CLV43x/CLV44x
Bar Code Scanner

Advanced Line

SICK
Sensor Intelligence.

Software versions

Software/Tool	Function	Version
CLV 430/431/432	Firmware	From V 3.03 K 949
CLV 440	Firmware	From V 3.03 K 949
CLV 442	Firmware	From V 3.03 K 949
CLV Setup	Operating software (Windows-based)	From V 3.2 L 547
CLV Setup Help	Online help (HTML)	From V 1.1
I-ViewPro^{TM}	HMTL browser (offline)	From V 2.38

Windows 95^{TM}/98^{TM}, Windows NT^{TM}, Windows XP^{TM} and Internet Explorer^{TM} are registered trademarks or trademarks of the Microsoft Corporation in the USA and other countries. Netscape Navigator^{TM} is a registered trademark of the Netscape Communications Corporation, USA. I-ViewPro^{TM} is a registered trademark of EnReach Technology, Inc., USA.

CLV 43x/44x Bar Code Scanner

Quick Finder

- **Scope of delivery**
  - *Chapter 3.1.1 "Scope of delivery", Page 3-1*

- **IMPORTANT!**
  - *Chapter 2 "Safety information", Page 2-1*

- **Installing device at reading station**
  - *Chapter 4 "Installation", Page 4-1*

- **Electrical connection of device**
  - *Chapter 5 "Electrical installation", Page 5-1*

- **Overview of device and its functions**
  - *Chapter 3 "Product description", Page 3-1*
  - *Chapter 6.2 "Default setting", Page 6-1*
  - *Chapter 6.5 "Operating modes and outputting the reading result", Page 6-20*
  - *Chapter 9 "Technical data", Page 9-1*

- **Starting device with default setting**
  - *Chapter 6.3 "Quick start", Page 6-3*

- **Installing "CLV Setup" to PC**
  - *Chapter 10.4 "Installation and operating instructions for the PC-based "CLV Setup" program", Page 10-26*

- **Adapting device to reading application**
  - *Chapter 6.4 "Configuration (parameterizing)", Page 6-5*

- **Troubleshooting**
  - *Chapter 8 "Troubleshooting", Page 8-1*

- **Finding information**
  - *Table of contents, Page E-5*
  - *Index, Page 10-74*

Installation procedure (overview)

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

1. Check scope of delivery for completeness.

2. Install the CLV at the reading station and align it with the object with a bar code.

3. Install the AMV/S 40 Connection Module.

4. Connect the CLV to the AMV/S 40 connection module.

5. Install the reading pulse sensor.

6. Connect the reading pulse sensor to the "Sensor 1" switching input in the AMV/S 40.

7. For CLV 44x: Install sensor for distance detection.

8. For CLV 44x: Connect the distance sensor to the "Sensor 2" switching input in the AMV/S 40.

9. Connect the host to the "host interface" in the AMV/S 40. Adapt AMV/S 40 to the host interface type of the CLV.

10. Switch on the power supply to the AMV/S 40. After the CLV has been started, the "Device Ready" LED lights up. The beeper signals that Reading mode has been started by means of two consecutive tones.
    Line scanner with oscillating mirror:
    In the Reading mode, the CLV deflects (by default) the scan line about the position CW = 50 at a frequency of 1 Hz and a maximum angle of ±20°.

11. Switch on the PC and start Windows™ (at least Windows 95™ required).

12. Install accompanying operating software "CLV Setup", online help "CLV Setup Help" and, if necessary, HTML browser "I-ViewPro™" from CD-ROM to PC.

13. Connect the PC to the terminal interface of CLV.
    For this purpose, connect the PC via the RS 232 data connection cable to the "Service" plug in the AMV/S 40.

14. Start "CLV Setup".
    CLV Setup contacts the CLV and copies the parameter set of the CLV via an upload. The parameter set is displayed on tabs.

15. Carry out a test read with the test bar code sample (clock the CLV accordingly). Display the reading result in the Terminal Emulator of CLV Setup.

16. Configure the CLV for the application by means of the setting options on the tabs in CLV Setup if necessary.
    Raster scanner: Select the Standard decoder!
    Copy the modified parameter set temporarily to the CLV via download. **Do not** switch off the power supply of the AMV/S 40 (of the CLV)!

17. Run a test under realistic conditions.

18. Check proper data transfer of the CLV to the host.

19. Check and optimize the set parameter values if necessary. Copy the parameter set to the CLV **permanently** via download.

20. Save the parameter set as a "*.scl" configuration file in CLV Setup.

The CLV contains **application-specific** settings and is ready for operation.

Contents

Abbreviations

DC	**D**istance **C**onfiguration
AMV/S	**A**nschluss**m**odul mit **V**erteiler (Signal)/mit zusätzlicher **S**tromversorgung (connection module with distributor (signal) and additional power supply)
BMV/S	**B**usanschluss**m**odul mit **V**erteiler (Signal)/mit zusätzlicher **S**tromversorgung (bus connection module with distributor (signal) and additional power supply)
CAN	**C**ontroller **A**rea **N**etwork (field bus protocol based on the CAN bus)
CLV	**C**ode-**L**eser **V**-Prinzip (code reader V principle) The CLV 43x/44x Bar Code Scanners will simply be called CLV in the document, except in such text passages where differentiation is required
DOF	**D**epth **O**f **F**ield
EEPROM	**E**lectrically **E**rasable **P**rogramable **R**ead **O**nly **M**emory
HD	**H**igh **D**ensity (based on module width)
HTML	**H**yper **T**ext **M**arkup **L**anguage (language of Internet websites)
LD	**L**ow **D**ensity (based on module width)
LED	**L**ight **E**mitting **D**iode
RAM	**R**andom **A**cces **M**emory (temporary memory which is accessed directly)
ROM	**R**ead **O**nly **M**emory (permanent)
RTF	**R**ich **T**ext **F**ormat (standardized document format with format descriptions)
SD	**S**tandard **D**ensity (based on module width)
SMART	**S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology
PLC	**P**rogammable **L**ogic **C**ontroller

Tables

Figures

1 Notes on this document

1.1 Purpose

This document contains instructions for operating the following bar code scanners:

- CLV 430 Long Range, with fixed focus
- CLV 431 Mid Range, with fixed focus
- CLV 432 Short Range, with fixed focus
- CLV 440 with dynamic focus control
- CLV 442 High Density, with dynamic focus control

in the variants

- Line scanner without/with 105° angle attachment
- Raster scanner without/with 105° angle attachment
- Line scanner with oscillating mirror

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 bar code scanners will all simply be called "CLV" below, except in such text passages where a differentiation is required.

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 required for installation, electrical installation and startup of the CLV with the **factory default setting**.

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

The CLV is configured for **specific applications** using the Windows-based "CLV Setup" and "CLV Assistant". 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.

For further information on the design of the bar code scanner or on bar code technology in general, please contact the Auto Ident division at SICK AG.

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 bar code scanner.

➢　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 setting.
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 terminal interface of the CLV.

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

 This symbol is used to mark sections that describe steps carried out with the profile programming.

 This symbol refers to additional technical documentation.

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

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

8 008 568/K949/10-06-2002

2 Safety information

2.1 Authorized users

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

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 software and hardware environment of the relevant application (e.g. conveyor belt)
- Basic knowledge of Windows 95^{TM}/98^{TM}, Windows NT^{TM} or Windows XP^{TM}
- Basic knowledge of an HTML browser (e.g. Netscape Navigator^{TM})
- Basic knowledge of data transmission
- Basic knowledge of bar code technology

2.2 Intended use

The CLV is designed to detect and decode bar codes automatically. It is installed in a reading station and reads bar codes on objects positioned on a conveyor belt, for example.

The CLV transfers the data content of the decoded bar codes via its host interface 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.

2.3 General safety precautions and protection measures

➢ Carefully read the general safety precautions and observe them at all times. This also applies to the warnings provided for the activities described in each chapter of this document.

WARNING

Risk of injury by electrical current!

Depending on the type of device, the AM**S** 40 Connection Module (accessory) for the CLV is connected to a mains voltage of 230 V AC 50 Hz or 115 V AC 50/60 Hz.

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

Laser beam can cause blindness!

The CLV uses a class 2 red-light laser. Looking directly at the laser beam can seriously damage your eyesight.

➢ As with sunlight, never look directly into the laser beam.

➢ Do not point the laser beam at persons.

➢ When installing and aligning the CLV, avoid reflections caused by reflective surfaces.

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

➢ Observe the laser protection specifications in accordance with DIN EN 60825-1 (latest version).

Laser power

The laser operates at a wavelength of $\lambda = 670$ nm (visible red light). The power output of the laser beam at the reading window is max. 3.5 mW (CLV 43x/440) or 1.5 mW (CLV 442). The emitted beam is not dangerous to human skin.

Laser warning labels

The laser warning labels relevant for Europe (*Fig. 2-1*) are attached at the following positions on the CLV:

• The laser warning symbol and the laser warning in British/US English on Line/Raster scanners are positioned beside the front reading window on the side of the device (*Fig. 3-1, Page 3-4*).

• The laser warning symbol and the laser warning in British/US English on Line/Raster scanners with angle attachment and on Line scanners with oscillating mirror are positioned on the wide side of the device at the back of the reading window (*Fig. 3-2, Page 3-5*).
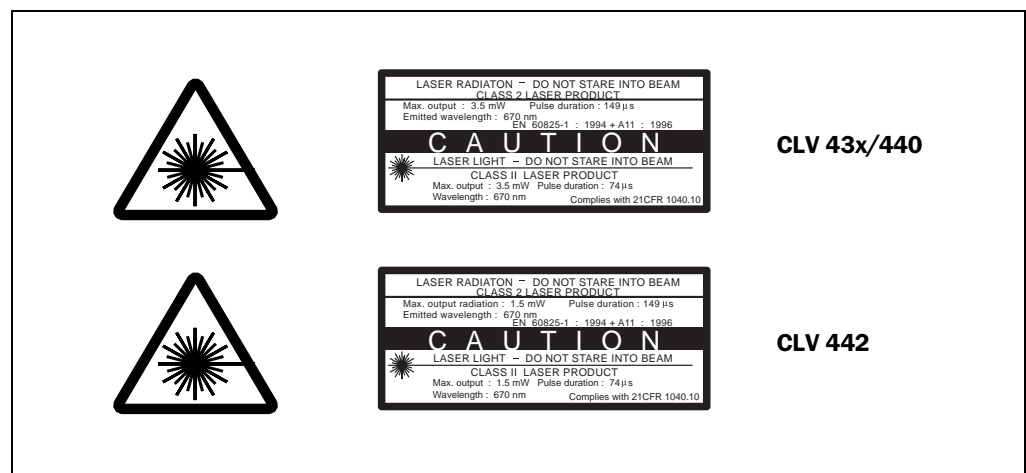
Fig. 2-1:   Laser warning label found on the CLV (valid for Europe)

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

If the CLV is installed in a machine/panel with the result that the laser 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 laser beam.

2-2   8 008 568/K949/10-06-2002

Internal protective circuits

Explanation   The CLV is equipped with monitoring circuits that deactivate the laser diode in the event of a malfunction.

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

A timer (laser timeout) automatically deactivates the laser diode 10 minutes (default setting) after a continuous reading pulse is initiated in Reading mode with switching input pulse modes "Sensor Input" and "Serial Interface". In this case, the CLV outputs the message: "Laser safety timeout" via the terminal interface.

The reading pulse is to be terminated by resetting the pulse signal. The laser diode is activated again by the next reading pulse.

The laser timeout can be set in the range of 1 min to 25 h or deactivated *(see Table 6-7, Page 6-13)*.

In the "Percentage Evaluation" mode, "Adjusting" mode, "Show CP-limits" and "AutoSetup" mode as well as in the "Free Running" reading mode, the laser diode is constantly activated. In the "reflector polling" trigger mode the laser diode is switched on for each 20th scan.

2.4   Quick stop and quick restart

2.4.1   Switching off the CLV

➢   Switch off the power supply or remove the CLV connector 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 CLV

•   The last reading result

•   Daily operating data
    (operating hours counter, reading interval count, good read count, maximum duration reading interval, minimum duration reading interval, average identification quality)

2.4.2   Restarting the CLV

➢   Switch on the power supply or reattach connector to the connection module.
    The CLV resumes operation with the parameter set that was **last stored permanently** and resets the daily operating data.

2.5 Environmental information

The CLV is designed to cause minimum impact on the environment. It does not contain any silicone-based materials 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 CLV 430/431/432 Line/Raster scanners have a max. power consumption of 4 W
- The CLV 440/442 Line scanners have a max. power consumption of 5 W
- The Line scanners with oscillating mirror have a max. power consumption of 6.15 W

The values are given for devices with disconnected switching outputs.

2.5.2 Disposal after final removal from service

Always dispose of irreparable devices in a manner that is not harmful to the environment and in accordance with the applicable national waste disposal regulations. The CLV can be separated into recyclable secondary raw materials and special-category waste (electronic scrap). *See also 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 CLV is **supplied** with the following:

- Two polling reflectors for automatic reading pulse generation
- An information sheet (note on device) with terminal diagram and Quick Start instructions
- An additional set of Class 2 laser warning labels (self-adhesive) in German/US English and French/US English

Depending on the **number of devices ordered**, a **set of technical documentation** consisting of one or more copies of the following:

- These CLV 43x/44x Operating Instructions in English and German
- A CD-ROM containing "CLV Setup" for Windows^{TM}, the online help system "CLV Setup Help" and the HTML browser "I-ViewPro^{TM}"
- A fold-out card with 12 profile bar codes

Chapter 10.11 "Accessories", Page 10-59 provides an overview of the available installation accessories, connection modules, cables and plug-in connections and sensors for reading pulse generation and object distance detection (CLV 44x).

3.1.2 Variants

The CLV is available in the following variants:

CLV 43x

Type (red light)	Part No.	Scan procedure	Reading window
CLV 430-0010	1 017 585	Line scanner	Front
CLV 430-1010	1 016 705	Raster scanner	Front
CLV 430-6010	1 017 981	Line scanner with oscillating mirror	Side
CLV 431-0010	1 017 622	Line scanner	Front
CLV 431-1010	1 016 679	Raster scanner	Front
CLV 431-2010	1 016 746	Line scanner with 105° angle attachment	Side
CLV 431-3010	1 016 747	Raster scanner with 105° angle attachment	Side
CLV 431-6010	1 017 982	Line scanner with oscillating mirror	Side
CLV 432-0010	1 017 623	Line scanner	Front
CLV 432-1010	1 016 680	Raster scanner	Front
CLV 432-2010	1 016 748	Line scanner with 105° angle attachment	Side
CLV 432-3010	1 016 749	Raster scanner with 105° angle attachment	Side
CLV 432-6010	1 017 983	Line scanner with oscillating mirror	Side

Table 3-1: Variants of the CLV 43x

CLV 440

Type (red light)	Part No.	Scan procedure	Reading window
CLV 440-0010	1 017 588	Line scanner	Front
CLV 440-6010	1 017 984	Line scanner with oscillating mirror	Side

Table 3-2: Variants of the CLV 440

CLV 442

Type (red light)	Part No.	Scan procedure	Reading window
CLV 442-0010	1 017 595	High-density Line scanner	Front

Table 3-3: Variants of the CLV 442

3.1.3   System requirements

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

1. A SICK Connection Module to provide the power supply and connect the data and functional interfaces.
   Available types:
   – AMV 40-011 (no. 1 017 132) for 24 V DC ±20 %, enclosure rating max. IP 54
   – AMS 40-013 (no. 1 017 135) for 230 V AC 50 Hz/24 V DC, enclosure rating max. IP 54
   – AMS 40-012 (no. 1 017 136) for 115 V AC 50/60 Hz/24 V DC, enclosure rating max. IP 54
   – AMV 100-011 (no. 6 021 105) for 10 to 30 V DC, enclosure rating max. IP 65
   – AMV 200-011 (no. 6 021 106) for 10 to 30 V DC, enclosure rating max. IP 65

– or –

   Alternatively, a non-SICK device with a voltage output of 10 to 30 V DC pursuant to IEC 742 (functional extra-low voltage) and at least **10 W** power output.
   Cable no. 6 010 137 with 15-pin D Sub HD socket and one open end for connecting the CLV to the external power pack.

2. The following operating voltages/power outputs
   – AM**V** 40-011: 24 V DC ±20 % (pursuant to IEC 742), at least 10 W
   – AM**S** 40-013: 230 V AC ±10 % 50 Hz
   – AM**S** 40-012: 115 V AC ±10 % 50/60 Hz
   – AM**V** 100-011: 10 to 30 V DC (pursuant to IEC 742)
   – AM**V** 200-011: 10 to 30 V DC (pursuant to IEC 742)

3. With external clock pulse 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 object distance detection via the "Sensor 2" switching input (CLV 44x):
   a suitable sensor for two-stage dynamic focus control, e.g. photoelectric reflex switch.

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

6. The optional interface converter no. 2 020 825 (installed in the AMV/S 40 Connection Module) for connecting the CLV to a 20 mA data interface.

7. A PC (at least 80486, 66 MHz, 16 MB RAM, CD-ROM drive, serial interface, mouse (recommended)) with Windows 95™/98™, Windows NT™ or Windows XP™.

8. An RS 232 data connection cable with two 9-pin D-Sub sockets for connecting the PC to the terminal interface of the CLV in the AMV/S Connection Module, e.g. no. 2 014 054. Pin 2 (RxD) and Pin 3 (TxD) are crossed.

9. To use the online help system "CLV Setup Help", an HTML browser is required, e.g. "Netscape Navigator^{TM}" or the supplied "I-ViewPro^{TM}" browser (see *Chapter 3.1.1 "Scope of delivery", Page 3-1*).

10. For connection of the CLV to the Interbus S, the Profibus DP, the DeviceNet or Ethernet: the corresponding BMV/BMH 10 Bus Connection Module (on request).

11. For connection of the CLV to the CAN bus: the operating instructions "Using the CAN interface" (no. 8 009 180, English edition).

3.1.4   View of Line/Raster scanner devices with angle attachment

Key:

①   D-Sub HD plug, 15-pin

②   Tapped blind holes M 5, 5 mm deep

③   Reading window

④   Laser warning labels

⑤   Connection cable

⑥   Sound opening of the beeper (covered)

⑦   LEDs (status indicators)

⑧   Integrated angle attachment with 105° light reflection

Front reading window   Side reading window
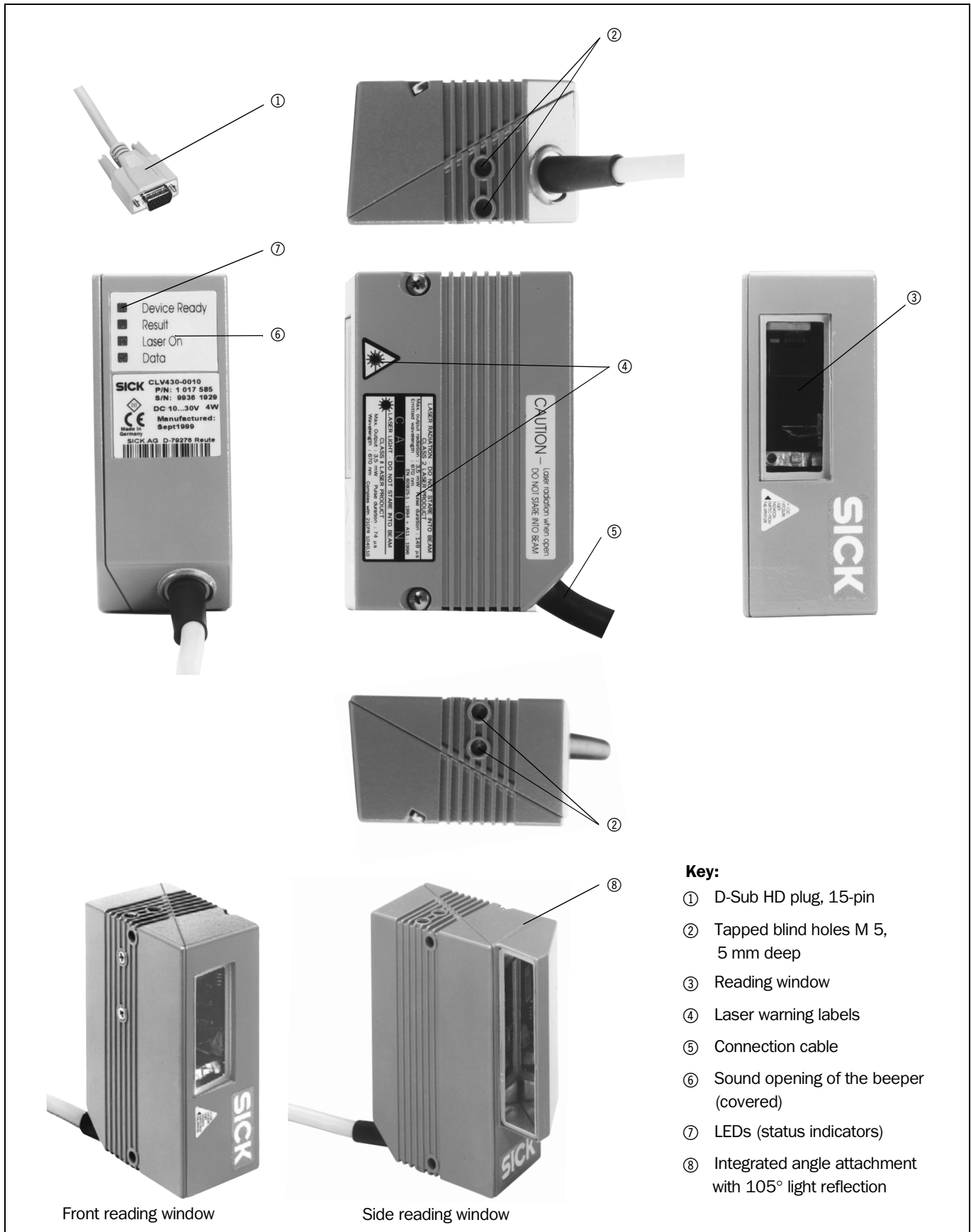
Fig. 3-1:   CLV43x/44x Line/Raster scanner without/with 105° angle attachment

3.1.5 View of Line scanner device with oscillating mirror

Key:

① D-Sub HD cable plug, 15-pin

② Tapped blind holes M 5, 5 mm deep

③ Laser warning labels

④ Connection cable

⑤ Sound opening of the beeper (covered)

⑥ LEDs (status indicators)

⑦ Integrated oscillating mirror

⑧ Reading window

Side reading window
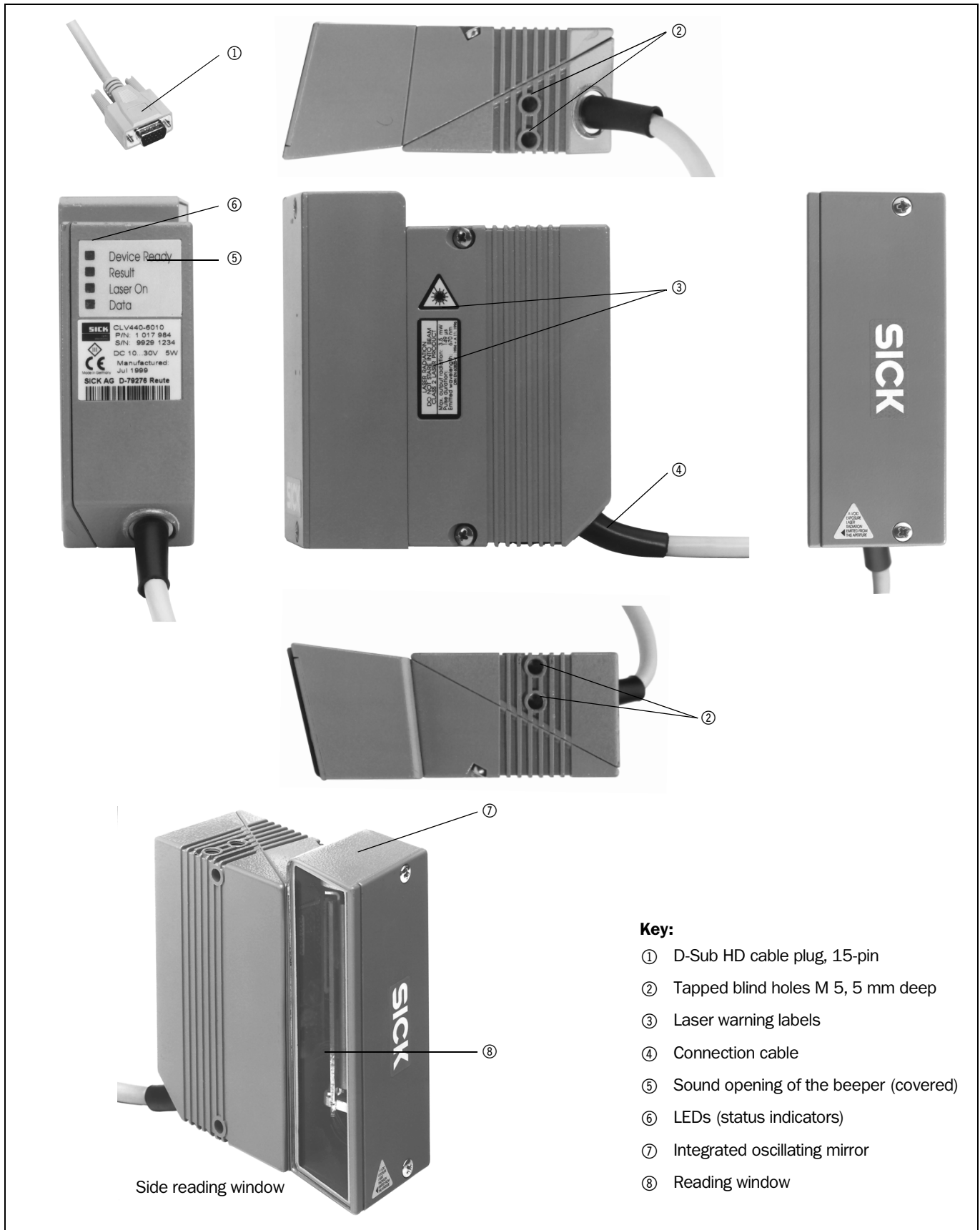
Fig. 3-2: CLV 43x/440 Line scanner with oscillating mirror

