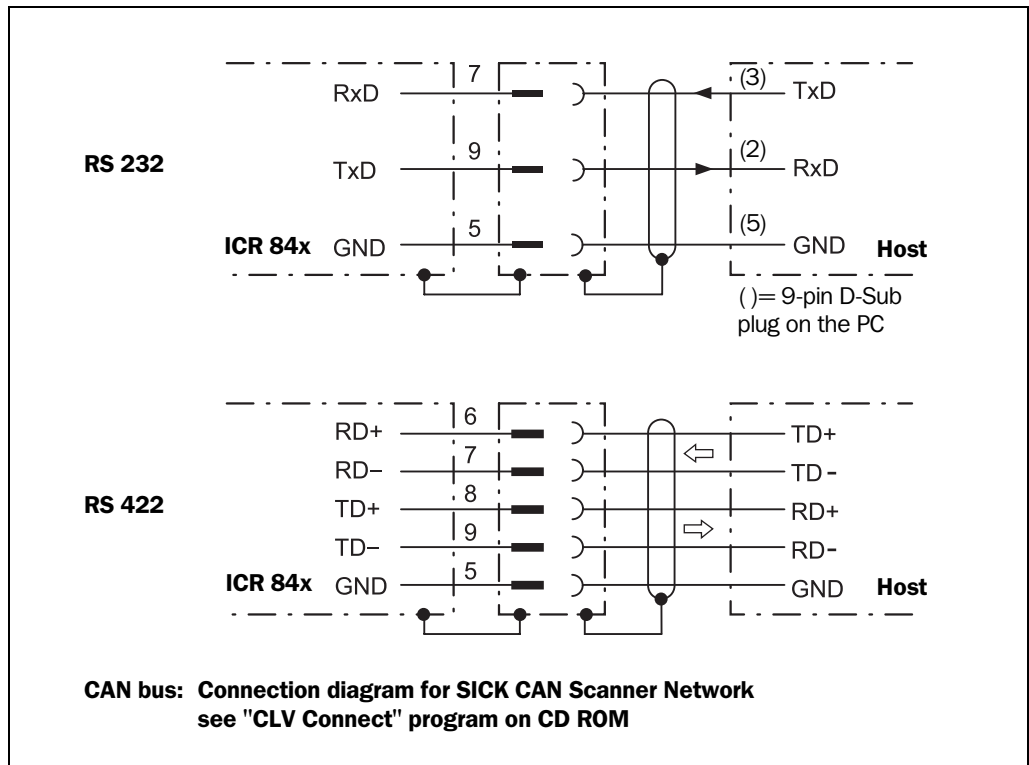


Fig. 5-2:    Connections of the host interface

**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.

WARNING

➢    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)

                 8 010 961/0000/10-05-2005

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.
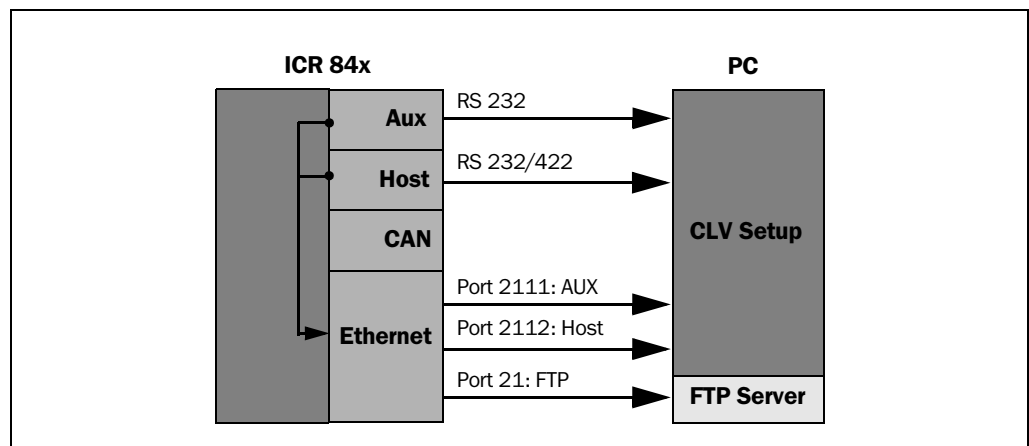


Fig. 5-3:　Block diagram: Function of the Ethernet interface

**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 3-9* describes the function of the two LEDs on the connection socket.

 8 010 961/0000/10-05-2005

**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)
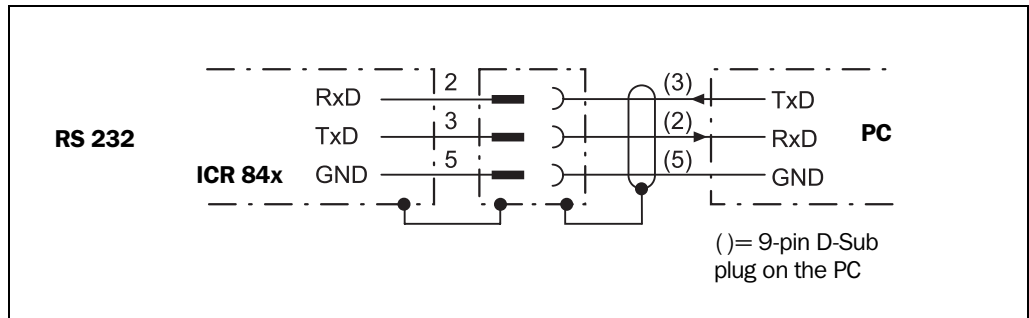


Fig. 5-4:     Connection of the auxiliary interface

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*). The ICR communicates with the PC via the auxiliary interface using the fixed values shown in *Table 5-10*.

| 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) |

Table 5-10: Communication parameters for the auxiliary interface

**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 5-11* contains the characteristic data for this input.

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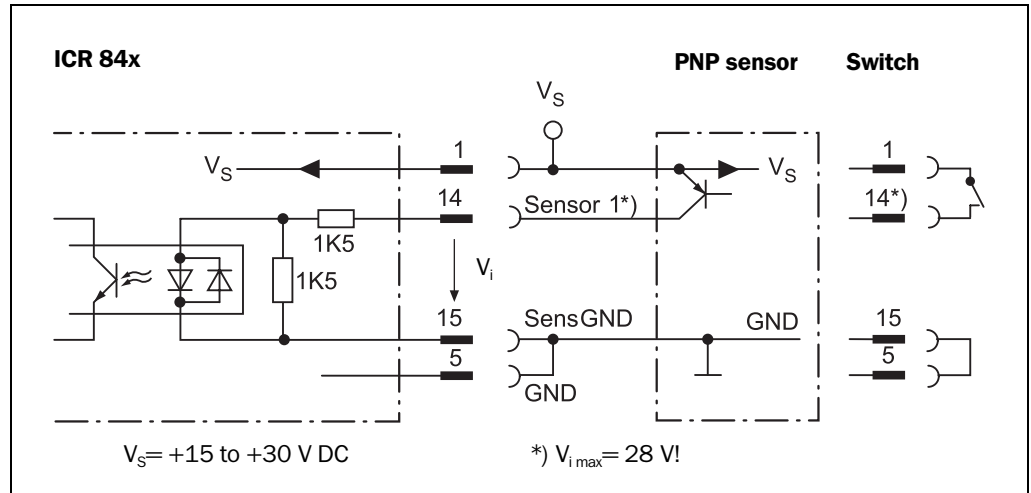


Fig. 5-5: Connections of the "Sensor 1" switching input

| 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 | – Optodecoupled, non-interchangeable<br>– Can be connected to PNP output on a sensor | |
| Electrical values | Low: $-1\,V \leq V_i \leq +1\,V$<br>$-0.3\,mA \leq I_i \leq +0.3\,mA$ | High: $+8\,V \leq |V_i| \leq +28\,V$<br>$+1.4\,mA \leq |I_i| \leq +18\,mA$ |

Table 5-11: 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.

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)*.

**Note**  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 for track controlled delaying of the external reading trigger
- Trigger source for teaching in the match code 1
- External trigger source for end of the reading interval

"No function" is selected by default.
The characteristic data is identical to that for the "Sensor 1" input (*Table 5-11, Page 5-13*).

➢ Connect switch or incremental sensor as shown in *Fig. 5-6*.
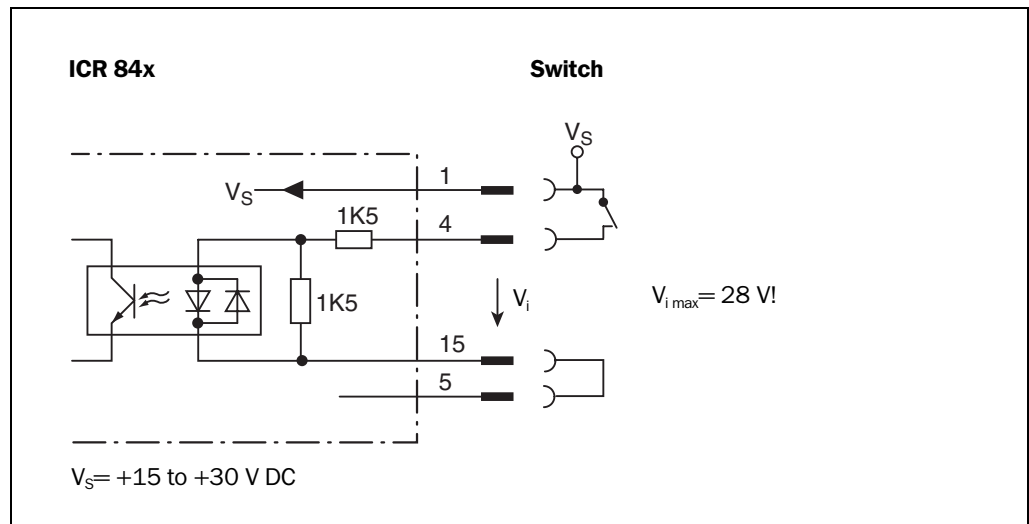


Fig. 5-6:    Connections of the "Sensor 2" switching input

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 10-28)*.

### 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, except to the additional function of Result 1 (triggering an external illumination).

Using the "Result 1" output, an external field illumination (powered external) can additionally be triggered or switched on when directly powered (max. 100 mA) by the ICR.
The "Result 1" output operates as low side switch, the "Result 2" output operates as high side switch.

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* and *Fig. 5-8, Page 5-16* show an example of how the switching outputs can be connected. *Table 5-12* and *Table 5-12, Page 5-15* describe the characteristic data for the outputs.

➢ Connect the outputs as shown.

**"Result 1" switching output:**
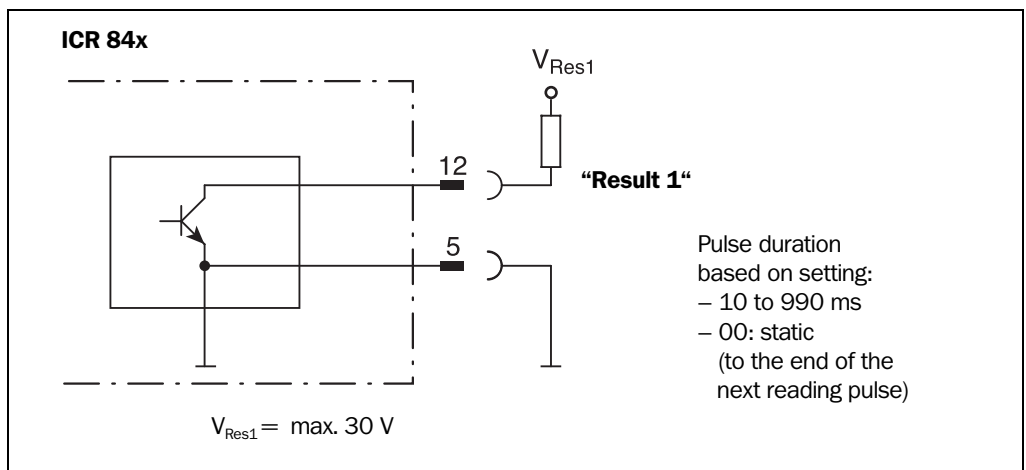


Fig. 5-7:   Connection of the "Result 1" switching output

| Switching mode | NPN-switching with respect to the ground |
|---|---|
| Characteristics | – Short-circuit-proof + temperature protected <br> – not electrically isolated from $V_s$ |
| Function assignment (default setting) | "Device Ready (static)", polarity: not inverted |
| Electrical values | $V_{LOW} < 0.2$ V at $I_o \leq 100$ mA |

Table 5-12: Characteristic data of the "Result 1" switching output

**Note** To trigger an external field illumination, the corresponding function must be assigned to the "Result 1" output on the DEVICE CONFIGURATION tab in the CLV Setup program.

1. Click the RESULT OUTPUT PARAMETERS button.
   In the RESULT FUNCTIONS section, select the EXTERNAL FLASH PULSE option in the drop down list for the Result 1.
2. In the EXTERNAL FLASH section, define the kind of flashing.
3. Download all changes to ICR.

**"Result 2" switching output:**
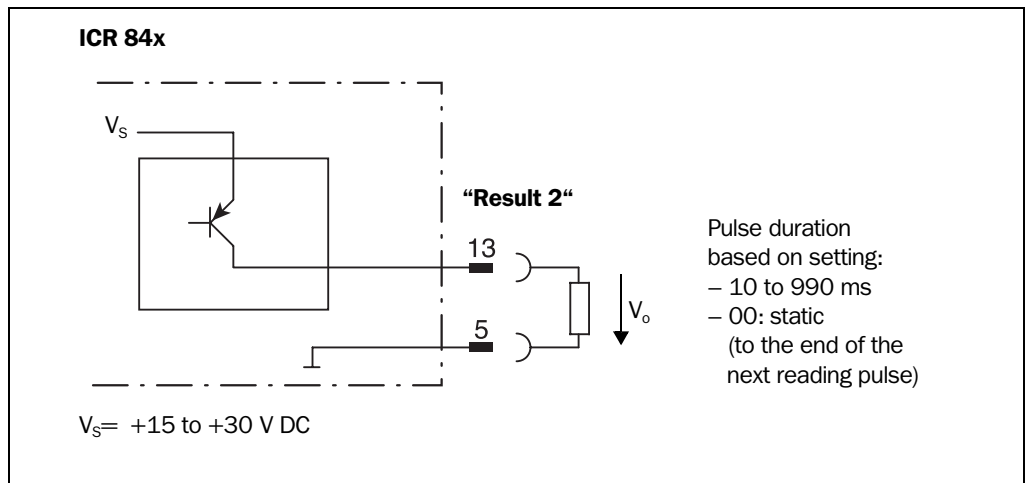


Fig. 5-8:      Connection of the "Result 2" switching output

| Switching mode | PNP-switching with respect to the power supply $V_s$ |
|---|---|
| Characteristics | – Short-circuit-proof + temperature protected <br> – not electrically isolated from $V_s$ |
| Function assignment (default setting) | "Good Read" (100 ms), polarity: not inverted |
| Electrical values | $(V_s - 1.5\ V) \leq V_o < V_s$ at $I_o \leq 100$ mA |

Table 5-13: Characteristic data of the "Result 2" switching output

**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.

      8 010 961/0000/10-05-2005

# 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 840 (Standard) |
|---|---|
| Decoder | 2-D decoder |
| Active codes types | DataMatrix ECC 200<br>(square data field, white background) |
| Symbol length/Code length | Fsree |
| Min./max. code position | 0/100 CP (area of interest 1) |
| Image refresh rate | 25 Hz at 1,3 Megapixel (1280 x 1024 Pixel) |
| Flash pulse duration | 1,000 µs |
| Efficiency of image buffer memory<br>(image geometry) | 100% (Y1= 0%, Y2=100%, X1= 0%, X2=100%) |
| Resolution (min. cell size/min. bar width) | 0.25 mm (9.8 mil)/0.35 mm (13.8 mil) |
| Max. object velocity | No movement |
| Printing procedure | Standard |
| Illumination mode | Internal, all LEDs on |
| 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,<br>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:<br>IP address: 192.168.000.001, IP mask: 255.255.255.000,<br>IP port Aux: 2111 (server), IP port Host: 2112 (server)<br>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 oodes (free symbol length, square data field, white background).

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 red, pulsed illumination field on for lighting the reading area.
5. For 2-D code reading, represent the sample from *Fig. 6-1* at following reading distance (no conveyor movement during reading!):
   ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window.
   At this reading distance the ICR provides a reading area size of 40 mm x 32 mm (1.58 in x 1.26 in). For assigning the reading area to the reading window see *Fig. 3-2, Page 3-6*).
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 field. 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 0.3 mm (11.8 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**
  (Starts the "ImageFTP" program for displaying the image, mapps the code in sharp focus by the ICR in its image memory)

- **DataMatrix AutoSetup**
  (Prepares and performs AutoSetup)

- **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

- Code background

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

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 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 select CLV ASSISTANT in the TOOL menu.
    The Assistant displays with the following dialog box:
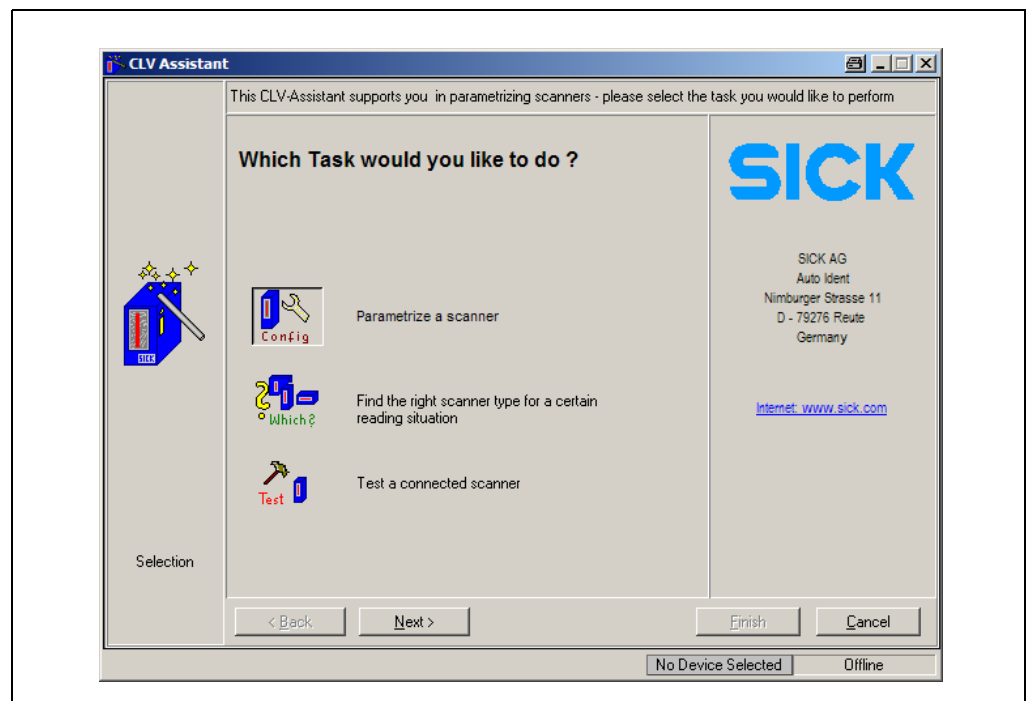


Fig. 6-3: CLV Assistant: Starting up window

The program window of CLV Setup is minimized.

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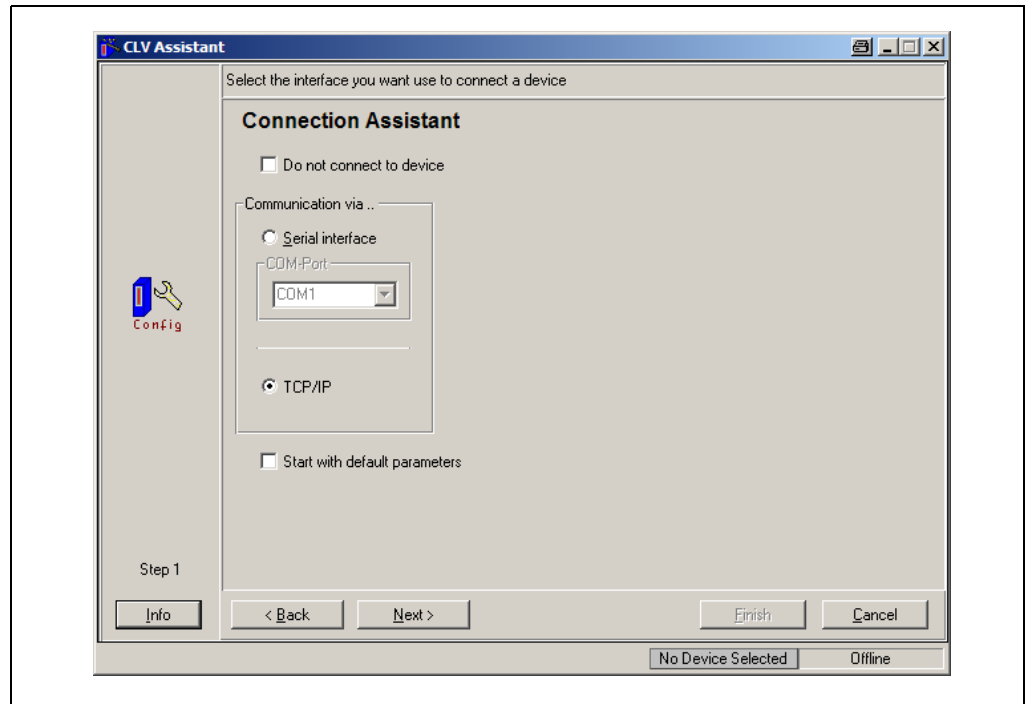
Fig. 6-4:     CLV Assistant: "Connection Assistant" dialog box

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
      successfull Ethernet connection will be deleted.)