3.2   Method of operation

The CLV first scans the bar code with a scan line and then decodes it. The CLV directs the data to a host/PC for further processing via the main data interface (serial host interface). An overview of the CLV functions is provided in *Fig. 3-3*.
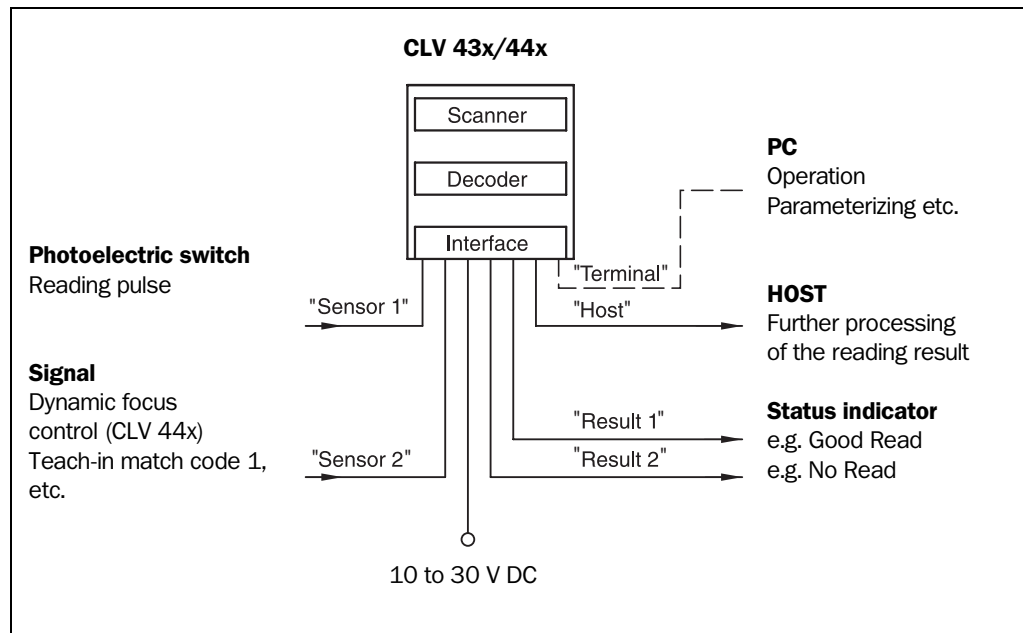
Fig. 3-3:   Block diagram: CLV functions

The CLV is equipped with two decoders:

- 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

The CLV derives useful diagnosis data from the reading process and transfers it to the host. It also records operating data that can be interrogated at any time. The quality of the read can be checked in "Percentage Evaluation" mode.

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

Reflector polling is only supported in "Fixed Position" mode (no oscillation) on the Line scanner with oscillating mirror.

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 CLV. The "Sensor 2" switching input is used to switch the focus position on the CLV 44x and to switch the distance configuration on the CLV 43x. Alternatively, it can be used to teach in a match code. The "Result 1" and "Result 2" switching outputs can be assigned various functions and control external devices, such as a PLC.

Product description

The CLV is operated and configured via the auxiliary interface (terminal interface) using the "CLV Setup" software or via the host/terminal interface and command strings.

System messages, warnings and error messages help you with configuration and with locating the source of errors during startup and in Reading mode.

3.2.1 Dynamic focus control

Unlike the fixed focus of the CLV 43x, the CLV 44x can switch its focus position dynamically and thus cover a large reading range. A maximum of eight reading ranges can be defined as distance configurations, each of which can be approached consecutively in Reading mode *Fig. 3-4*.
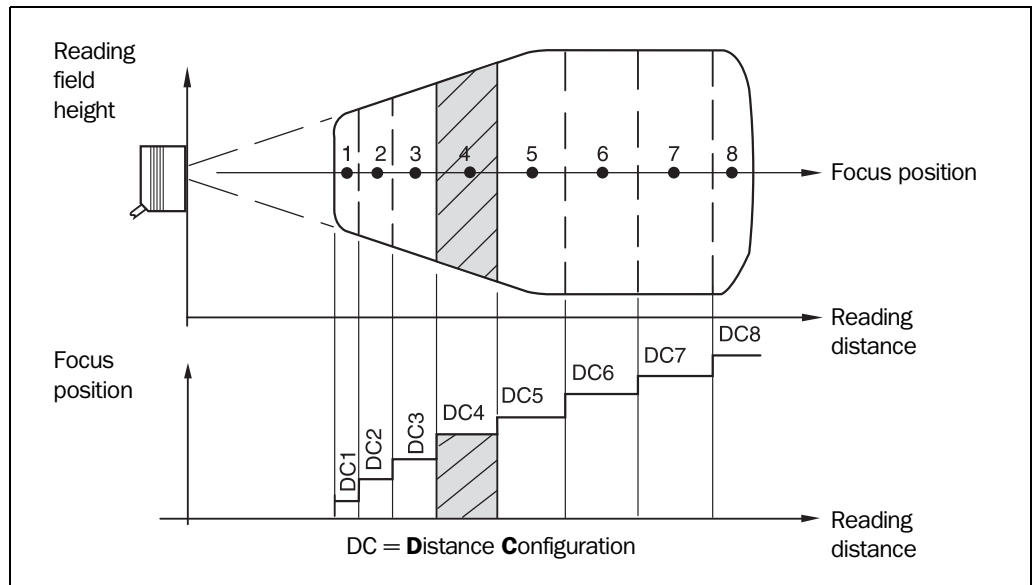
Fig. 3-4:   Dynamic focus control CLV 44x: classification of the reading range in distance configurations

The switch takes place in response to changes in the object distance (with reads from above: object height detection). The trigger source for the max. two-stage switchover is a signal at the "Sensor 2" switching input. The source for the max. eight-stage switchover is a command on the host interface or the integrated timer (e.g. for search mode). In the case of the Line scanner with oscillating mirror, the source can also be the oscillating mirror reversal points. The distance configurations are assigned to the switchover sequence via a programmable assignment table.

In the case of the CLV 430, 431, and 432 with fixed focus, the distance configurations can also be used to restrict the active evaluation range of the scan line and to limit the angle of deflection of the oscillating mirror.

In the default setting, the first three focus positions of the CLV 440 cover the reading ranges of the CLV 432 (short range), CLV 431 (mid range), and CLV 430 (long range).

3.2.2   Scan procedure variants

Line scanner

Generates a scan line. Due to the V-principle of beam generation, the reading field height (for evaluating the useful length of the scan line) is dependent on the reading distance.

Raster scanner

Generates 8 parallel scan lines that are offset by the same distance. Due to the V-principle of beam generation, the reading field height (for evaluating the useful length of the scan lines) is dependent on the reading distance.
Raster height of the scan line field: 15 mm at a reading distance of 200 mm (front reading window). Can only be used with the standard decoder!

Line scanner with oscillating mirror

The oscillating mirror also deflects the scan line perpendicularly to the scan direction at both sides around the neutral position with a low oscillating frequency. As a result, the CLV can also scan larger areas for bar codes. Due to the V-principle of beam generation, the reading field height (for evaluating the useful length of the scan line) is dependent on the reading distance.

In addition to parking (fixed position) and simple deflection with the maximum deflection range, optimized oscillating mirror functions are also available:

*   Oscillating with variable deflection range for each distance configuration
*   One-shot: one-off, defined deflection per reading pulse (forward and return phase).

Fig. 3-5 shows an example of the trigger for dynamic focus control on a stationary object using the internal timer or the oscillating mirror reversal points ("search mode") for six distance configurations.
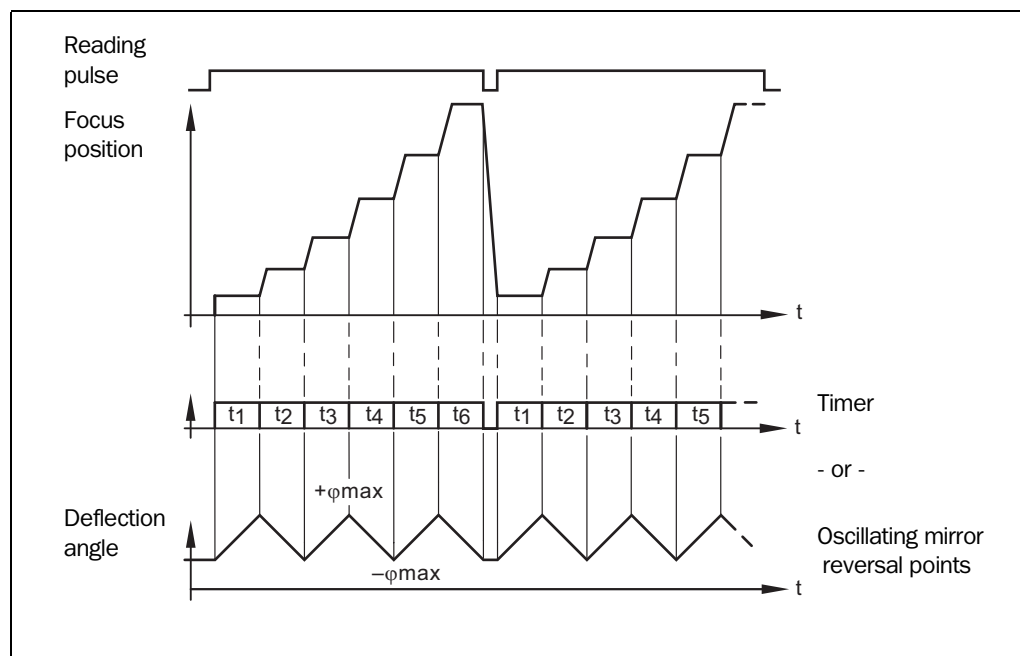
Fig. 3-5:   Oscillating mirror of CLV 440: example of dynamic focus control in search mode

3.3 Indicators and control elements

3.3.1 Control elements

The CLV is operated and configured via the terminal interface using the "CLV Setup" program or using command strings sent via the host interface/terminal interface. 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
- The structure of the data output string for "good read" and "no read" on the host interface
- The function of the terminal interface

Chapter 10.4 "Installation and operating instructions for the PC-based "CLV Setup" program", Page 10-26 describes the procedure for installing the "CLV Setup" program and how to operate the user interface. Configuration (parameterizing) is explained in *Chapter 6.4 "Configuration (parameterizing)", Page 6-5*.

3.3.2 Function of the LEDs

Four LEDs indicate the operating status, activity of the laser diode, output of the reading result and data transfer on the host interface. The LEDs (*Fig. 3-6*) are located on the rear of the device. *Table 3-4* shows the meaning of the LEDs in the different operating modes/ functions.

Device Ready

Result

Laser On

Data
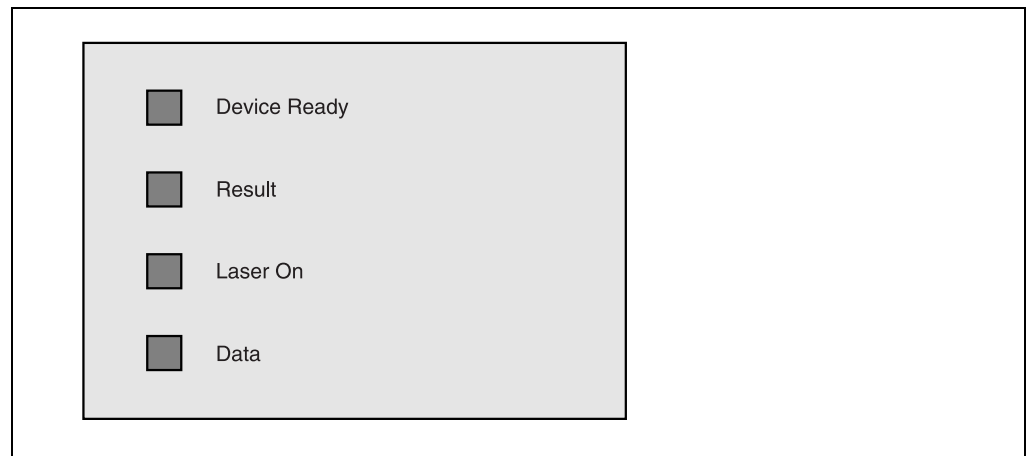
Fig. 3-6:   LEDs

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 has expired
	Laser On	*Orange*	• Lights up while the laser diode for reading the profile bar codes is active
Reading mode	**Device Ready**	*Orange*	• Lights up constantly
			• Extinguishes with new operating mode/function
	Laser On	*Orange*	• Lights up if reading diode active (The laser diode is activated/deactivated by reading pulse)
			• Lights up constantly in "Free Running" mode, since the laser diode is always active
			• Lights up with every 20th scan in Reflector Polling mode. The scan line is faintly visible.
	Result	*Orange*	LED is connected to the "Result 2" switching output. It indicates the result status for selected for the pulse duration of the output.
			• Lights up after a good read (default setting: "Good Read")
			• Illuminates if code comparison is activated, the read barcode matches the predefined match code(s) and the corresponding result status output is selected for the "Result 2" output
	Data	*Orange*	• Flickers while the CLV 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:
			• Extinguishes if reading rate < 30 %
			• Blinks twice a second if reading rate 30 % to 70 %
			• Blinks five times a second if reading rate 70 % to 90 %
			• Lights up constantly if reading rate > 90 %
Profile programming	**Laser On**	*Orange*	• Lights up while the profile bar codes are being read (Free Running mode)
AutoSetup	**Laser On**	*Orange*	• Lights up while the application-specific bar codes are being read (Free Running mode)
Adjusting mode	**Laser On**	*Orange*	• Lights up constantly (Free Running mode)
Show CP-limits	**Laser On**	*Orange*	• Blinks bright/dark alternately, in the frequency with which the scan line is (partially) masked out

Table 3-4: Meaning of the LEDs

3-10   8 008 568/K949/10-06-2002

3.3.3 Function of the beeper

The beeper uses different tone sequences and lengths (*Table 3-5*) to signal whether functions have been executed successfully and whether any malfunctions have occurred.

For information on troubleshooting, see *Chapter 8.5 "Troubleshooting", Page 8-7*.

In the default setting, the beeper indicates the event status Good READ by means of a LOW (quiet) beep. 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 has elapsed
	Beep	• Confirms a successful read (good read; default setting) and the reading result output
Profile programming Start AutoSetup	Beep	• Confirms successful read of profile bar code for start/end of AutoSetup
	Beep Beep	• Confirms successful read of application-specific bar code and start of Reading mode
	Beep (long tone)	• Signals that the application-specific bar code was not read
Profile programming	Beep	• Confirms successful read of profile bar code
	Beep Beep	• Confirms start of Reading mode 10 s after last profile bar code was read
Exceeding the laser timeout	Beep Beep Beep	• Signals that the laser diode has been deactivated after the laser timeout of 10 min (default setting) was exceeded in Reading mode. The reading pulse is still active.

Table 3-5: Beeper function

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

Volume:

Click the required field in the BEEPER group.

Output function for the result status:

1. Click the EDIT RESULT OUTPUTS button in the RESULT OUTPUT section. The EDIT RESULT OUTPUTS 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 required function and choose "OK".

4. Perform a download to the CLV. This is done by clicking 🖳 in the toolbar. The DOWNLOAD PARAMETERS dialog box is then displayed.

5. Confirm the dialog box by selecting the PERMANENT save option.

The CLV operates the beeper with the values selected for the result status and volume.

Notes

4   Installation

4.1   Overview of installation sequence

- Changing the language version of the laser warning label (if necessary)
- Selecting the installation location for the CLV
- Aligning the CLV with the bar code
- Installing the CLV
- Installing the AMV/S 40 Connection Module
- Connecting the CLV to the AMV/S 40 Connection Module
- Adjusting the CLV
- Installing the reading pulse sensor for triggering the reading pulse
- Option with dynamic focus control (CLV 44x):
  installing the sensor for detecting the object distance

4.2   Installation preparations

4.2.1   Laying out the components to be installed

- CLV bar code scanner

4.2.2   Accessories

- Mounting bracket no. 2 020 410 with two M 5 x 8 mm screws and two washers (not included in the scope of delivery of the CLV) or

  Mounting bracket no. 2 022 564 with three M 5 x 8 mm screws, three spring washers and two M 5 x 12 mm hexagonal bolts with washers (not included in the scope of delivery of the CLV) or

  Round rod bracket no. 2 023 691 with three M 5 x 8 mm screws and three spring washers (not included in the scope of delivery of the CLV)
- Alternatively, if the bracket is supplied by the user:
  – Stable installation device that allows the alignment of the CLV to be varied in the x and y axes. The maximum weight of the CLV (Line/Raster scanner) is 480 g, or 510 g with additional angle attachment, and 620 g as a Line scanner with oscillating mirror (with connecting cable in each case).
  – Two M5 screws for the CLV. The screw length depends on the wall thickness of the bracket used. Depth of engagement in **CLV max. 5 mm** from housing surface
- AMV/S 40 Connection Module, also available with CL 20 mA interface converter (both not included in the scope of delivery of the CLV)
- Reading pulse sensor for external reading pulse trigger, e.g. photoelectric reflex switch/ photoelectric proximity switch (not included in the scope of delivery of the CLV)

  – or –

  Polling reflectors for generating the reading pulse internally
- Option with dynamic focus control (CLV 44x): sensor for detecting the object distance, e.g. photoelectric reflex switch/photoelectric proximity switch (not included in the scope of delivery of the CLV)

4.2.3 Laying out the required tools

- Two/three screws of type M 5 for securing the SICK mounting bracket to the base. The screw length depends on the wall thickness of the base.
- Set of laser warning labels (if necessary)
- Tool
- Measuring tape (up to 2 000 mm)
- Protractor

4.2.4 Replacing the laser warning label

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

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

- German/US English
- French/US English

See *also Chapter 2.3 "General safety precautions and protection measures", Page 2-1*.
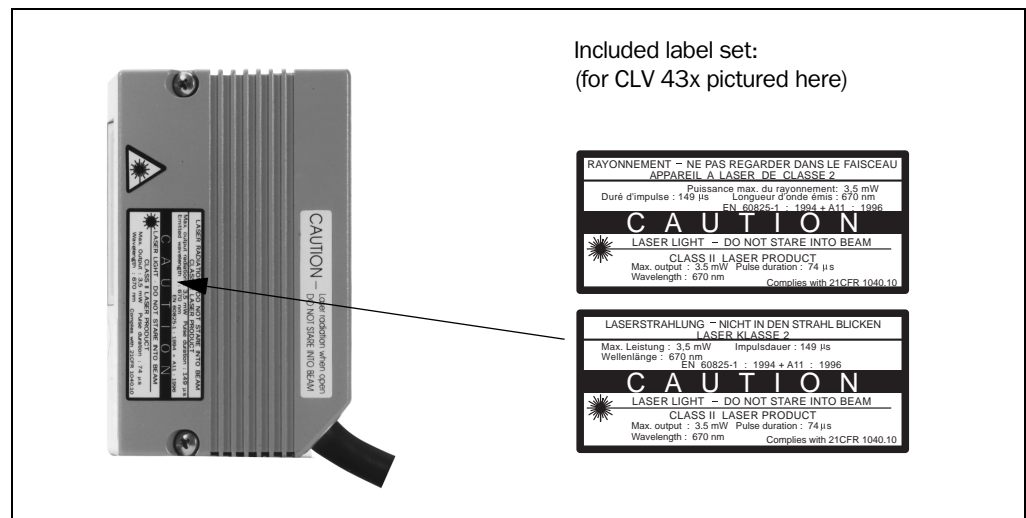
Fig. 4-1: Line/Raster scanner example: replacing the laser warning label

4.2.5 Selecting the installation site

When you select the installation site, the distance between the CLV and the host and between the CLV and the bar code are important.

Distance between the CLV and the host

The CLV can be installed without a connection to the SICK network or to a bus connection max. 1 200 m away 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 5-2, Page 5-2*).

Distance between the CLV and the AMV/S 40 Connection Module

The AMV/S 40 Connection Module must not be located further than 10 m from the CLV, since the "CLV Setup" program on the PC accesses the terminal interface of the CLV via this module (RS 232).