4.    Click NEXT.
      The dialog box of the **Ethernet Assistant** is then displayed:
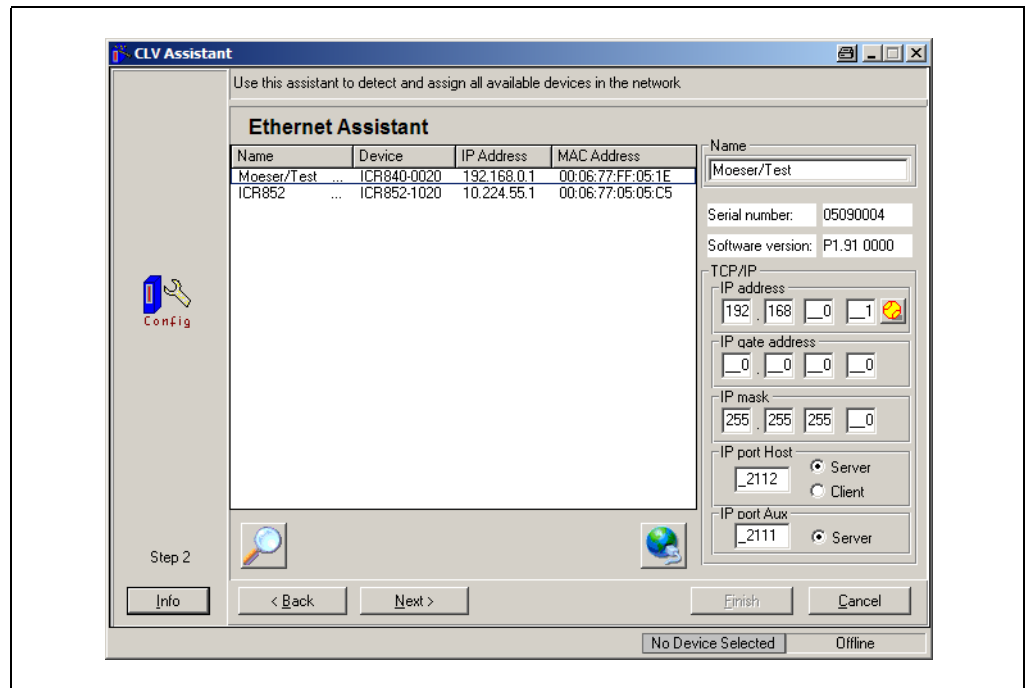


Fig. 6-5:     CLV Assistant: "Ethernet Assistant" dialog box after an ICR has been detected in the
              network (here: IP address in the default setting of the ICR)

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 display 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*).
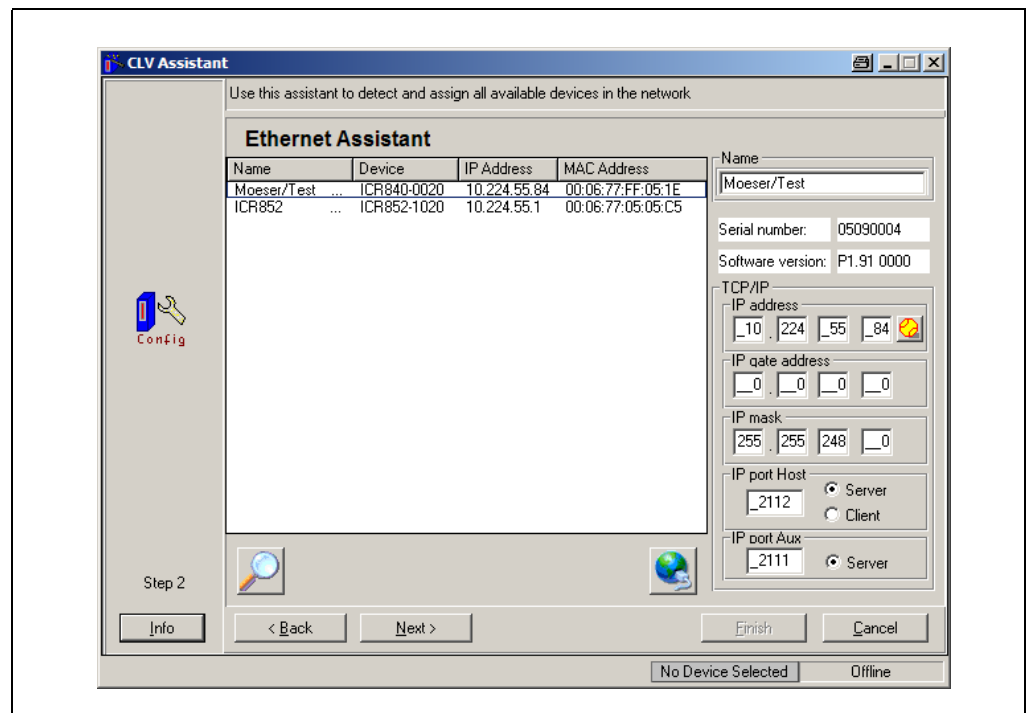


Fig. 6-6:    CLV Assistant: "Ethernet Assistant" dialog box after a new IP address/mask has been assigned to the ICR (here: 010.224.055.084/255.255.248.000)

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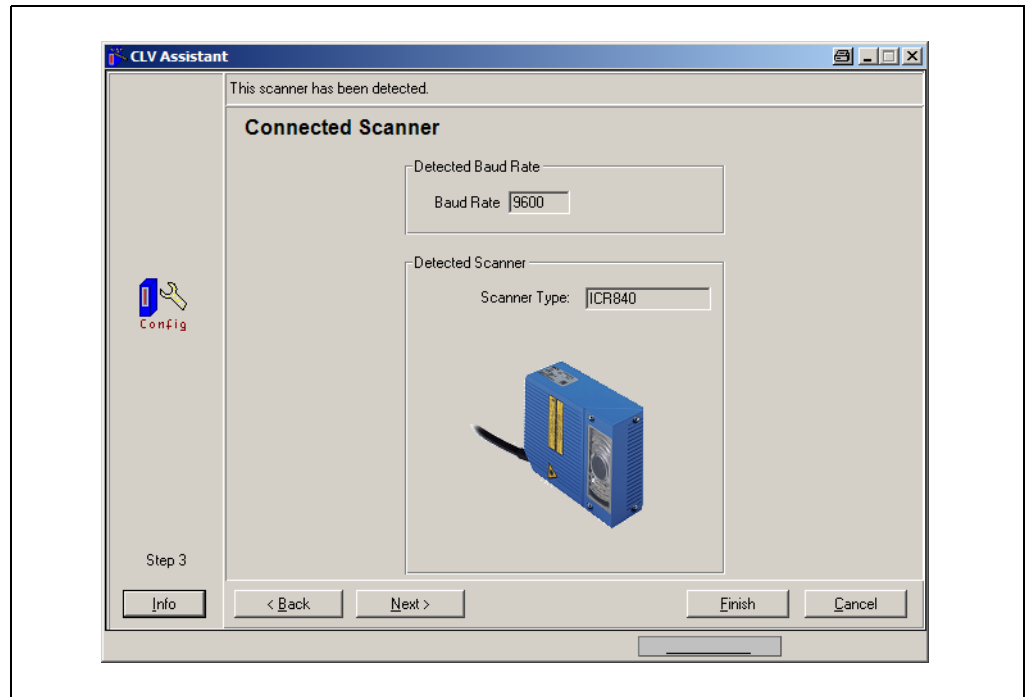
Fig. 6-7:    CLV Assistant: Dialog box confirming that communication with the ICR via Ethernet (TCP/IP) is successful

12. Click NEXT.

The dialog box of the **Scanner Adjustment** is then displayed:
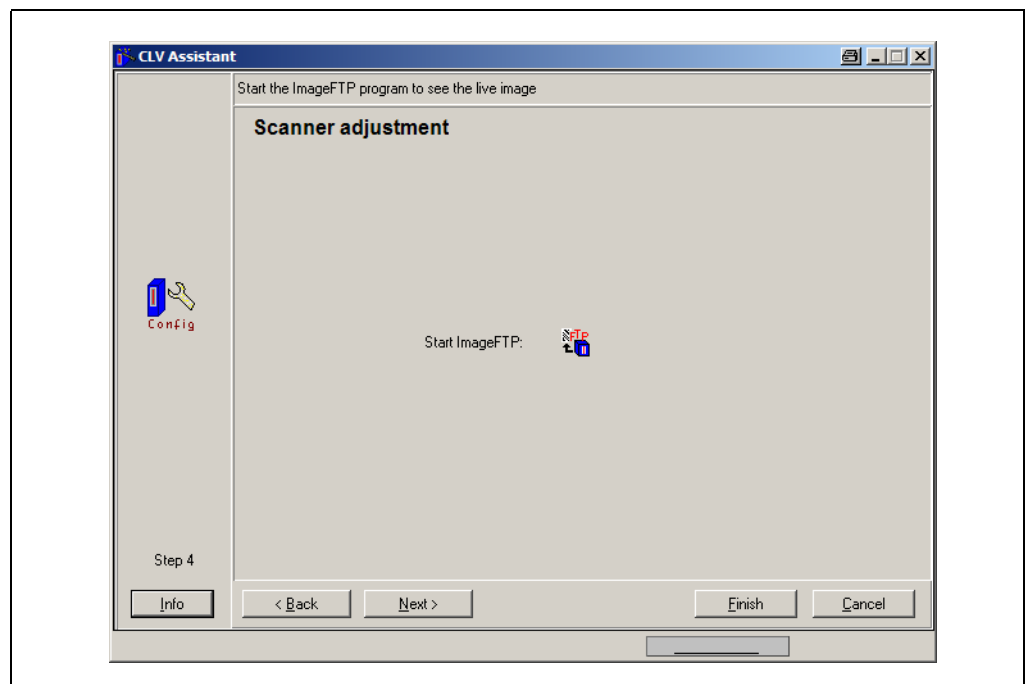


Fig. 6-8:    CLV Assistant: "Scanner Adjustment" dialog box

The ICR switches the red illumination field (pulsed) on for lighting the reading area.

**6-8**                   8 010 961/0000/10-05-2005

**Starting the PC program "ImageFTP"**

1. To start the "ImageFTP" program for outputting the images recorded in the ICR, click 📇 .
   The "Select IP address" dialog box is then displayed:
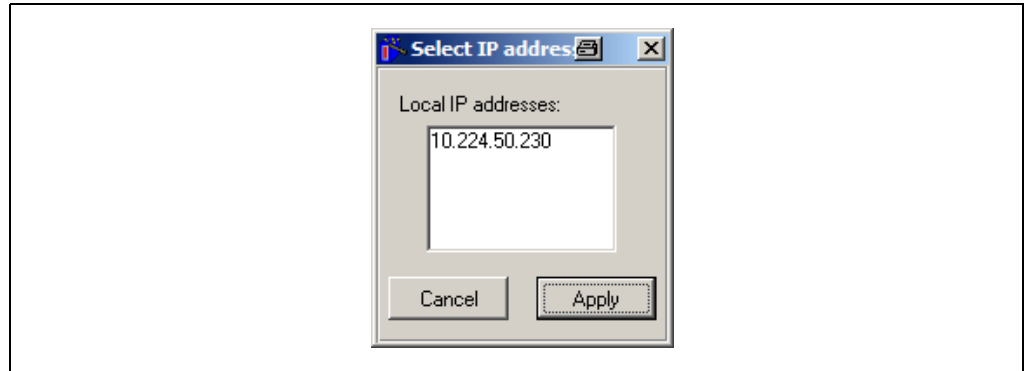


Fig. 6-9:     ImageFTP: "IP address" dialog box

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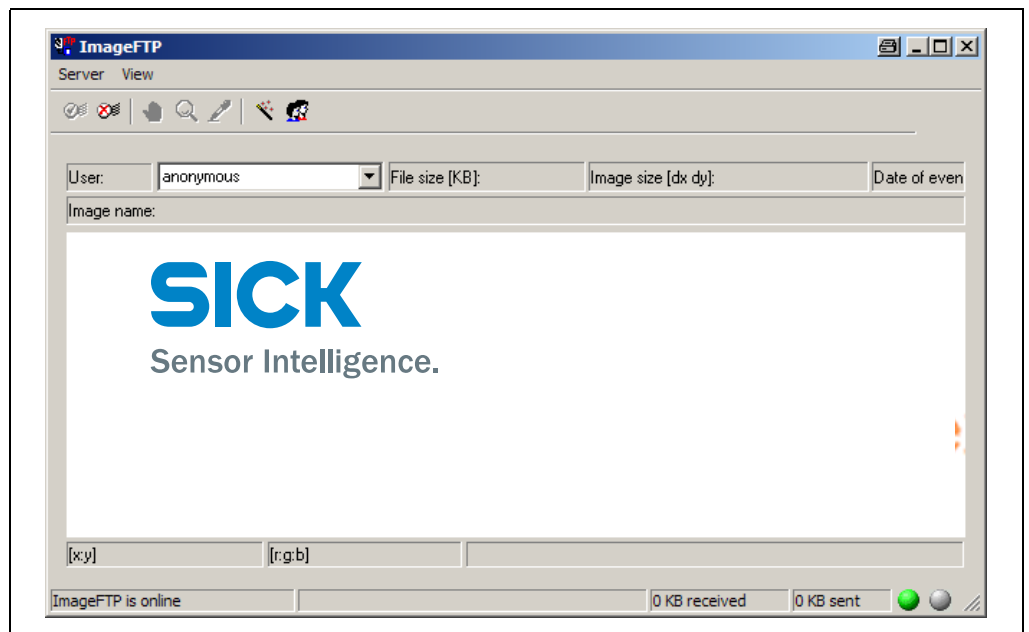


Fig. 6-10:    ImageFTP: Program window

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.

3. Move the program window to a free place on the screen, so that it is parallel to the DataMatrix AutoSetup dialog box.

4. Represent the application-specific DataMatrix code in the reading area (no conveyor movement). Reading distance:
   ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window.
   At this reading distance the ICR provides a reading area size of 40 mm x 32 mm (1.58 in x 1.26 in).

The ICR again records an image of the reading area (surface) in its image memory.

5.   Check the image in ImageFTP. The DataMatrix code must cleary be visible with sufficient sharpness and be undistorted (*Fig. 6-11*). If necessary, modify the reading distance.
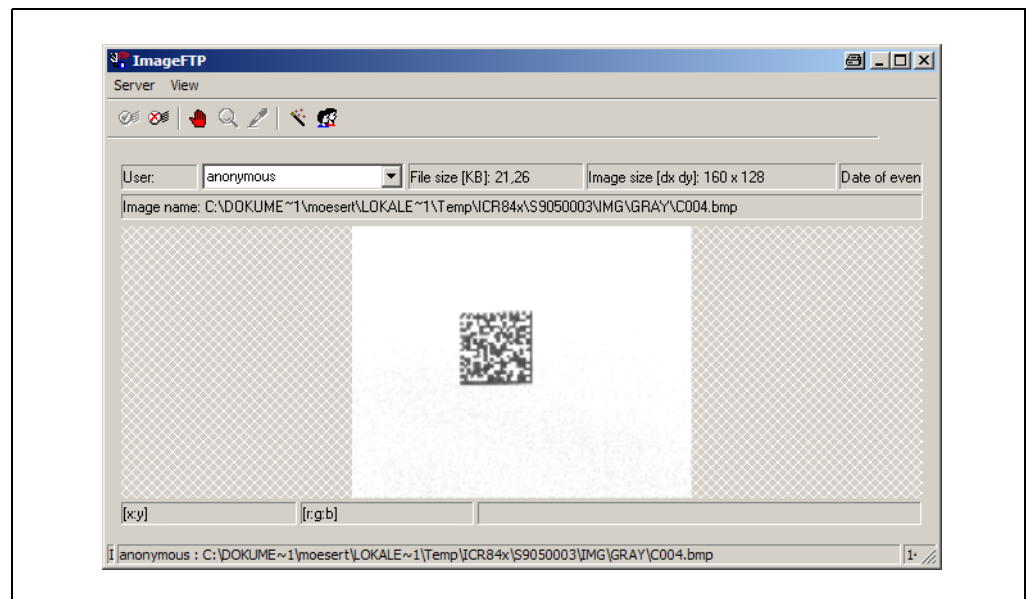


Fig. 6-11:  ImageFTP: Image output when adjusting the ICR (before starting the AutoSetup)

**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.

6.   In the USER section select ANONYMOUS.

7.   Click  in the tool bar or select USER ACCOUNTS in the SERVER menu.
    The following dialog box is then displayed:
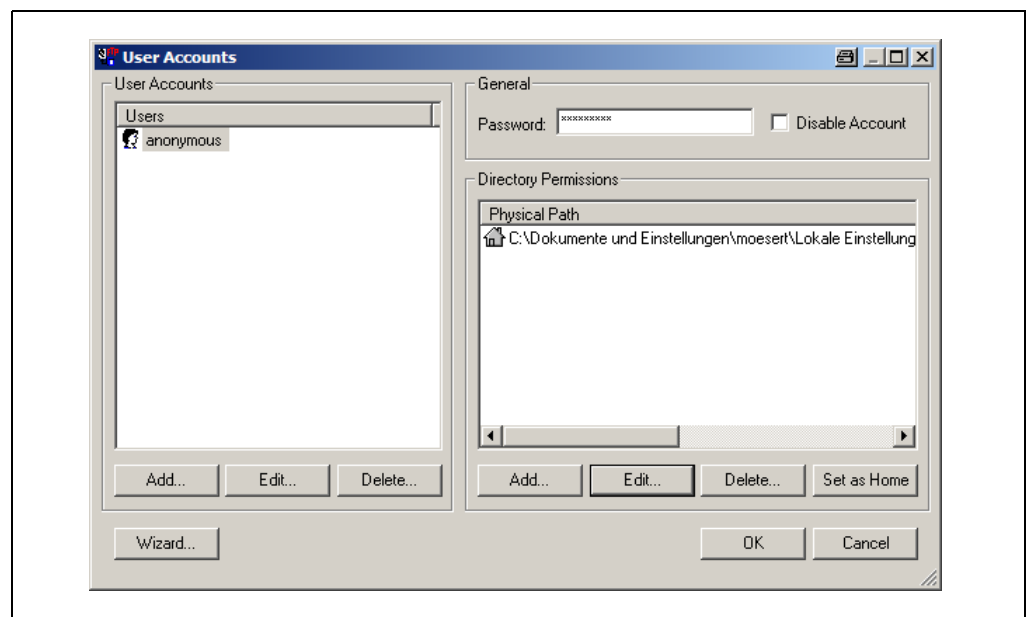


Fig. 6-12:  ImageFTP: "User accounts" dialog box

(Pass word for the default entry "anonymous": anonymous.)

8. In the DIRECTORY PERMISSIONS group, select the proposed PHYSICAL PATH and click EDIT. The "Edit Directory" dialog box for entering the permissions for the "anonymous" account is then displayed:
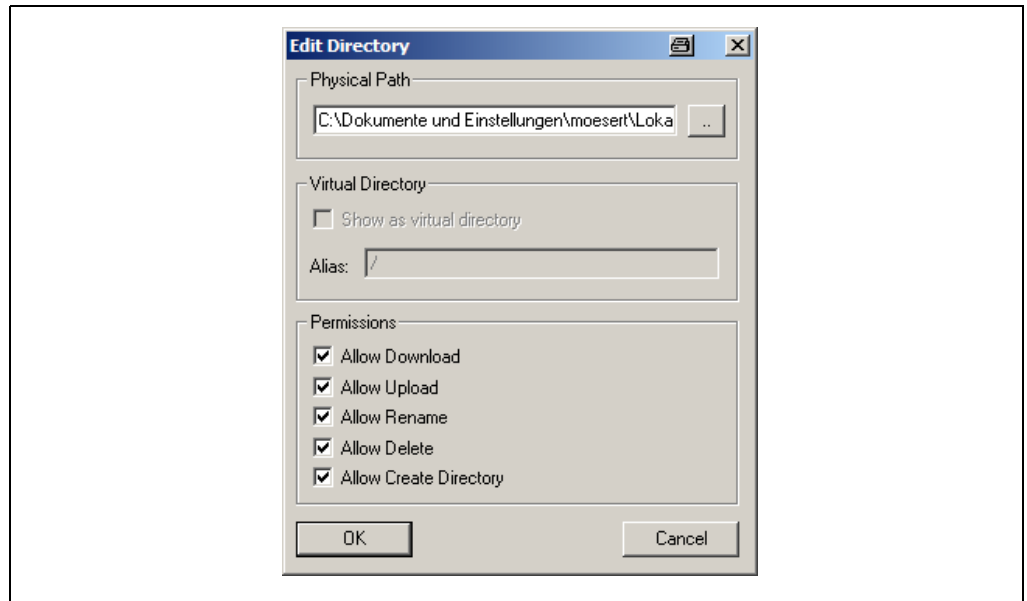
Fig. 6-13:   ImageFTP: "Edit Directory" dialog box

9. In the PHYSICAL PATH section, click ⬚ and select the desired directory in which you want to save the transfered images.
10. Confirm with OK.
    ImageFTP returns to the "User Accounts" dialog box.
11. Confirm with OK.
12. 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.

**Output criteria during using the Scanner Adjustment and 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 bitmaps, 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:
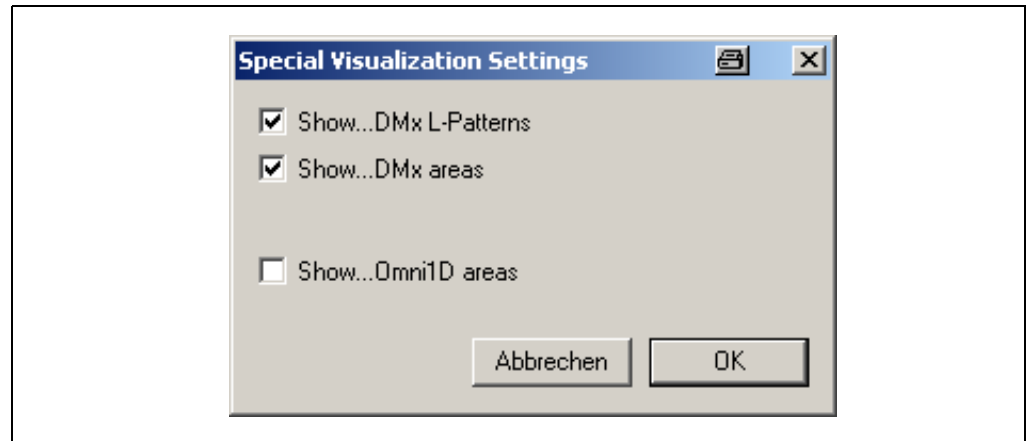
Fig. 6-14:  ImageFTP: "Visualization" dialog box

➢   For DataMatrix code, click SHOW DMX L PATTERN and SHOW DMX AREAS.

➢   Confirm the dialog box with OK.

**Performing the DataMatrix AutoSetup**

1.   Return to the dialog box of the CLV assistant.

2.   Click NEXT.
     The ICR switches the red illumination field off.
     The dialog box of the **DataMatrix AutoSetup** is then displayed:
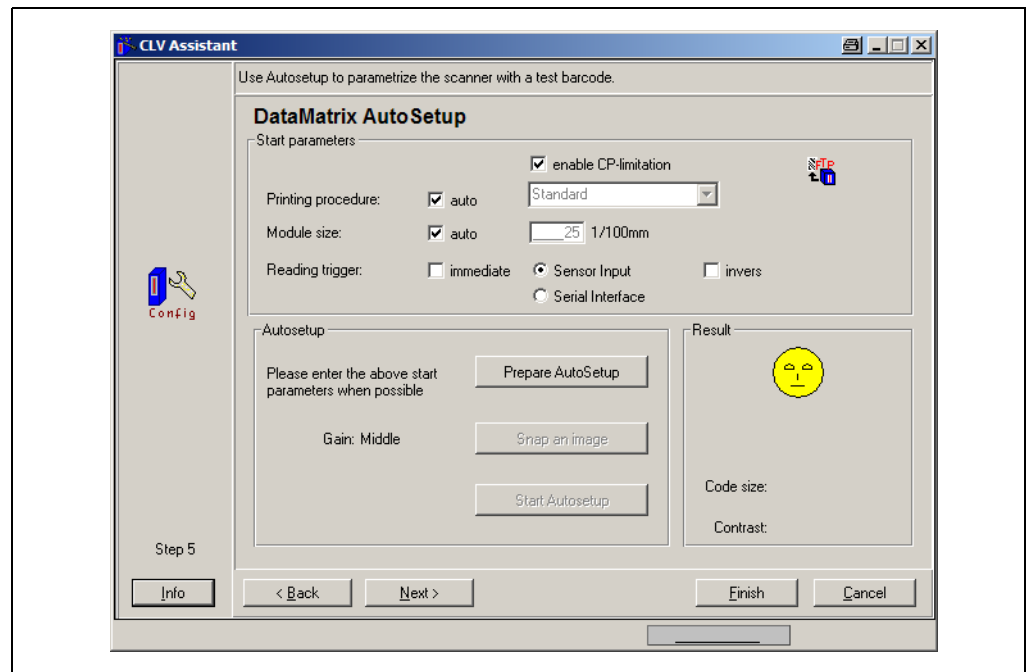


Fig. 6-15:  CLV Assistant: "DataMatrix AutoSetup" dialog box (part 1)

3.   Enter known values in the STARTING PARAMETERS group for the AutoSetup.

     –   Click (activate) the ENABLE CP LIMITATION checkbox if the code is always on the same
         place on the objects.

     –   For reading trigger, choose SENSOR INPUT.

4.   Click PREPARE AUTOSETUP.
     The Assistant downloads the start parameters to the ICR.

5.   Click SNAP AN IMAGE (*Fig. 6-16*).

The Assistant requests the trigger for the ICR.
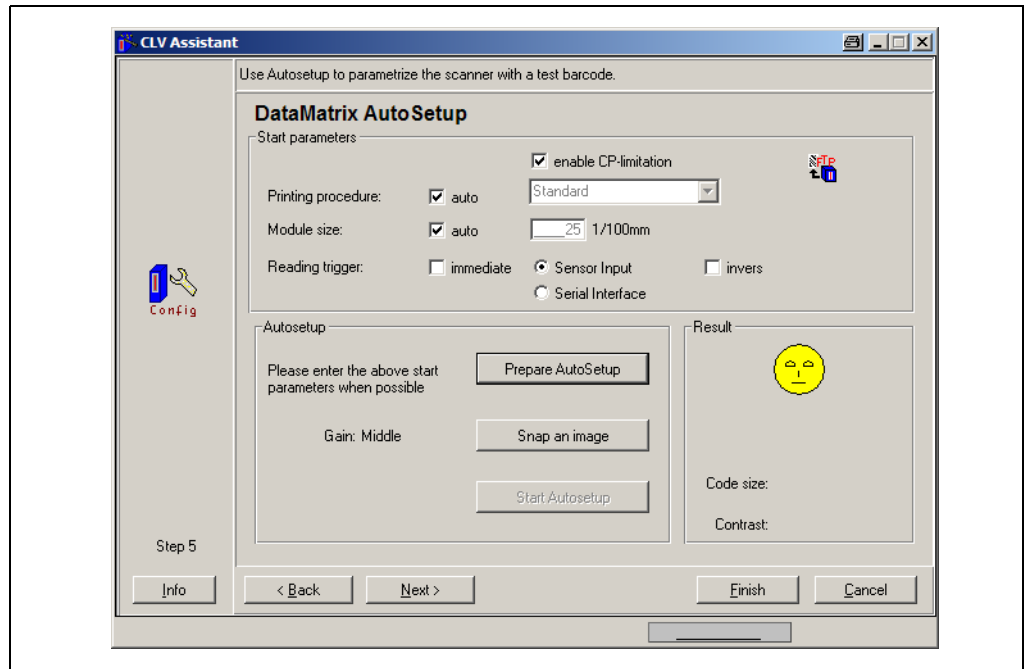


Fig. 6-16:   CLV Assistant: "DataMatrix AutoSetup" dialog box (part 2)

6.   Start the reading pulse: block the light path of the photoelectric switch or close the switch.
     The ICR switches the red illumination field (pulsed) on for lighting the reading area. The ICR starts recording the information from the reflected light of the reading area (surface) as grey scale values in the image memory. With a small offset, the ICR starts decoding simultaneously.

7.   Represent the application-specific DataMatrix code in the reading area (no conveyor movement). Retain the reading distance you adjusted previously.