4.2.6 Mounting accessories

The CLV is secured in position using the two tapped blind holes (M 5) on the bottom narrow side of the device. The position of these holes on the Line/Raster scanner is shown in *Fig. 4-2*. The dimensions of the CLV housing are shown in *Fig. 9-1, Page 9-4* to *Fig. 9-3*.
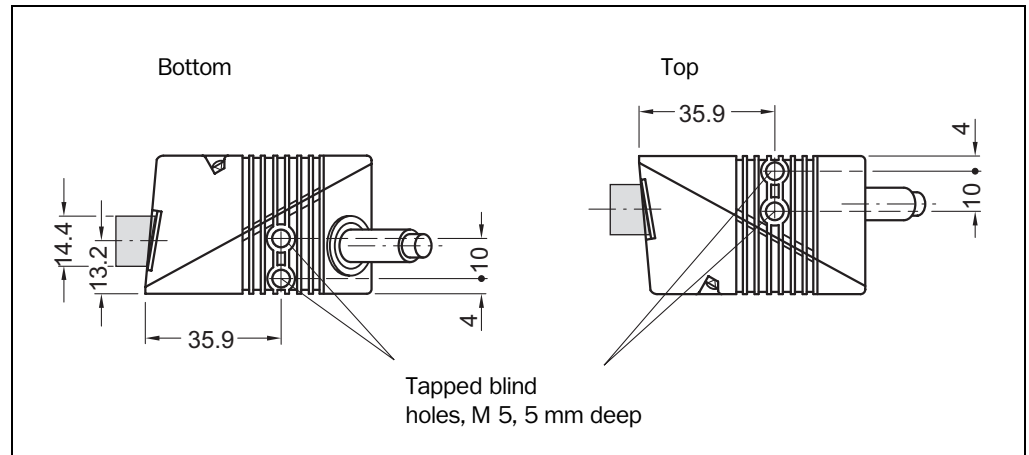
Fig. 4-2: Line/Raster scanner example: location of the securing threads on the CLV

The CLV can be installed using the following SICK brackets:

- Mounting bracket no. 2 020 410
- Mounting bracket no. 2 022 564
- Round rod bracket no. 2 023 691

The brackets are designed to support a variety of installation positions and alignment of the CLV in two planes. *Fig. 4-3* and *Fig. 4-4* show two mounting examples. The slots in mounting bracket no. 2 020 410 allow a turning freedom of ±15° for the fine adjustment of the CLV. The slots in mounting bracket no. 2 022 564 allow unlimited turning freedom.
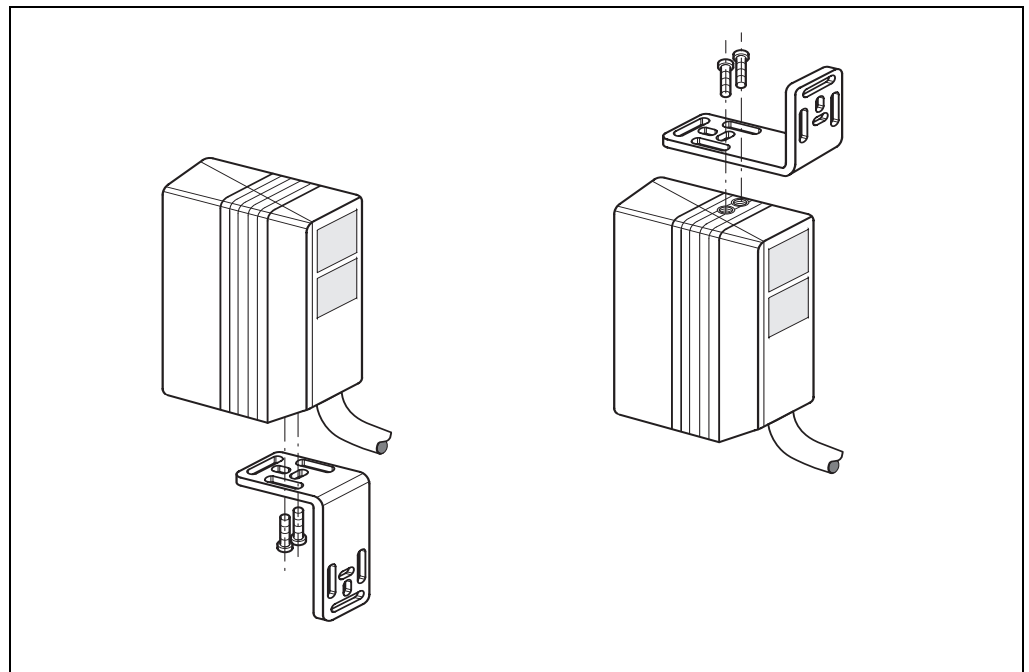
Fig. 4-3: Line/Raster scanner: CLV installation options using the mounting bracket no. 2 020 410
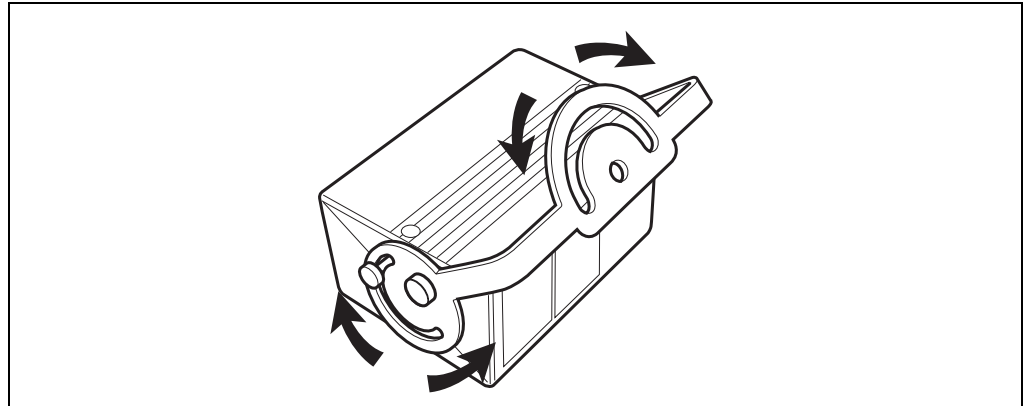
Fig. 4-4:　　Line/Raster scanner: CLV installation options using the mounting bracket no. 2 022 564

The dimensions of the mounting brackets are shown in *Chapter 10.12 "Dimensional drawings of the accessories", Page 10-62*.

Note　　Special installation brackets for applications where the CLV is subject to strong mechanical oscillations (vibrations) are available for purchase on request.

4.2.7　Distance between the CLV and the bar code

Basic alignment of the scan line to the bar code

Depending on the application, the Line scanner, Raster scanner, or Line scanner with oscillating mirror versions of the CLV is used. *Fig. 4-5* shows how the device is aligned with the bar code on the object for each of the three scanning methods.
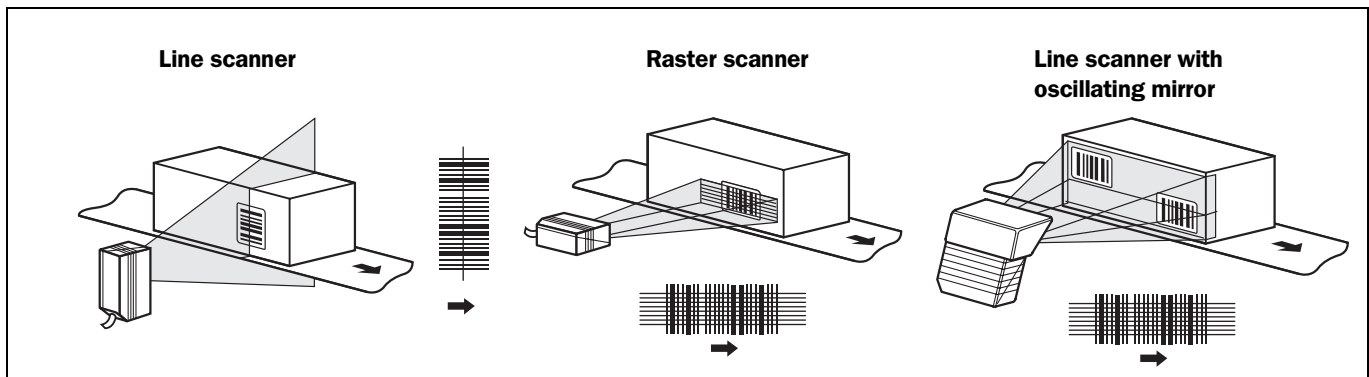
Fig. 4-5:　　Scanning methods: alignment with bar code and conveyor direction

Reading distance between bar code and aperture angle α

The distance between the reading window of the CLV and the bar code must not exceed the technical limits. The height of the reading field is shown as a function of the reading distance for various resolutions (module widths) in *Chapter 10.2.3 "Reading field diagram for CLV 430 Line/Raster scanner (front reading window)", Page 10-4* to *Chapter 10.2.10 "Reading field diagram for CLV 432 Line scanner with oscillating (side reading window)", Page 10-11*.

Fig. 4-6 shows the definition of the reading distance "a" from the reading window and of the aperture angle α for each of the three scanning methods.

| Line scanner | Raster scanner | Line scanner with oscillating mirror |
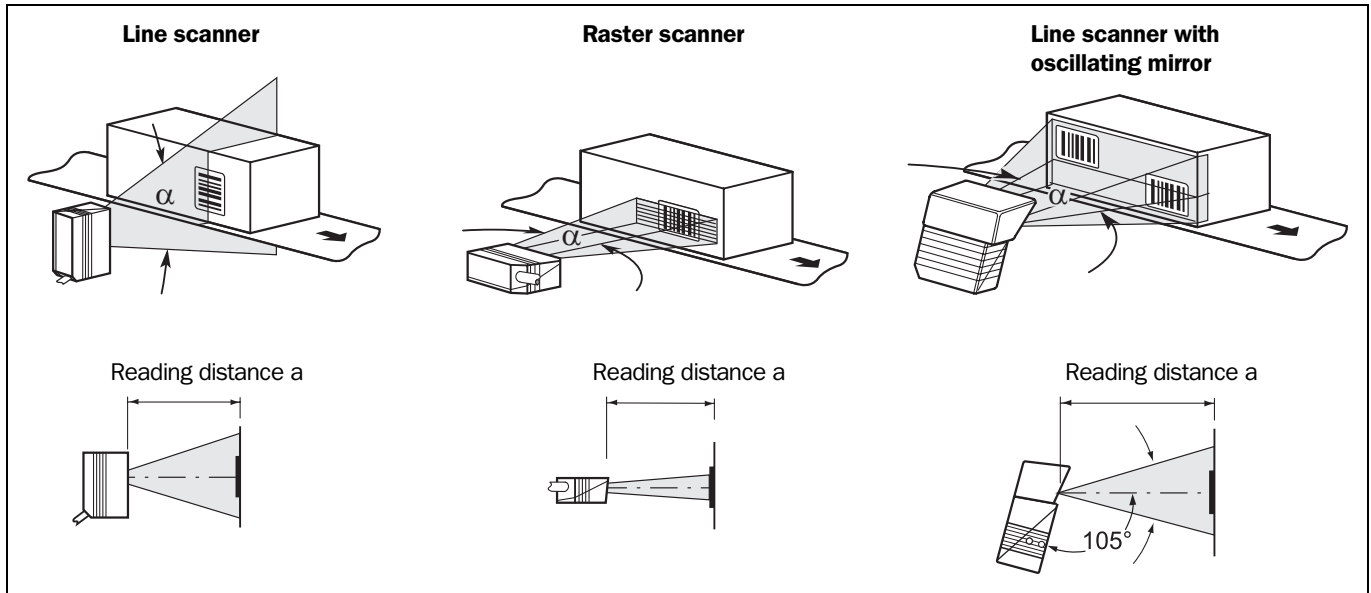
Fig. 4-6:   Definition of the reading distance a and the aperture angle α

The usable aperture angle α is **max. 50**° for all three scanning methods, even with the additional angle attachment. Due to the V-principle of beam deflection, the reading field height (for evaluating the useful length of the scan line) depends on the reading distance.

Angular alignment of the CLV

The alignment of the CLV is optimum when the scan line travels over the bar code lines almost at a right angle (90°) (*Fig. 4-5*). All possible reading angles that can occur between the scan line and the bar code must be taken into consideration (*Fig. 4-7* and *Table 4-1*).

α: Azimuth angle (tilt)
β: Inclination angle (pitch)
γ: Rotation angle (skew)
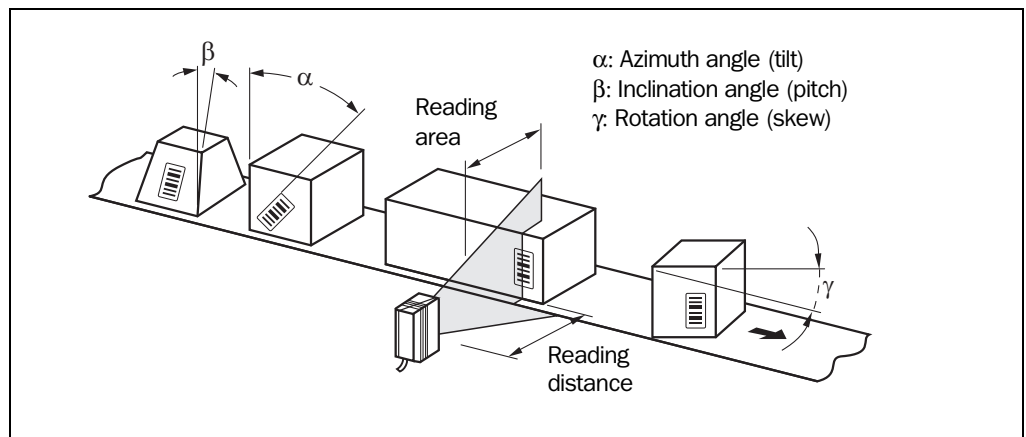
Fig. 4-7:   Line scanner: reading angles between the scan line and the bar code

Angle	Limit value
Azimuth α (tilt)	max. 30° (resolution 0.35 mm, depending on the code print)
Incline β (pitch)	max. 45°
Rotation γ (skew)	max. 45°

Table 4-1: Permissible reading angles between the scan line and bar code

Preventing surface reflection

If the light from the scan line strikes the surface of the bar code perpendicularly, interference may be caused by reflections when the returned light is received. To prevent this effect, the CLV must be installed in such a way that the emitted light is tilted slightly with respect to the vertical axis (*Fig. 4-8*).

Line scanner
(front reading window)

105°

Top view

Line scanner with 105° angle attachment
(side reading window)

105°

Top view

Line scanner with oscillating mirror
(side reading window)

15°

105°

Side view
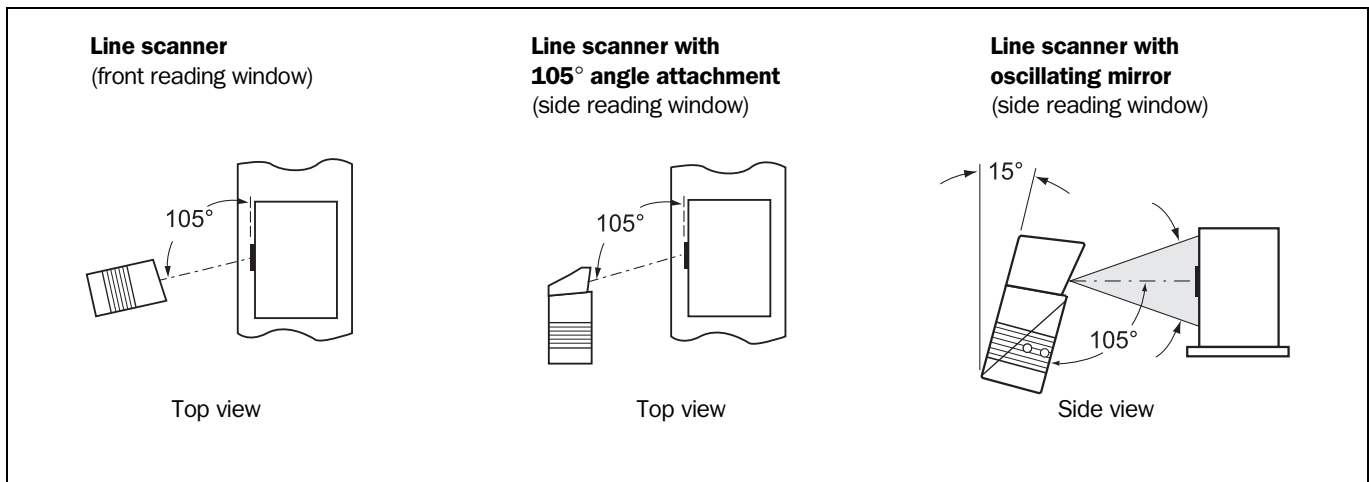
Fig. 4-8:   Avoiding surface reflection: angle between the emitted light and bar code (tilted away from the vertical axis)

- The laser beam from the Line/Raster scanner with angle attachment is emitted at an angle of 105° with respect to the housing. Depending on the application, the device can also be installed flush with the conveyor belt.
- In the case of the Line scanner with oscillating mirror, the laser beam is emitted at an angle of 105° with respect to the housing as it passes through the neutral position (CW = 50) while oscillating. The device can only be flush-mounted with the conveyor belt with limited deflection ranges. Otherwise, the device must also be mounted at an angle of 15° to ensure that the deflection ranges are symmetric.

4.2.8   Count direction of the code position CP and code angle CW

Explanation   The CLV can scan and decode several bar codes with each read. In doing so, it determines the specific local reading diagnosis data for each bar code:

- The position (CP value) of the center of the bar code within the scan line
- (Scanning method using the oscillating mirror) also the angle of deflection of the scan line (CW value) at which the center of the bar code is recorded

Fig. 4-9 shows the count direction of the code position and code angle.

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

          8 008 568/K949/10-06-2002

Line/Raster scanner

Line/Raster scanner with 105° angle attachment

Line scanner with oscillating mirror

Front reading window   Side reading window   Side reading window

Deviation angle α (aperture angle) in scan direction: $1° = 2$ CP ($50° = 100$ CP)
Deflection angle of the scan line perpendicular to the scan direction: $1° = 2$ CW ($20° = 40$ CW)
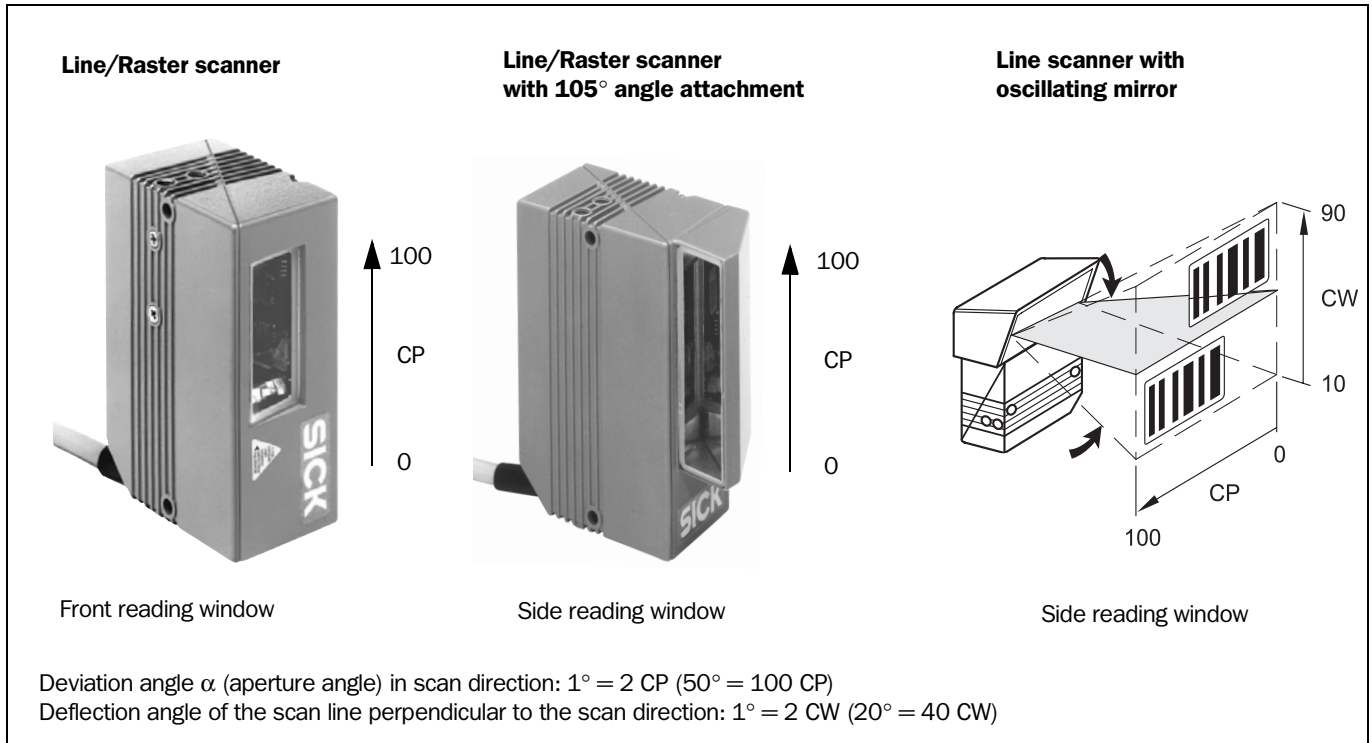
Fig. 4-9:   Count direction of the code position CP in the scan line and of the code angle CW for the oscillating mirror

Tip

In the default setting, the CLV does not output the "CP" and "CW" values (CW only with Line scanner with oscillating mirror) in the reading result on the host interface. If this is desired to evaluate the result in the host, the values can be included in the separator of the output string using CLV Setup.

Configuring the separator:

1. Select the DATA STRINGS tab.
2. Click the SEPARATOR field.
    The dialog window EDIT PARAMETER TFS is displayed.
3. In the list field, click the CP and/or CW parameters in the desired order. CP and/or CW then appears in the top line.
4. Confirm the dialog box with "OK".
5. Perform a download to the CLV. This is done by clicking 📲 in the toolbar.
    The DOWNLOAD PARAMETER dialog box is displayed.
6. Confirm the dialog box by selecting the PERMANENT save option.
    The CLV outputs the CP value and the CW value on the host interface for each bar code in the reading result. The values are displayed as a 3-digit number in the associated separator.

4.3   Installing and adjusting the device

4.3.1   Installing the CLV

1. Prepare the base for installing the bracket as described in *Chapter 4.2.2 "Accessories", Page 4-1*.

2. Place the object containing the bar code within the visible range of the CLV (in the position at which it is to be read) with the conveyor belt switched off.

3. Align the CLV with the bar code (in accordance with the scanning method) in such a way that

    – with the Line/Raster scanner, the narrow end with the LED indicators is almost parallel with the bar code surface

    – with the Line/Raster scanner with angle attachment, the wide side with the laser warning labels is almost parallel with the bar code surface

    – with the Line scanner with oscillating mirror, the wide side with the laser warning labels is almost parallel with the bar code surface

    All of the possible reading angles must be taken into consideration (*see Fig. 4-7, Page 4-5*).

4. If it is relevant for the evaluation, note the count direction of the code position and code angle *(see Fig. 4-9, Page 4-7)*.

5. Install the CLV bracket on the base.

Risk of damage to the housing!

The maximum depth of engagement of the two tapped blind holes M 5 is 5 mm. Longer screws will damage the housing.

➢ Use screws with the correct length.

CAUTION

---

6. Screw the screws M 5 through the bracket into the tapped blind holes of the CLV.

7. Tighten the screws slightly.

8. Adjust the CLV as described in the following chapter.

4.3.2   Adjusting the CLV

The CLV can be adjusted in "Percentage Evaluation" mode. In this mode, the CLV displays the quality of the bar code reads that enter the CLV reading field statically (the object is not moved on the conveyor belt). The CLV performs 100 scans in Free Running mode and evaluates the reading quality statistically. It outputs the reading result continuously every 2 s via the terminal interface.

The behavior of the "Result" LED also indicates the reading quality:

• The LED does not light up if the CLV cannot read the bar code (reading quality < 30 %).

• If the CLV is having problems reading the bar code (reading quality 30 % to 90 %), the LED flashes.

• The CLV is aligned optimally when the LED lights up constantly (reading quality > 90 %). The scanning frequency in the default setting is 700 Hz.

1. Connect the CLV to the AMV/S 40 Connection Module and switch on the power supply to the module *(see Chapter 5.5.3 "Connecting the power supply", Page 5-4)*.
    Once the CLV has started, it outputs an acoustic signal to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two acoustic signals to indicate that it has assumed Reading mode. The "Device Ready" LED lights up.

2. Connect the PC to the terminal interface of the CLV. For this purpose, connect the RS 232 data connection cable to the internal 9-pin "Service" plug of the module *(see Chapter 5.5.6 "Connecting the PC", Page 5-6)*.

3. Start Windows and "CLV Setup" on your PC *(see Chapter 10.4.3 "Starting "CLV Setup"", Page 10-29)*.

Choose standard decoder:

4. Select the CODE CONFIGURATION tab.

5. In the DECODER group, choose STANDARD.

6. Perform a download to the CLV. This is done by clicking 🖳 in the toolbar.
   The DOWNLOAD PARAMETER dialog box is displayed.

7. Confirm the dialog box by choosing the TEMPORARY storage option (or PERMANENT for Raster scanners). The CLV then uses the standard decoder.

Activating Percentage Evaluation mode:

8. From the VIEW menu, choose PERCENTAGE EVALUATION.
   The dialog box for the distance configuration is then displayed.

9. Choose the appropriate distance configuration for the reading distance:
   - CLV 43x:
     distance configuration no. 1 (default setting) if no DC-specific restriction of the active evaluation range of the scan line has been carried out
   - CLV 44x:
     distance configuration which corresponds to the reading distance of the object (default setting: no. 1, focus position F = 140 mm).

10. Confirm the dialog box with "OK". The Terminal Emulator shows the reading result continuously *(see Chapter 6.5.2 "Percentage evaluation", Page 6-23)*.
    Monitor the **reading quality (%)** during each of the subsequent steps!

    Line scanner with oscillating mirror:
    In "Percentage Evaluation" mode, the CLV behaves as follows:
    - in "Oscillating" mode (default setting: oscillating with fixed Amplitude) switches to Oscillating mode and positions the scan line at the angle CW = 50 (corresponds to an angle of emergence under 105°). This position cannot be changed.
    - in "One-shot" mode, it also positions the scan line under the angle CW = 50.
    - in "Fixed Position" mode, on the other hand, the selected scan line position remains unchanged.

Performing fine adjustment:

11. Align the CLV in such a way that the angle between the scan line and the bars on the bar code CLV is almost 90°.

12. To prevent interfering reflections, tilt the CLV away from the vertical axis so that the light strikes the bar code at an angle of approx. 105° (Line scanner) *(Fig. 4-8, Page 4-6)*.

13. If necessary, position the scan line exactly at the direct center of the bar code *(see Chapter 4.3.3 "Auxiliary functions for adjustment", Page 4-10)*.

14. Move objects carrying bar codes into the CLV reading field manually under realistic conditions and check the reading result. If the objects are aligned randomly, or if the bar code is located at different positions (angles), ensure that the limit values of the permissible reading angles are not exceeded.

15. Adjust the CLV in such a way that the good read rate is between **70 and 100 %**.
CLV 44x: if the objects in each reading range (distance configuration) have different sizes, check the selected focus position and correct the parameter settings if necessary (see *Chapter 6.4.3 "Parameterization guide", Page 6-9*).

16. Tighten the screws on the CLV.

The CLV is aligned with the bar code.

4.3.3　　Auxiliary functions for adjustment

Adjusting mode

The "Adjusting mode" helps you to position the **center** of the scan line on the object. To do so, the CLV masks out one half of the scan line from the center (code position CP = 50 to CP = 100). This is independent of the selected distance configuration. *Fig. 4-10* shows the resulting position of the scan line (Line scanner).
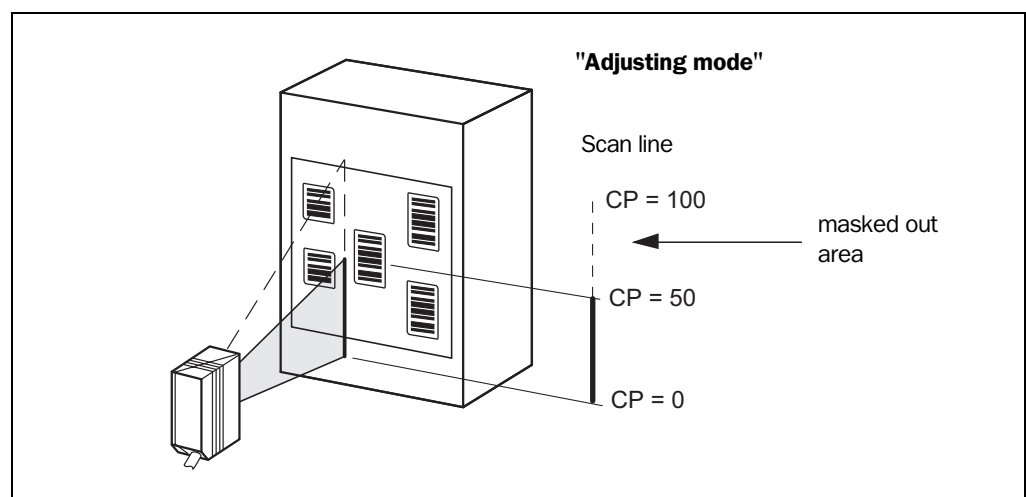
Fig. 4-10:　Line scanner: appearance of the scan line in the "Adjusting mode" operating mode

Line scanner with oscillating mirror:
In "Adjusting mode", the oscillating mirror behaves in the same manner as in "Percentage Evaluation" mode *(see Activating Percentage Evaluation mode:, Page 4-9)*

1. Activate the operating mode as described in *Chapter 6.5.3 "Adjusting mode", Page 6-25*.

2. Position the CLV in such a way that the center of the scan line (end of the visible scan line, code position CP = 50), is located at the center of the bar code, or at the center of the field for all codes if several bar codes are used.

Show CP-limits

The "Show CP-limits" operating mode enables you to test whether a limit placed on the active evaluation range of the scan line via parameterization has had the desired effects. For this purpose, the CLV alternately masks out a certain part of the scan lines corresponding to the selected minimum and maximum values of the code position. For information on calling up this operating mode and for checking procedures, *see Chapter 6.5.4 "Show CP-limits", Page 6-25*.

4.4 Installing external components

4.4.1 Installing the AMV/S 40 Connection Module

1. Install the AMV/S 40 Connection Module near the CLV. The distance between the AMV/ S 40 and CLV must not exceed 10 m.
2. Install the AMV/S 40 in such a way that the device can be accessed when opened. The terminal interface of the CLV is accessed via the internal "Service" connector.

Detailed information on the installation and electrical installation procedures is provided in the *Operating Instructions for the "AMV/S 40 Connection Module" (order no. 8 008 292, English edition).*

4.4.2 Installing the external reading pulse sensor

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

Fig. 4-12 shows two examples of where a photoelectric reflex switch can be installed. This depends on the distance a from the bar code to the front of the object. Depending on the application, you may need to attach the sensor in such a way that bar codes on objects of different sizes can be read completely during the reading interval.
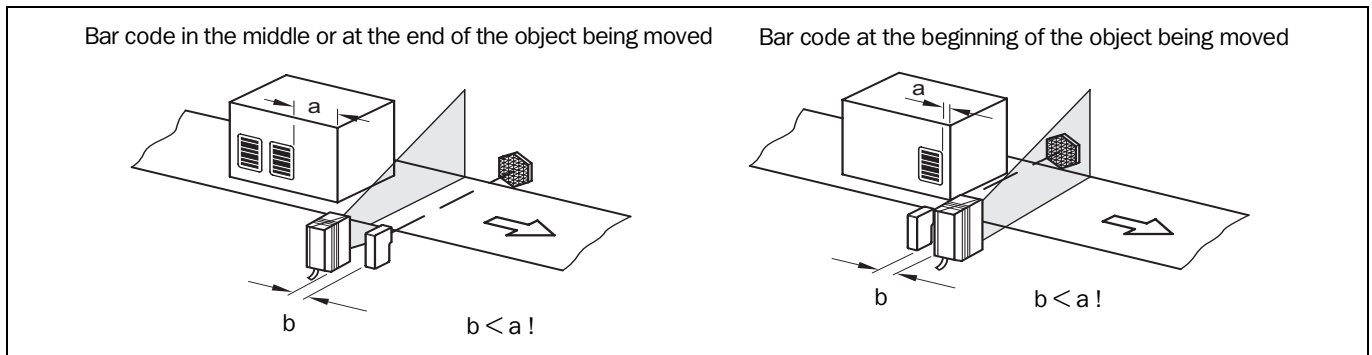
Fig. 4-11: Line scanner: installation example for the external reading pulse sensor

1. Attach the reading pulse sensor to the installation site.
2. Connect the reading pulse sensor to the "Sensor 1" switching input of the CLV via the AMV/S 40 Connection Module (*see Chapter 5.5.7 "Connecting the "Sensor 1" switching input", Page 5-7*).
3. Connect the CLV to the AMV/S 40 Connection Module and switch on the power supply to the module (*see Chapter 5.5.3 "Connecting the power supply", Page 5-4*).
   Once the CLV has started, it outputs a tone to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two tones to indicate that it has assumed Reading mode. The "Device Ready" LED lights up.
4. Connect the PC to the terminal interface of the CLV. For this purpose, connect the RS 232 data connection cable to the internal 9-pin "Service" plug of the module *(see Chapter 5.5.6 "Connecting the PC", Page 5-6).*
5. Start Windows and "CLV Setup" on your PC (*see Chapter 10.4.3 "Starting "CLV Setup"", Page 10-29*).
6. *Raster scanner:* select the standard decoder (*see Chapter 4.3.2 "Adjusting the CLV", Page 4-8*).

7. From the VIEW menu, choose READING MODE.
    The Terminal Emulator window is then displayed. The CLV is in Reading mode.
    Monitor the reading result during each of the subsequent steps!
    Line scanner with oscillating mirror:
    In the Reading mode, the CLV deflects (by default) the scan line about the position
    CW = 50 at a frequency of 1 Hz and a maximum angle of ±20°. 50 CW corresponds to
    a light emergence under 105°.

8. Move objects with bar codes into the CLV reading field manually under realistic
    conditions.

9. Check whether the reading result and trigger pulse are correct.

10. Repeat the procedure with the conveyor switched on. Check whether the reading
    procedure is synchronized with the approaching objects.

Parameterizing an external sensor as a trigger source (N/A with default setting):

1. Select the DEVICE CONFIGURATION tab.

2. Click the EDIT READING TRIGGER button.
    The EDIT READING TRIGGER dialog box is then displayed.

3. Choose SENSOR INPUT (ACTIVE HIGH) and confirm your selection.

4. Perform a download to the CLV. 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 CLV 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 polling reflector

The reading pulse can also be triggered by the presence of an object in the reading field,
independent of an external reading pulse sensor, by using the "Reflector Polling" pulse
mode of the CLV. In order to do so, attach one of the two polling reflectors (special bar
codes) included with the device opposite the CLV behind the conveyor belt (*Fig. 4-12*).
Table 4-2 lists the permissible range values for the polling reflectors. The pulse type is not
selected in the default setting.
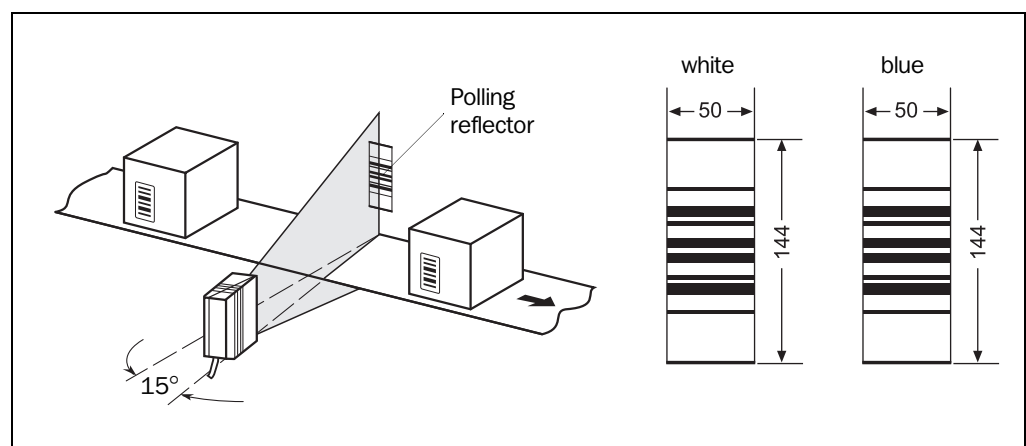
Fig. 4-12:   Line scanner: installation site of the polling reflector

                   8 008 568/K949/10-06-2002

Device type	Reflector	Range (with scan frequency = 700 Hz)
CLV 430 CLV 440 with F3=280 mm	White Blue with film Blue without film	200 to 600 mm 1 000 to 1 300 mm 1 350 to 1 500 mm
CLV 431 CLV 440 with F2 = 215 mm	White Blue with film Blue without film	200 to 500 mm 750 to 950 mm 950 to 1 100 mm
CLV 432 CLV 440 with F1 = 140 mm	White Blue with film Blue without film	160 to 260 mm 450 to 500 mm 500 to 600 mm

Table 4-2: Permissible range values for the polling reflectors

Explanation When reflector polling is used, the CLV activates the laser diode with every 20th scan and checks whether it detects the reflector. If the reflector is visible, the CLV repeats the procedure after the next 20 scans. If the reflector is concealed by an object entering the reading field, the CLV starts the reading pulse. This pulse ends when the CLV detects the reflector again. Following this, the CLV repeats the above procedure. When the CLV is switched on, the polling reflector must be visible before the first reading pulse can start. The CLV does not output the data content of the polling reflector in "Reading" mode.

Note This pulse type is **not** suitable for:

- Applications where time is critical.
  The max. delay between the reliable detection of the reflector and the start of the internal reading pulse is approx. 25 ms at a scanning rate of 800 Hz.

- Line scanner with oscillating mirror in oscillating mode.
  The oscillating motion causes the scan line to cross the polling reflector repeatedly. Each time it leaves the reflector, it triggers a new reading interval in the CLV.

- Operation with dynamic focus control (CLV 44x).
  The polling reflector may exceed the depth of field of the CLV, with the result that it cannot be detected, if the object distances are reduced.

Adjusting the polling reflector roughly:

1. Connect the CLV to the AMV/S 40 Connection Module and switch on the power supply to the module (see *Chapter 5.5.3 "Connecting the power supply", Page 5-4*).
   Once the CLV has started, it outputs an acoustic signal to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two acoustic signals to indicate that it has assumed Reading mode. The "Device Ready" LED lights up.

2. Align the CLV optimally with the bar code on the objects (see *Chapter 4.3.2 "Adjusting the CLV", Page 4-8*).

3. Choose a suitable polling reflector for the device type, as shown in *Table 4-2*. Other ranges available on request.

4. Secure the polling reflector directly opposite the CLV on a suitable base (movable bracket, wall) temporarily so that the CLV has an unobstructed view of the reflector in the gaps between the objects and can scan them reliably. The reflector must be in the center of the scan line (*Fig. 4-12*).

Choosing the standard decoder:

5. Connect the PC to the terminal interface of the CLV. For this purpose, connect the RS 232 data connection cable to the internal 9-pin "Service" plug of the module *(see Chapter 5.5.8 "Connecting the "Sensor 2" switching input", Page 5-8)*.

6. Start Windows and "CLV Setup" on your PC
    (see *Chapter 10.4.3 "Starting "CLV Setup"", Page 10-29*).

7. Select the CODE CONFIGURATION tab.

8. In the DECODER group, choose STANDARD.

9. Perform a download to the CLV. This is done by clicking 📠 in the toolbar.
    The DOWNLOAD PARAMETER dialog box is displayed.

10. Confirm the dialog box by choosing the TEMPORARY storage option (or PERMANENT for Raster scanners).

The CLV then uses the standard decoder.

Activating Percentage Evaluation mode:

11. From the VIEW menu, choose PERCENTAGE EVALUATION.
    The dialog box for entering the distance configuration appears.

12. Choose the appropriate distance configuration for the reading distance:
    – CLV 43x:
      distance configuration no. 1 (default setting) if no DC-specific restriction of the active evaluation range of the scan line has been carried out
    – CLV 44x:
      distance configuration that matches the reading distance of the object. The polling reflector must be located within the depth of field of this focus position (default setting: no. 1, focus position F = 140 mm).

13. Confirm the dialog box with "OK".
    The Terminal Emulator is launched and displays the reading result continuously (*see Chapter 6.5.2 "Percentage evaluation", Page 6-23*).

Fine-adjusting and securing the polling reflector:

14. Align the reflector with the CLV (not vice versa!) until a good read rate of **95 to 100 %** is reached. In doing so, prevent any surface reflection (*see Chapter 4.2.7 "Distance between the CLV and the bar code", Page 4-4*). The CLV outputs the data content of the unconcealed polling reflector with the identifier "REPO".

15. Once the device is in the final attachment position, remove the protective film from the reflector and stick it to the base.

Activating Reflector Polling pulse mode in the CLV:

16. Select the DEVICE CONFIGURATION tab.

17. Click the EDIT READING TRIGGER button.
    The dialog box is displayed.

18. Click the REFLECTOR POLLING option in the MODE group.

19. Confirm the dialog box with "OK".

20. Perform a download to the CLV. This is done by clicking 📠 in the toolbar.
    The DOWNLOAD PARAMETER dialog box is displayed.

21. Confirm the dialog box by selecting the PERMANENT save option.
    The CLV is then operating in the "Reflector Polling" pulse mode.

22. Check whether the device operates correctly with objects moving under realistic conditions on the conveyor belt. Readjust the reflector if necessary.

     8 008 568/K949/10-06-2002

4.4.4   Mounting the sensor for detecting the object distance (CLV 44x)

The CLV 44x is equipped with a dynamic focus control function for covering a large reading range in series. A maximum of two levels can be defined for this purpose using the "Sensor 2" switching input. *Fig. 4-13* shows an example of reading from above. A photoelectric reflex switch, for example, is used to detect the distance of the object. This application is suitable for object sizes whose difference can be covered by two switching ranges. The distance sensor should be mounted in such a way that the object sizes can be classified clearly and that two overlapping reading ranges are created that can be mapped with the depths of field of the CLV. The two distance configurations (reading ranges) are assigned from a maximum of eight configurations using the internal assignment table. In the default setting, the "Sensor 2" switching input is selected for dynamic focus control purposes.
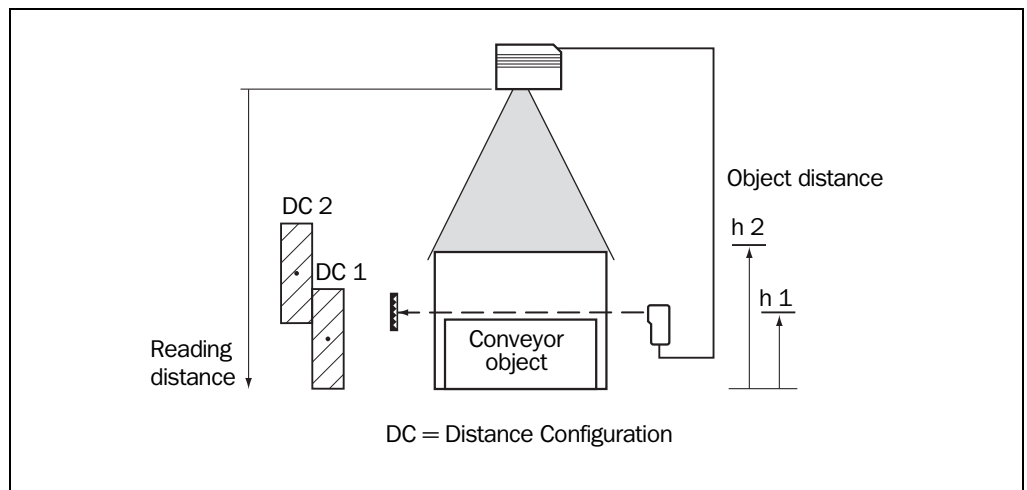
Fig. 4-13:   CLV 44x: installation example for positioning of object distance detection

1. The depths of field of the CLV for the bar code resolution in question are shown in the graphs in *Chapter 10.2.11 "Reading field diagrams for CLV 440 Line scanner (front reading window)", Page 10-12* to *Chapter 10.2.12 "Reading field diagrams for CLV 440 Line scanner with oscillating mirror (side reading window)", Page 10-17* (CLV 440) or *Chapter 10.2.15 "Reading field diagrams for CLV 442 Line scanner (front reading window)", Page 10-22* (CLV 442). Find and note suitable focus positions for overlapping reading ranges.

    – or –

    Determine the depth of field automatically using the CLV Assistant in the user interface of CLV Setup (values are automatically transferred to the tabs).

2. Mount the distance sensor (photoelectric reflex switch) for object height detection in such a way that the light path for the reading range 1 remains uncovered *(see Table 5-8, Page 5-9)*. We recommend that you install the distance sensor opposite the direction of motion of the conveyor belt at a distance of approx. 100 mm in front of the reading pulse sensor.

3. Connect the distance sensor to the "Sensor 2" switching input on the CLV via the AMV/S 40 Connection Module (see *Chapter 5.5.8 "Connecting the "Sensor 2" switching input", Page 5-8*).

4. After manual determination, set the focus positions for the two reading ranges on the READING CONFIGURATION tab in the CLV Setup program. To do so, click the DISTANCE CONFIGURATION/ASSIGNMENT TABLE button and edit the required entries in the dialog box that is then displayed.

5. As described in *Chapter 4.3.2 "Adjusting the CLV", Page 4-8*, choose the standard decoder and start Percentage Evaluation mode temporarily.

6. Check the reading quality in both distance configurations while the conveyor belt is stationary.

7. Then check the distance detection function in Reading mode under realistic conditions. To do so, monitor the reading result in the Terminal Emulator as described in *Chapter 4.4.2 "Installing the external reading pulse sensor", Page 4-11*.

Default: CLV 440: F1 = 140 mm, F2 = 215 mm, F3 = 280 mm

  CLV 422: F1 = 140 mm, F2 = 215 mm, F3 = 280 mm

Note The CLV can switch between a maximum of 8 distance ranges for slow search runs using the integrated timer or the oscillating mirror reversal points.

The CLV can be switched between a maximum of 8 distance ranges synchronously to the reading process using command strings.

4.5 Removing the device

1. Switch off the power supply to the AMV/S 40 Connection Module.

2. Loosen the screws and remove the CLV connector from the AMV/S 40 Connection Module

3. Unscrew the CLV 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*.

 8 008 568/K949/10-06-2002

5   Electrical installation

5.1   Overview of the installation sequence

- Connecting the CLV to the SICK AMV/S 40 Connection Module
- Adapting the connection of the host interface in the module to the host interface of the CLV
- Connecting the data and function interfaces of the CLV in the module
- Connecting the PC to the Connection Module (at the terminal interface on the CLV)
- Connecting the power supply to the connection module

5.2   Electrical connections and cables

The electrical connection for the CLV consists of a 15-pin D-Sub HD plug. It supplies the following interfaces:

- Three serial data interfaces (host interface, CAN interface and terminal 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!

5.2.1   Connections/cables for the AMV/S 40 Connection Module

The AMV/S 40 Connection Module is suitable for connecting the CLV to peripherals (distribution function) and the power supply. The module can be used to establish a connection to the host (point-to-point) or integrate the device in a SICK network or daisy-chain configuration (pass-through or master/slave configuration). *Fig. 5-1* shows the connection principle of the AMV/S 40 for one CLV.
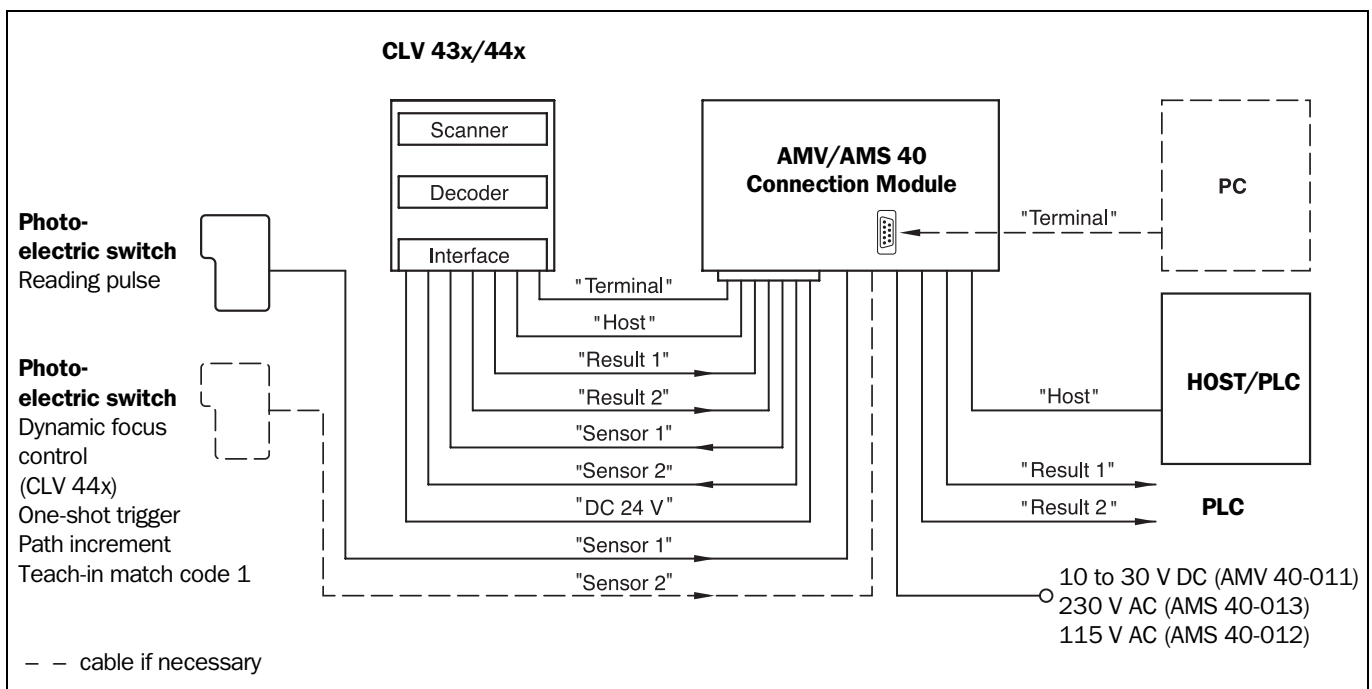
Fig. 5-1:   Block diagram: connection of the CLV to the AMV/S 40 Connection Module

For connecting and configuring the AMV/S 40 Connection Module, see the *Operating Instructions for the "AMV/S 40 Connection Module" (order no. 8 008 292, English edition).*

5.3 Connector pin assignment

Pin	Signal	Function
1	+10 to +30 V DC	Power supply
2	RxD (Terminal)	Terminal interface (receiver)
3	TxD (Terminal)	Terminal 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 5-1: Pin assignment of the 15-pin D-Sub HD plug

5.4 Preparations for electrical connection

5.4.1 Requirements for the host interface

The host interface of the CLV can be operated as an RS 422/485 or an RS 232 interface. *Table 5-2* 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 bit/s 38 400 to 57 600 bit/s	Max. 10 m Max. 3 m
RS 422/485[1]	Max. 38 400 bit/s Max. 57 600 bit/s	Max. 1 200 m Max. 500 m

1) with suitable line termination

Table 5-2: Maximum cable lengths between the CLV and host

➢ 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 CLV requires a power supply of 10 to 30 V DC in accordance with IEC 742 (functional extra-low voltage) for operation. The power consumption varies depending on the device type:

CLV type	Scan procedure	Power consumption[1]
CLV 43x	Line/Raster scanner	Max. 4 W
CLV 43x	Line scanner with oscillating mirror	Max. 6.15 W
CLV 44x	Line scanner	Max. 5 W
CLV 440	Line scanner with oscillating mirror	Max. 6.15 W
1) switching outputs not connected		

Table 5-3: Power consumption of the CLV

The CLV is supplied with 24 V DC ±20 % via the AM**S** Connection Module 40-013, -012.