8.   Stop the reading pulse: unblock the light path of the photoelectric switch or open the switch.

9.   Check the image in ImageFTP (*Fig. 6-17*).
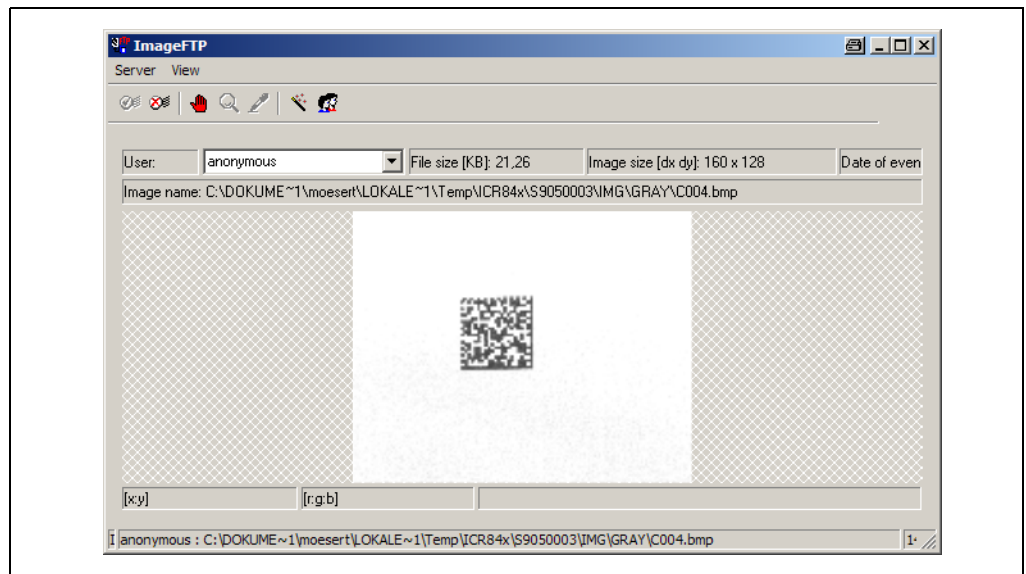


Fig. 6-17:   ImageFTP: Image output when preparing the AutoSetup

10. If OK, click START AUTOSETUP in CLV Assistant.
    The ICR tries to detect a DataMatrix code in the recorded image.
    This can take some seconds.

11. 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.
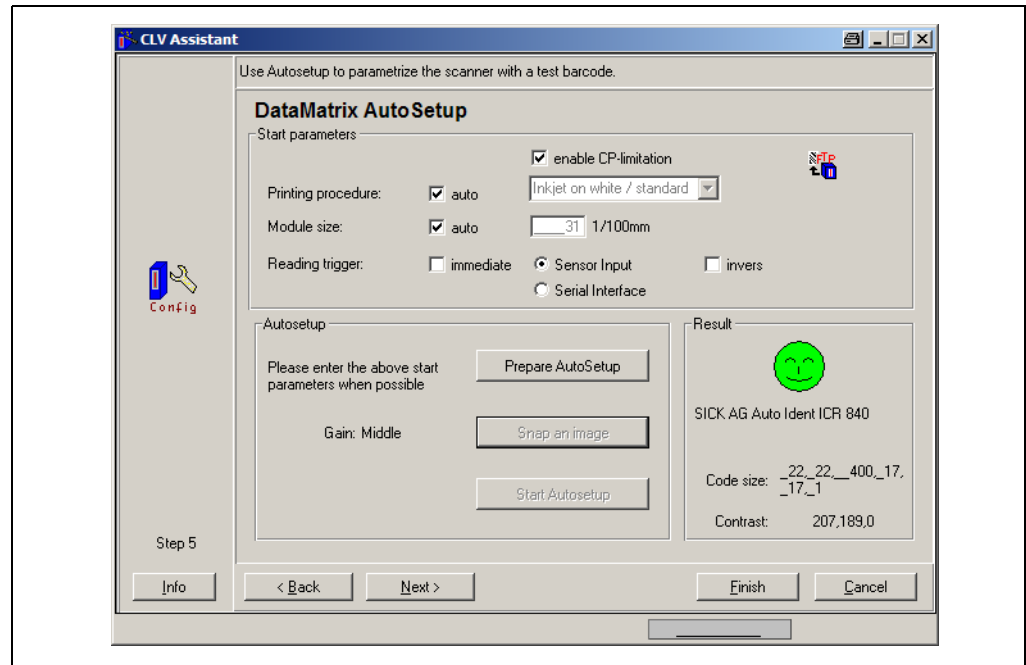


Fig. 6-18:   CLV Assistant: "DataMatrix AutoSetup" dialog box after successful reading

12. Click NEXT.
    The Assistant now displays the steps that were carried out and the values determined
    (*Fig. 6-19*). This parameter values are permanently saved in the ICR.
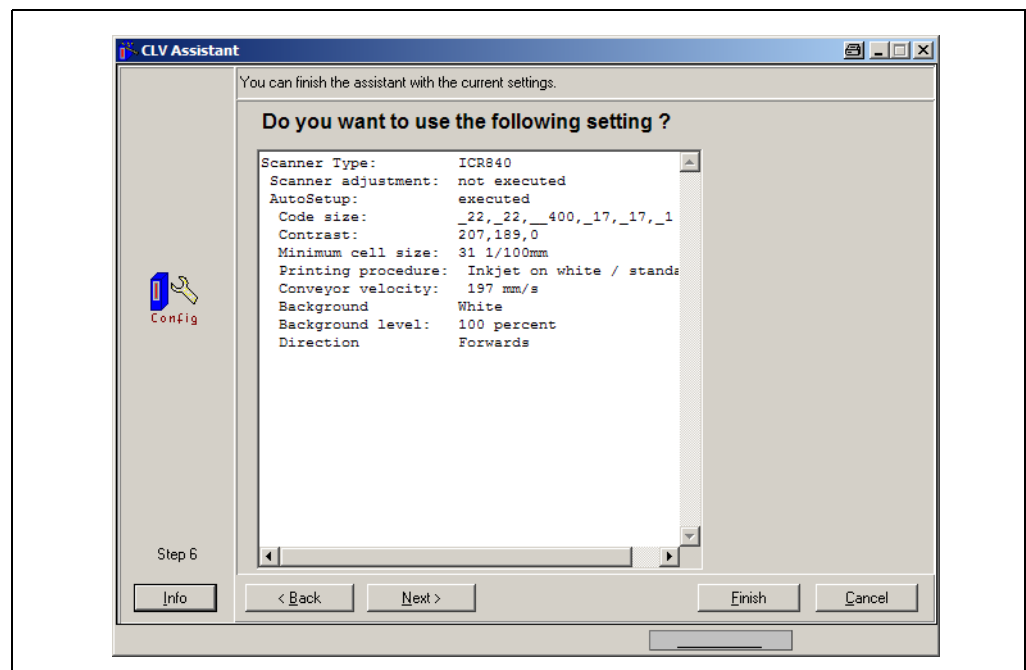


Fig. 6-19:   CLV Assistant: Display of the performed steps and determined values

13. Click NEXT.

    The Assistant transfers the determined 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.

14. 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.

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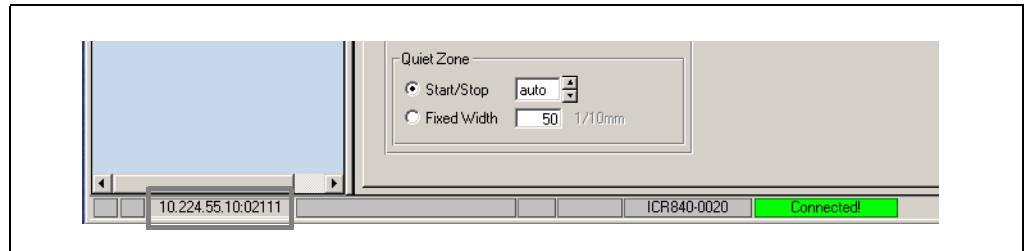


Fig. 6-20:   CLV Setup: Status line with IP address/port of the Ethernet connection

16. The INTERFACE OPTIONS dialog box is then displayed:
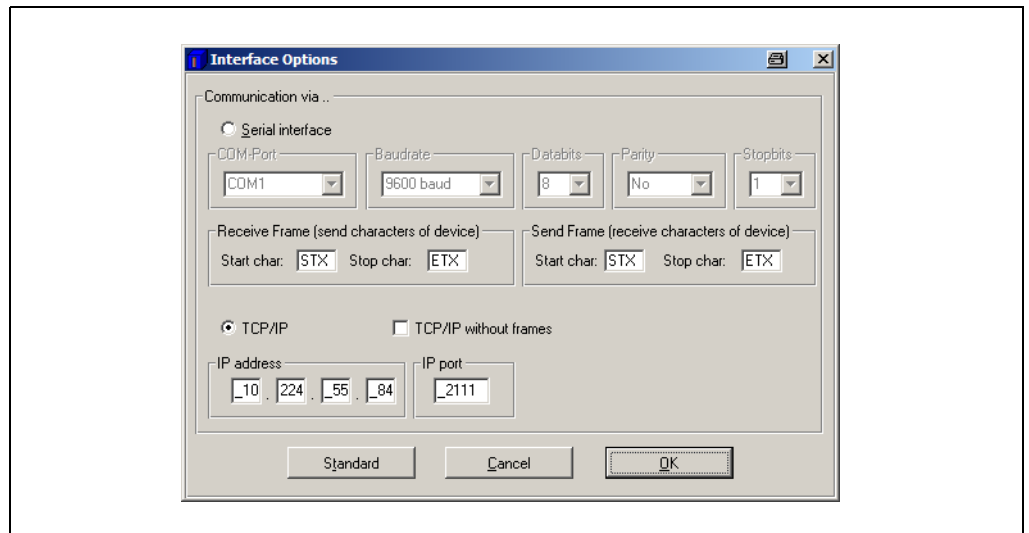


Fig. 6-21:   CLV Setup: "Interface Options" dialog box line with IP adress/port of the Ethernet connection

17. Click OK.

    CLV Setup restarts the communication with the ICR.

18. If the ICR again reads the DataMatrix code successfully, ImageFTP displays the reading diagnosis data when enabled for outputting (*Fig. 6-22, Page 6-16*).
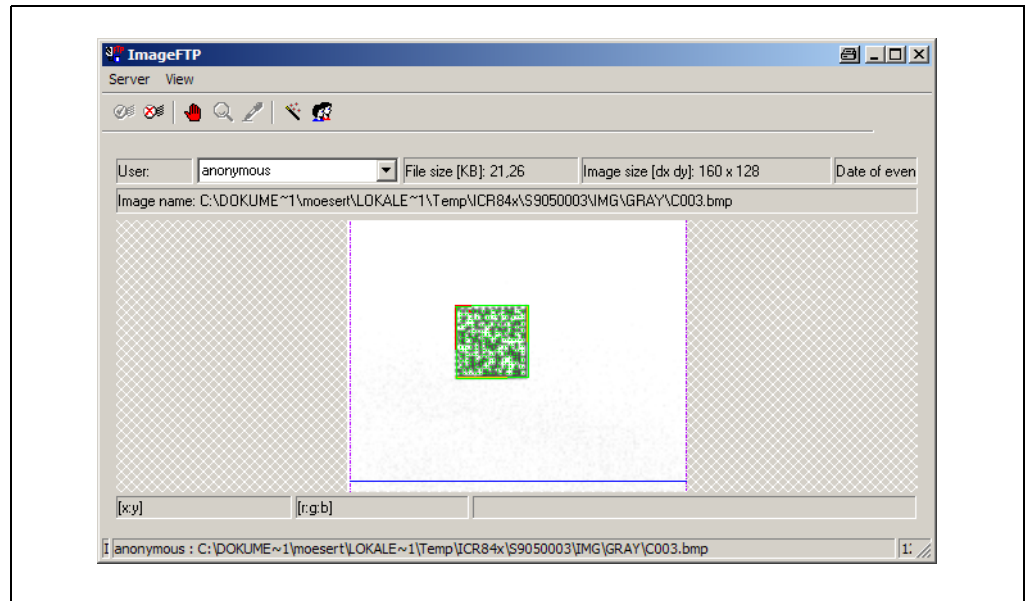
Fig. 6-22:   ImageFTP: Image output, with the markings for CP limitations (violet), the 2-D symbol
            (green) and the position of the DataMatrix decoder at the end of reading pulse (blue)

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)
- Red line: areas with DataMatrix codes
- Blue line (vertical): position of the DataMatrix decoder at the end of the reading pulse

For further marks, also for bar codes, see *Chapter 6.5.3 "Image Acquisition", Page 6-36*.

## 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 10-25*)

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

### 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 84x 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 84x 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".

**6-18**       8 010 961/0000/10-05-2005

### 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/maximum cell size and module width for 2-D codes and/or bar codes
- Evaluation range of the reading area (CP value), image geometry
- Flash pulse duration, internal illumination mode
- Printing procedure of the code to be read
- Adapting to the quality of the code
- Design of 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
- Illumination 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, omni-directional 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 (by the server (PC))
- 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 illumination 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 section
  - Elimination of masking by the code surface ⇨ READING CONFIGURATION tab ⇨ IMAGE PROCESSING section ⇨ CODE PROPERTIES PARAMETERS button ⇨ SURFACE section
  - For ink-jet printing: Compensation of poor dot size ⇨ READING CONFIGURATION tab ⇨ IMAGE PROCESSING section ⇨ CODE PROPERTIES PARAMETERS button ⇨ DILATATION section
  - Illumination mode ⇨ READING CONFIGURATION tab ⇨ CODE PROPERTIES PARAMETERS button ⇨ INTERNAL ILLUMINATION MODE section

See also

**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 section

See also

**General:**

- Flash pulse duration and Illumination power ⇨ READING CONFIGURATION tab ⇨ IMAGE PROCESSING section and CODE PROPERTIES PARAMETERS button ⇨ INTERNAL ILLUMINATION MODE section
- Evaluation range of the reading area ⇨ READING CONFIGURATION tab ⇨ READING PARAMETERS 2-D section ⇨ AREA OF INTEREST section
- Codelabel quality ⇨ READING CONFIGURATION tab ⇨ IMAGE PROCESSING section ⇨ PRINTING PROCEDURE section

## b) Parameterizing reading pulse source

| Action | Settings in CLV Setup |
|---|---|
| Parameterize reading trigger:<br>**one external sensor**<br><br>*– or –* | ⇨ DEVICE CONFIGURATION tab<br>⇨ SENSOR 1 section<br>   – Debouncing<br>   – Invert Input (if necessary)<br>⇨ READING TRIGGER PARAMETERS button<br><br>**Start:**<br>⇨ START OF READING INTERVAL section<br>   – Sensor Input<br>⇨ START DELAY section<br>   – Time controlled: value *or*<br>   – Track contolled: value<br>     (with connected increment encoder)<br>⇨ DELAY CONTROLLING section<br>   – Time controlled delaying *or*<br>   – Track controlled delaying<br>⇨ FIRST TRIGGER SENSOR section<br>   – Edge *or*<br>   – Level<br><br>**Stop:**<br>⇨ END OF READING INTERVAL section (No Read)<br>   – Trigger Source *or*<br>   – Timer: Timeout (referred to beginning of reading interval)<br>⇨ STOP DELAY section<br>   – Auto *or*<br>   – User defined<br>     – Time controlled: value *or*<br>     – Track contolled: value<br>       (with connected increment encoder)<br><br>**Output of reading result referred to beginning of reading interval:**<br>⇨ RESULT OUTPUT section (Good Read)<br>   – End of reading interval *or*<br>   – Immediate output *or*<br>   – End of next reading interval<br>**Note:**<br>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**<br><br>– *or* – | ⇨ DEVICE CONFIGURATION tab<br>⇨ SENSOR 1 section<br>  – Debouncing<br>  – Invert Input (if necessary)<br>⇨ READING TRIGGER PARAMETERS button<br><br>**Start (sensor 1):**<br>⇨ START OF READING INTERVAL section<br>  – Sensor Input<br>⇨ START DELAY section<br>  – Time controlled: value<br>⇨ DELAY CONTROLLING section<br>  – Time controlled delaying<br>⇨ FIRST TRIGGER SENSOR section<br>  – Edge *or*<br>  – Level<br><br>**Stop (sensor 2):**<br>⇨ END OF READING INTERVAL section (No Read)<br>  – Trigger source<br>⇨ DEVICE CONFIGURATION tab<br>⇨ SENSOR 2 section<br>  – Assignment<br>    – Reading trigger stop<br>  – Debouncing: value<br>  – Invert Input (if necessary)<br><br>**Output of reading result referred to beginning of reading interval:**<br>⇨ RESULT OUTPUT section (Good Read)<br>  – End of reading interval *or*<br>  – Immediate output *or*<br>  – End of next reading interval<br><br>**Note:**<br>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.)

8 010 961/0000/10-05-2005       **6-23**

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

              8 010 961/0000/10-05-2005

## c) Parameterizing illumination timeout

Function only available for trigger source "Sensor input"/"Ser. interface".

| Action | Settings |
|---|---|
| 1. Select the duration for the illumination timeout<br>**– or –** | ⇨ Device Configuration tab<br>⇨ Reading Trigger Parameters button<br>⇨ Illumination timeout section<br>   – Duration |
| 2. Deactivate the illumination timeout<br>(laser diode is always active when pulsing,<br>regardless of the pulse duration) | ⇨ Illumination timeout section<br>   – Click (deactivate) the Active checkbox |

Table 6-3: Guide: Parameterizing the illumination timeout

## d) Parameterizing evaluation characteristics

**For 2-D codes (DataMatrix ECC200):**

- 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 "Improving the image quality", Page 10-14*

**Optimization (time-critical applications)**

- Defining code size ⇨ Code Configuration tab ⇨ 2D-Symbologies section ⇨ Edit button ⇨ Symbol size section
- Evaluation area of the image buffer memory ⇨ Reading Configuration tab ⇨ Code Properties Parameters button ⇨ Image Geometry section

Requirement for additional optimizations: high code quality

- Error correction restriction ⇨ Code Configuration tab ⇨ 2D-Symbologies section ⇨ Edit button ⇨ Permissible error correction section
- Supression of further decodings ⇨ Code Configuration tab ⇨ 2D-Symbologies section ⇨ Edit button ⇨ Optimization Parameters button ⇨ Decoder retry on... section

See also *Chapter 10.4.2 "Optimizing reading characteristics for special 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<br>⇨ CODE POSITION section<br>  – **Deactivate** "Compare"! |
| 2. Number n > 1:<br>  – Same code type<br>  – Contents different or identical | ⇨ CODE POSITION section<br>  – **Activate** "Compare"!<br>⇨ NUMBER OF CODES section<br>  – Minimum<br>  – Maximum |
| 3. Number n > 1:<br>  – Code type different<br>  – Contents different or identical | ⇨ CODE POSITION section<br>  – **Deactivate** "Compare"!<br>⇨ NUMBER OF CODES section<br>  – Minimum<br>  – 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

**6-26**                   8 010 961/0000/10-05-2005

**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" blocks ⇨ 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 6-17*)
- 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 10-28*).

**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 become 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 length of the readable code is reduced with respect to the decodable length as a result
of the distance-dependent dimensions of the reading area (surface) (see samples in
*Table 9-2, Page 9-2*).

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

**6-28**                       8 010 961/0000/10-05-2005

**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. Start the reading pulse.
   The "Laser On" LED lights up. The red illumination field (pulsed) appears.

4. Represent the 2-D code sample from *Fig. 6-1, Page 6-3* in the reading area (no conveyor movement during reading!).
   Reading distances:
   ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window. Available reading area size at this reading distance: 40 mm x 32 mm (1.58 in x 1.26 in).

5. End the reading pulse.
   The "Laser On" LED is extinguished. The ICR switches off the red illumination field. 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. Start the reading pulse.
   The "Laser On" LED lights up. The red illumination field (pulsed) appears.

7. Represent the bar code sample from *Fig. 6-2, Page 6-3* in the reading area (no conveyor movement during reading!).
   Reading distances:
   ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window. Available reading area size at this reading distance: 40 mm x 32 mm (1.58 in x 1.26 in).

8. End the reading pulse.
   The "Laser On" LED is extinguished. The ICR switches off the red illumination field. 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. 6-23* shows an example of the "Good Read" reading result output for 2-D codes and *Fig. 6-25, Page 6-32* 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. 6-25*.

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 6-40* 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)**
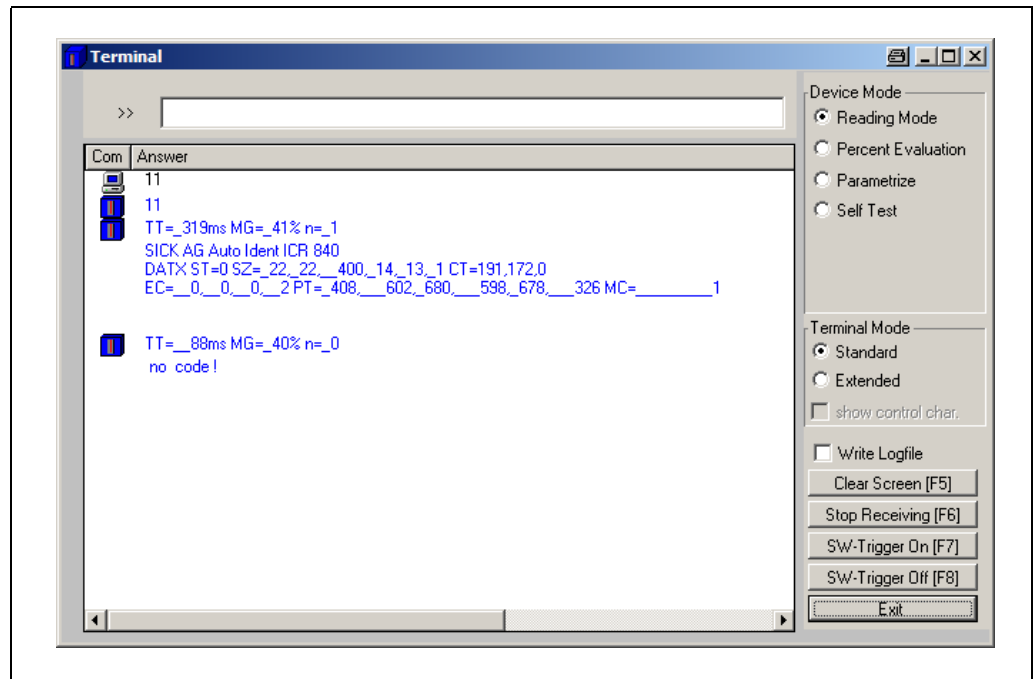


Fig. 6-23:  CLV Setup: Output of the reading result of the auxiliary interface for 2-D codes in the Terminal Emulator

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

TT=_319 ms  MG=_41 %  n=_1

**SICK AG Auto Ident ICR 840**

DATX  ST= 0  SZ=_22,_22,__400,_14,_13,_1  CT=191,172,0

EC= __0,__0,__0,__2  PT=_408,__602,680,__598,678,__326  MC=_____1

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 840** =  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

                    ccccc =  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, bbbbb, cccc, ddddd, eeee, fffff) |
|  |  | aaaa = | x position P 1 |
|  |  | bbbbb = | y position P 1 |
|  |  | cccc = | x position P 2 |
|  |  | ddddd = | y position P 2 |
|  |  | eeee = | x position P 3 |
|  |  | ffffff = | y position P 3 |
| **MC** | = | | Multi Count (Number of multiple readings), 8-digit |

*Fig. 6-24* shows the definition of the position of the symbol in the image field.
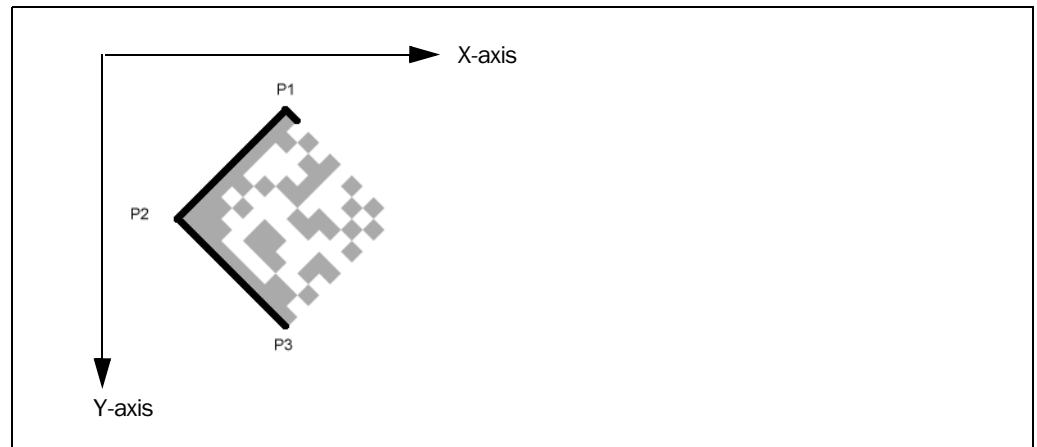


Fig. 6-24:   Position of the symbol in the image field of the image memory

**2. Output of reading result: Bar code**
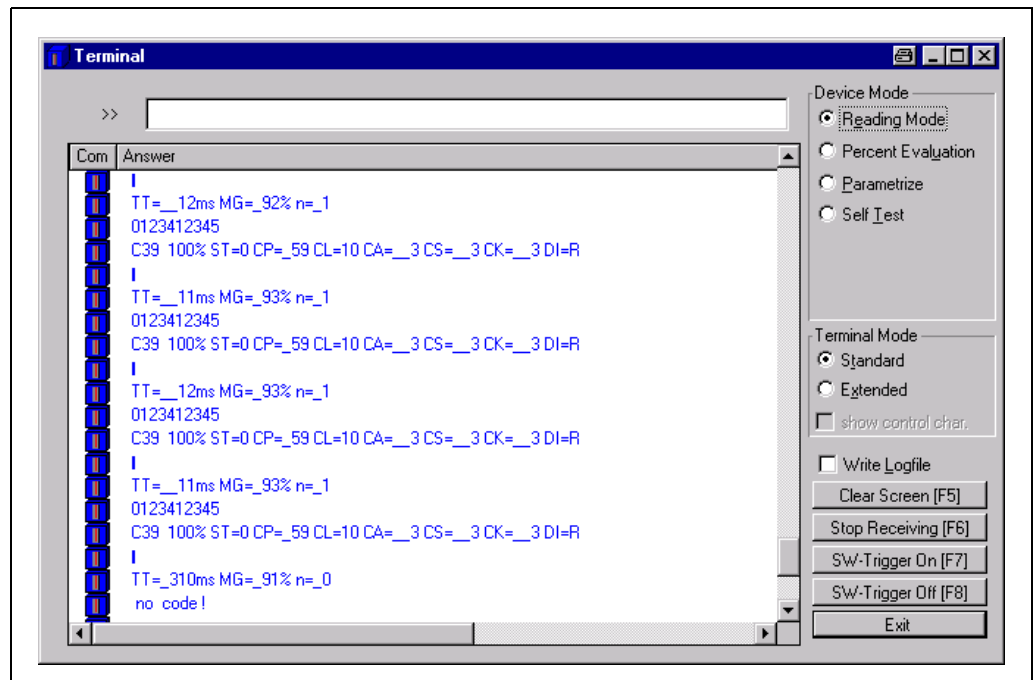


Fig. 6-25: CLV Setup: Output of the reading result of the auxiliary interface for bar codes in the Terminal Emulator

**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

<u>with:</u>

| 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!