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 CLVs (e.g. in the SICK network) are to be supplied from one power source. *Table 5-4* 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 ms	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 5-4: Power-up delay as a function of the device number GN

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

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

If a non-SICK power pack is used instead of the AMV/S 40, it must provide a continuous power output of 10 W and comply with IEC 742 (functional extra-low voltage).
The output circuit must be reliably electrically isolated from the input circuit pursuant to IEC 742 by means of double insulation and a safety isolating transformer.

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

➢ Use the cable no. 6 010 137 with 15-pin D-Sub HD socket and open end to connect the CLV. The color assignment of the wires is shown in *Table 5-5*.
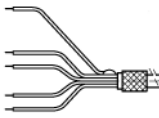
Pin	Signal	Wiring color
1	+10 to +30 V DC	Red
2	RxD (Terminal)	Purple
3	TxD (Terminal)	Yellow
4	Sensor 2	Red/black
5	GND	Black
6	RD+ (RS 422/485)	Light blue
7	RD− (RS 422/485); RxD (RS 232)	Blue
8	TD+ (RS 422/485)	Turquoise
9	TD− (RS 422/485); TxD (RS 232)	Green
10	CAN H	Gray
11	CAN L	Pink
12	Result 1	Brown
13	Result 2	Orange
14	Sensor 1	White
15	SensGND	White/black
−	Shield	White/green

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

5.5   Performing electrical installation

5.5.1   Overview of connection procedure

- Connecting the power supply
- Connecting the host interface
- Connecting the PC (connect the terminal interface)
- 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 CLV is powered via the AMV/S 40 Connection Module, the power supply does not have to be wired separately.

1. Ensure that the power supply to the AMV/S 40 is switched off.
2. Connect the 15-pin plug on the CLV to the corresponding socket on the AMV/S 40 and screw it tightly. The connecting cable can be extended by 2 m using the extension cable no. 6 010 075.

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

– or –

External power supply unit:

➢ Connect the power supply to the red wire (pin 1, +10 to +30 V DC) and the black wire (pin 5, GND) of cable no. 6 010 137 (see *also Table 5-5*).

5.5.4 Connecting the host interface
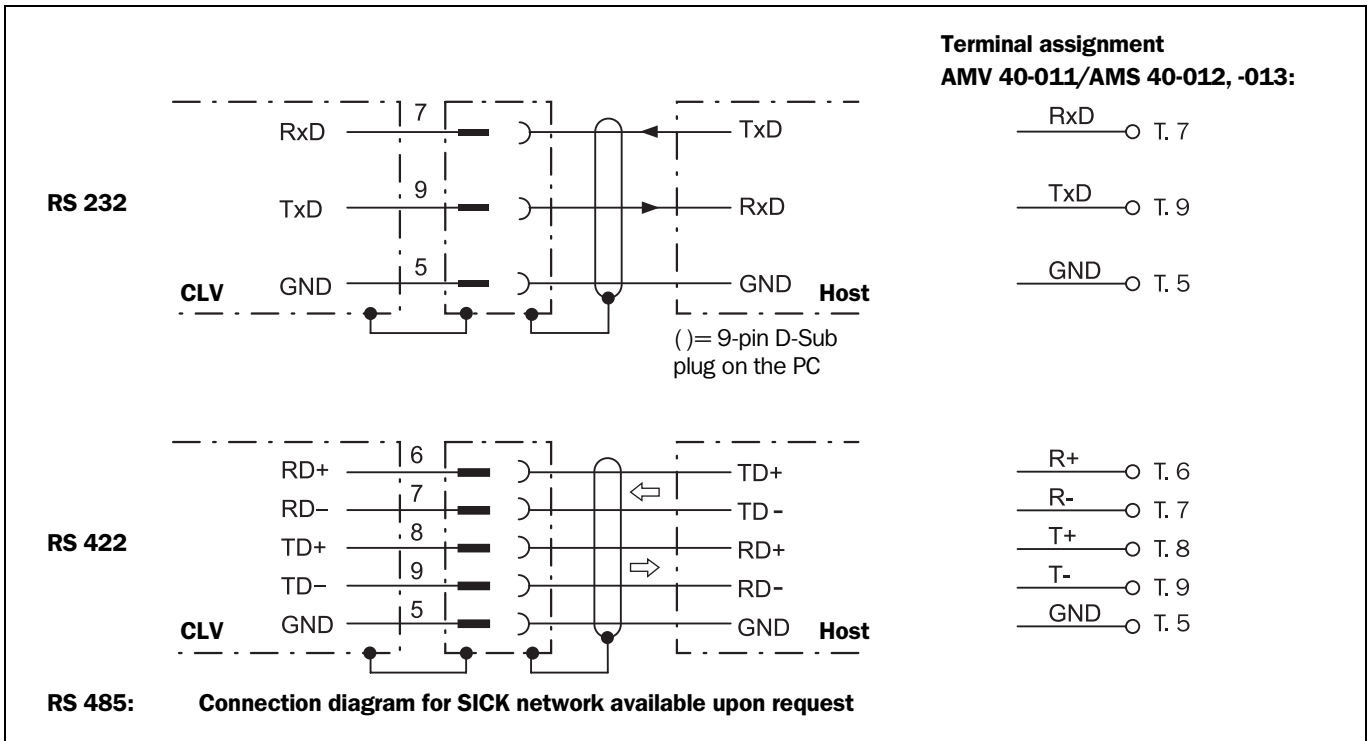
Fig. 5-2:   Connections of the host interface

Risk of damage to the interface module!

Electrical components in the CLV may be damaged if the host interface is connected incorrectly. This also applies when the host interface connections are changed in the AMV/S 40 Connection Module (configuration).

CAUTION

➢   Connect the host interface as shown in *Fig. 5-2*.

➢   Check the connections carefully before you switch on the CLV.

1.   Connect the host interface on the CLV to the host using shielded cables (EMC requirements). Ensure that the maximum cable lengths are not exceeded (*Table 5-2, Page 5-2*).

Recommendation   2.   Apply the shielding at one end.

In the default setting, the CLV communicates with the host via the host interface using the values shown in *Table 5-6*.

Parameter	Value
Interface model	RS 422/485
Data transmission rate	9 600 bit/s
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 5-6: Communication parameters for the host interface (default setting)

For connecting the host interface via the AMV/S 40 Connection Module, see the *Operating Instructions for the "AMV/S 40 Connection Module" (order no. 8 008 292, English edition)*

Terminating the RS 422 interface

The interface can be terminated in the AMV/S 40 Connection Module. *See Operating Instructions for the "AMV/S 40 Connection Module".*

Connecting to a CL 20 mA interface

The optional interface converter no. 2 020 825 can be installed in the AMV/S 40 Connection Module to connect the RS 422 interface to a CL 20 mA interface. The connection procedure is described in the *Operating Instructions for the "AMV/S 40 Connection Module".*

Activating the RS 232 interface

The RS 232 interface can be activated with the CLV Setup program:

1. Select the HOST INTERFACE tab.
2. Choose the "RS 232" option from the HARDWARE drop-down list under DATA FORMAT.
3. Perform a download to the CLV. 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 CLV uses the RS 232 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 CAN interface

For information on the connection and parameterization of the CLV for use in a SICK scanner network or in a CANopen network, *see the Operating Instructions "Alpplication of the CAN interface" (no. 8 009 180, English edition).*

5.5.6 Connecting the PC

The CLV 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 terminal interface (auxiliary interface). Unlike the host interface, the terminal interface has a permanent data format and a fixed data transfer rate. *Fig. 5-3* shows how the terminal interface is connected. The cable length is not to exceed 10 m.
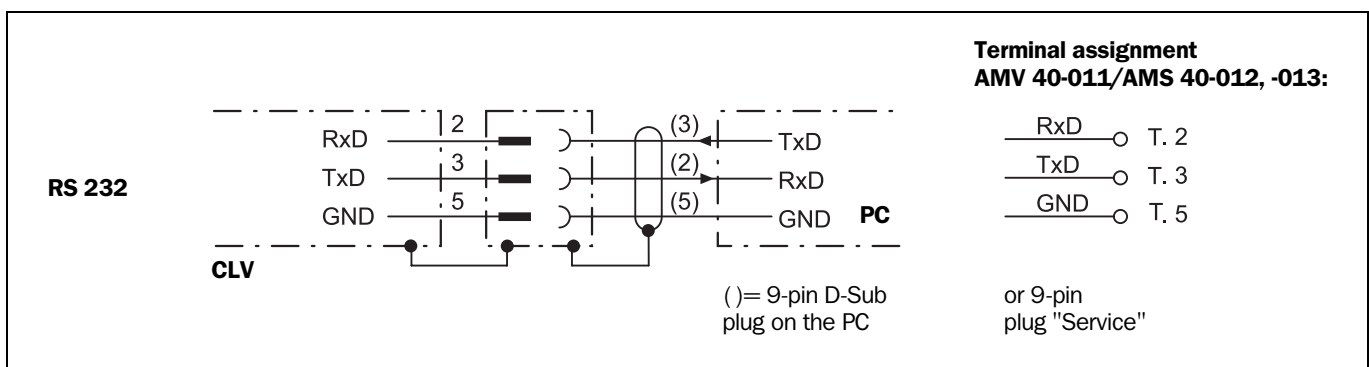
Fig. 5-3:   Connections of the terminal interface

1. Switch off the PC and power supply to the SICK connection module.

2. Connect the PC to the internal, 9-pin "Service" plug of the connection module. Use an RS 232 data connection cable for this purpose, e.g. no. 2 014 054 (RxD and TxD crossed).

    – or –

    if no SICK Connection module is used: Connect the PC as shown in *Fig. 5-3*.

3. Switch on the PC and power supply to the SICK connection module.

4. Set the communication parameters (*see Chapter 10.4.3 "Starting "CLV Setup"", Page 10-29*).

Tip   In the default setting, the terminal interface outputs the reading result in "Reading Diagnosis" mode. You can change the operating mode to "Monitor Host Interface" or "Auxiliary Input" on the AUX. INTERFACE tab in the CLV Setup program.

5.5.7   Connecting the "Sensor 1" switching input

If a reading procedure is to be triggered on the CLV 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 CLV. *Fig. 5-4* shows the connections for the "Sensor 1" switching input. *Table 5-7* contains the characteristic data for this input.

➢   Connect the reading pulse sensor as shown in *Fig. 5-4*.
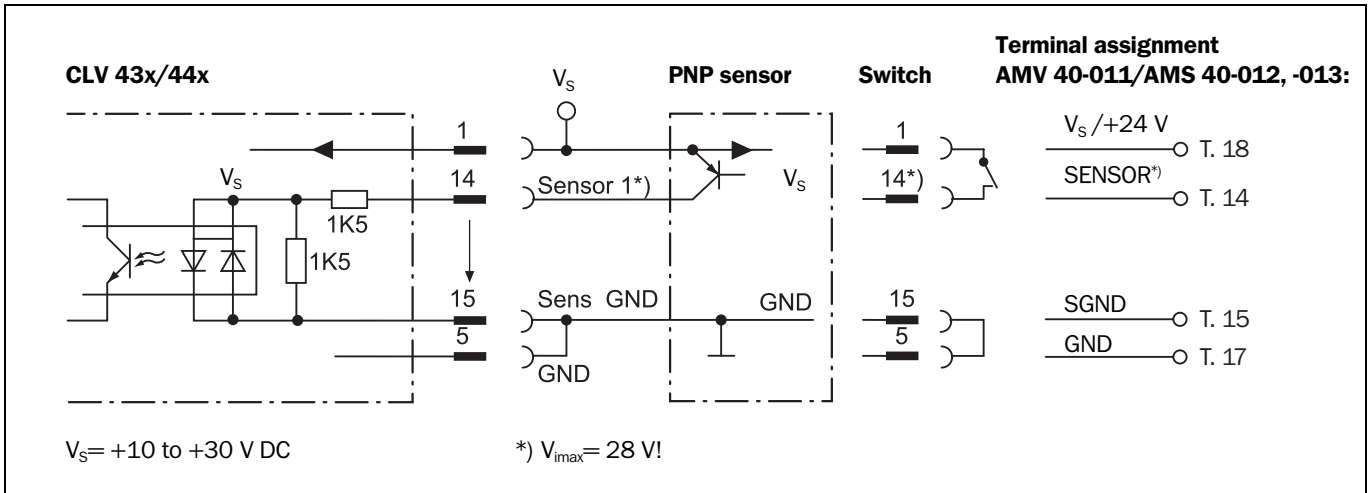
Fig. 5-4:   Connections of the "Sensor 1" switching input

Switching mode	Current at the input starts the reading interval on the CLV. (default setting: active high, debouncing: max. 30 ms (standard))	
Properties	– optodecoupled, non-interchangeable – can be connected to PNP output on a sensor	
Electrical values	Low: $-1V \leq V_i \leq +1$ V -0.3 mA $\leq I_i \leq +0.3$ mA	High: $+3$ V $\leq |V_i| \leq +28$ V $+1.4$ mA $\leq |I_i| \leq +18$ mA

Table 5-7: Characteristic data of the "Sensor 1" switching input

Tip   You can change the switching mode (polarity, debouncing, response for first pulse after power-up) of the "Sensor 1" switching input on the DEVICE CONFIGURATION tab in the CLV Setup program.

➢   Click the EDIT READING TRIGGER button. Edit dialog box.

For connecting the switching input via the AMV/S 40 Connection Module, *see the* Operating *Instructions for the "AMV/S 40 Connection Module" (order no. 8 008 292, English edition).*

Note   An external pulse is not required for "Percentage Evaluation" mode.

5.5.8   Connecting the "Sensor 2" switching input

If the dynamic focus control function of the CLV 44x is to be triggered by an external sensor, the sensor must be connected at the "Sensor 2" input. In conjunction with the internal assignment table, this causes the changeover between 2 distance configurations (from a max. of 8 configurations).

The input also has the following functions for all CLVs:

- Trigger source for teaching in the match code 1
- Conveyor increment input
- Trigger source for one-shot function of the oscillating mirror

The "dynamic focus control" function is selected by default. The characteristic data is identical to that for the "Sensor 1" input (*Table 5-7*).

Fig. 5-5 shows the connection of the switching input. *Table 5-8* contains the input combinations with regard to the distance configurations.

➢   Connect the sensors as shown in *Fig. 5-5*.
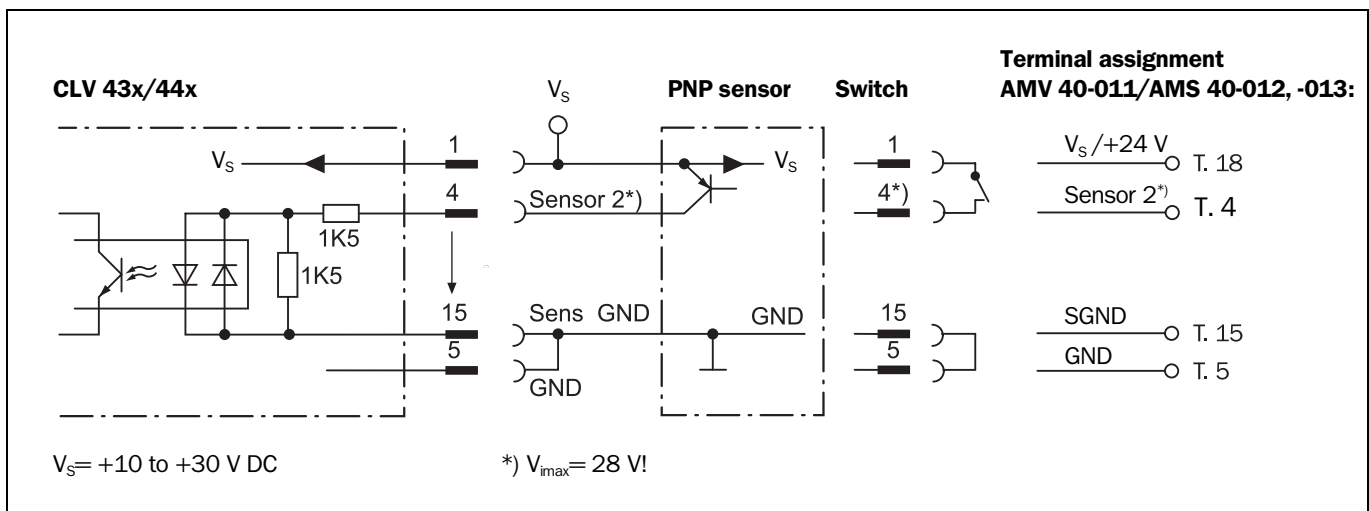
Fig. 5-5:   Connections of the "Sensor 2" switching input

For connecting the switching input via the AMV/S 40 Connection Module, see the *Operating Instructions for the "AMV/S 40 Connection Module" (order no. 8 008 292, English edition).*

             8 008 568/K949/10-06-2002

Switching input		Content Assignment Table Distance Config.[1]	
Logical state of "Sensor 2" input	Allocation table index	Default setting	Example: Photoelectric switches (bright switching)
0	0	DC 1	DC 2
1	1	DC 2	DC 3
	2	DC 3	DC 3
	3	DC 4	DC 4
	4	DC 5	DC 5
	5	DC 6	DC 6
	6	DC 7	DC 7
	7	DC 8	DC 8
1) Distance configuration (DC): data record for focus position			

Table 5-8: Dynamic focus control: switching input/distance configuration assignment table

The function assigned to the "Sensor 2" input can be modified on the DEVICE CONFIGURATION tab in the CLV Setup program.

➢ Click the FUNCTION SENSOR 2 drop-down list and choose the desired function.

The connections and procedure for teaching in match code 1 are described in *Chapter 10.9.1 "Triggering the Teach-in match code 1 via the "Sensor 2" switching input", Page 10-48*.

5.5.9   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 procedure, the corresponding switching output becomes live at the end of the reading pulse for the selected pulse duration. The pulse duration is identical for both outputs.
The "Result" LED is linked to the "Result 2" output and lights up in "Reading" mode for the selected pulse duration and function of the result status display (default setting: "Good Read", 100 ms).
Fig. 5-6 shows an example of how the "Result 1" switching output can be connected.
Table 5-9 describes the characteristic data for the outputs. This data is identical for both outputs.

➢ Connect the outputs as shown in *Fig. 5-6*.
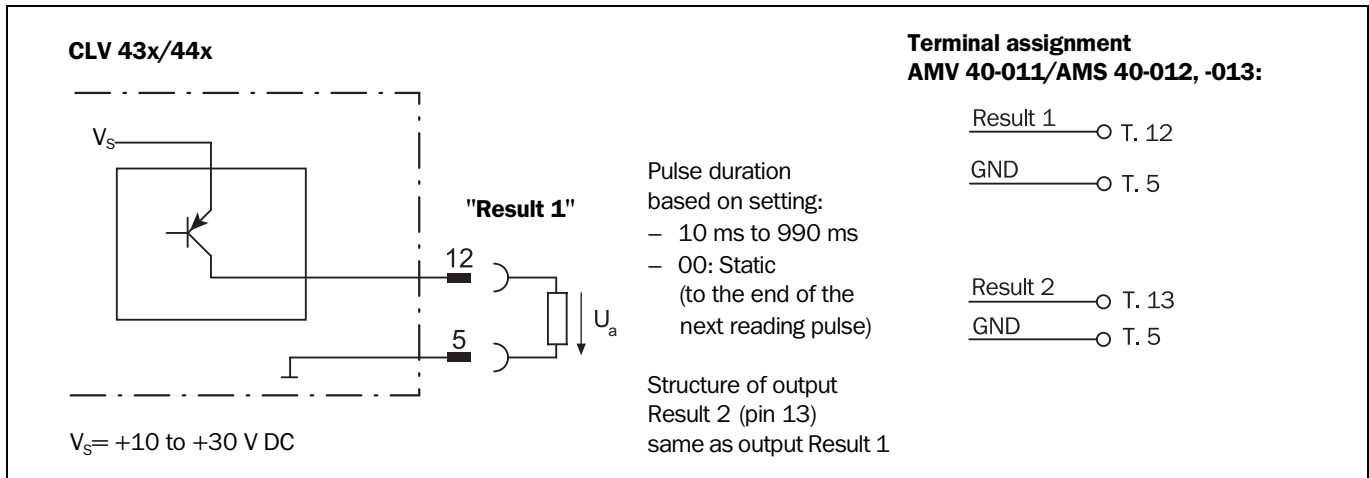
Fig. 5-6: Connection of the "Result 1" switching output

For connecting the switching outputs via the AMV/S 40 Connection Module, see the *Operating Instructions for the "AMV/S 40 Connection Module" (order no. 8 008 292, English edition).*

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

Table 5-9: Characteristic data of the "Result 1" and "Result 2" switching outputs

Note If the "Device Ready" function is chosen, the CLV outputs a static pulse in Reading mode.

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 EDIT RESULT OUTPUTS button. Edit dialog box.

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

6   Operation

6.1   Overview of the startup procedure

- Starting up the CLV with the factory default setting (Quick Start). With this configuration, the CLV can be operated without being connected to a PC (exception: the first time the Raster scanner is switched on)

- Connecting the PC (see *Chapter 5.5.6 "Connecting the PC", Page 5-6*) and install the "CLV Setup" program (see *Chapter 10.4 "Installation and operating instructions for the PC-based "CLV Setup" program", Page 10-26*)

- Configuring (parameterizing) the CLV for the desired application

6.2   Default setting

Table 6-1, Page 6-2 and *Table 6-2, Page 6-3* contain an overview of the factory default setting for the CLV. The default parameters are such that the CLV can be put into operation either straight away or following a few minor adjustments. A PC is not required for startup with the default setting (exception: the first time the Raster scanner is switched on).

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

Displaying and printing out complete default settings in CLV Setup

1. To save the current settings in the parameter set, 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 them 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 all of the 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 settings: CLV 43x/44x Line/Raster Scanner

Parameter	Default setting
Decoder	SMART decoder
Active codes types	Code 39, 2/5 Interleaved, Code 128
Code length	Freely assignable (2/5 Interleaved: interval 4 to 50 characters)
Segmentation	Start/stop ratio, automatic
Min./max. code position	0/100 CP
Multiple read	3
Min./max. no. codes	1
Scanning frequency	700 Hz
Resolution (min. bar width)	0.35 mm
Min. reading distance	DC 1: 60 mm, DC 2: 100 mm, DC 3: 200 mm, DC 4 to DC 8: 200 mm
Focus control (CLV 44x)	8 distance configurations
Focus positions	DC 1: 140 mm, DC 2: 215 mm, DC 3: 280 mm, DC 4 to DC 8: 280 mm
Trigger	"Sensor 2" switching input/serial interface
Reading pulse source	Start: "Sensor 1" switching input (active: high); end: "Sensor 1" switching input
"Sensor 2" switching input	Dynamic focus control
"Sensor 1" switching input	Start and end of reading pulse (level: active high), debouncing 20 to 30 ms
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, Volume "Low"
Arrangement to host	Standalone
Output of the reading result	Host interface
Device number	1
Host interface (type)	RS 422/485
Protocol	NAK ; start character: STX, stop character: ETX
Transfer rate	9 600 bit/s
Data format	8 data bits, no parity, 1 stop bit
Output format	Header: blank; separator: blank; terminator: blank; error string: NOREAD + separator
Output sorting	In accordance with code position
Output time	Reading result: end of reading pulse separator: after code
Test string	Not activated
Terminal interface	RS 232, 9 600 bit/s, 8 data bits, no parity, 1 stop bit (values cannot be changed)
Function	Reading diagnosis

Table 6-1: Extract: default parameter setting of the CLV 43x/44x Line/Raster Scanner

6.2.2 Default setting of the Line scanner with oscillating mirror CLV 43x/440

Default setting as for CLV 43x/44x Line/Raster Scanner, with the following additional parameters:

Parameter	Default setting
Oscillating amplitude	± 40 CW (corresponds to an angle of deflection of −20° to + 20°)
Operating mode	Oscillating with fixed amplitude
Oscillating frequency	1 Hz
Fixed position	50 CW (corresponds to an angle of deflection of 105°)

Table 6-2: Extract: default parameter settings of the Line scanner with oscillating mirror CLV 43x/440

6.3 Quick start

A PC need not be connected when the CLV is operated with the factory default setting (exception: the first time the Raster scanner is switched on, see *Chapter 6.3.2 "Starting up the Raster scanner for the first time with the factory default setting", Page 6-4*).

6.3.1 Starting up the Line scanner/Line scanner with oscillating mirror with the factory default setting

1. Connect the CLV to the SICK AMV/S 40 Connection Module.
2. Connect the reading pulse sensor (e.g. photoelectric reflex switch) to the "Sensor 1" switching input of the CLV via the AMV/S 40 *(see Chapter 5.5.7 "Connecting the "Sensor 1" switching input", Page 5-7)*.
3. Switch on the power supply to the AMV/S 40.
   Once the CLV has started, it outputs an acoustic signal to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two acoustic signals to indicate that it has assumed Reading mode. The "Device Ready" LED lights up. The "Result 1" ("Device Ready") output switches.

   Line scanner with oscillating mirror:
   In the Reading mode, the CLV deflects (by default) the scan line about the position CW = 50 at a frequency of 1 Hz and a maximum angle of ±20°. 50 CW corresponds to an angle of deflection of 105°.
4. Start the reading pulse: block the light path of the photoelectric switch or close the switch. The "Laser On" LED lights up. The CLV switches the laser diode on and the scan line appears.
5. Present the bar code pattern from *Fig. 6-1, Page 6-4* to the CLV at the reading distance specified in *Table 6-3*.
6. Align the bar code in such a way that the red scan line is almost at a 90° angle to the bars (Line scanner) or that the red scan line sweeps the bars at a 90 angle when it is deflected (oscillating mirror).
7. End the reading pulse: unblock the light path of the photoelectric switch or open the switch. The "Laser On" LED is extinguished. The CLV switches off the laser diode. The CLV 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 CLV 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:　　Bar code sample (code 39; module width 0.35 mm; print ratio 2:1)

Device types	Scan procedure	Reading distance
CLV 430/431	Line/Raster scanner	approx. 300 mm
CLV 430	Line scanner with oscillating mirror	approx. 300 mm
CLV 431	Line/Raster scanner with 105° angle attachment	approx. 250 mm
CLV 431	Line scanner with oscillating mirror	approx. 250 mm
CLV 432	Line/Raster scanner	approx. 150 mm
CLV 432	Line/Raster scanner with 105° angle attachment	approx. 150 mm
CLV 432	Line scanner with oscillating mirror	approx. 150 mm
CLV 440	Line scanner	approx. 150 mm (DC 1)
CLV 440	Line scanner with oscillating mirror	approx. 120 mm (DC 1)
CLV 442	Line scanner	approx. 110 mm (DC 1)

Table 6-3: Reading distances for resolution of 0.35 mm (default setting)

6.3.2　Starting up the Raster scanner for the first time with the factory default setting

The Raster scanner also uses the SMART decoder when operated with the factory default setting. Since CLV Setup cannot distinguish between Line scanners and Raster scanners, the decoder type for the Reading mode must be set to the standard decoder manually when the Raster scanner is used. A PC with the "CLV Setup" program must be connected for this purpose.

1. Connect the CLV to the SICK AMV/S 40 Connection Module.

2. Connect the reading pulse sensor (e.g. photoelectric reflex switch) to the "Sensor 1" switching input of the CLV via the AMV/S 40 *(see Chapter 5.5.7 "Connecting the "Sensor 1" switching input", Page 5-7).*

3. Switch on the power supply to the AMV/S 40.
   Once the CLV has started, it outputs an acoustic signal to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two acoustic signals to indicate that it has assumed Reading mode. The "Device Ready" LED lights up. The "Result 1" ("Device Ready") output switches.

4. Connect the PC to the terminal interface of the CLV. For this purpose, connect the RS 232 data connection cable to the internal 9-pin "Service" plug of the module *(see Chapter 5.5.6 "Connecting the PC", Page 5-6).*

5. Start Windows and "CLV Setup" on your PC *(see Chapter 10.4.3 "Starting "CLV Setup"", Page 10-29).*
   In its default setting, CLV Setup attempts to communicate with the CLV via COM 1. If the communication parameters are identical, CLV Setup copies the current parameter set of the CLV from its RAM via upload into the internal database and shows the values on the tabs (at first start up, the default setting of the parameter values is in effect).

6-4　　　　　　　　　　8 008 568/K949/10-06-2002

If necessary, choose "CLV 43x" in the "Device" drop-down list in the top right-hand corner in order to initiate communication and the upload manually.

6. Select the CODE CONFIGURATION tab.

7. In the DECODER group, click the STANDARD radio button.

8. Perform a download to the CLV. This is done by clicking 🖼️ in the toolbar. The DOWNLOAD PARAMETER dialog box is displayed.

9. Confirm the dialog box by selecting the PERMANENT save option. The CLV then uses the standard decoder.

Continue the quick start from Step 4 under *Chapter 6.3.1 "Starting up the Line scanner/ Line scanner with oscillating mirror with the factory default setting", Page 6-3*.

6.4 Configuration (parameterizing)

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

The CLV supports four different configuration methods:

*   Configuration via the "CLV Setup" program and the CLV Assistant
    (parameter values are set via the serial interface).

*   Configuration via AutoSetup
    (reading and code configurations for a bar code are adapted automatically via the optical interface (reading window)).
    (See Chapter 6.4.4 "Configuring the CLV with AutoSetup", Page 6-15)

*   Configuration via profile bar codes
    (parameter values are set via the optical interface (reading window))
    (See Chapter 10.5.2 "Profile programming", Page 10-37).

*   Configuration via command strings
    (parameter values are set via the serial interface).
    (See Chapter 10.6 "Configuring the CLV with command strings", Page 10-41).

In Parameter mode, the CLV only outputs a reading result with AutoSetup.

6.4.1 Configuring CLV with the user interface of CLV Setup

To use the "CLV Setup" software, a PC must be connected and the software must be installed on it. The procedure for connecting the PC to the CLV is described in *Chapter 5.5.6 "Connecting the PC", Page 5-6*. Installation and startup of "CLV Setup" and operation of the user interface are described in the appendix *(see Chapter 10.4 "Installation and operating instructions for the PC-based "CLV Setup" program", Page 10-26)*.

Transferring parameter sets between CLV Setup and the CLV

When the CLV is being parameterized, CLV Setup runs in **Offline** mode. To be able to modify the current parameter set of the CLV, it must first be loaded to CLV Setup from the CLV. This procedure is referred to as an **Upload** ("Upload from CLV"). Here, CLV Setup always loads a complete copy of the current CLV parameter set. This remains there, unchanged, until overwritten by CLV Setup. Using the context menu (right mouse button), only the parameter which was just edited is loaded from the memory (RAM) of the CLV ("Upload Parameter"). Changes made to the current parameter set in CLV Setup do not take effect until the parameter set has been transferred to the CLV. CLV Setup always loads a complete copy of the entire parameter set to the CLV, i.e. all previous parameter values in the CLV are overwritten. The procedure for transferring and saving the parameter values in the CLV is

referred to as a **Download** ("Download to CLV"). Using the context menu (right mouse button), only the parameter which was just edited is loaded temporarily into memory (RAM) of the CLV ("Download Parameter").

Loading the complete parameter set from the CLV (Upload)

➢   Click 🖳 in the toolbar.
    CLV Setup loads the current CLV parameter set from the RAM of the CLV 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 message. 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 CLV and saving it (Download)

1.   Click 🖳 in the toolbar.
     The "Device Ready" LED is extinguished. CLV Setup copies the parameter set to the RAM of the CLV. 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 CLV.

     TEMPORARY: CLV Setup copies the parameter set to the RAM only. The changes are
                    lost when the CLV 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 saved in the CLV.

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 CLV FILE SELECTOR dialog box is then displayed.

2.   Enter the file name in the dialog box (file extension "*.scl") and confirm the entry.

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

6.4.2   Function of tabs in CLV Setup (overview)

Reading Configuration

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

- Scanning frequency and module width
- CLV 43x: distance configuration (min. reading distance, evaluation range of the scan line, deflection range of the oscillating mirror, assignment table)
- CLV 44x: focus control (min. reading distance, focus position, evaluation range of the scan line, deflection range of the oscillating mirror, assignment table)
- Trigger source for the distance configuration switchover (CLV 43x) or dynamic focus control function (CLV 44x)
- Start/stop ratio
- Adapting the reading function to the quality of the bar code

Device Configuration

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

- Device number
- Source of the reading pulse
- Output time of the reading result referred to the start of the reading pulse
- Spatial parameters
- Output filter
- Laser timeout
- Physical arrangement for data output via the host interface (standalone, master/slave)
- Functional assignment of the "Sensor 2" switching input
- Functional assignments of the "Result 1" and "Result 2" switching outputs
- Functional assignment and volume of the beeper
- Mode for programming match code 1 (teach-in) via the "Sensor 2" switching input
- Code comparison

Code Configuration

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

- Type of active decoder (SMART and/or standard decoder)
- Activation of evaluation routines for individual code types
- Number of identical reads (multiple reads)
- Minimum and maximum number of bar codes to be read/output
- 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 422/485 or RS 232)
- Data format and transfer rate
- Data transfer protocol
- Start and stop characters of the interface protocol

Data Strings

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

- Data output format of the host interface
- Constants and reading diagnosis data in the header, separator and terminator
- Arrangement of the separators 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 bar code per reading pulse
- Activation and structure of format mask

Auxiliary Interface

This tab is used to set the following:

- Operating mode of the terminal interface

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 CLVs
- Use of switching inputs/outputs of the CLV as CANopen Digital I/O

Oscillating Mirror

This tab is used to set the following:

- Operating mode of the oscillating mirror
- Oscillating frequency
- Angle of deflection (oscillating amplitude)
- Start of Oscillating mode based on the reading pulse
- Trigger source for one-shot

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 10.4.6 ""CLV Setup Help" online help", Page 10-32*).

6.4.3   Parameterization guide

Overview of parameterization procedure

- Parameterizing optical reading characteristics of the scanner
- Setting up reading pulse
- Parameterizing the evaluation characteristics of the decoder
- Parameterizing the output characteristics (data, result status)
- Setting the function of the terminal interface (auxiliary interface)

When the CLV is started up for the first time, the **factory default setting** is in effect. In this case, the following parameters are to be set:

a) Parameterizing optical reading characteristics

- Module width ⇨ Reading Configuration tab ⇨ Module width
- Scanning frequency ⇨ Reading Configuration tab ⇨ Reading parameters
- Rest zone ⇨ Reading Configuration tab ⇨ Segmentation
- Poor quality bar code print ⇨ Reading Configuration tab ⇨ Codelabel quality

Setting up switchover of the distance configuration (CLV 43x) or the focus position (CLV 44x)

Action	Line/Raster scanner	Line scanner with oscillating mirror
1. Activate switchover of the distance configuration/focus position (choose trigger source)	⇨ Reading Configuration tab ⇨ Focus Trigger Source – Inputs/Serial or – Timer ⇨ Timer or – Static/No Trigger	⇨ Reading Configuration tab ⇨ Focus Trigger Source – Inputs/Serial or – Timer ⇨ Timer or – Static/No Trigger or – *Oscillating Mirror Reversal Points*
2. Choose switchover/focus point (based on reading pulse)	Focus Trigger Source ⇨ Inputs/Serial – Immediate or Synchronous – Latched	Focus Trigger Source ⇨ Inputs/Serial – Immediate or Synchronous – Latched
3. Set up distance configurations/focus positions	Distance Configuration/Assignment Table ⇨ Distance configuration – Minimum Distance – Focus Position (CLV 44x only) – Minimum Code Position CP – Maximum Code Position CP ⇨ Assignment Table – Index – Valid Configurations	Distance Configuration/Assignment Table ⇨ Distance configuration – Minimum Distance – Focus Position (CLV 44x only) – Minimum Code Position CP – Maximum Code Position CP – *Oscillating Mirror Amplitude CW* ⇨ Assignment Table – Index – Valid Configurations
4. In trigger mode "Inputs/Serial": Choose function for switching input "Sensor 2"	⇨ Device Configuration tab ⇨ Assignment Sensor 2 – Dynamic focus control	⇨ Device Configuration tab ⇨ Assignment Sensor 2 – Dynamic focus control

Table 6-4: Guide: parameterizing switchover of the distance configuration/focus position

Note   The minimum and maximum values for the active evaluation range of the scan line (Min. and Max. Code Position) can be checked in the "Show CP-limits" mode *(see Chapter 6.5.4 "Show CP-limits", Page 6-25)*.

Parameterizing oscillating mirror functions

Action	Line scanner with oscillating mirror

1. Choose "Oscillating Mode"
 (identical angles of deflection with distance configuration switchover/focus positions)
 – or –
	⇨ OSCILLATING MIRROR tab
	  ⇨ OSCILLATING MIRROR MODE
	   – Oscillating with fixed amplitude
	 ⇨ OSCILLATING
	  – Frequency

2. Choose "Oscillating with Variable Amplitude" mode
 (amplitude can be chosen for each distance configuration with distance configuration switchover/focus control)
 – or –
	⇨ "Oscillating Mirror" tab
	  ⇨ OSCILLATING MIRROR MODE
	   – Oscillating with Variable Amplitude
	 ⇨ OSCILLATING
	  – Frequency
	 ⇨ READING Configuration tab
	 ⇨ DISTANCE CONFIGURATIONS
	  – Oscillating Mirror Amplitude

3. Choose "Fixed Position" mode
 – or –
	⇨ OSCILLATING MIRROR tab
	 ⇨ OSCILLATING MIRROR MODE
	  – Fixed Position
	 ⇨ FIXED POSITION
	  – Fixed angle CW

4. Choose "One-shot" mode	⇨ OSCILLATING MIRROR tab
	 ⇨ OSCILLATING MIRROR MODE
	  – One-shot
	 ⇨ ONE-SHOT
	  ⇨ PHASE 1
	   – Mirror Speed
	   – Start Position
	   – Distance Configuration (no.)
	  ⇨ PHASE 2
	   – Mirror Speed
	   – Start Position
	   – Distance Configuration (no.)

5. With One-shot: choose trigger source	⇨ OSCILLATING MIRROR tab
	 ⇨ ONE-SHOT
	  ⇨ TRIGGERMODE
	   – Reading interval or
	   – Switching input "Sensor 2" or
	   – Serial interface

6. With One-shot and trigger source "Sensor 2" switching input: Choose function for switching input	⇨ DEVICE Configuration tab ⇨ ASSIGNMENT SENSOR 2 – One-shot

7. Choose start of activity of oscillating mode "Oscillating with ..."	⇨ OSCILLATING MIRROR tab
	 ⇨ OSCILLATING MIRROR ACTIVE
	  – continuous
	  – during reading interval

Table 6-5: Guide: parameterizing the oscillating mirror functions

Explanation of oscillating mirror functions

Operating mode "Oscillating with Fixed Amplitude"

The oscillating mirror deflects the scan line up to the maximum angle of deflection of ±40 CW (corresponds to ±20°). *Fig. 6-2* illustrates the flow when reading from above.

6-10   8 008 568/K949/10-06-2002

Operating mode "Oscillating with Variable Amplitude"

The deflection range can be parameterized separately for each of the maximum of 8 distance configurations/focus positions. The minimum/maximum values that can be set for the deflection range for fast applications ensure that the scan line only sweeps areas that contain bar codes during the time available. This also ensures that the scan line density on the object is, for the most part, constant. *Fig. 6-3* illustrates this mode when reading from above.
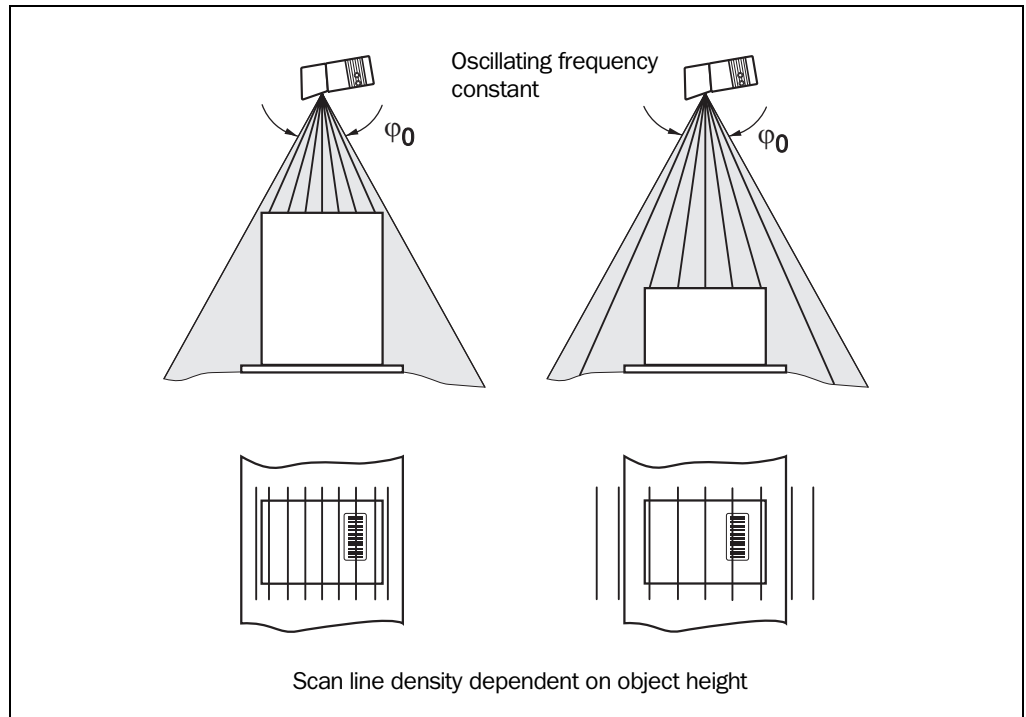
Oscillating frequency constant

φ_0

φ_0

Scan line density dependent on object height

Fig. 6-2:   Oscillating mirror operating mode "Oscillating with Fixed Amplitude"

Oscillating frequency constant

φ_0

φ_0

φ_1

Limitation of the deflection range (CW value)

Scan line density is the same, independent of object height

Fig. 6-3:   Oscillating mirror operating mode "Oscillating with Variable Amplitude"

8 008 568/K949/10-06-2002   **6-11**
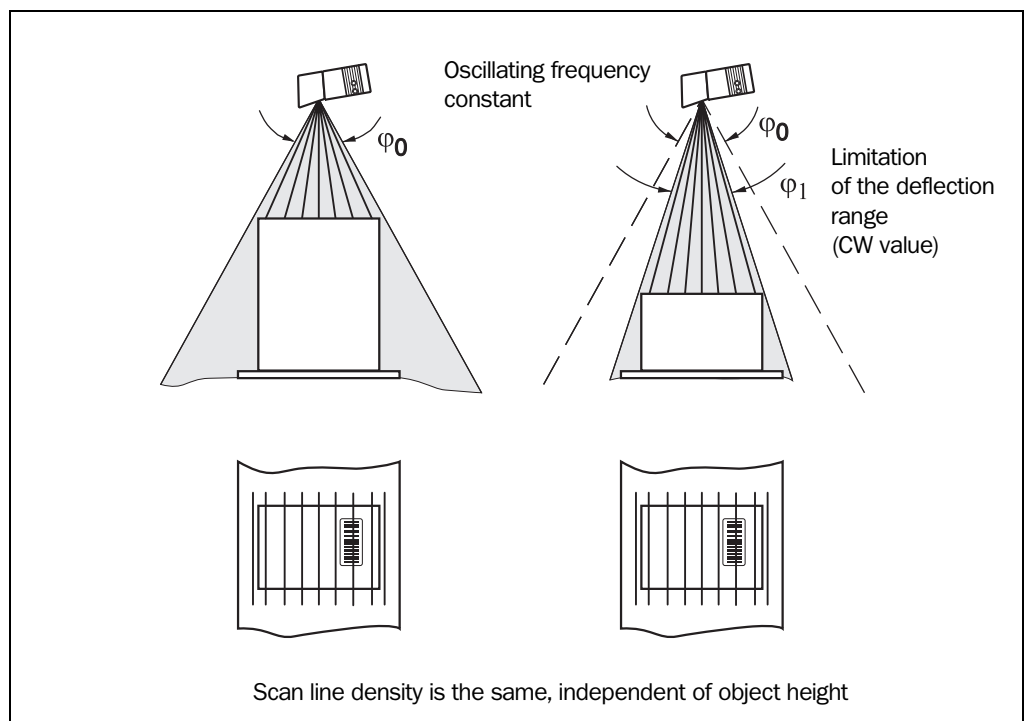
"Fixed Position" operating mode

The CLV parks the oscillating mirror at the desired position. 10 CW corresponds to −20°, and 90 CW to +20° (*Fig. 4-9, Page 4-7*). In the default setting, the fixed position is set to 50 CW (angle of deflection of 105°). The Oscillating mode is switched off.

"One-shot" operating mode

In the "One-shot" mode, the oscillating mirror only performs one specific oscillating movement per reading interval. This movement consists of a forward phase and a return phase. The start position of the scan line, the mirror speed and the valid distance configuration can be parameterized separately for each phase. The end position of the one phase is also the start position of the other phase. *Fig. 6-4* illustrates this mode with object tracking. During the forward phase, the front of the object that moves towards the oscillating mirror is swept once by the scan line from top to bottom in accordance with the conveyor speed. Multiple focus position switchovers are not necessary as the required reading range (DOF) is much smaller than with the Line scanner. *Chapter 10.7.3 "Calculation of the start position and mirror speed for the forward and return phase of the one-shot function", Page 10-46* explains how the start position and mirror speed are calculated for a given conveyor speed.