<u>with:</u>

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 field (pulsed) appears.

8.   Represent the 2-D code sample from *Fig. 6-1, Page 6-3* in the reading area (no conveyor movement during reading!).
     Reading distances:
     ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window. Available reading area size at this reading distance: 40 mm x 32 mm (1.58 in x 1.26 in).

**Note**       To read a bar code, proceed as described in *"Displaying the reading result in the Terminal Emulator", Page 6-29.*

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 red illumination field.
     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

In Percentage Evaluation mode, the quality of the reading of codes which are brought statically into the reading area 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 become 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 field (pulsed) appears repeatedly all 2 s.
    The ICR initiates the percentage evaluation and outputs the reading results continuously. An example is shown in *Fig. 6-26, Page 6-35*.

6.  Represent the 2-D code sample from *Fig. 6-1, Page 6-3* or the bar code sample from *Fig. 6-2, Page 6-3* in the reading area (no conveyor movement during reading!).
    Reading distances:
    ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window. Available reading area size at this reading distance: 40 mm x 32 mm (1.58 in x 1.26 in).

7.  Monitor the reading results in the window of the Terminal Emulator.
    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 %

               8 010 961/0000/10-05-2005
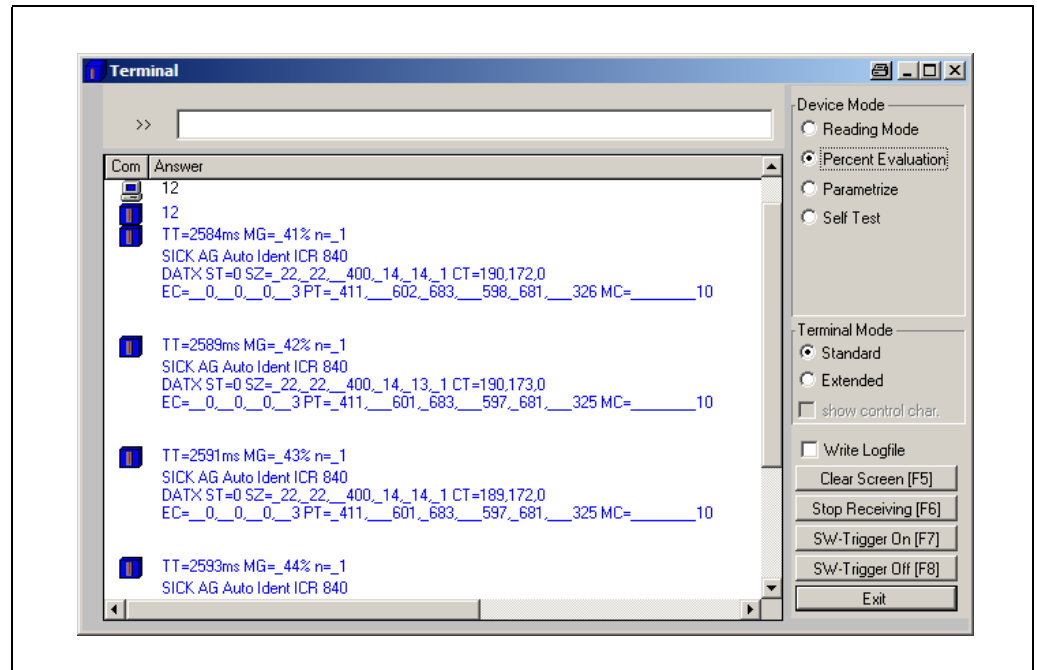
Fig. 6-26:   CLV Setup: Display of the percentage evaluation of the auxiliary interface for bar codes in the Terminal Emulator

The output format of the reading result is the same as that of the Reading mode. *Fig. 6-23, Page 6-30* 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.

**Additional quality check of 2-D code reading**

The quality of 2-D code reading can additionally 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 6-30.*
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 "Optimizing reading characteristics for special 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 Scanner Adjustment and the DataMatrix AutoSetup:", Page 6-11*.

**Prerequisistes**  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 procdure)

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 the 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 esablishes 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.

   8 010 961/0000/10-05-2005

**Starting the image acquisition**

1.  Start the "ImageFTP" program.
    To do so, click [icon] in the tool bar of CLV Setup.
    The program window of ImageFTP is then displayed.
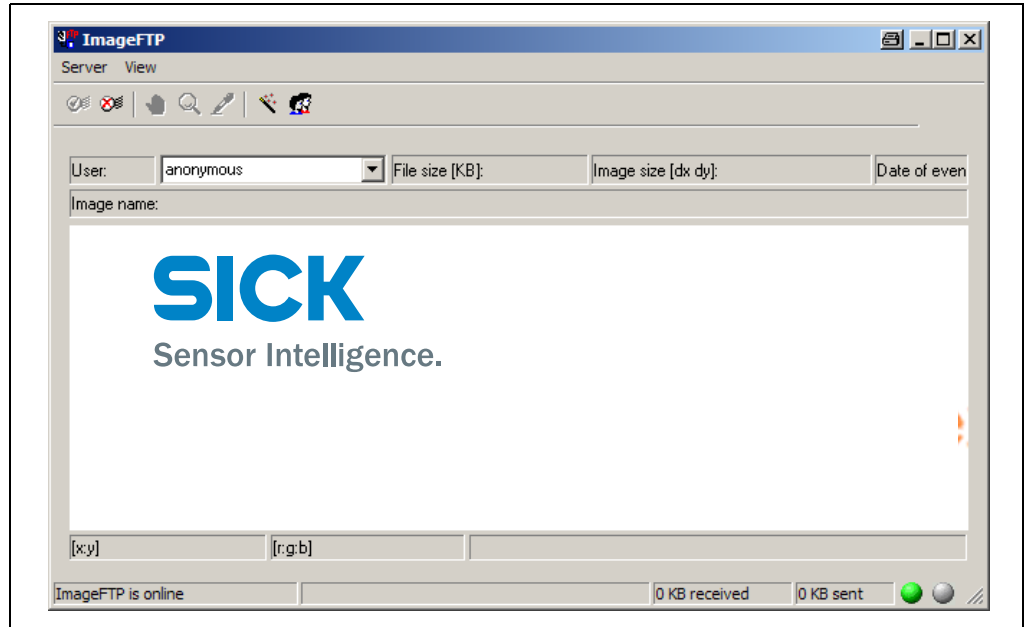


Fig. 6-27:   ImageFTP: Program window

The symbol buttons in the symbol bar provide the following functions:

| Symbol | Function |
|---|---|
| [icon] | Stops the FTP server |
| [icon] | Starts the FTP server |
| [icon] | Freezes the image that is currently displayed |
| [icon] | Zooms in on the image (once it has been frozen) |
| [icon] | 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) |
| [icon] | Starts the Assistant for setting the user accounts |
| [icon] | 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 6-9*.
    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 |
| 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 field (pulsed) appears.

6.  Represent the DataMatrix code in the reading area (no conveyor movement during reading!). Reading distances:
    ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window. Available reading area size at this reading distance: 40 mm x 32 mm (1.58 in x 1.26 in).

7.  Stop the reading pulse.
    The "Laser On" LED extinguishes. The ICR switches off the red illumination field. ImageFTP displays the image memory content of the ICR.
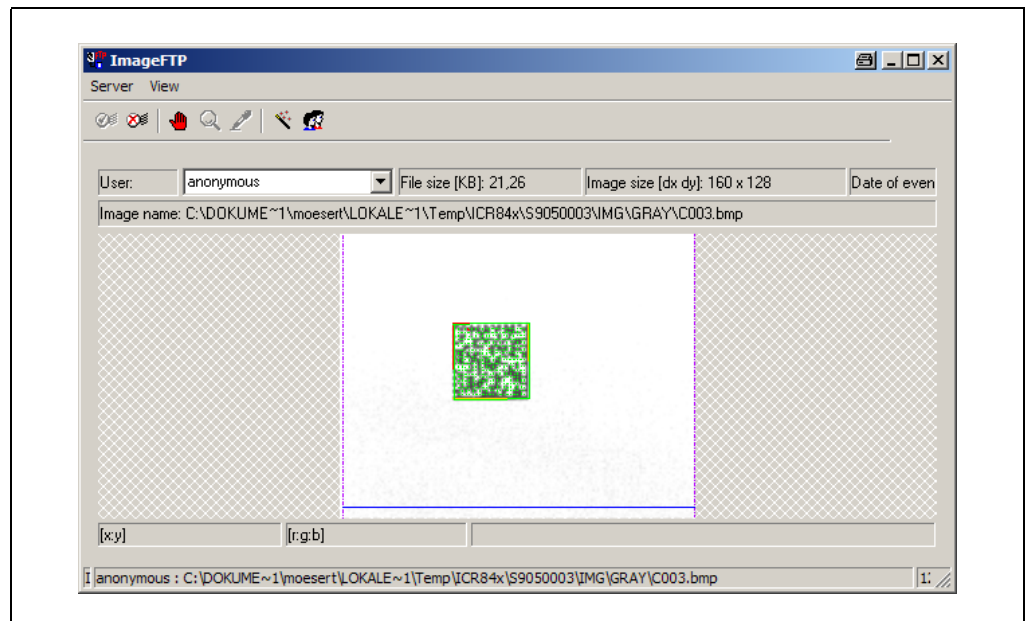


Fig. 6-28:   ImageFTP: Image output, with the marks for CP limitations (violet), the 2-D symbol (green) and the position of the DataMatrix decoder at the end of reading pulse (blue)

8 010 961/0000/10-05-2005

### 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 [icon] in the toolbar.
   The ICR cancels Reading mode. The "Device Ready" LED is extinguished.
   The OPERATING DATA dialog box appears (*Fig. 6-29*).

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.
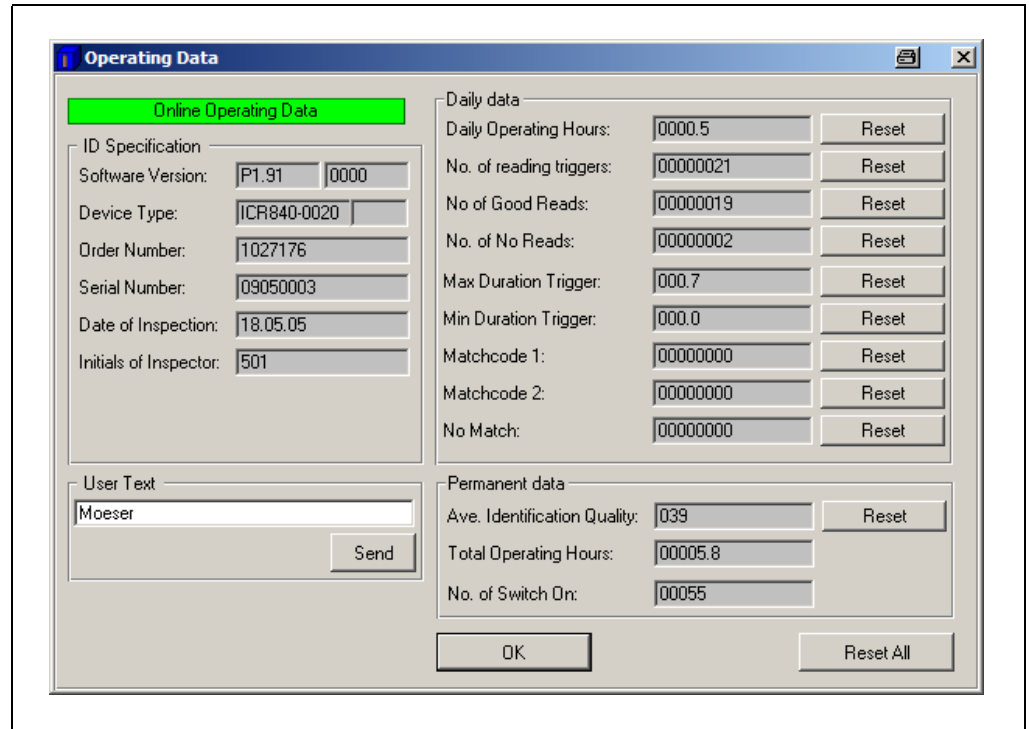


Fig. 6-29: CLV Setup: "Operating Data" dialog box

### 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. 6-23, Page 6-30 and Fig. 6-25, Page 6-32* 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 become 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\> O data \<CR\> \<LF\> \<ETX\> | O 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 become 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. 6-30* 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 6-33.*
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 field (pulsed) of the ICR appears.
5. Represent the 2-D code sample from *Fig. 6-1, Page 6-3* in the reading area (no conveyor movement during reading!).
   Reading distances:
   ICR 840 (standard type): 80 mm (3.15 in) for side/front reading window. Available reading area size at this reading distance: 40 mm x 32 mm (1.58 in x 1.26 in).

**Note**      To read a bar code, proceed as described in *"Displaying the reading result in the Terminal Emulator", Page  6-29.*

6. Click the SW-TRIGGER OFF button or press [F8].
   The ICR switches off the red illumination field.
   CLV Setup outputs the reading result in the Terminal Emulator.
   Example: "SICK AG Auto Ident ICR 840".
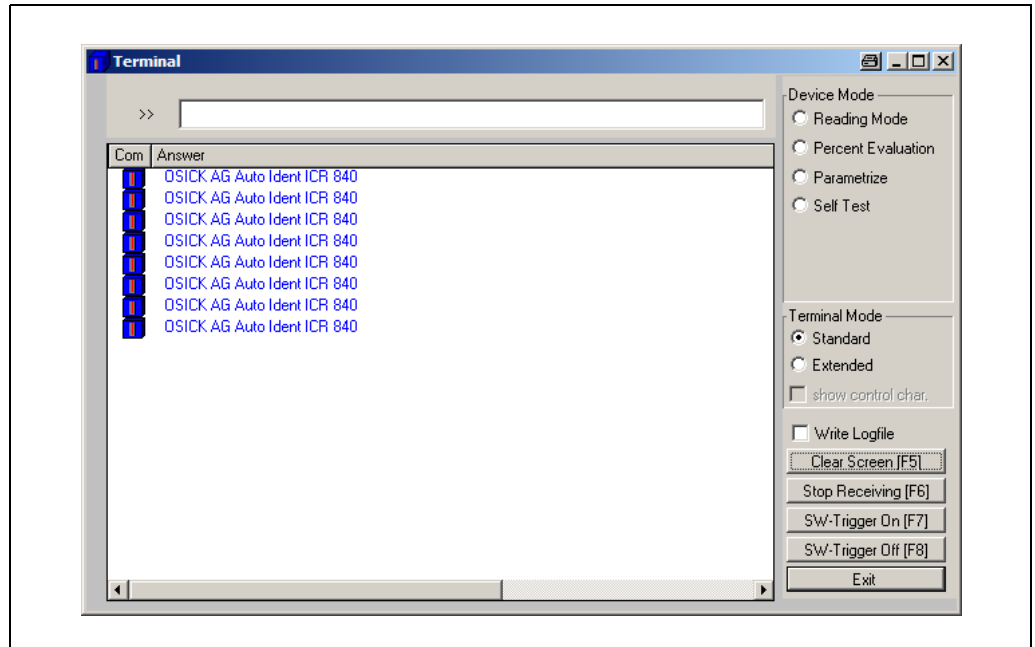


Fig. 6-30: CLV Setup: Output of the reading result of the host interface in the Terminal Emulator (in this case: O = Output)

**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 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.

1. Choose the DATA STRINGS tab.

2. Click the HEADER field.
   The dialog window EDIT PARAMETER: TFH is displayed.

3. 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 code contents in the READING DATA field. The selected arrangement is the same for all output 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 10-34* 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. 6-31, Page 6-43*).

**6-42**              8 010 961/0000/10-05-2005
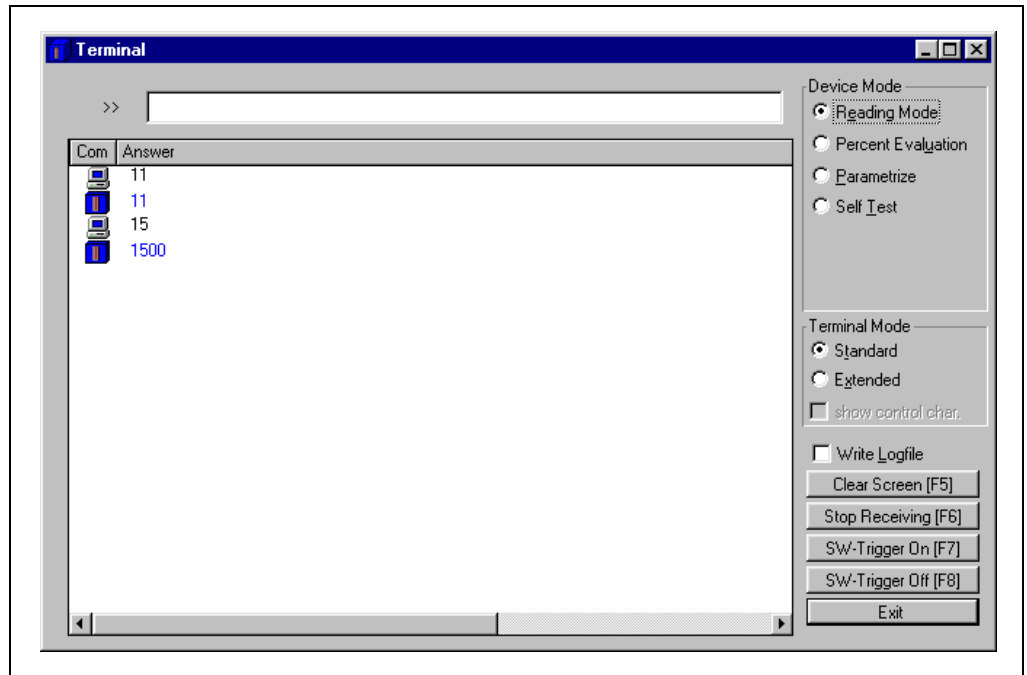
Fig. 6-31:   CLV Setup: Displaying the self-test result in the Terminal Emulator

3.   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 "15**00**" means that the self-test was completed successfully and that no
faults were diagnosed.

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 84x, 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. 6-32* shows an example of the dialog box that appears after Matchcode Teach-in has been started.



Fig. 6-32:   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: "ICR SYS-Message: xxx"
- Error message: "ICR SYS-Error: 048ID8xxx"

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. 6-33* shows an example.
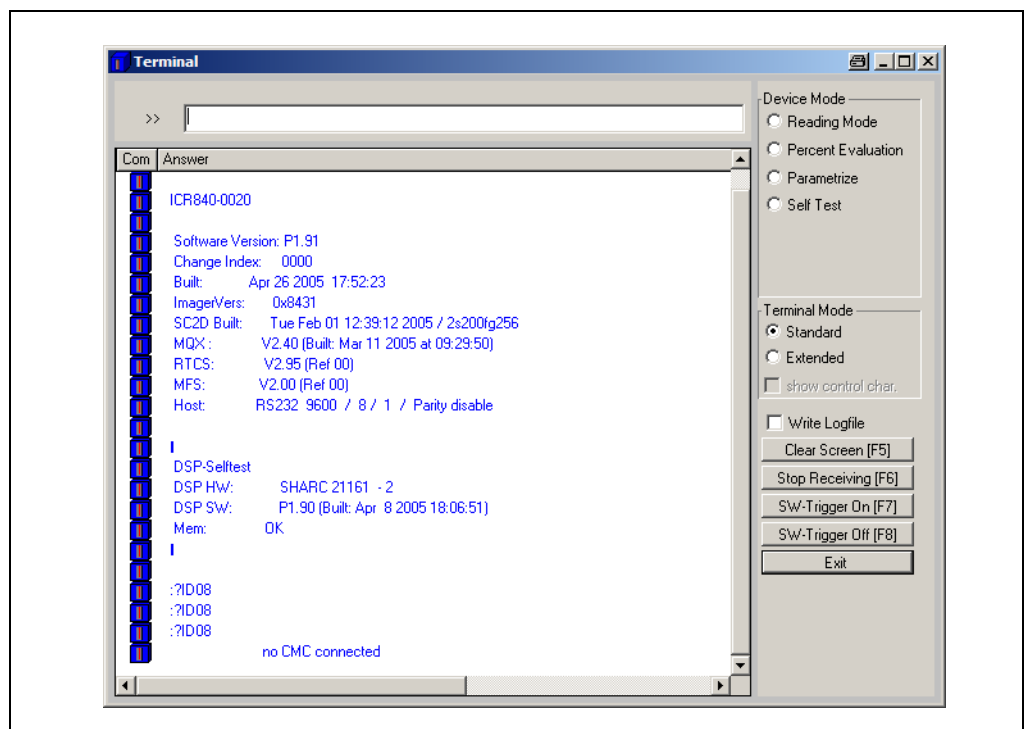


Fig. 6-33: CLV Setup: Displaying the system messages in the Terminal Emulator when starting the ICR

*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 8-5* 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.

    8 010 961/0000/10-05-2005

# 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 LED class 1.

| | |
|---|---|
| ⚠ WARNING | **The ICR 85x is classified in LED class 1.** Under normal and sensible conditions, the accessible beam of the LED illumination is not hazardous. Blinding, impairment of ability to see color, or other irritations, however, cannot be excluded. |

➢ The entire glass window acts as a LED outlet aperture.

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

➢ Switch off the device while it is being cleaned.

➢ Observe the laser protection specifications (latest version).

| | |
|---|---|
| ⚠ CAUTION | **Damage to the reading window** The reading window is made of plastic. 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.
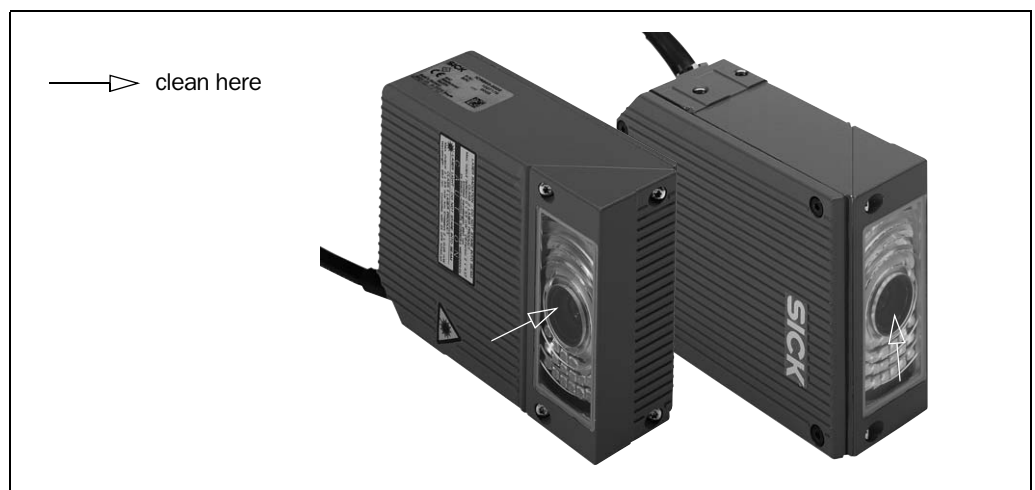


Fig. 7-1: Cleaning the reading window

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.
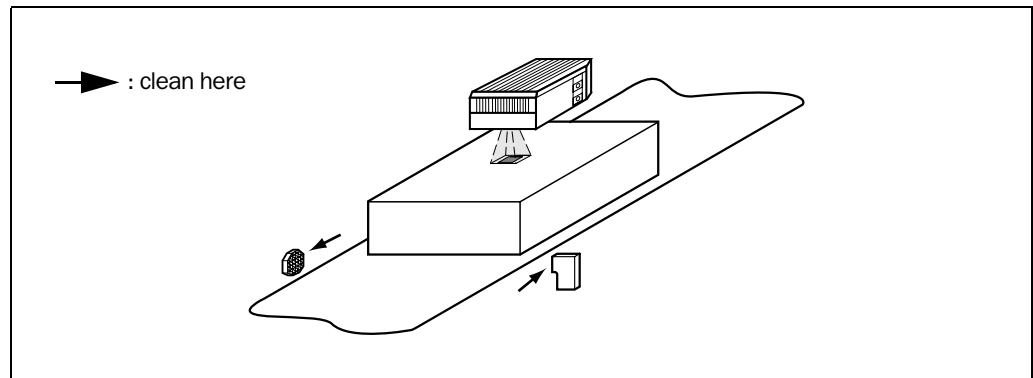


Fig. 7-2:     Cleaning the external optical sensor (reading pulse generator)

**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.

                   8 010 961/0000/10-05-2005

# 8        Troubleshooting

## 8.1        Overview of errors and malfunctions which could occur

### 8.1.1        Installation errors

- ICR positioned incorrectly in reading distance
- The code is not completely in the reading area
- 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

- Timeout for illumination field 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 6-42*.
- 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 illumination LEDs 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: "Illumination 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: 048ID**890x**"[1] with x:<br>1   Error SPI interface<br>5   SC2D configuration failed<br>6   SC2D parametrization failed<br>7   ADC9840 parametrization failed<br>8   CT2D parametrization failed<br>9   laser current measurement failed | The ICR has diagnosed a system error.<br>The "Device Ready" LED does not light up, rather it extinguishes.<br>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: 048ID**8902**" 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: 048ID**8903**" 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: 048ID**8904**" EEPROM device too small for eeMap parameter[1] | The EEPROM is too small. | Device defect | Contact the SICK Service department. |
| "ICR SYS-Error: 048ID**8109**" Error DSP boot[1] | The ICR can not boot the DSP | Device defect | Contact the SICK Service department. |
| "ICR SYS-Error: 048ID**810A**" Error DSP memory test[1] | Error when proofing the DSP. | Device defect | Contact the SICK Service department. |
| „ICR SYS-Error: 048ID**8401**" 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. | • No code in the ICR's reading range during the reading pulse<br>• Code type/length in the ICR not enabled for decoding<br>• Reading window obstructed/dirty | • Synchronize the pulse of the ICR with the entry of a code into the reading area.<br>• Correct the code configuration parameters.<br>• Check the reading window. |
| 3 | Device defect | Device defect | Call up the self-test! (see *Chapter 6.5.8 "Self-test", Page 6-42*). If result ≠ 000: Contact the SICK Service department. |
| 5 | Required number of successful multiple reads for the bar code not reached. | • Conveyor speed of the object is too high<br>• Scanning frequency is too low<br>• Ladder-type arrangement for bar code relative to the conveyor direction: code height (bar length) too poor<br>• Print quality too poor | • Check the conveyor speed.<br>• Adapt the "Object velocity" parameter in the ICR.<br>• Check the code height.<br><br>• 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 (15 to 30 V DC)

| Fault | Possible cause | Remedy |
|---|---|---|
| The "Device Ready" LED is not lit.<br>The "Result 1" switching output (default setting: "Device Ready") does not switch from HIGH to LOW. | After switching on the power supply:<br>• The ICR is not supplied with operating voltage (15 to 30 V DC)<br><br>• The ICR diagnosed a device error during the self-test<br><br>During operation:<br>• The ICR is not in "Reading mode"<br><br><br>• The ICR has deactivated the LEDs of the red illumination field (pulsed) 10 min. (default setting) after the start of the current reading pulse (pulse mode: sensor input/serial interface) | • 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.<br>• Switch the ICR off and on again. Does the LED light up? If not, contact the SICK Service department.<br><br>• Return to Reading mode using the CLV Setup program.<br>(see *Chapter 6.5.1 "Reading mode (standard operating mode)", Page 6-28*).<br>• Terminate reading pulse.<br>Check the reading pulse function. Generate new pulses or parameterize illumination timeout duration using the CLV Setup user interface (see *Chapter 6.4.3 "Parameterization guide", Page 6-21*). |

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 |
|---|---|---|
| 1. Pulse mode: "**sensor 1**" input (external sensor).<br><br>The ICR cannot be pulsed:<br>– the "Laser On" LED does not light up<br>– the red illumination field (pulsed) does not appear | • Sensor not connected or connected to incorrect switching input | • 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. |
| | • If sensor supplied by ICR: sensor not connected to ground potential | • Insert jumper between pin 5 and pin 15. (CDB 420: switch S3 "SGND-GND", CDM 420: switch S6 "SGND-GND") |
| | • Incorrect reading pulse source parameterized on the ICR | • 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) |
| | • Polarity of the Sensor 1" switching input inverted | • 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) |
| | • Incorrect debouncing of the "Sensor 1" switching input parameterized on the ICR | • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, SENSOR 1 group: debouncing: selected value too small/large? |
| | • Incorrect delay of the "Sensor 1" switching input parameterized on the ICR | • Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, click the READING TRIGGER PARAMETERS button, START DELAY group: Values set by mistake?<br>Time controlled: selected value too high?<br>Track controlled: incremental encoder connected to "Sensor 2" input, ICR parametrized correctly? |
| | • Photoelectric switch not aligned with the reflector (photoelectric proximity switch/ inductive sensor not dampened) | • Align sensor.<br>Check functioning. |
| | • The object does not pass the reading pulse sensor for trigger start with the conveyor running | • 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 4-9* |

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

                   8 010 961/0000/10-05-2005

| Fault | Possible cause | Remedy |
|---|---|---|
| 2. Pulse mode:<br>**Serial Interface**<br><br>The ICR cannot be pulsed:<br>– the "Laser On" LED does not light up<br>– the red illumination field (pulsed) does not appear | • Incorrect reading pulse source parameterized on the ICR<br><br><br><br><br><br>• Incorrect commands use<br><br><br><br><br><br><br><br><br>• The ICR is not receiving any command strings to start the reading interval on the data interface. | • 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?<br><br>• 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).<br><br>• 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 6-40*). Download temporarily to the ICR. |

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

| Fault | Possible cause | Remedy |
|---|---|---|
| 3. ICR does not respond to an external signal that ends the reading pulse (Pulse mode: sensor input(s), serial interface) | *Trigger mode: one external sensor*<br>• Incorrect end of reading pulse parameterized on the ICR<br><br><br><br><br>• Signal/no signal from the sensor at the "Sensor 1" input<br><br><br><br>*Trigger mode: two external sensors*<br>• If "Sensor 2" switching input is selected as trigger source for end of reading interval: no sensor connected or polarity inverted<br><br><br><br><br><br><br><br><br><br><br><br>• The object does not pass the reading pulse sensor for trigger stop with the conveyor running<br><br><br>• Illumination timeout exceeded. | • 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?<br><br>• Check wiring of the sensor: (see *Chapter 5.5.8 "Connecting the "Sensor 1" switching input", Page 5-13*)<br><br><br><br>• 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)<br><br>• Install the sensor for stopping the reading pulse in front of the sensor for starting the reading pulse in conveyor direction.<br><br>• See remedy in *Table 8-3, Page 8-5*. |
| 4. ICR stops reading with delay after the **end of reading pulse** (Pulse mode: sensor input(s), serial interface) | *Trigger mode: one external sensor*<br>• Stop delay for "Sensor 1" parameterized incorrectly<br><br><br><br><br><br><br><br><br><br>*Trigger mode: two external sensors*<br>• Debouncing for "Sensor 2" switching parameterized incorrectly<br><br><br><br><br>• Stop delay for "Sensor 2" parameterized incorrectly | • 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?<br><br><br>• Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab, SENSOR 2 group: correct the values for debouncing. Download to the ICR.<br><br>• 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.)*

**8-8**     8 010 961/0000/10-05-2005

### 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 |
|---|---|---|
| **No Read:**<br>1. The "Result" LED (default setting: "Good Read") does not light up at the end of the reading pulse.<br>– The "Result 2" switching output (default setting: "Good Read") does not output a pulse<br>– 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)<br>– The ICR outputs the system message "no code" via the auxiliary interface (Terminal Emulator of CLV Setup) | • Read not successful, since there was no code stationary in the illumination field during the reading pulse<br><br><br><br>• Code not completely within the distance-dependent reading surface (red illumination field positioned incorrectly)<br><br><br><br><br><br><br>• Code presented at incorrect reading distance<br><br><br><br><br><br>• Evaluation range of the reading area in the image memory was incorrectly limited (image geometry or area of interest)<br><br><br><br><br><br><br><br>• Insufficient light on the reading area | • Perform the reading while the code is stationary. Check the content of the image memory with CLV Setup/ ImageFTP: trigger the ICR; is the code in the image memory once the reading cycle is complete?<br><br>• Align ICR: reading area 40 mm x 32 mm (1.58 in x 1.27 in) at reading distance 80 mm (3.15 in) (see also *Fig. 9-4, Page 9-5*). Is the code in the center of the illumination field? For remedy, see above. If necessary, call up PERCENTAGE EVALUATION (see *Chapter 6.5.2 "Percentage Evaluation", Page 6-34*)<br><br>• Check: reading distance of code in specified reading range? ICR 840 (standard type) with side/front reading window:  80 mm (3.15 in). See also *Fig. 9-4, Page 9-5*. Check with image output via ImageFTP: Is the code recorded in sharp focus in the image memory?<br><br>• Check with image output via ImageFTP: Has all the code been recorded in the image memory? Check in the CLV Setup program: Select the READING CONFIGURATION tab, click the CODE PROPERTIES PARAMETERS button, find the IMAGE GEOMETRY group: Active evaluation range ok? Select the READING CONFIGURATION tab. Find the AREA OF INTEREST group: Are the min. and max. code position values correct?<br><br>• Check in the CLV Setup program: Select the READING CONFIGURATION tab, click the CODE PROPERTIES PARAMETERS button, find the INTERNAL ILLUMINATION MODE group: is the number of selected segments sufficient? See also *Chapter  "f) Illumination mode", Page 10-18*. |

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

| Fault | Possible cause | Remedy |
|---|---|---|
| **Good Read:**<br>2. The ICR is not transferring any reading results to the host<br>– It does output the code contents via the auxiliary interface, however (Terminal Emulator of CLV Setup) | • Wiring fault in data connection<br><br>• Host interface on CDB 420 or CDM 420 Connection Module configured incorrectly<br>• Host interface in ICR parameterized incorrectly<br><br><br><br><br><br><br><br>• No Read format for output suppressed (permitted in default setting) | • Check wiring as shown in *Fig. 5-2, Page 5-8*.<br>• Check configuration in the CDB 420 or CDM 420 (switch setting, wiring).<br><br>• 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.<br>• 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. |
| **Good Read:**<br>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) | *The number of codes to be read is 1:*<br>• Min. and max. number of codes parameterized to > 1 (default setting = 1)<br><br>*The number of codes to be read is > 1:*<br>• Specified min. and max. number of codes are not reached or are exceeded<br>• Output of error string for ST=5 activated<br><br>• Sorting based on code length list activated<br>• Code comparison (match code) and output filter for host interface activated | • Check in the CLV Setup program: Select the CODE CONFIGURATION tab, NUMBER OF CODES group: min. and max. no. of codes = 1?<br><br>• Objects have too many or too few codes during reading process.<br>• Number of multiple reads was not reached.<br>• Length of read codes does not correspond with the set lengths.<br>• Read codes do not correspond with the match code. |
| **Good Read:**<br>4. The ICR outputs the data contents of the bar code incorrectly, incompletely or modified via the host interface. | • The data format of the host interface is parameterized incorrectly in the ICR<br><br>• Format mask is activated | • Check in the CLV Setup program: Select the HOST INTERFACE tab, DATA FORMAT group. Are the values correct?<br>• In the CLV Setup program: Enter the value 00 (zero) in the input field of the FORMAT MASK group. Download to the ICR. |
| **No Read:**<br>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). | The ICR has diagnosed a device error in the self-test | Switch the ICR off and on again. Does the "Device Ready" LED light up? If not, contact the SICK Service department. |

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

### Malfunction when reading 2-D codes (DataMatrix ECC 200)

See also *Chapter 10.4.1 "Improving the image quality", Page 10-14* and *Chapter 10.4.2 "Optimizing reading characteristics for special applications", Page 10-20*.

| Fault | Possible cause | Remedy |
|---|---|---|
| **No Read:**<br>The "Result" LED (default setting: "Good Read") does not light up at the end of the reading pulse.<br>– The "Result 2" switching output (default setting: "Good Read") does not output a pulse.<br>– 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).<br>– The ICR outputs the system message "no code" via the auxiliary interface (Terminal Emulator of CLV Setup). | • Read not successful, since there was no code stationary in the illumination field during the reading pulse | • Perform the reading while the code is stationary. Check the content of the image memory with CLV Setup/ImageFTP: trigger the ICR; is the code in the image memory once the reading cycle is complete? |
| | • Parameterized resolution lower than required | • In the CLV Setup program:<br>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. |
| | • Parameterized number of multiple reads not reached | • Select the CODE CONFIGURATION tab, find the 2-D SYMBOLOGIES group .Click the EDIT button, find the MULTIPLE READS group. selected value too large? |
| | • Insufficient contrast between dark cells and light background | • Select the READING CONFIGURATION tab and click the CODE PROPERTIES PARAMETERS button. Improve the contrast with the "Background" slider.<br>Download to the ICR!<br>If there is no improvement:<br>Select the CODE CONFIGURATION tab and click the 2D-SYMBOLOGIES PARAMETERS button. Click the OPTIMIZATION PARAMETERS button. Enter the value 10 in the "Decoder retry on weak contrast for xx cells" input field.<br>Download to the ICR!<br>Increase the value if necessary. |
| | • Surface texture of the code causes masking | • Reduce masking with the "Surface" slider.<br>Download to the ICR! |
| | • For ink-jet printing: The individual points of the code do not touch sufficiently | • Compensate for the insufficiently small dots with the "Deviation of dot size" slider. Download to the ICR. |
| | • Finder pattern is visibly corrupted due to print errors | • 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.<br>Download to the ICR. |
| | • Code consists of rectangular data fields | • 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.<br>Download to the ICR. |
| | • Code printed negatively (light on dark background) | • In the CLV Setup program:<br>Select the CODE CONFIGURATION tab and click the EDIT button in the 2D-SYMBOLOGIES group. Select the "Black" option in the BACKGROUND group.<br>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 |
|---|---|---|
| **No Read:** <br><br> 1. The "Result" LED (default setting: "Good Read") does not light up at the end of the reading pulse. <br><br> – The "Result 2" switching output (default setting: "Good Read") does not output a pulse <br><br> – 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) <br><br> – the ICR outputs the system message "no code" via the auxiliary interface (Terminal Emulator of CLV Setup) | • Read not successful, since there was no bar code stationary in the illumination field during the reading pulse <br><br> • Bar code type not activated for reading <br><br><br><br><br><br> • Code not completely within the distance-dependent reading area. <br><br><br><br><br><br> • Parameterized resolution lower than required <br><br> • Parameterized number of multiple reads not reached <br><br> • The bar code is tilted excessively with respect to the illumination field <br><br><br> • The reading angles at which the bar code appears to the ICR are too large <br><br><br><br><br><br> • Evaluation criteria for bar code not set correctly | • Perform the reading while the code is stationary. Check the content of the image memory with CLV Setup/ ImageFTP: trigger the ICR; is the code in the image memory once the reading cycle is complete? <br><br> • 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! <br><br> • Reading area 40 mm x 32 mm (1.58 in x 1.27 in) at reading distance 80 mm (3.15 in) also *Fig. 9-4, Page 9-5*). Check with image output via ImageFTP: Has all the code been recorded in the image memory? Is the code too long? <br><br> • 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. <br><br> • Extend the reading pulse, reduce the number or increase the scanning frequency. <br><br> • In the CLV Setup program: Select the CODE CONFIGURATION tab and find the 1D-DECODER group. Select the SMART decoder. Download to the ICR. <br><br> • 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! <br><br> • 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 |
|-------|----------------|--------|
| **No Read:**<br><br>1. The "Result" LED<br>(default setting: "Good Read") does not light up at the end of the reading pulse.<br><br>*- continued -* | • Bar code quality inadequate<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>• Bar code printed negatively (light on dark background) | • Check: Is the print contrast adequate? In CLV Setup program:<br>Select the READING CONFIGURATION tab and click the CODE PROPERTIES PARAMETERS button. Improve the contrast with the "Background" slider.<br>Download to the ICR.<br>Check: Are sufficient blank zones present?<br>Is the print contrast adequate?<br>Are the specified print tolerances exceeded?<br>Check in the CLV Setup program:<br>Select the READING CONFIGURATION tab and find the QUIET ZONE group: Is "Start/Stop auto" selected?<br>Perform test read with a reference code in good condition.<br>• In the CLV Setup program:<br>Select the CODE CONFIGURATION tab and click the „Black" option in the 1D BACKGROUND field in the 1D-SYMBOLOGIES group.<br>Download to the ICR. |
| **No Read:**<br><br>2. The ICR outputs the data contents of the bar code incorrectly, incompletely or modified via the host interface. | The ICR suppresses the last character in the bar code | Check in the CLV Setup program:<br>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.<br>Download to the ICR. |

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 |
|-------|----------------|--------|
| 1. The switching output "Result 1" (default setting: Device Ready) does not switch from HIGH to LOW.<br>The switching output "Result 2" (default setting: Good Read) do not output a pulse. | • The event of the assigned function for outputting the result status does not occur during the reading process<br>• Incorrect switching mode parameterized in ICR | • Not applicable.<br><br><br><br>• 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.<br>Download to the ICR. |
| 2. The beeper is not confirming the output of the reading result (default setting: "Good Read") | Beeper deactivated | Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab and find the BEEPER group: is "On" selected? |

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 |
|---|---|---|
| **DataMatrix AutoSetup:**<br>The ICR cannot decode the code from the content of its image memory. | • The code is distorted. | • Perform the reading while the code is stationary. Check the content of the image memory with CLV Setup/ ImageFTP: repeat steps 1 and 2 of AutoSetup; trigger ICR; is the code still distorted in the image memory? If OK, complete AutoSetup. |
| | • Reading distance has changed after adjustment | • Check with image output via ImageFTP: Is the code recorded in sharp focus in the image memory?<br>If necessary, readjust the ICR.<br>Repeat AutoSetup from the beginning. |
| | • Evaluation range of the reading area in the image memory was incorrectly limited (image geometry or area of interest) | • Check with image output via ImageFTP: Is the code recorded completely in the image memory?<br>Check in the CLV Setup program:<br>Select the READING CONFIGURATION tab, click the CODE PROPERTIES PARAMETERS button, find the IMAGE GEOMETRY group: Active evaluation range ok?<br>Select the READING CONFIGURATION tab. Find the AREA OF INTEREST group: Are the min. and max. code position values correct?<br>Repeat AutoSetup from the beginning. |
| | • Low code quality in image memory | • see *Table 8-6, Page 8-11*.<br>After troubleshooting, repeat AutoSetup from the beginning |

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 contents of the ICR image memory. | • The ICR is not triggered<br>• Image acquisition parameterized incorrectly in the ICR | • Trigger the ICR accordingly.<br>• 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?<br>IMAGE FORMAT group: is at least one image type selected? |
| | • Ethernet connection:<br>The PC (server) has an incorrect FTP address | • 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 connection:<br>The ICR has not been defined as an FTP client | • ETHERNET tab, FTP-CLIENT group: active? |
| | • ImageFTP: the server has been stopped or the image has been frozen<br>• The evaluation range in the image memory was incorrectly limited | • In the program window, restart the server or unlock the current image<br>• see *Table 8-9* |

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 subsidary:

•    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:**

  8 010 961/0000/10-05-2005

# 9      Technical data

## 9.1      Data sheet for ICR 84x Image Code Reader

| Type | ICR 840 (Standard) |
|---|---|
| Front reading window | ICR 840-0020 |
| Side reading window | ICR 840-1020 |
| Focus | Fixed focus |
| Illumination LEDs (wavelength) | Red light (($\lambda = 617 \pm 15$ nm) |
|     LED class of device | Class 1 (to EN 60825-1), shut off of LEDs after 10 min[1] |
| Image buffer memory | CMOS matrix sensor, 1.3 Mega pixel (1280 x 1024 pixel) |
| Scanning/decoding frequency | 25 Hz at 1.3 Mega pixel |
| Resolution | 0.15 to 2 mm (5.9 mil to 78.7 mil) |
| Reading distance | 80 mm (3.15 in), reading area 40 mm x 32 mm (1.58 in x 1.27 in), depending on reading distance,  see *Fig. 9-4, Page 9-5* |
| Reading ranges | see *Fig. 9-2, Page 9-4* |
| Print contrast (PCS) | $\geq 60$ % |
| Ambient light compability | 2,000 lux (on 2-D code/bar code) |
| No. of 2-D codes per image/read. interval[2] | 1 to 50 |
|     2-D code types | DataMatrix ECC 200 |
| No. of bar codes per scan | 1 to 50 (standard decoder), 1 to 6 (SMART decoder) |
| No. of bar codes per reading interval [2] | 1 to 50 (autodiscriminating). Due to the distance-dependent dimensions of the reading area, the scannable code length has decreased with respect to the length that can be decoded (see also examples in *Table 9-2, Page 9-2*) |
|     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")<br>– Optodecoupled, $V_{imax} = 28$ V, non-interchangeable, can be connected to PNP output<br>– "Sensor 1" (reading pulse): variable debouncing time (min. 3 ms)<br>– "Sensor 2" (variable function): variable debouncing time (min. 3 ms) |

Table 9-1: Technical specifications of ICR 84x

| Type | ICR 840 (Standard) |
|---|---|
| Switching outputs | 2 ("Result 1", "Result 2")<br>– Variable output function for result status<br>– Variable pulse duration (static, 10 to 990 ms)<br>– "Result 1": low side switch, additional function: trigger or direct powering of an external field illumination, NPN, $I_{omax}$ = 100 mA, short-circuit-proof<br>– "Result 2": high side switch, PNP, $I_{omax}$ = 100 mA, short-circuit-proof |
| Electrical connection | 15-pin D-Sub HD connector, cable length 0.9 m (2.95 ft)<br>Ethernet connection: RJ 45 socket 10baseT |
| Operating voltage/power consumption | 15 to 30 V DC pursuant to IEC 364-4-41/ typ. 7 W (290 mA at 24 V DC), max. 10 W |
| 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 | According to EN 61000-6-2, EN 61000-6-4/ to EN 61010-1/ to EN 60068-2-27 |
| 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 84x (contd.)