Possible trigger sources for One-shot:

- "Sensor 2" switching input
- Command string (via serial interface)
- Reading interval start
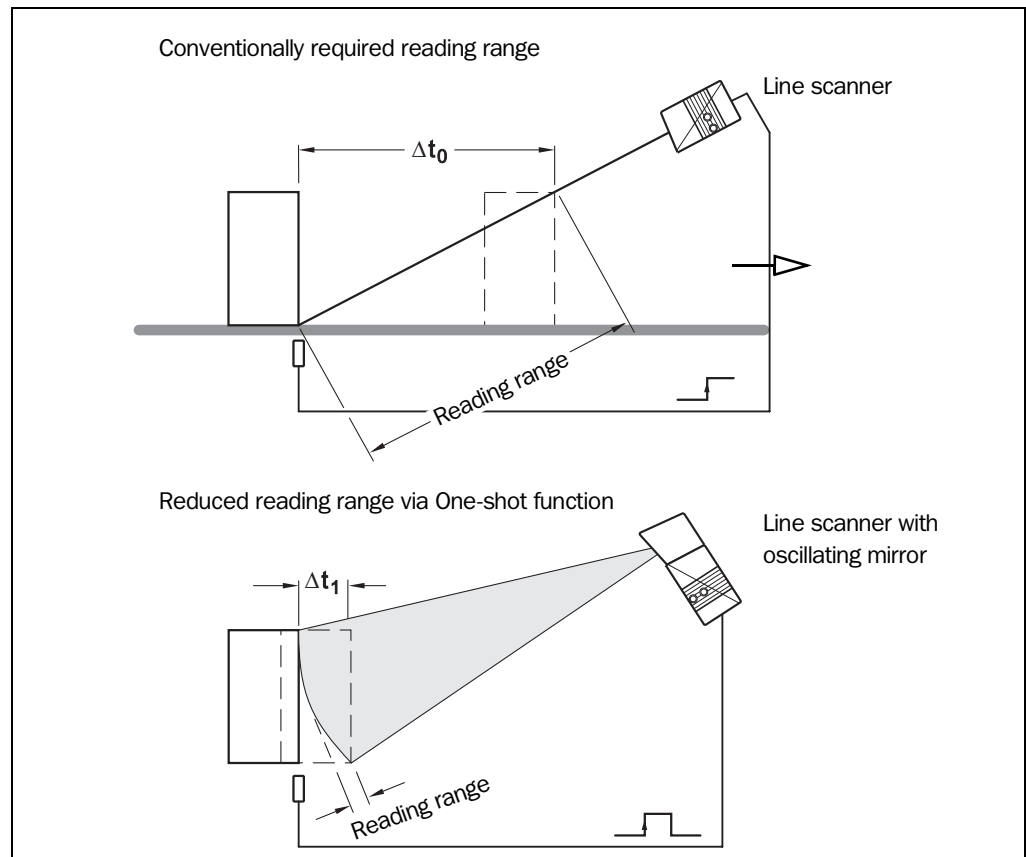
Fig. 6-4:   One-shot: object tracking (reading from front)

b) Parameterizing reading pulse source

Action	Settings

1. Reading pulse: choose source for start	⇨ Device Configuration tab
	⇨ Edit Reading Trigger
	  – Sensor Input (Active High) or
	  – Sensor Input (Active Low) or
	  – Serial Interface or
	  – Free Running with Timeout or
	  – Reflector polling

2. Pulse source "Sensor Input 1":
Select debouncing and response at first trigger
	⇨ Edit Reading Trigger
	⇨ Debouncing sensor
	  – Standard or
	  – Fast
	⇨ First Trigger
	  – Dynamic or
	  – Static

3. Pulse source "Serial Interface":
choose trigger character
	⇨ Edit Reading Trigger
	⇨ Serial Interface
	  – Standard Trigger or
	  – Single Character

4. For trigger source "Free Running": choose timeout	⇨ Edit Reading Trigger ⇨ End of Label / Free Running – Timeout

5. Reading pulse: choose source for end	⇨ Edit Reading Trigger
	⇨ End of Reading Interval
	  – Generated by Trigger Source or
	  – Timer

Table 6-6: Guide: parameterizing the reading pulse source

c) Parameterizing laser timeout

Action	Settings
1. Select the duration for the laser timeout	⇨ Device Configuration tab ⇨ Edit Reading Trigger ⇨ Laser timeout – Duration
2. Deactivate the laser timeout (laser diode is always active when pulsing, regardless of the pulse duration)	⇨ Laser timeout – Click (deactivate) the Active checkbox

Table 6-7: Guide: parameterizing the laser timeout

d) Parameterizing evaluation characteristics

- Selecting decoder type ⇨ CODE CONFIGURATION tab ⇨ "Decoder" (*Raster scanner*: choose standard decoder!)

- Activating code types for evaluation ⇨ CODE CONFIGURATION tab ⇨ "Codes" and "Edit Codes"

- Activating code comparison ⇨ DEVICE CONFIGURATION tab ⇨ "Code Comparison"

- Mode for teaching in match code 1 via the "Sensor 2" switching input ⇨ DEVICE CONFIGURATION tab ⇨ "Teach-In"

- Setting output time of the reading result ⇨ DEVICE CONFIGURATION tab ⇨ EDIT READING TRIGGER ⇨ output for Good Read

Number of bar codes per object	Line/Raster scanner	Line scanner with oscillating mirror	
	Stationary/moving conveyor object	**Stationary conveyor object**	**Moving conveyor object**

1. Number n = 1	⇨ CODE CONFIGURATION tab
	⇨ CODE POSITION
	  – **Deactivate** "Compare"!
		⇨ CODE CONFIGURATION TAB
		⇨ CODE POSITION
		  – **Deactivate** "Compare"!
			⇨ CODE CONFIGURATION TAB
			⇨ CODE POSITION
			  – **Activate** "Compare"!
			⇨ NUMBER OF CODES
			  – Minimum
			  – Maximum
			⇨ DEVICE CONFIGURATION tab
			⇨ EDIT OPC SPATIAL PARAMETERS
			  – Code distance
			  – Length of the increment vector
			  – Angle of the increment vector

2. Number n > 1:
– Same code type
– Contents different or identical
	⇨ CODE POSITION
	  – **Activate** "Compare"!
	⇨ NUMBER OF CODES
	  – Minimum
	  – Maximum
		⇨ CODE POSITION
		  – **Activate** "Compare"!
		⇨ NUMBER OF CODES
		  – Minimum
		  – Maximum	

3. Number n > 1:
– Code type different
– Contents different or identical
	⇨ CODE POSITION
	  – **Deactivate** "Compare"!
	⇨ NUMBER OF CODES
	  – Minimum
	  – Maximum
		⇨ CODE POSITION
		  – **Deactivate** "Compare"!
		⇨ NUMBER OF CODES
		  – Minimum
		  – Maximum	

Table 6-8: Guide: settings to be made for the evaluation of identical bar codes

e) Parameterizing output characteristics

Result status: Switching outputs and beeper

- Defining function of result status output of "Result 1" and "Result 2" switching outputs ⇨ DEVICE CONFIGURATION tab ⇨ "Edit Result Outputs"

- Defining function of result status output and volume of beeper ⇨ DEVICE CONFIGURATION tab ⇨ "Edit Result Output"

Main data interface (general):

- Destination of the reading result ⇨ HOST INTERFACE tab ⇨ "Destination of result data strings"

- Filter reading result ⇨ DEVICE CONFIGURATION tab ⇨ "Odette Filter"

- Sorting of the reading result ⇨ DATA STRINGS tab ⇨ "Output Sequence Sort"

- Masking of the reading result ⇨ DATA STRINGS tab ⇨ "Format Mask"

Host Interface

- Arrangement on the data network ⇨ DEVICE CONFIGURATION tab ⇨ "Scanner arrangement"
- Physical interface ⇨ HOST INTERFACE tab ⇨ "Data Format"
- Communication parameters ⇨ HOST INTERFACE tab ⇨ "Data Format"
- Protocol ⇨ HOST INTERFACE tab ⇨ "Interface Protocol"

Function of the CAN interface (alternative):

See "*Application of the CAN Interface*" *Operating Instructions (no. 8 009 180, English edition)*

Data output string

- Selecting contents of header, separator and terminator ⇨ DATA STRINGS tab ⇨ Output Format
- Position of separator in data output string ⇨ DATA STRINGS tab ⇨ Separator Position
- Setting wrong read format ⇨ DATA STRINGS tab ⇨ Wrong Read Format, Character Count and Error String
- If necessary, parameterizing/activating test string ⇨ DATA STRINGS tab ⇨ Test String
- Parameterizing special functions DATA STRINGS tab ⇨ Specials

f) Parameterizing auxiliary interface (terminal interface)

- AUXILIARY INTERFACE tab

6.4.4   Configuring the CLV with AutoSetup

AutoSetup enables the reading and code configurations of the CLV to be adapted auto-matically to the application at hand. The following conditions must be fulfilled with regard to this:

- **one** bar code (code type, code length)
- fixed reading distance
- **no** conveyor movement (static reading)

The CLV determines the code type, code length, the optimum focus position (for CLV 44x) and the most favorable scanning rate for the bar code presented. This takes place in the Free Running mode with the standard decoder in spite of the fact that the SMART decoder may have been preselected beforehand for the Reading mode. Once AutoSetup has been completed successfully, the CLV copies the parameter values determined to its parameter set. **All other code types and code lengths are then disabled.** If AutoSetup was not completed successfully, the parameter set is not changed. The CLV does not read a Pharmacode or any EAN/UPC types in AutoSetup. It does not react to an external reading pulse.

AutoSetup can be activated in three different ways in the CLV:

- Via the interface of CLV Setup
- By presenting profile bar code no. 10 (on the card supplied) to the optical interface (reading window) (*see Chapter 10.5.1 "Activating AutoSetup with a profile bar code", Page 10-35*)
- Via a command string (via the serial interface) (*see Chapter 10.6 "Configuring the CLV with command strings", Page 10-41*)

While AutoSetup is running, the CLV outputs the step-by-step changes made to the parameter values in the search mode and the determined diagnosis data via the terminal interface in the form of a list. The list can be displayed, for example, in the Terminal Emulator of CLV Setup. Once AutoSetup has been completed, appropriate error messages are output for diagnosed malfunctions in the event of a no read.

Explanation   **AutoSetup procedure**

For CLV 44x (dynamic focus position)

1. Starting at F = 20 mm, the CLV moves across the entire focus position range in steps of 20 mm at a scanning frequency of 500 Hz. It evaluates the reading quality of 100 scans at each focus position.

2. When it reaches the part of the focus position range with the highest reading quality, the CLV determines 5 positions from which it then calculates the maximum reading quality and the focus position.

3. The CLV approaches this calculated focus position and performs a verification read.

4. If the reading quality is >75 %, the CLV increases its scanning frequency in steps of 100 Hz, starting at 300 Hz, up to 800 Hz. Once again, it evaluates the reading quality of 100 scans for each step. If the reading quality is lower, the CLV changes further parameter values internally.

5. The CLV performs verification reads ± 50 Hz about the scanning frequency with the highest reading quality.

6. It then copies the optimum scanning frequency, the focus position, as well as the code type and code length to its parameter set.

For CLV 43x (fixed focus)

1. Starting at 300 Hz, the CLV increases its scanning frequency to 800 Hz in steps of 100 Hz. It evaluates the reading quality of 100 scans for each step.

2. The CLV performs verification reads ± 50 Hz around the scanning frequency with the highest reading quality.

3. It then copies the optimum scanning frequency, the code type and code length to its parameter set.

Activating AutoSetup via the user interface of CLV Setup

In CLV Setup, AutoSetup can be started by choosing the appropriate menu path, via the terminal emulator or as an executable device function (interactively). Due to the better display of the progressing procedure, we recommend starting AutoSetup via the Terminal Emulator.

Preparing AutoSetup:

1. Switch on the power supply of the AMV/S 40 Connection Module (of the CLV). After the CLV has started, it emits an acoustic signal to indicate that the self-test was successful. After a short while, it outputs two consecutive acoustic signals to indicate that it has switched to Reading mode. The "Device Ready" LED lights up.

   Line scanner with oscillating mirror:
   In AutoSetup mode, the CLV behaves as follows:

   – in "Oscillating" mode (default setting: oscillating with fixed Amplitude) switches to Oscillating mode and positions the scan line at the angle CW = 50 (corresponds to an angle of emergence under 105°). This position cannot be changed.

   – in "One-shot" mode, it also positions the scan line under the angle CW = 50

  — in "Fixed Position" mode, on the other hand, the selected scan line position remains unchanged.

2. Upload the current parameter set from the CLV with CLV Setup (the parameter set initially contains the factory default setting). CLV Setup displays the current values on the tabs.

3. AutoSetup overwrites important values in the current parameter set of the CLV. Save the existing parameter set as a configuration file "*.scl" in CLV Setup before you change the parameter settings.
   (See Chapter 6.4.1 "Configuring CLV with the user interface of CLV Setup", Page 6-5.)

Performing AutoSetup:

1. Click 🖥 in the toolbar.
   The Terminal Emulator is launched. The CLV is in Reading mode.

2. Present the application-specific bar code to the CLV at the maximum reading distance for the application. Note the limit values of the CLV here *(see reading field graphs in Chapter 10.2 "Specification diagrams", Page 10-1)*. To prevent surface reflections, rotate the bar code towards the CLV approximately 15° away from the vertical axis (see *Fig. 4-8, Page 4-6*).

3. Click AUTO SETUP under DEVICE MODE.
   The CLV cancels Reading mode. The "Device Ready" LED is extinguished. The CLV then starts AutoSetup and temporarily activates the standard decoder. The scan line appears when the "Laser On" LED lights up.

4. The CLV then runs AutoSetup and continuously displays the changes to the parameter values in the terminal emulator. *Fig. 6-5, Page 6-18* contains an example of this.

5. The CLV confirms that AutoSetup has been completed successfully by outputting two consecutive acoustic signals via the beeper and activating the "Result" LED for 100 ms (default setting). To begin with, it only overwrites the appropriate parameter values in the RAM. The CLV returns to the Reading mode with the decoder parameterized for this purpose. The "Device Ready" LED lights up. The READING MODE radio button in the terminal emulator is not, however, displayed as the active device mode again. The CLV only evaluates the presented code type and length the next time a bar code is read.

6. Perform an upload from the CLV. This is done by clicking 📥 in the toolbar.
   CLV loads the current parameter set from the RAM of the CLV and displays the new values in the tabs.

7. Perform a download to the CLV. 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 CLV saves the changes made to the parameter set permanently in the EEPROM.

9. Close the Terminal Emulator.

```
with:
FocPos    = focus position
Step      = motor step for dynamic focus control
Amp       = amplifier setting
ScanFreq  = scanning frequency
ReadRate  = reading quality
CodeType  = code type
CodeLen   = code length
CodeStr   = data contents of the bar code
```
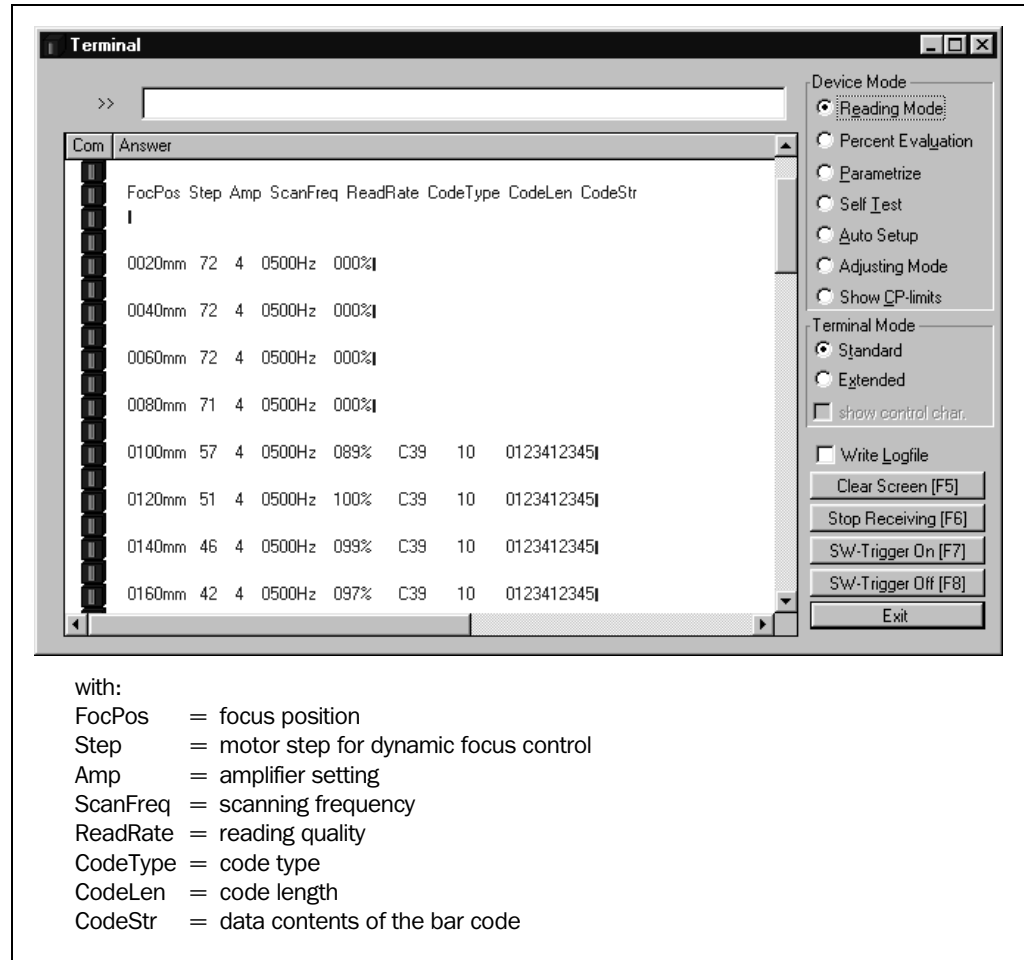
Fig. 6-5:   CLV Setup: AutoSetup displayed in the Terminal Emulator for CLV 44x

Cancelling AutoSetup by the CLV in the event of a no read:

If the CLV was not able to execute AutoSetup successfully, it cancels the search mode after the last increase made to the parameter values by outputting a long acoustic signal via the beeper.

Depending on the reason for AutoSetup being terminated, it outputs one of the following error messages via the Terminal Interface:

"No valid code found" (no valid bar code found or reading quality less than 75 %)

"Cancel AutoSetup" (AutoSetup terminates)

– or –

"More than one code found"

"Cancel AutoSetup" (AutoSetup terminates)

The current parameter set in the CLV does not change. The CLV returns to the Reading mode with the decoder parameterized for this purpose. The "Device Ready" LED lights up.

Running AutoSetup again:

1. Click READING MODE under DEVICE MODE.
    The CLV switches to Reading mode.
2. Click AUTO SETUP under DEVICE MODE again.
    The CLV then starts AutoSetup.

6-18   8 008 568/K949/10-06-2002

3. If AutoSetup is unsuccessful again, check whether the CLV is able to read the bar code correctly (reading distance, tilt, more than one bar code in the reading field).

Terminating AutoSetup prematurely:

It is not possible to abort AutoSetup here.

➢ To prevent parameter values in the RAM of the CLV from being overwritten, move the bar code away from the reading field and wait for the CLV to output an error message (AutoSetup must not supply valid settings).

Checking parameter values stored in the CLV (after parameters are saved):

1. Switch the power supply of the connection module (of the CLV) off and on again.
2. Perform an upload from the CLV. This is done by clicking 🖳 in the toolbar.
3. Check the values in the READING CONFIGURATION and CODE CONFIGURATION tabs. Only one code type may be active on the CODE CONFIGURATION tab.

Note   The CLV does not enter any real values in the parameter set for the parameters "Minimum Distance" or "Minimum Bar Width" as it is not able to determine any absolute dimensions. The values displayed in the READING CONFIGURATION tab or the EDIT DISTANCE CONFIGURATIONS dialog box do not, therefore, reflect the actual situation.

Checking the stored reading and code configurations:

Once AutoSetup has been completed successfully, check the CLV settings as follows:

1. Click 🖥 in the toolbar.
   The Terminal Emulator is launched. The CLV is in Reading mode.
2. Click PERCENT EVAL under DEVICE MODE.
   The dialog box for the distance configuration is then displayed.
3. Click the appropriate distance configuration for reading the bar code.
   – CLV 43x: distance configuration no. 1
   – CLV 44x: distance configuration no. 1
4. Confirm the dialog box with "OK".
   The CLV starts the percentage evaluation and displays the reading quality of each set of 100 scans continuously *(see Chapter 6.5.2 "Percentage evaluation", Page 6-23)*.
5. Present the application-specific bar code at the teach-in distance (at the minimum and maximum reading distance if the bar code in the application is in a variable reading range).
6. Check the reading quality in the Terminal Emulator. This should be between 70 and 100 %.

6.5   Operating modes and outputting the reading result

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

Standard operating mode

- Reading mode

For startup

- Percentage evaluation
- Adjusting mode

For adapting device to application

- AutoSetup (automatic adaptation to reading conditions):
  See *Chapter 6.4.4 "Configuring the CLV with AutoSetup", Page 6-15*
- Parameterizing (configuration):
  See *Chapter 6.4.1 "Configuring CLV with the user interface of CLV Setup", Page 6-5*
- Profile programming (configuration):
  See *Chapter 10.5.2 "Profile programming", Page 10-37*
- Teach-in match code 1/activate match code comparison with "Sensor 2" switching
  input: See *Chapter 10.9.1 "Triggering the Teach-in match code 1 via the "Sensor 2" switching input", Page 10-48*
- Show CP-limits

For monitoring purposes/correcting faults

- Displaying and editing operating data
- Reading diagnosis
- Monitoring host interface
- Auxiliary input
- Self-test

6.5.1   Reading mode (standard operating mode)

The CLV performs a self-test after it has been switched on. It is then set to the Reading mode and confirms this by outputting two consecutive acoustic signals via the beeper. In the default setting, the "Sensor 1" switching input is the (external) trigger source of the reading pulse. The reading result is output by the CLV at the end of the reading pulse via the host interface (default setting) and terminal interface.

The reading result of the terminal interface can be displayed in the CLV Setup Terminal Emulator. The CLV terminal interface must be set to the READING DIAGNOSIS mode for this purpose. This mode is selected for the default setting. The reading result of the terminal interface has a fixed, invariable format.

The Reading mode can be called up by choosing VIEW in the menu bar or via the Terminal Emulator.
Line scanner with oscillating mirror:
In the Reading mode, the CLV deflects (by default) the scan line about the position CW = 50 at a frequency of 1 Hz and a maximum angle of ±20°. 50 CW correspond to a light emergence under 105°.

Displaying the reading result in the Terminal Emulator

1. *Raster scanner:* Select the standard decoder (*see Chapter 6.3.2 "Starting up the Raster scanner for the first time with the factory default setting", Page 6-4*).

2. Click 🖥 in the toolbar.
   The Terminal Emulator dialog box is then displayed.

3. Click READING MODE under DEVICE MODE.

4. Present the bar code pattern from *Fig. 6-1, Page 6-4* to the CLV and activate the reading pulse.
   The "Laser On" LED lights up. The scan line appears *(see also Chapter 6.3.1 "Starting up the Line scanner/Line scanner with oscillating mirror with the factory default setting", Page 6-3).*

5. Terminate reading pulse.
   The CLV outputs a tone via the beeper to indicate that the reading result is displayed in the output window of the Terminal Emulator. The "Result" LED lights up for duration of 100 ms (default setting).

Fig. 6-6 shows two examples of reading result output: "Good Read" and "No Read". The reading result comprises the data contents of the bar code(s) and the reading diagnosis data. *Fig. 6-7* explains the structure and function of the reading diagnosis data for Good Read, *and Fig. 6-8* for No Read.

Note The CLV only outputs several bar codes in the reading result if the parameterized minimum and maximum number of bar codes is > 1, and several bar codes have been presented. The number of bar codes to be read/output for each reading interval can be selected on the CODE CONFIGURATION tab in the NUMBER OF CODES group.
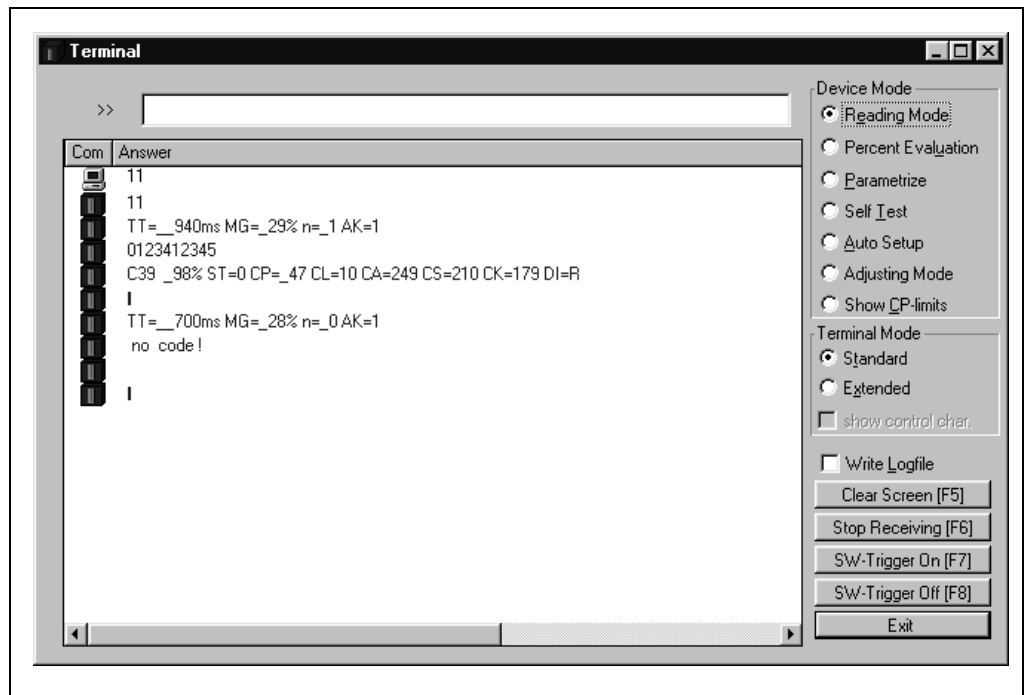
Fig. 6-6:   CLV Setup: displaying the reading result of the terminal interface in the terminal emulator

Successful read (Good Read):

TT = _940 ms   MG = _29 %   n = _1   AK = 1
0123412345
C39   _98 %   ST = 0   CP = _47   CL = 10   CA = 249   CS = 210   CK = 179   DI = R

with:

1st line:	TT	=	Reading interval time
	MG	=	Long-term mean value of CG
	n	=	Number of recognized codelabels
	AK	=	No. of distance configuration used
2nd line:	0123412345	=	Data content of the bar code
3rd line:	C39	=	ID: Code type code 39
	_98 %	=	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 = scanning direction, R = opposite scanning direction)

Fig. 6-7:   Reading result of the terminal interface: structure for "Good Read"

No Read:

TT = __700 ms   MG = _28 %   n = _0   AK = 1
no code!

with:

1st line:	TT	=	Reading interval time
	MG	=	Long-term mean value of CG
	n	=	Number of recognized codelabels
	AK	=	No. of distance configuration used
2nd line:	no code!	=	No bar codes found!
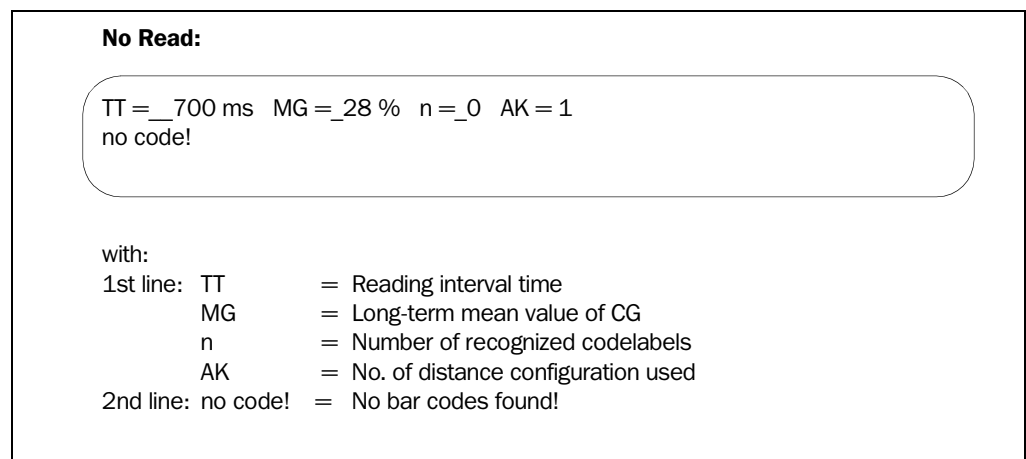
Fig. 6-8:   Reading result of the terminal interface: structure for "No Read"

Note   In the Reading mode, the CLV does not output the contents of the polling reflector.