### 9.1.1 Suitable bar code lengths in the reading area

| Bar code type | Module width | Number of characters | Length incl. quiet zone |
|---|---|---|---|
| Code 128 | 0,15 mm (5.9 mil) | 18 | 38 mm (1.49 in) |
| | 0,25 mm (9.8 mil) | 9 | 39 mm (1.53 in) |
| | 0,35 mm (13.8 mil) | 5 | 39 mm (1.53 in) |
| Code 39 | 0,15 mm (5.9 mil) | 16 | 38 mm (1.49 in) |
| | 0,25 mm (9.8 mil) | 8 | 37 mm (1.45 in) |
| | 0,35 mm (13.8 mil) | 5 | 39 mm (1.53 in) |
| 2/5 Interleaved | 0,15 mm (5.9 mil) | 32 | 38 mm (1.49 in) |
| | 0,25 mm (9.8 mil) | 18 | 39 mm (1.53 in) |
| | 0,35 mm (13.8 mil) | 12 | 39 mm (1.53 in) |

Table 9-2: Suitable bar code lengths at focus position (distance 80 mm (3.15 in), reading area 42 mm x 35 mm (1.65 in x 1.26 in))
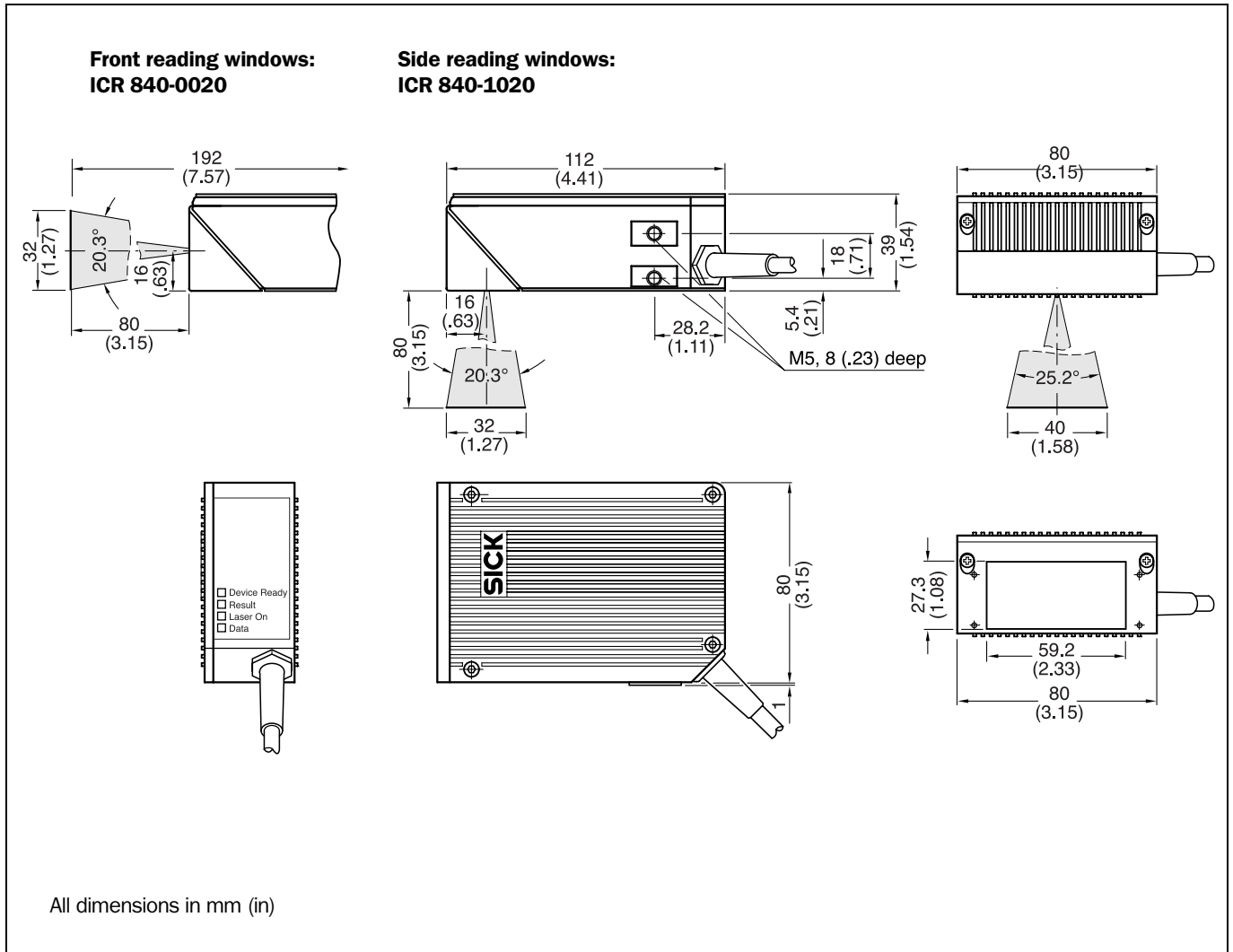
## 9.2    ICR 84x dimensional drawing

**Front reading windows:**
**ICR 840-0020**

**Side reading windows:**
**ICR 840-1020**



All dimensions in mm (in)

Fig. 9-1:    Dimensions of the ICR

## 9.3     Specification diagram

### 9.3.1     Reading conditions for the diagrams

| Test code | Code 128/DataMatrix ECC 200 |
|---|---|
| Print ratio | 2:1 |
| Print contrast | Bar codes: > 90 %<br>DataMatrix: Grade A pursuant to ISO/IEC 10622 |
| Tilt | Typical ±30° 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 9-3: Reading conditions for specification diagrams
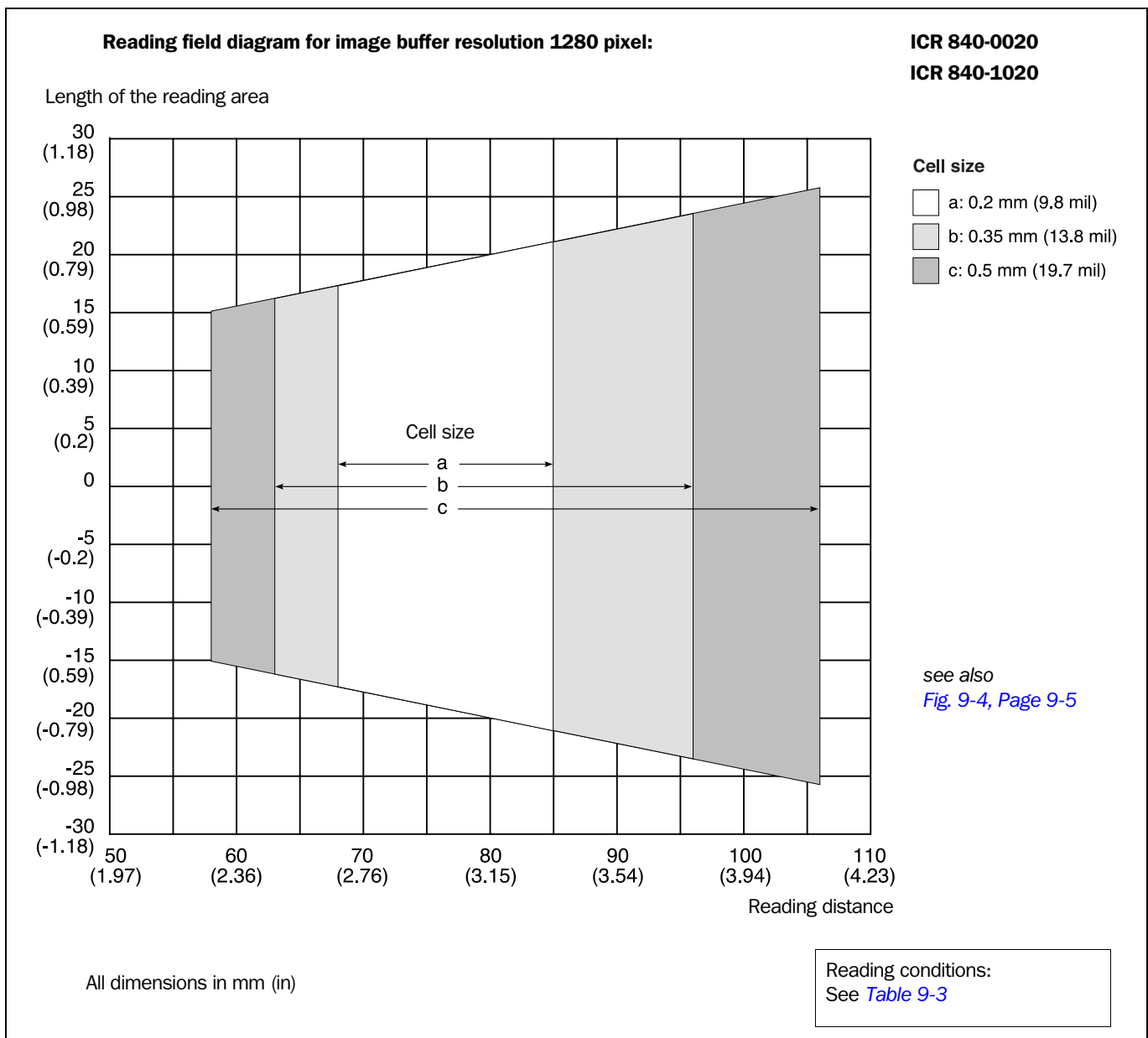
### 9.3.2     Reading ranges of ICR – preliminary –



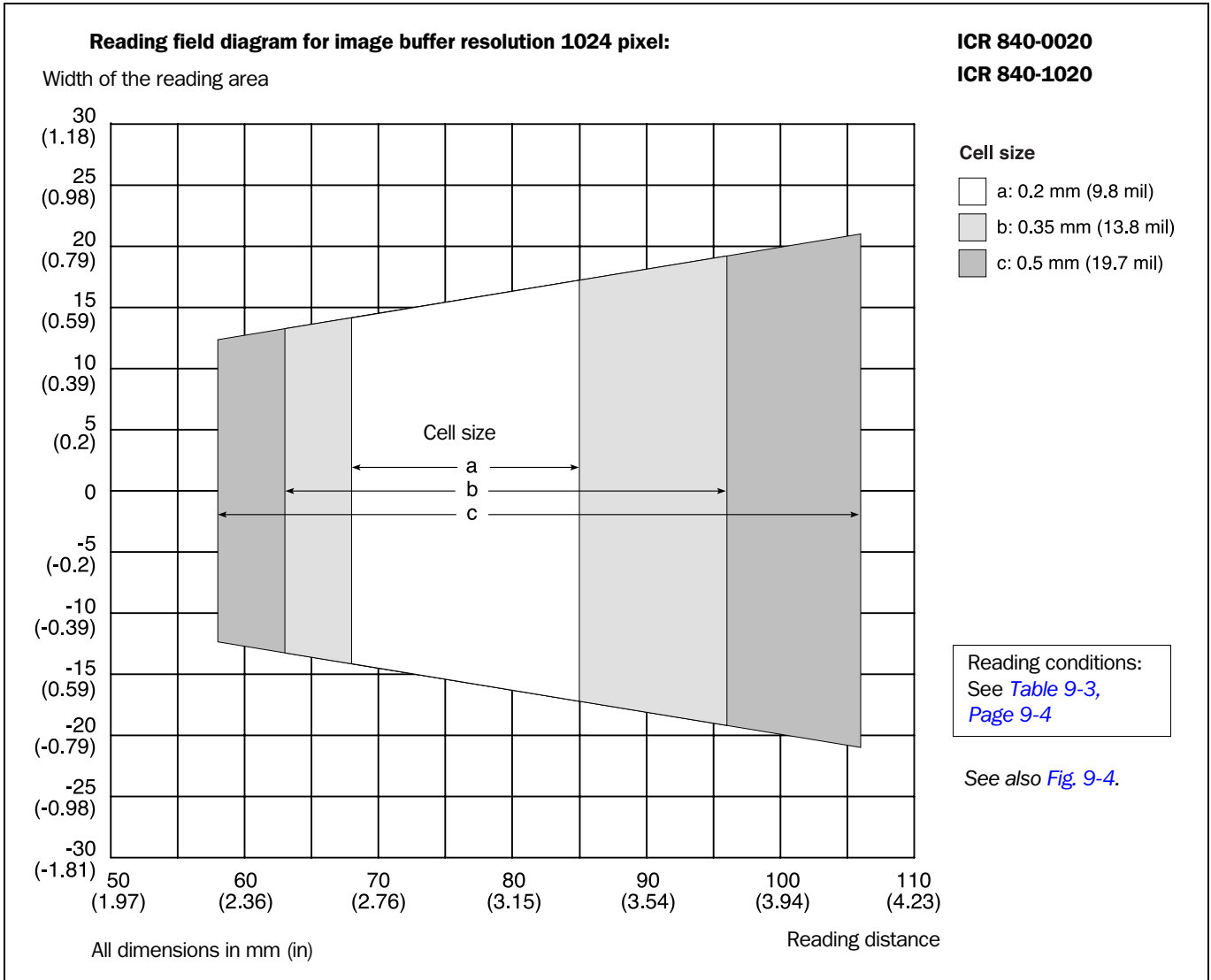Fig. 9-2:    ICR 840 (standard type): Reading range and length of the reading area

       8 010 961/0000/10-05-2005

**Reading field diagram for image buffer resolution 1024 pixel:**

Width of the reading area

ICR 840-0020
ICR 840-1020

Cell size

- a: 0.2 mm (9.8 mil)
- b: 0.35 mm (13.8 mil)
- c: 0.5 mm (19.7 mil)

Reading conditions:
See *Table 9-3, Page 9-4*

See also *Fig. 9-4*.

All dimensions in mm (in)

Reading distance

Fig. 9-3:    ICR 840 (standard type): Reading range and width of the reading area

### 9.3.3    Reading area mapped in the image buffer memory – preliminary –

ICR 840-0020
ICR 840-1020

Resolution

0.5 mm (19.7 mil)
0.35 mm (13.8 mil)
0.2 mm (9.8 mil)

Length

Width

Reading distance 80 mm (3.15 in): focus position of the ICR

Reading conditions:
See *Table 9-3, Page 9-4*
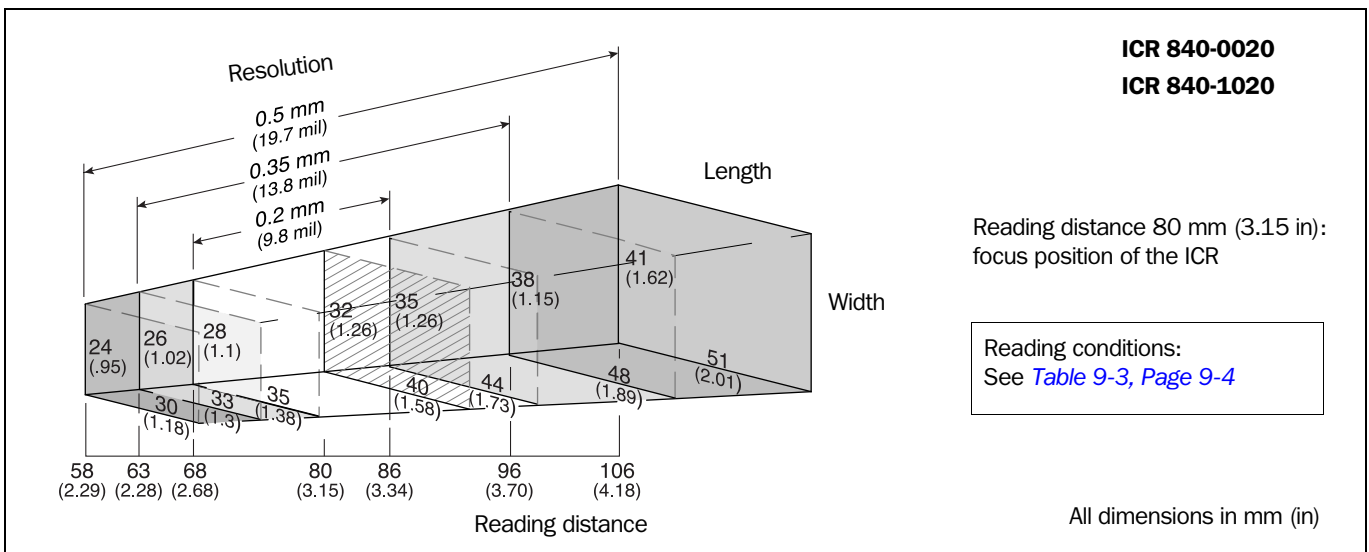
All dimensions in mm (in)

Fig. 9-4:    ICR 840 (standard type):  Reading area  and reading range in dependence of the reading distance

**Notes**

# 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 6-45*).

| Message | Meaning |
|---|---|
| "ICR 84x<br>SoftwareVersion VX.XX<br>Change Index:  0000<br>Built: ...<br>SC2D Built: ...<br>Host: RS 232 ..."<br>... | 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<br>(error status ST = 2 output on the host interface). |
| "laser safety timeout" | The ICR has deactivated the LED illumination 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.<br>The  LED illumination 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 lastest 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 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*.

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 the 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 entried 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 alsobe entried 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 serveal 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 serveal 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.

8 010 961/0000/10-05-2005       **10-5**

### 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<br>On scanner selection: Yes<br>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 84x).

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.
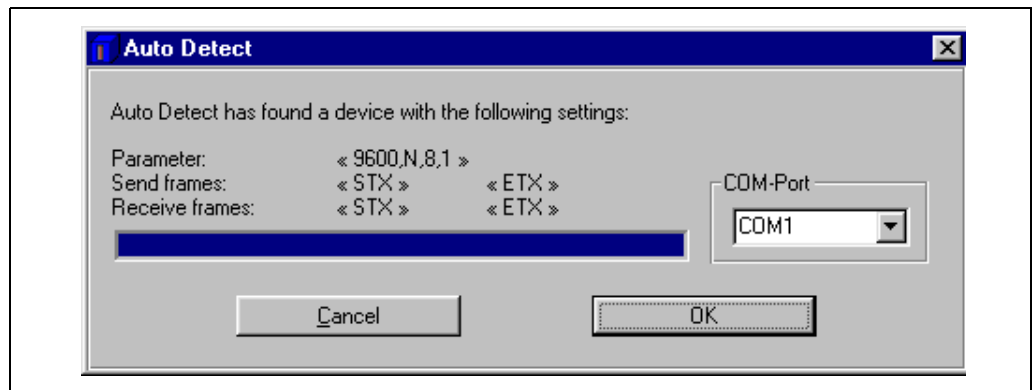


Fig. 10-1: CLV Setup: Results of the AutoBaud detect function

**– 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.
   The green "Ready" LED at the socket of the ICR lights up when the physical connection has finished successful.

2.　Enable TCP/IP communication.
Configure the IP adresses 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 84x (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.
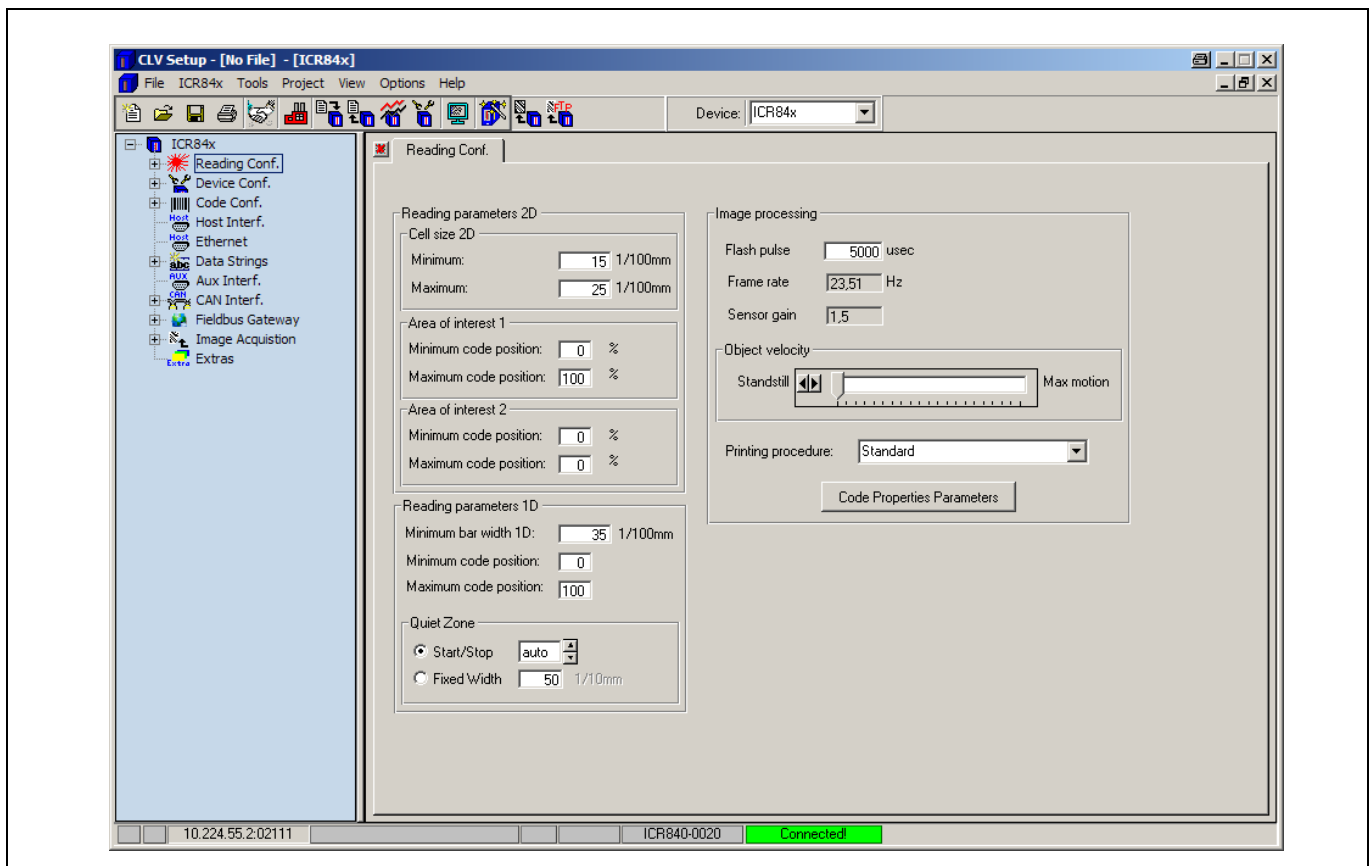


Fig. 10-2:　User interface of the "CLV Setup" software

### 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 serveal 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 neccessary, 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 seperate 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 6-17*.

### 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_84x.scl /INI user.ini"

CLV Setup is launched with the initialization data contained in the "user.ini" file and loads the
configuration file "Set1_84x.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, 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 "Improving the image quality", 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 "Optimizing reading characteristics for special 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 to check the content of the image memory (ICR) using ImageFTP. See also *Chapter 6.5.3 Image Acquisition, Page 6-36*.

The adjustments cover the following settings (initial status: default settings):

**Improving the image quality:**

a) Minimum and maximum cell size

b) Shape of data field and print type (positive or negative print image)

c) Properties of the print image

d) Error correction

e) Minimum code contrast

f) Illumination mode

g) Flash pulse duration

**Optimizing the reading characteristics for special applications:**

a) Setting the symbol size

b) Image geometry

c) Time and effort involved in error correction

d) Limiting the reading area to be evaluated

e) Resolution

### 10.4.1    Improving the image quality

#### a) Minimum and maximum cell size

1.    Select the READING CONFIGURATION tab.
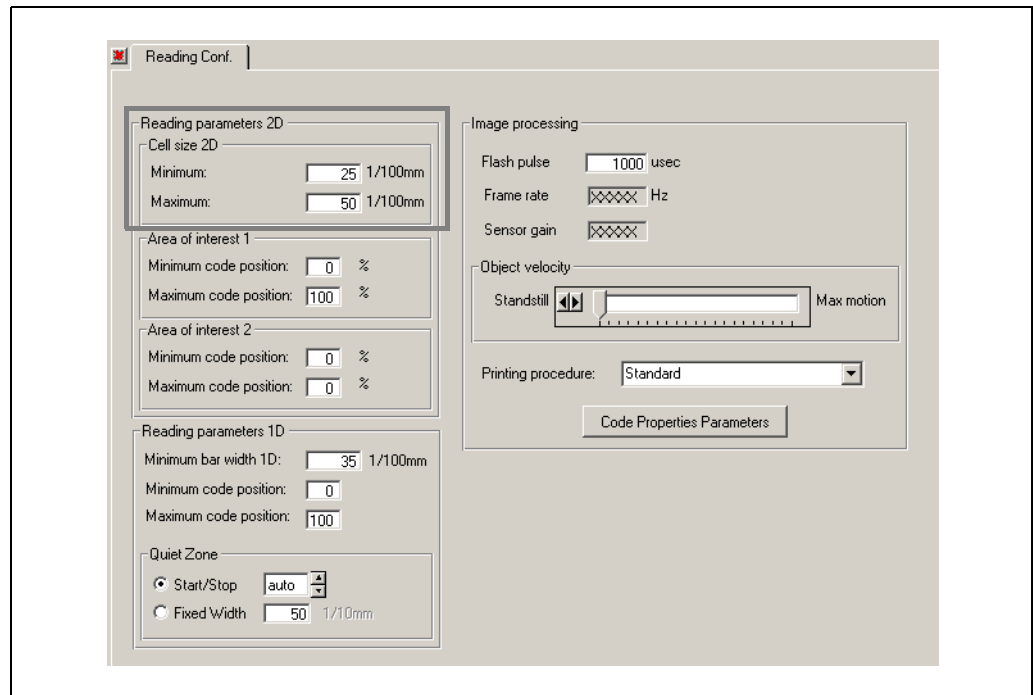


Fig. 10-3:   CLV Setup: "Reading Configuration" tab

2.    Adjust the following parameter values:

#### "2D reading parameters" group: minimum/maximum cell size 2-D
The cell size setting is a key factor in the reading quality:
If the ICR is to read symbols with different cell sizes, the area of the cell sizes that occur must be set here.

➤ Adjust the minimum cell size in line with the code to be read. The minimum cell size should be slightly smaller than the cell size in the print image.

➤ Adjust the maximum cell size in line with the code to be read. The maximum cell size should be slightly larger than the cell size in the print image.

#### b) Shape of data field and print type (positive or negative print)

3.    Select the CODE CONFIGURATION tab.
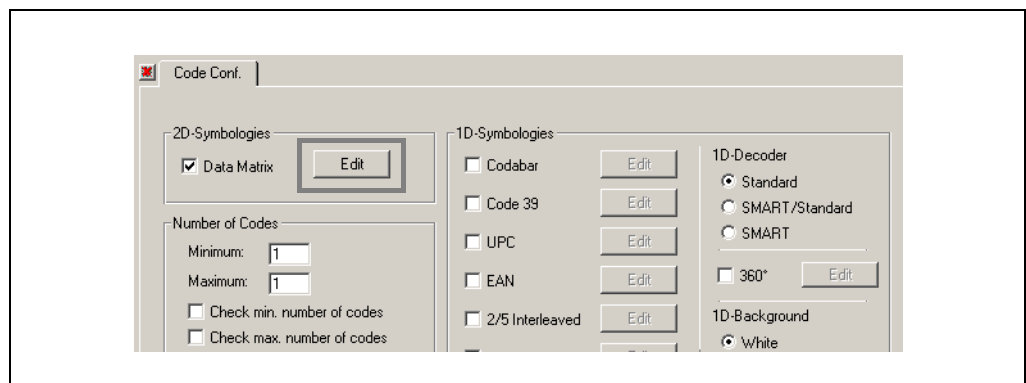


Fig. 10-4:   CLV Setup: "Code configuration" tab

---

                   8 010 961/0000/10-05-2005

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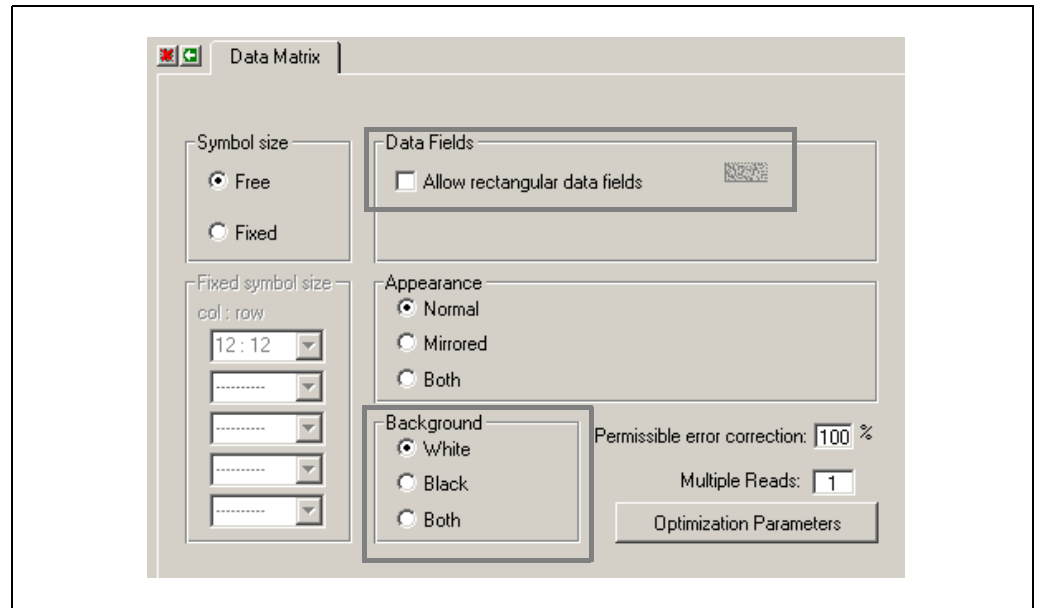


Fig. 10-5:   CLV Setup: "DataMatrix" tab

5.  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.

**c) Properties of the print image**

6.  Select the READING CONFIGURATION tab (*Fig. 10-3, Page 10-14*).

7.  Click the CODE PROPERTIES PARAMETERS button.
    The CODE PROPERTIES PARAMETERS dialog box is then displayed (*Fig. 10-6, Page 10-16*).
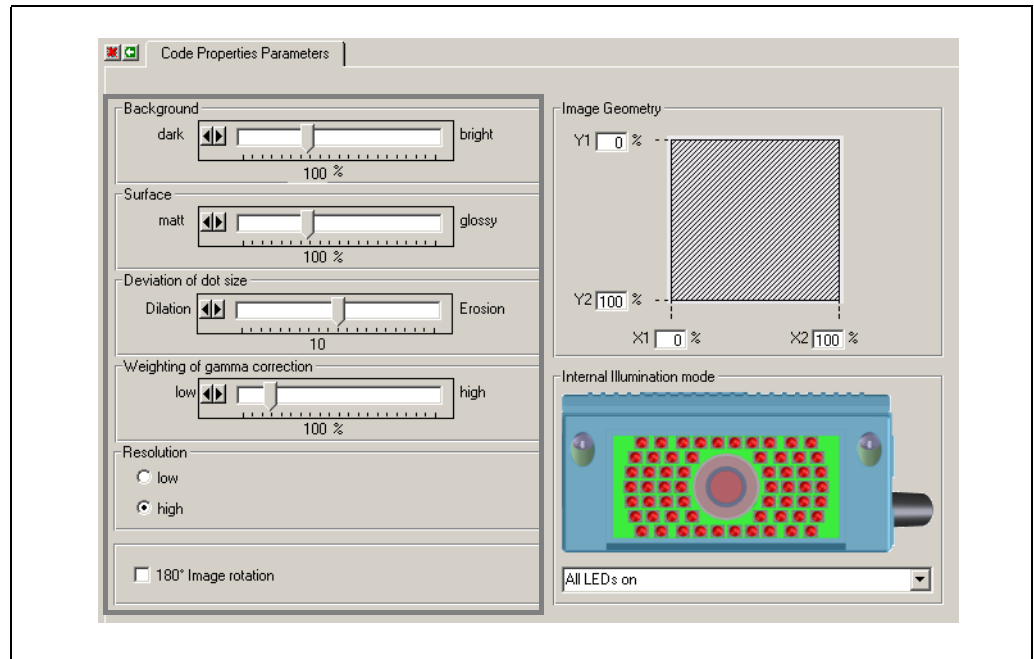
Fig. 10-6:  CLV Setup: "Code Properties Parameters" tab

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 specifically used to adjust the ICR in line with codes created with ink-jet printers (for 2-D code reading). In this printing procedure, the individual dots are often so small that they do not touch each other. which means that cells and bars are not solid.

You can use the slider to increase the white/black cells in the image memory incrementally:
– Dilatation: increases the black fields.
– Erosion: increases the white fields.

➢ Depending on the code to be read, move the slider incrementally until the reading is successful.

*Fig. 10-7* shows an example of using the slider.

    8 010 961/0000/10-05-2005
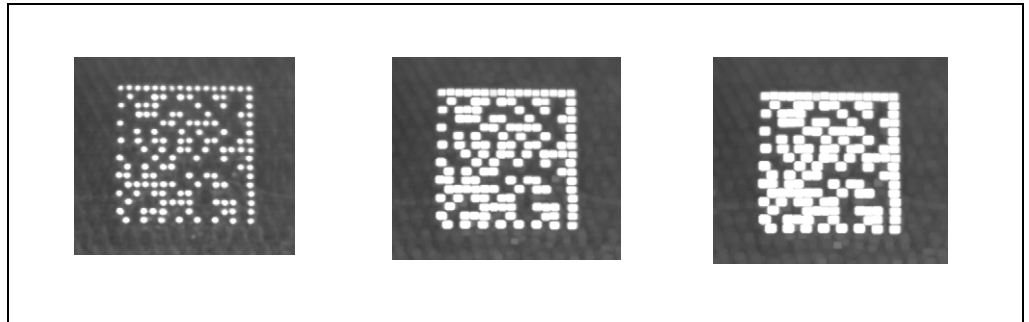
Fig. 10-7:   CLV Setup: using the "Deviation of dot size" slider

**"Weighting of gamma correction" slider:**

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

**d) Error correction**

9.    Select the CODE CONFIGURATION tab (*Fig. 10-4, Page 10-14*).

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.
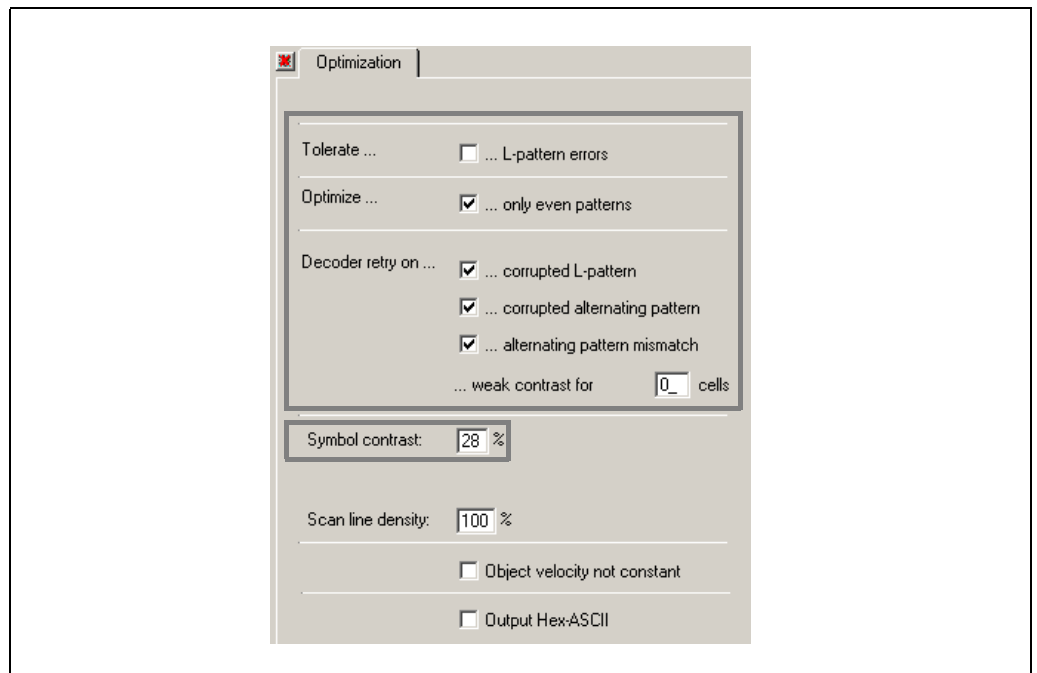


Fig. 10-8:   CLV Setup: "Optimisation" tab

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. 6-23, Page 6-30*). 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.

**e) Minimum symbol contrast**

13. Define the minimum symbol contrast according to *Fig. 10-8, Page 10-17.*

**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.

**f) Illumination mode**

14. Select the READING CONFIGURATION tab (*Fig. 10-3, Page 10-14*).

15. Click the CODE PROPERTIES PARAMETERS button.
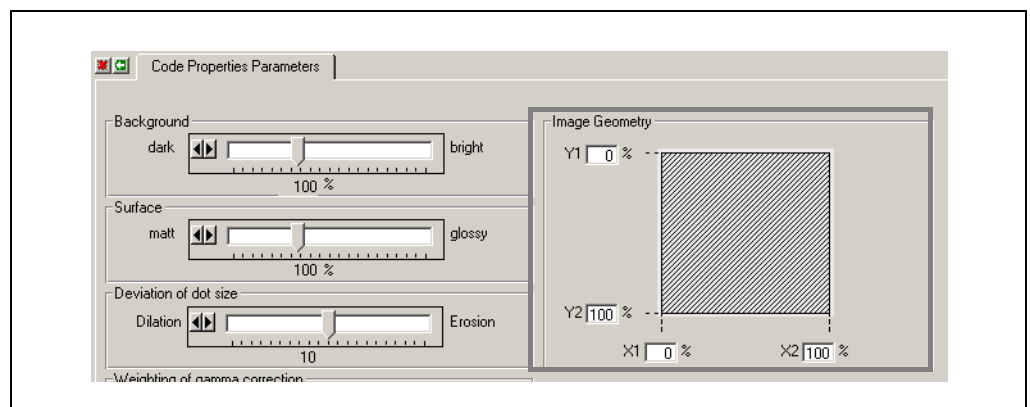The CODE PROPERTIES PARAMETERS dialog box is then displayed.

16. In the INTERNAL ILLUMINATION MODE group, define the number of LED segments for the ICR which are to be used for illuminating the reading area.
The LEDs are grouped in 4 segments, which can be switched on by the ICR independent of each over. In this way, the illumination can be specially adjusted to different applications. In CLV Setup, you can select the various LEDs accordingly.

**10-18**                   8 010 961/0000/10-05-2005
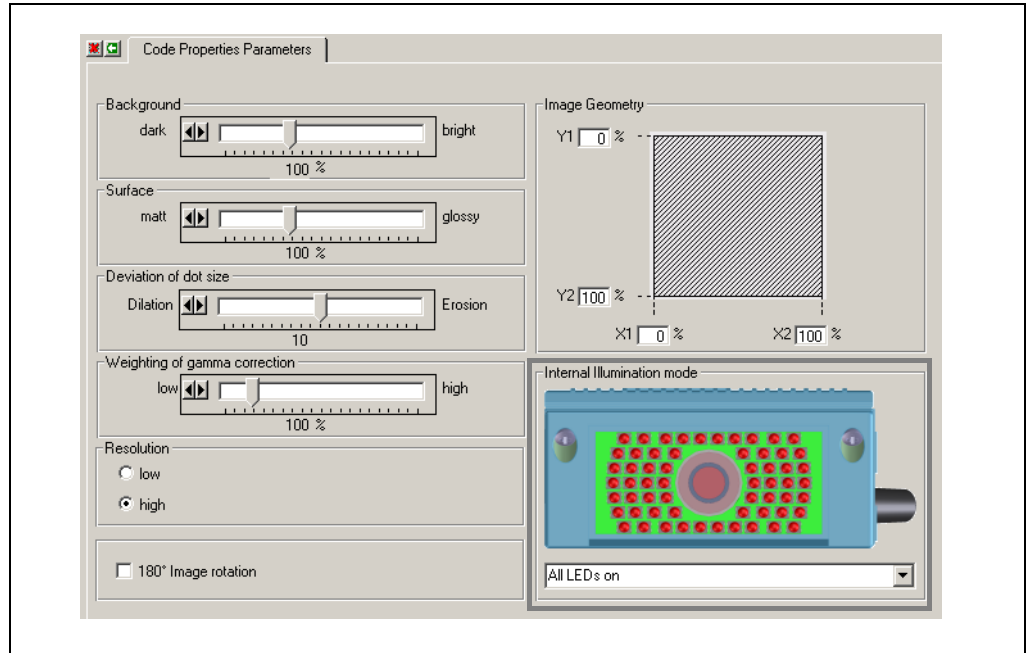
Fig. 10-9:   CLV Setup: "Code Properties Parameters" tab

### g) Flash pulse duration

17.  Select the READING CONFIGURATION tab.
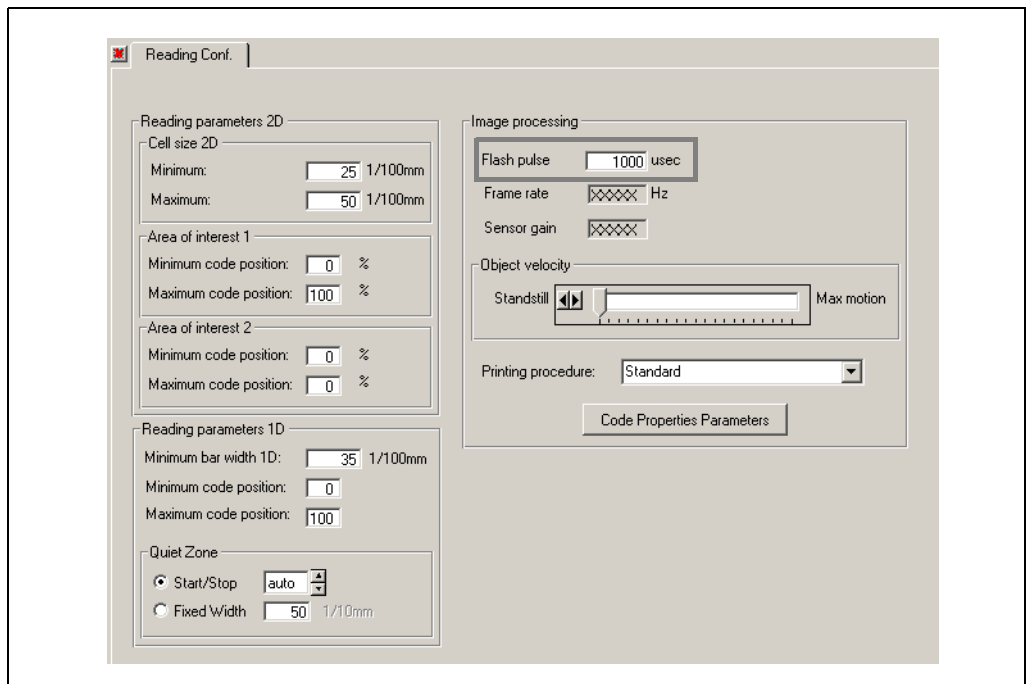


Fig. 10-10: CLV Setup: "Reading Configuration" tab

18.  In the IMAGE PROCESSING group, define the flash pulse duration.
     If the image recorded in the image memory is too dark (bright), you can increase
     (decrease) the flash pulse duration to increase (decrease) the amount of light cast onto
     the reading area. This brightens (darkens) the image.

### 10.4.2    Optimizing reading characteristics for special applications

**Prerequisite**   High code quality (high contrast, coherent structure, error-free alternating pattern).

### a) Setting the symbol size

1.   Select the CODE CONFIGURATION tab.
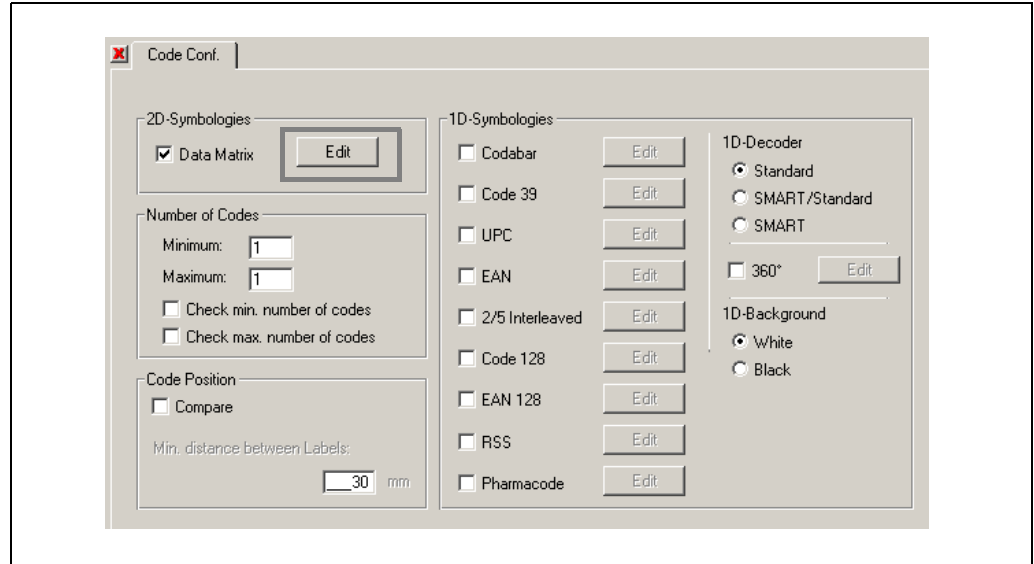


Fig. 10-11: CLV Setup: "Code Configuration" tab

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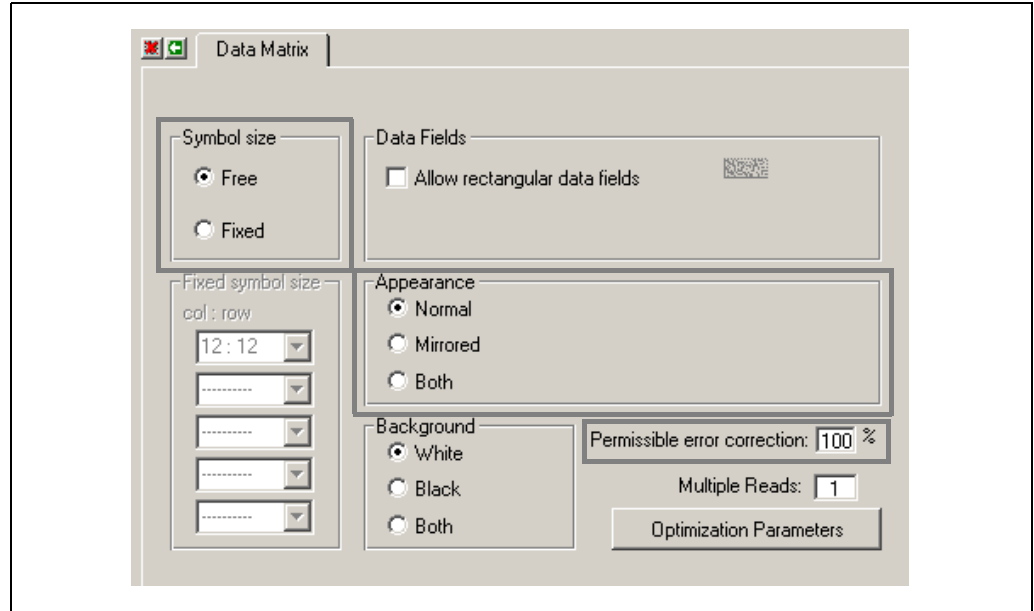


Fig. 10-12: CLV Setup: "DataMatrix" tab

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.

**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 error-correction 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. 6-23, Page 6-30*).

➢ 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.

**b) Image geometry**

4. Select the READING CONFIGURATION tab (*Fig. 10-10, Page 10-19*).

5. Click the CODE PROPERTIES PARAMETERS button.
   The CODE PROPERTIES PARAMETERS dialog box is then displayed.



Fig. 10-13: CLV Setup: "Code Properties Parameters" tab

6. When objects are conveyed in a consistent manner and the code is in the same position on the objects, you can reduce the image memory area to be evaluated by entering the relevant percentage values in the IMAGE GEOMETRY group.

*Sample:* Y1 = 20 %, Y2 = 70 %; X1 = 10 %, X2 = 80 %
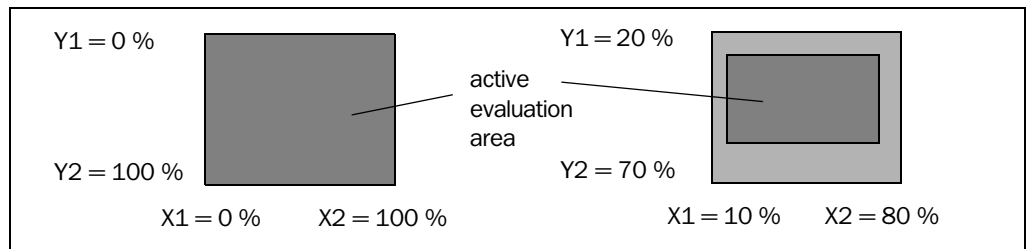


Fig. 10-14: Limiting the active evaluation area in the image memory

**Note** The limitation of the image memory for the selected values is not displayed graphically in the dialog box.

**c) Time and effort involved in error correction**

7. Click the OPTIMIZATION PARAMETERS button.
   The OPTIMIZATION tab opens (*Fig. 10-15*).

8. 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 ...**

   **... corrupted L-pattern:**

   When evaluating the image memory, the ICR uses a more complex search algorithm.
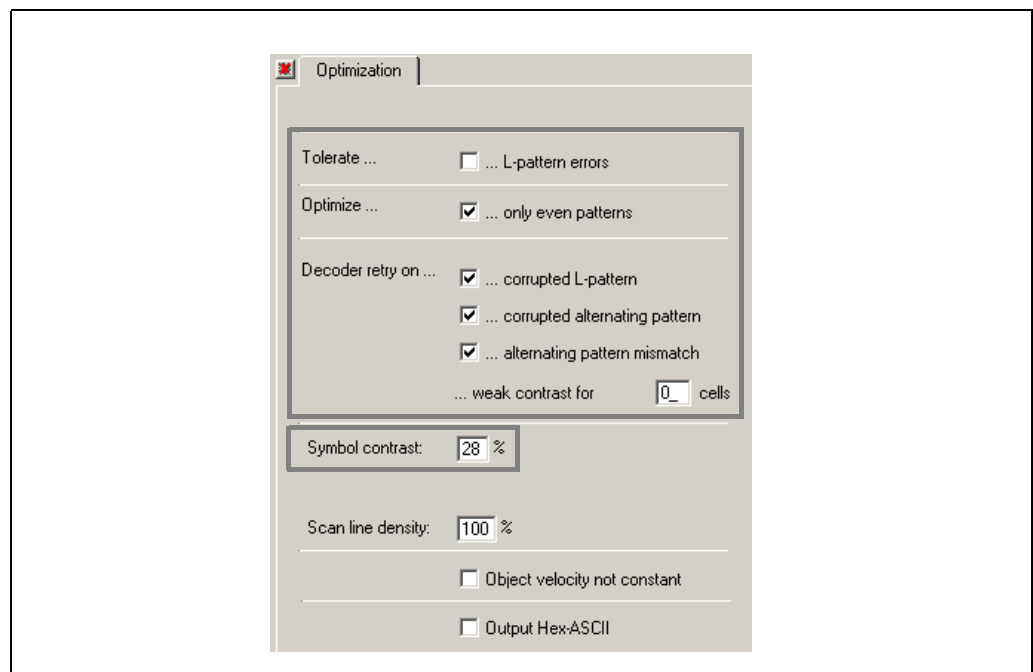


Fig. 10-15: CLV Setup: "Optimization" tab

 8 010 961/0000/10-05-2005

**... 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. 6-23, Page 6-30*). The maximum number of cells which can be set is 10 (default setting: 0).

➢ Set the number of weak cells to zero.

**d) Limiting the reading area to be evaluated**

9.  Select the READING CONFIGURATION tab.
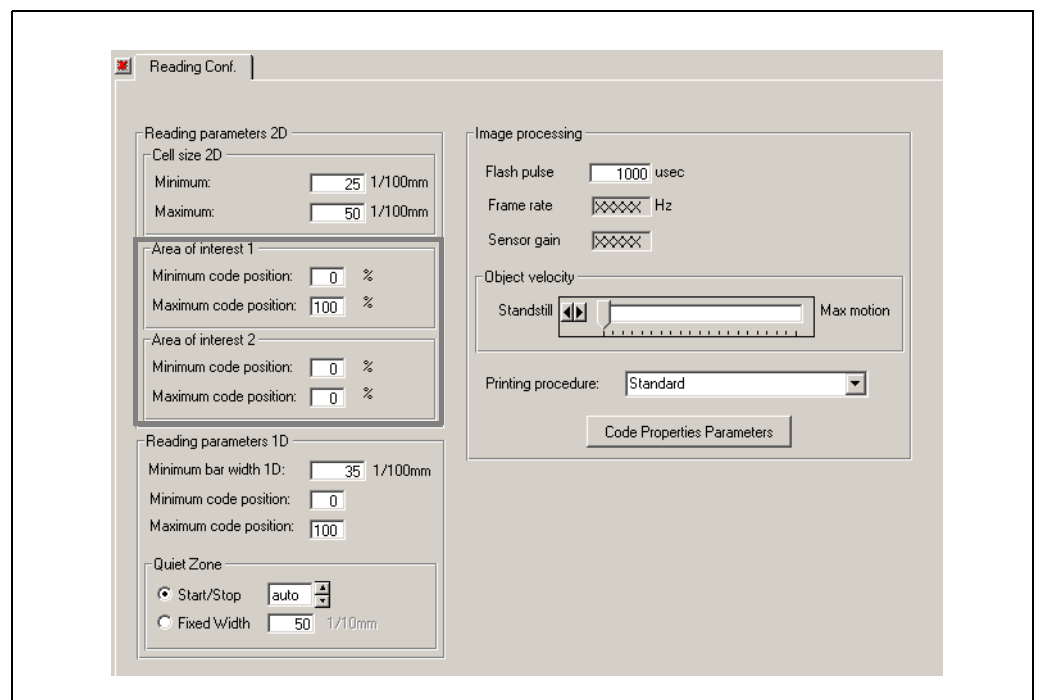


Fig. 10-16: CLV Setup: "Reading Configuration" tab

10. Adapt the following parameter values:

**Reading parameters 2-D group:**
**Area of interest 1 or 2: 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 buffer memory, the ICR only needs to evaluate one or two reduced areas. The count direction of the CP lengthwise the reading window is shown in *Fig. 4-7, Page 4-6*.

**e) Resolution**

11. Select the READING CONFIGURATION tab (*Fig. 10-16, Page 10-23*).

12. Click the CODE PROPERTIES PARAMETERS button.
    The CODE PROPERTIES PARAMETERS dialog box is then displayed.

13. In the RESOLUTION group, switch from HIGH to LOW (if necessary).
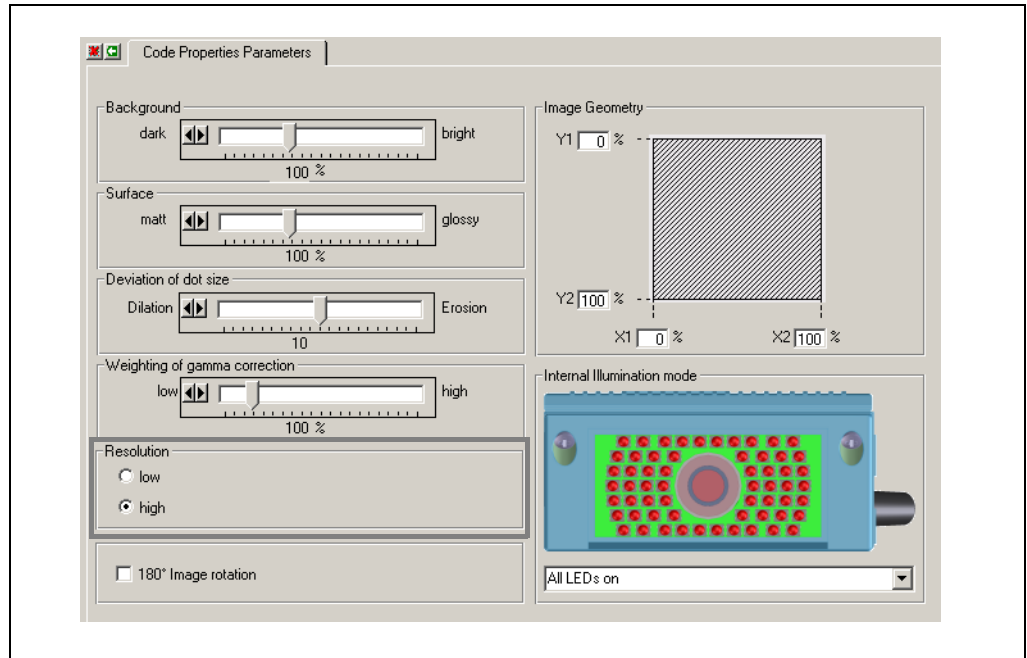


Fig. 10-17: CLV Setup: "Code Properties Parameters" tab

When you switch from HIGH (default setting) to LOW, the ICR only uses a fourth of all the pixels in each cell over the same reading area for the evaluation.
This can speed evaluation with large cell sizes.

## 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. 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.

8 010 961/0000/10-05-2005                        **10-25**
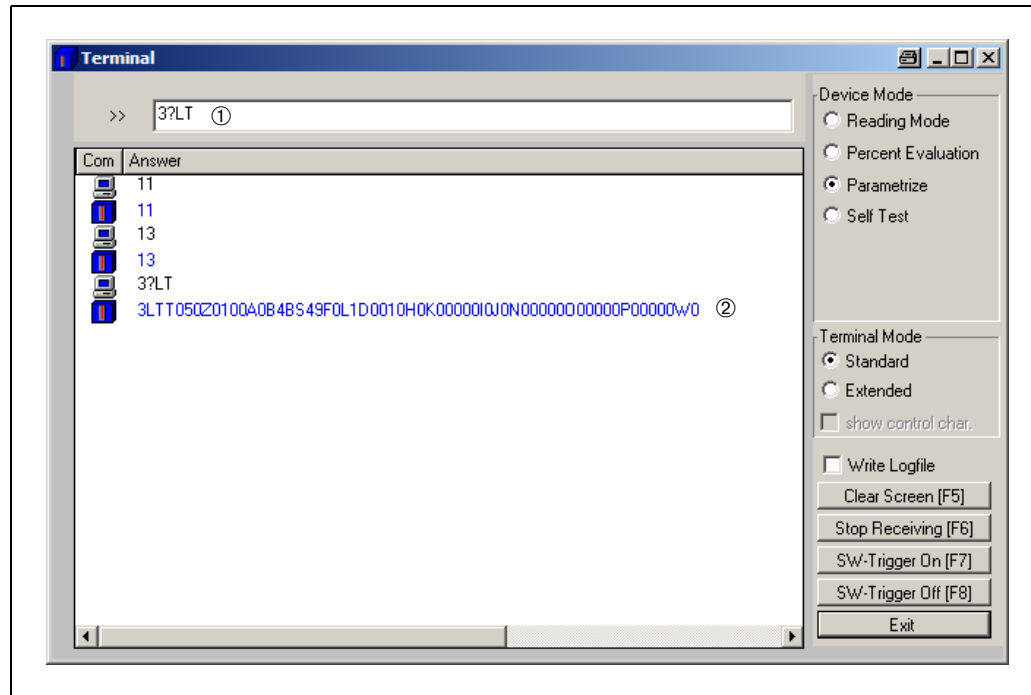
Fig. 10-18: CLV Setup: Entering commands in the Terminal Emulator

**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:

1.  In the menu bar, choose EXPORT PARAMETERS under ICR 84x.
    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.

2.  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 10-3*.

1.  Count the bars and gaps as specified in *Table 10-3*. 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 | $l_{Code} = \dfrac{\text{Number} - 10}{5}$ | Calculated code length |
| 2/5 Interleaved | Number of wide elements (bars and gaps) | $l_{Code} = \dfrac{\text{Number} - 1}{2}$ | Calculated code length |
| EAN | Not applicable | 13 characters (normal version)<br>8 characters (short version) | Activate 13-digit<br>Activate 8-digit |
| UPC | Not applicable | 12 characters (UPC A, normal version)<br>6 characters (UPC E, short version) | Activate version A<br>Activate version E |
| Codabar | Number of bars | $l_{Code} = \dfrac{\text{Number} - 8}{4}$ | Calculated code length |
| Code 128 (character set A) | Number of bars | $l_{Code} = \dfrac{\text{Number} - 10}{3}$ | Calculated code length |
| EAN 128 | Number of bars | $l_{Code} = \dfrac{\text{Number} - 10}{3}$ | Calculated code length |
| Pharmacode | Number of bars | Number | Number = code length |

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)

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.

Table 10-3:  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 characters 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
  (The length of readable code is reduced with respect to the decodable length as a result of the distance-dependent dimensions of the reading area (see examples in *Table 9-2, Page 9-2*).

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. 10-19*), the functional assignment of the switching input changed and Teach-in mode selected.
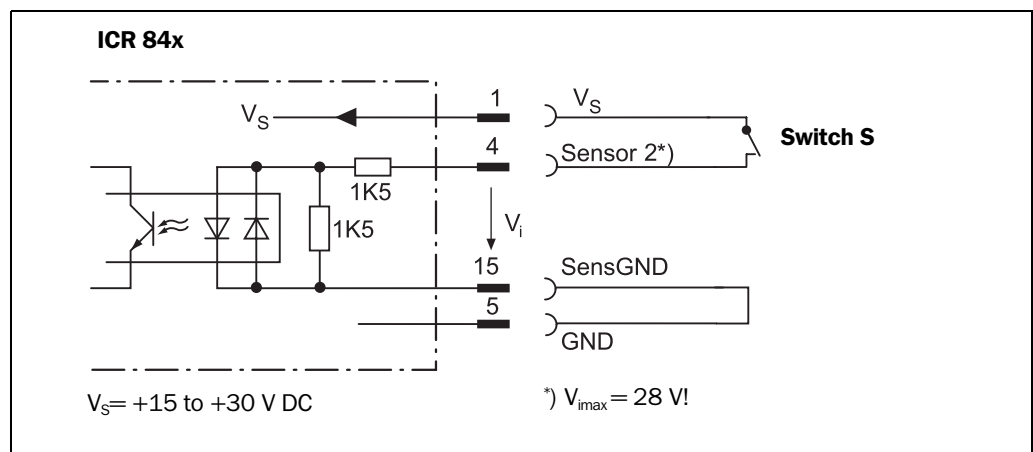


Fig. 10-19: "Sensor 2" configuration for triggering the teach-in match code 1

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. 10-19, Page 10-28*. 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 field (pulsed), starts the reading interval and waits for the match code.

7.  Present the match code at following reading distances:
    ICR 840 (standard type) : 80 mm (3.15 in) for side/front reading window

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 field (pulsed) 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 840 (standard type) : 80 mm (3.15 in) for side/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"*,

**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

8 010 961/0000/10-05-2005        **10-33**

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. 10-20* shows the flow of auxiliary input.
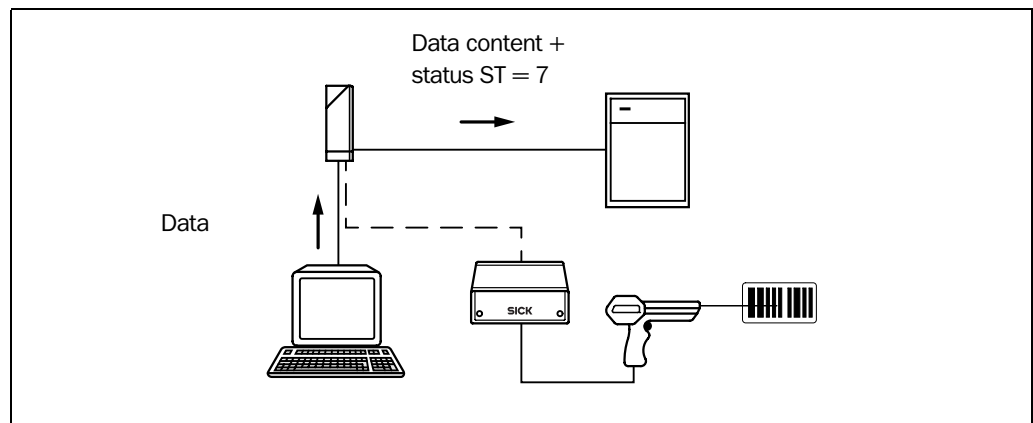


Fig. 10-20: Auxiliary input via the auxiliary interface of the ICR

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.
    To do so, click the AUXILIARY INPUT 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 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. 10-21, Page 10-36* 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.
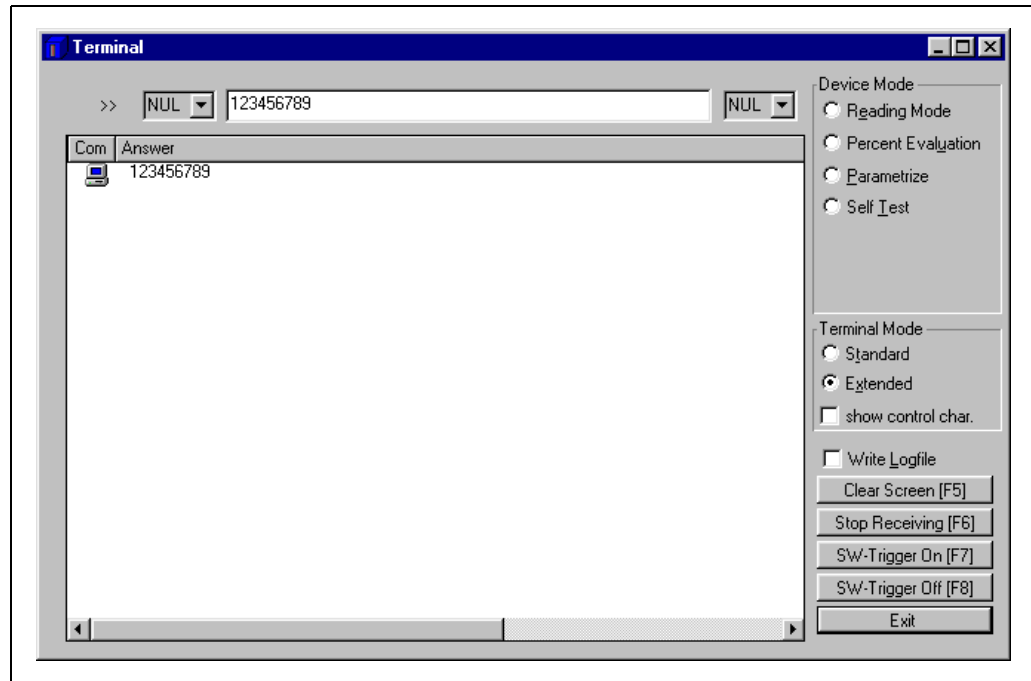
Fig. 10-21: CLV Setup: Auxiliary input via the Terminal Emulator

**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 10-4*.

| Parameter | Value |
|---|---|
| Data transmission rate | 9,600 bd |
| Data bits | 8 |
| Parity | none |
| Stop bits | 1 |
| Data output format | Data terminator<br>*e.g. 1234 CR* |

Table 10-4:　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 10-4*.

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 10-5*.

| 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 10-5: 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 84x to another ICR 84x 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. 10-22, Page 10-43* |

Table 10-6:  Accessories: Installation accessories

### 10.9.2    Connection modules

| Part No. | Type | Description | Design |
|---|---|---|---|
| 1 023 885 | CDB 420-001 | Connection module for one ICR 84x, with:<br>• 1 x 15-pin D-Sub HD device socket<br>• 4 x plastic cable grips (dia. 4.5 to 10 mm (0.18 to 0.39 in))<br>• terminal strips (signal distributors) for wiring the data and functional interfaces<br>• 1 x internal 9-pin D Sub "Aux" plug<br>• 5 x LED (status indicators)<br>• polycarbonate housing, enclosure rating max. IP 65<br>• operating temperature –35[1] to +40 °C (+32 to +104 °F)<br>• operating voltage 10 to 30 V DC | |
| 1 024 305 | CDB 420-101 | As CDB 420-001 but with:<br>• 2 x plastic cable grips (dia. 4.5 to 10 mm (0.18 to 0.39 in))<br>• 2 x M12 plug connection (1 x plug, 1 x socket) | |
| 1 025 362 | CDM 420-0001 | Connection module for one ICR 84x, with:<br>• 1 x 15-pin D-Sub HD device socket<br>• 6 x plastic cable grips (dia. 4.5 to 10 mm (0.18 to 0.39 in))<br>• terminal strips (signal distributors) for wiring the data and functional interfaces<br>• 1 x internal 9-pin D Sub "Aux" plug<br>• 5 x LED (status indicators)<br>• polycarbonate housing, enclosure rating max. IP 65<br>• operating temperature –35[1] to +40 °C (+32 to +104 °F)<br>• operating voltage 10 to 30 V DC,<br>  power consumption 0.5 W without ICR 84x | |
| 1) Without any mounting or electrical installation work, otherwise  –20 °C (–4 °F) | | | |

Table 10-7:  Accessories: Connection modules CDB 420/CDM 420

### 10.9.3 Extensions for connection modules
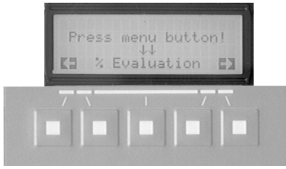
| Part No. | Type | Description | Design |
|---|---|---|---|
| 1 023 850 | CMC 400-101 | Parameter memory (Connection Module Cloning) as plug-in module for the **CDB 420** or **CDM 420** Connection Module. Storage of parameter set for ICR 84x (from firmware version V 1.95). Rotary code switches for activating the network mode of the ICR 84x. 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 84x (from firmware version V 1.95). 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 84x 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 84x (from firmware version V 1.95) 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 84x (from firmware version V 1.95) to **DeviceNet** (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 10-8: 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 84x 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 84x 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 (RxD) and pin 3 (TxD) 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 mm² (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 mm² (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 84x 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 84x to PC |

Table 10-9:  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 10-10: Accessories: Incremental encoder

**10-42**                   8 010 961/0000/10-05-2005

## 10.10  Dimensional drawings of the accessories

### 10.10.1  Mounting bracket (for an ICR)



Included for mounting the ICR:
2 pan-head screws M5 x 16 mm (0.63 in),
Allen screws size 3 mm (0.12 in), self-locking

All dimensions in mm (in)
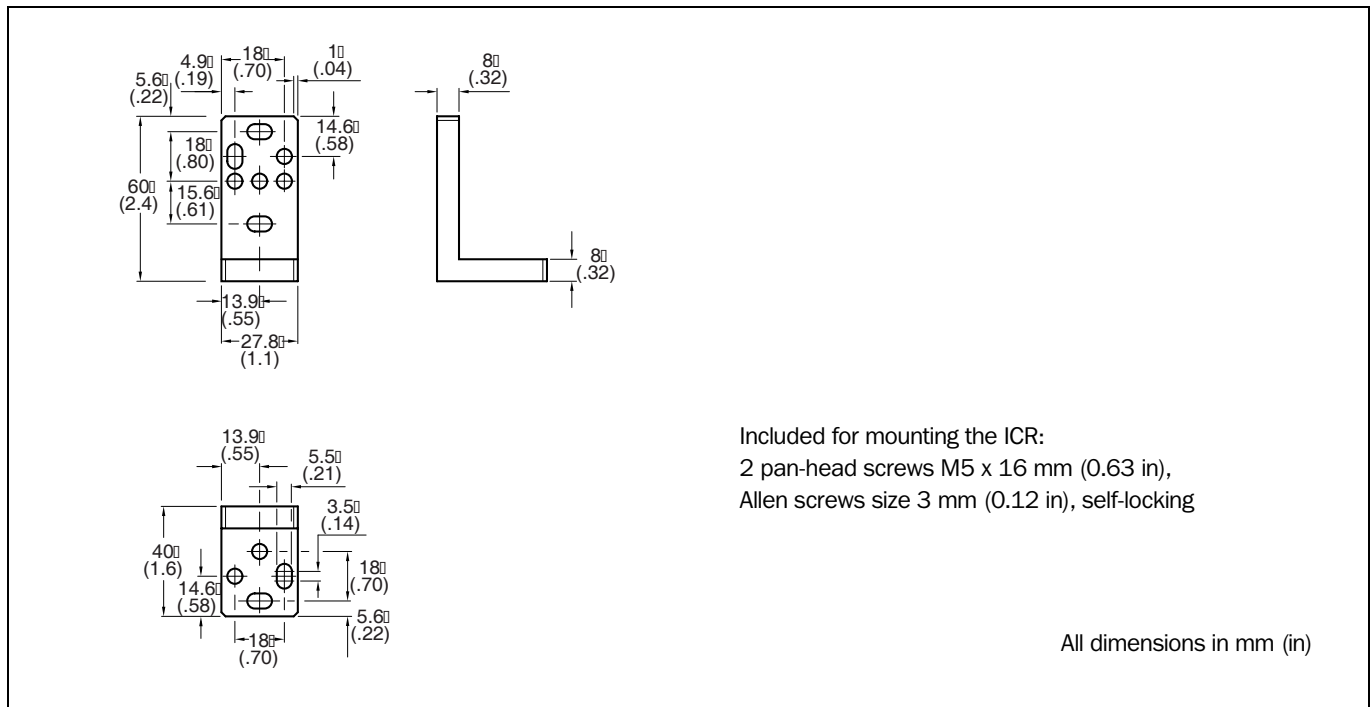
Fig. 10-22: Dimensions of the mounting bracket no.  2 025 491

## 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 10-11: Supplementary documentation

### 10.11.1 CLV Connect (from version > 2.0)

Diagramms 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[TM]).

## 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 scanability.

### 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).

### 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 lengthwise the reading window. 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 reading window can be restricted for ⇨ decoding purposes by specifying the maximum and minimum CP values of max. two areas of interest 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.

**10-46**         8 010 961/0000/10-05-2005

### 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 84x).

### 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 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 84x.

### 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).

### 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 initialized 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 code reads (but not the codes) is assessed statistically. The 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 84x default setting.

        8 010 961/0000/10-05-2005

**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 84x).

**Reading interval**

Timeslot in which the ICR activates the red illumination field 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 84x.

**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. 10-23* shows the scaled down copy of the EC Declaration of Conformity (page 1).

➢   Complete copy of EC Declaration of Conformity on request.

# SICK

## EC Declaration of conformity

Ident-No. : 9092642

The undersigned, representing the following manufacturer

**SICK AG**
Nimburger Straße 11
79276 Reute
Deutschland

herewith declares that the product

| **ICR840** |
|---|

is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced in page 2 have been applied.

(place),..Reute...........................................                (date),.. 2005-06-29

.............................................                .............................................
ppa. Pierenkemper                                     ppa. Walter
(Manager Development                                (Manager Production
Division Auto Ident)                                   Division Auto Ident)

Fig. 10-23: Copy of the Declaration of Conformity (Page 1, scaled down)

## 10.14  Index

## 10.15  Code samples

### 10.15.1  1-D and 2-D code samples for ICR 840 (standard type)



|   |   |   |   |
|---|---|---|---|
| **❶** | **❷** | **❸** | **❹** |
| 2/5 interleaved | EAN 13-digit | Code 39 | DataMatrix ECC200 |
| 9876543210 | 4 096072 615590 | R C I | |
| Module width 0.30 mm (11.8 mil) | Module width 0.35 mm (13.8 mil) | Module width 0.5 mm (19.7 mil) | Cell size 0.5 mm (19.7 mil) |
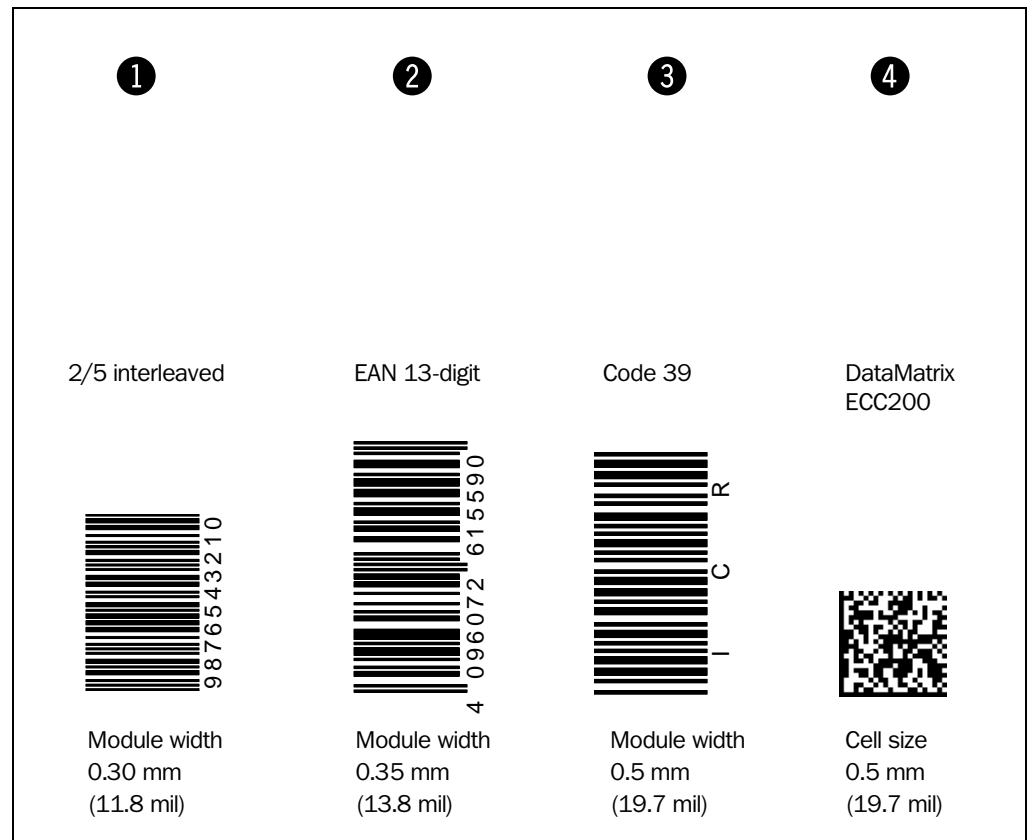
Fig. 10-24: Scannable 1-D codes with various module widths (print ratio 2:1)/2-D code

SICK AG | Waldkirch | Germany | www.sick.com

**SICK**
Sensor Intelligence.