The reading result of the **host interface** can also be displayed. *Chapter 6.5.7 "Monitor host interface", Page 6-28* describes the procedure for this and the structure of the reading result in the default setting.

Triggering the reading pulse via the Terminal Emulator

In the default setting, the "Sensor 1" switching input is the (external) 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 CLV.

1. Choose the DEVICE CONFIGURATION tab.
2. Click the EDIT READING TRIGGER button.
    The EDIT READING TRIGGER dialog box is then displayed.
3. Click SERIAL INTERFACE.
4. Confirm the dialog box with "OK".
5. Perform a download to the CLV. This is done by clicking 🖥 in the toolbar.
    The DOWNLOAD PARAMETER dialog box is displayed.
6. Confirm the dialog box by selecting the TEMPORARY save option.
    The serial interface has been activated as the trigger source of the reading pulse and is ready to receive appropriate commands.
7. Click 🖥 in the toolbar.
    The Terminal Emulator dialog box is then displayed. The CLV is in Reading mode.
8. Click the SW-TRIGGER ON button or press [F7].
    CLV Setup sends a start command to the CLV. The "Laser On" LED lights up. The scan line then appears.
9. Present the bar code sample from *Fig. 6-1, Page 6-4*.
10. Click the SW-TRIGGER OFF button or press [F8].
    CLV Setup sends a stop command to the CLV. The "Laser On" LED is extinguished. The CLV switches off the laser diode. The CLV outputs an acoustic signal via the beeper to indicate that the reading result is displayed in the output window of the terminal emulator. The "Result" LED lights up for a duration of 100 ms (default setting).

6.5.2 Percentage evaluation

In the Percentage evaluation mode, the quality of the reading function (concerning bar codes which are statically put in place into the reading field of the CLV) is assessed (no conveyor movement).

The CLV performs 100 scans in Free Running mode and evaluates the reading quality. It outputs the reading result continuously every 2 sec. via the **terminal interface**. The reading results can be displayed in the Terminal Emulator of CLV Setup. The standard decoder has to be set temporarily for the percentage evaluation.

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

Line scanner with oscillating mirror:

In "Percentage evaluation" mode, the CLV behaves as follows:

–   in "Oscillating" mode (default setting: oscillating with fixed Amplitude) switches to Oscillating mode and positions the scan line at the angle CW = 50 (corresponds to an angle of emergence under 105°). This position cannot be changed.
–   in "One-shot" mode, it also positions the scan line under the angle CW = 50.
–   in "Fixed Position" mode, on the other hand, the selected scan line position remains unchanged.

8 008 568/K949/10-06-2002 **6-23**

1. Select the CODE CONFIGURATION tab.

2. In the DECODER group, click the STANDARD radio button.

3. Perform a download to the CLV. This is done by clicking 🖥 in the toolbar.
   The DOWNLOAD PARAMETER dialog box is displayed.

4. Confirm the dialog box by choosing the TEMPORARY storage option (or PERMANENT for Raster scanners).
   The CLV then uses the standard decoder.

5. Click 🖥 in the toolbar.
   The Terminal Emulator window is then displayed. The CLV is in Reading mode.

6. Click PERCENT EVAL under DEVICE MODE.
   The dialog box for choosing the distance configuration is then displayed.

7. Click the appropriate distance configuration for the reading distance:
   – CLV 43x: distance configuration no. 1 (default setting) if no DC-specific restriction of the active evaluation range of the scan line has been carried out
   – CLV 44x: distance configuration that matches the reading distance of the object (default setting: no. 1, focus position F = 140 mm).

8. Confirm the dialog box with "OK".
   The "Device Ready" LED is extinguished. The CLV initiates the percentage evaluation and outputs the reading results continuously. An example is shown in *Fig. 6-9.*

9. Present the bar code pattern from *Fig. 6-1, Page 6-4* and monitor the reading results in the Terminal Emulator window.

The behavior of the "Result" LED also indicates the reading quality:

– LED is extinguished if reading quality is $< 30\ \%$

– LED flashes twice per second if the reading quality is 30 % to 70 %

– LED flashes five times per second if the reading quality is 70 % to 90 %

– LED is lit continuously if the reading quality is $> 90\ \%$
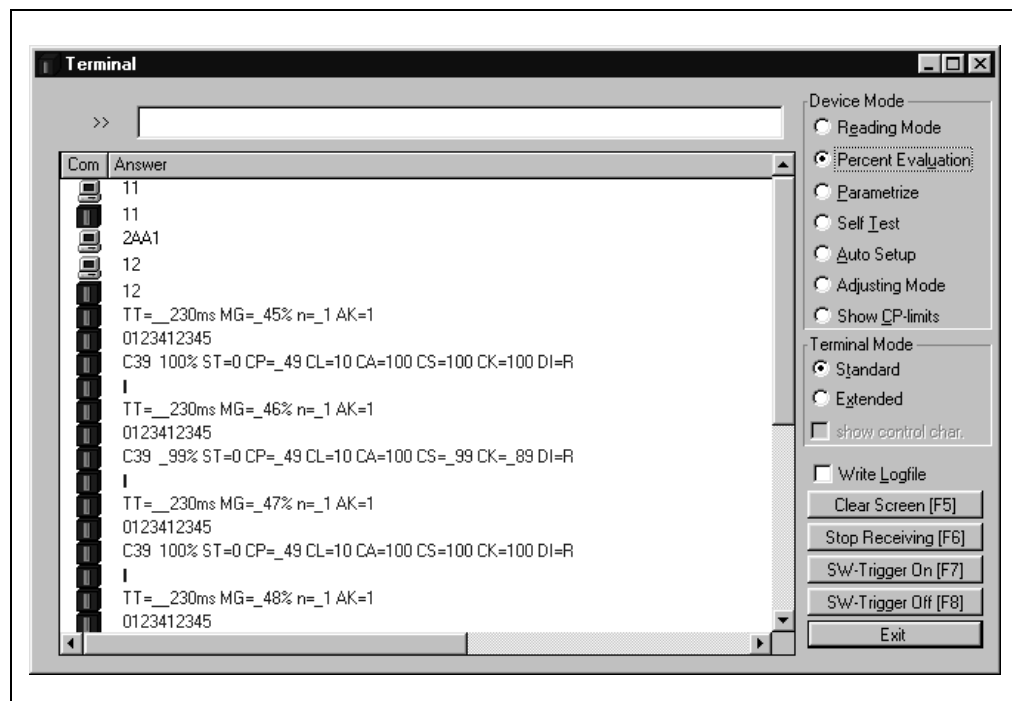
Fig. 6-9:   CLV Setup: display of the Percentage evaluation in the Terminal Emulator

                  8 008 568/K949/10-06-2002

The output format of the reading result is the same as that of the Reading mode. *Fig. 6-7, Page 6-22* explains the structure and function of the reading diagnosis data.

Note   Profile bar codes read by the CLV during the percentage evaluation do not cause any changes to be made to the parameter set and do not, therefore, affect the reading process either.

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.

The CLV outputs the data contents of the uncovered polling reflector with the identifier "REPO" in the Percentage evaluation mode.

6.5.3   Adjusting mode

The "Adjusting" mode enables the center of the scan line to be optimally positioned on the bar code. *Chapter 4.3.3 "Auxiliary functions for adjustment", Page 4-10* describes the procedure for going about this after the Adjusting mode has been started. The CLV does not output a reading result in this mode.

The Adjusting mode can be called up by choosing VIEW in the menu bar, as a device function via TOOLS (interactively), or via the Terminal Emulator.

Line scanner with oscillating mirror:

In "Adjusting" mode, the CLV behaves as follows:

– in "Oscillating" mode (default setting: oscillating with fixed Amplitude) switches to Oscillating mode and positions the scan line at the angle CW = 50 (corresponds to an angle of emergence under 105°). This position cannot be changed.

– in "One-shot" mode, it also positions the scan line under the angle CW = 50.

– in "Fixed Position" mode, on the other hand, the selected scan line position remains unchanged.

1. Click 🖥 in the toolbar.
   The Terminal Emulator window is then displayed. The CLV is in Reading mode.

2. Click ADJUSTING MODE under DEVICE MODE.
   The "Device Ready" LED is extinguished. The CLV cancels the Reading mode and masks the scan line from position CP = 50 to position CP = 100.

3. Click READING MODE to exit the Adjusting mode.
   The CLV returns to Reading mode. The "Device Ready" LED lights up.

6.5.4   Show CP-limits

In this mode, the CLV blanks certain parts of the scan line so that any limit values defined for the active evaluation range of the scan line can be checked directly during parameterization. The limitation of the active evaluation range shortens the evaluation time for fast applications, for example, as the evaluation routine need only take relevant areas of the scan line into account. The range is restricted by entering appropriate values for MINIMUM CODE POSITION and MAXIMUM CODE POSITION in the EDIT DISTANCE CONFIGURATIONS dialog box on the READING CONFIGURATION tab.

"Show CP-limits" allows you to check whether the limitation for each active distance configuration has been adjusted to the reading distance in question for the selected focus control setting ("Christmas tree effect"). The CLV does not output a reading result.

"Show CP-limits" can be called up via VIEW in the menu bar, as a device function via TOOLS (interactively), or via the Terminal Emulator.

Line scanner with oscillating mirror:

The CLV behaves as follows in "Show CP-limits" mode:

– in "Oscillating" mode (default setting: oscillating with fixed Amplitude) switches to Oscillating mode and positions the scan line at the angle CW = 50 (corresponds to an angle of emergence under 105°). This position cannot be changed.

– in "One-shot" mode, it also positions the scan line under the angle CW = 50.

– in "Fixed Position" mode, on the other hand, the selected scan line position remains unchanged.

The CLV masks the scan line alternately from the set value for CP_{min} and from the set value for CP_{max}. An example is shown in *Fig. 6-11*. The switchover is made continuously at intervals of one second. The part of the scan line that remains active for the reading procedure is the section between CP_{min} and CP_{max}.

Example:

Default setting: Evaluation set for the area from $CP_{min}= 5$ to $CP_{max}= 95$. The CLV masks the line from $CP_{min} = 5$ (short scan line) and from $CP_{max} = 95$ (long scan line).
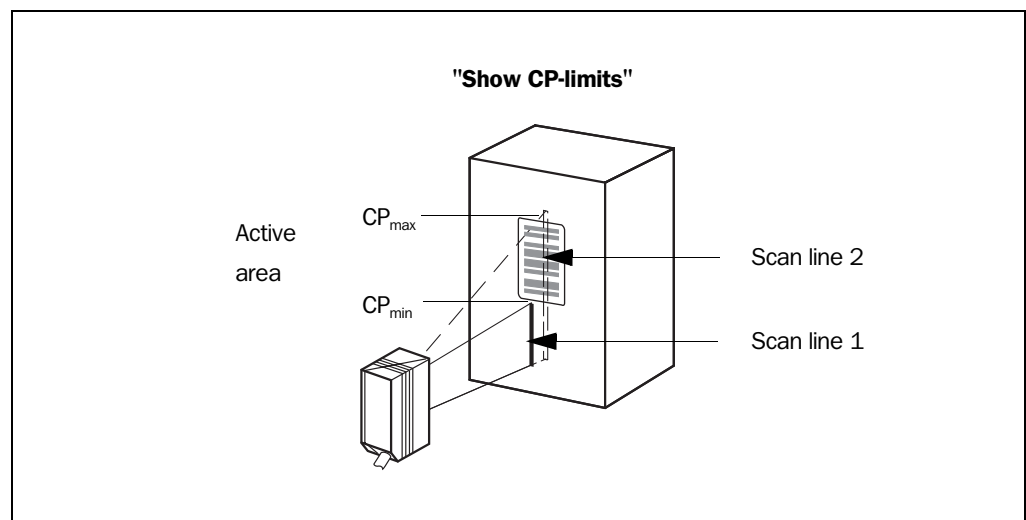
Fig. 6-10: Appearance of scan line in the "Show CP-limits" mode

Proceed as follows to check the restricted evaluation range:

1. Click ▣ in the toolbar.
    The Terminal Emulator window is then displayed. The CLV is in Reading mode.

2. In the DEVICE MODE group, click SHOW CP-LIMITS.
    The dialog box for the distance configuration is then displayed.

3. Click the distance configuration for which the active evaluation range of the scan line has been restricted (DC-specific).
    The "Device Ready" LED is extinguished. The CLV cancels the Reading mode and blanks the scan line alternately (as described above) as of CP_{min} and CP_{max}.

4. Check Steps 2 and 3 for each active distance configuration to determine whether the bar code is in the center of the range between the end of the shorter scan line (CP_{min}) and the end of the longer scan line (CP_{max}) or, if there are several bar codes, to determine whether the center of the field of all the codes is within the range.

5. If necessary, correct CP_{min} and CP_{max} accordingly. Perform a download to the CLV!

6. Click READING MODE to exit the SHOW CP-LIMITS mode.
    The CLV returns to Reading mode. The "Device Ready" LED lights up.

Note   In the Reading mode, the CLV does not actually mask the scan line visually, but instead
       takes the values specified for the restricted evaluation range into account when the data
       contents are decoded.

6.5.5   Displaying and editing operating data

This function enables statistical operating data, which the CLV maintains in the form of
counters during the reading procedure, to be displayed and reset. The CLV does not output
a reading result in this mode.

1. Click 📈 in the toolbar.
    The CLV cancels Reading mode. The "Device Ready" LED is extinguished. The
    OPERATING DATA dialog box appears *(Fig. 6-11)*.

2. After checking/resetting the desired counters, click "OK" to confirm any changes made.
    The CLV returns to Reading mode. The "Device Ready" LED lights up.
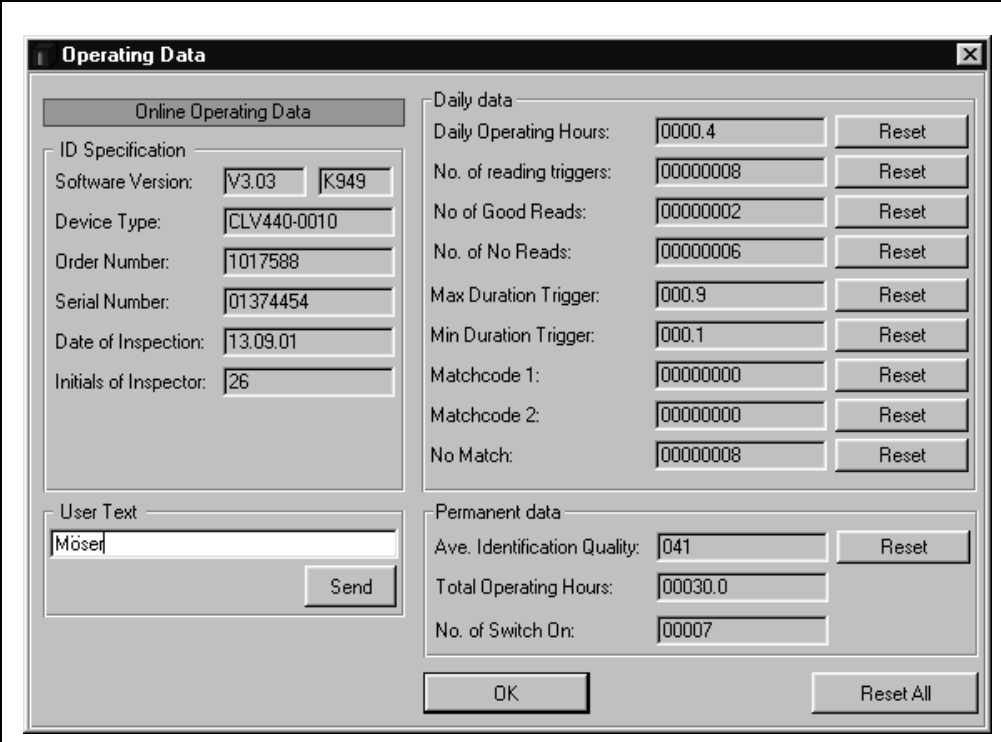
Fig. 6-11:   CLV Setup: "Operating Data" dialog box

6.5.6   Reading diagnosis

Function of the **terminal interface**. In this mode, the CLV outputs the data contents of all
the bar codes that were read – including those that, according to the evaluation criteria,
were not read properly and were thus incorrect – together with the associated reading
diagnosis data via the terminal interface. The number of bar 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 terminal interface. *Fig. 6-6, Page 6-21*
shows the corresponding output format of the terminal interface.

In the default setting, the CLV 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 CLV. This is done by clicking 🖥 in the toolbar.

     The DOWNLOAD PARAMETERS dialog box is then displayed.

3.   Confirm the dialog box by selecting the PERMANENT save option.

The terminal interface is now set to the "Reading Diagnosis" mode.

6.5.7   Monitor host interface

Function of the **terminal interface**. In this mode, the CLV outputs the data traffic of its host interface via the terminal interface. Protocol driver handshakes and protocol-specific data, such as start and stop characters, are suppressed here *(Table 6-9)*. Each data string is displayed on a separate line on the screen.

Direction of data	Output format	Represenation on screen
CLV receives from host	\<STX\> I data \<CR\> \<LF\> \<ETX\>	I data
CLV sends to host	\<STX\> O data \<CR\> \<LF\> \<ETX\>	O data

Table 6-9: "Monitor Host Interface" function

"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 CLV. This is done by clicking 🖥 in the toolbar.
     The DOWNLOAD PARAMETER dialog box is displayed.

3.   Confirm the dialog box by selecting the TEMPORARY save option.

The terminal interface is then set to the "Monitor Host Interface" until the CLV is switched off again.

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. 6-12* 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 6-23*).

2.   Click 🖥 in the toolbar.
     The Terminal Emulator window is then displayed. The CLV is in Reading mode.

3.   Click the SW-TRIGGER ON button or press [F7].
     The scan line then appears.

4.   Present the bar code sample from *Fig. 6-1, Page 6-4*.

5.   Click the SW-TRIGGER OFF button or press [F8].
     CLV Setup outputs the reading result in the terminal emulator.
     Example: "O 0123412345".

              8 008 568/K949/10-06-2002
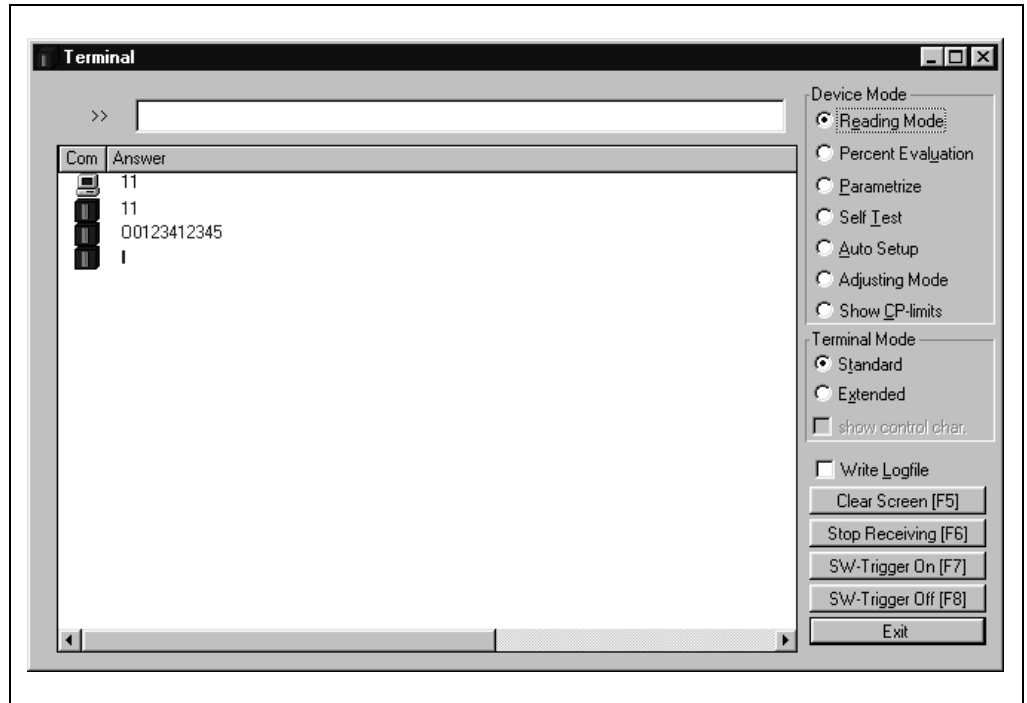
Fig. 6-12: CLV Setup: output of the reading result of the host interface in the Terminal Emulator at the beginning (in this case: O = Output)

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 terminal interface (display " ... "). This is caused by the slower data transfer speed of the terminal interface (9 600 bit/s).

In the default setting, the CLV transmits the data content of the bar code(s) as a data string via the host interface.

The header, separator and terminator are blank.

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 and/or reading diagnosis data, can be entered in the header, separator and terminator.

1. Choose the DATA STRINGS tab.
2. Click the HEADER drop-down list.
   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 text box at the top of the dialog box in the sequence in which they were selected.
4. Confirm the dialog box with "OK".
5. Repeat this procedure for the separator and terminator.
6. Perform a download to the CLV. 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 CLV outputs the selected elements in the data output string of the host interface with the next reading result.

6.5.8   Auxiliary input

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

Chapter 10.9.2 "Auxiliary input via terminal interface", Page 10-53 describes this function and the associated procedure in greater detail.

6.5.9   Self-test

After the CLV 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 CLV checks that its hardware components are functioning correctly. A final message via the terminal interface provides information on the test result. The CLV does not output a reading result during the test routine.

1. Click 🖥 in the toolbar.
   The Terminal Emulator window is then displayed. The CLV is in Reading mode.
2. Click SELF TEST under DEVICE MODE.
   The "Device Ready" LED is extinguished. The CLV cancels the Reading mode and starts the test routine. After a few seconds, the CLV outputs the encoded test result in the form of a code number (*Fig. 6-13*).
3. To return to the Reading mode, click READING MODE or close the Terminal Emulator.
   The CLV returns to Reading mode. The "Device Ready" LED lights up.
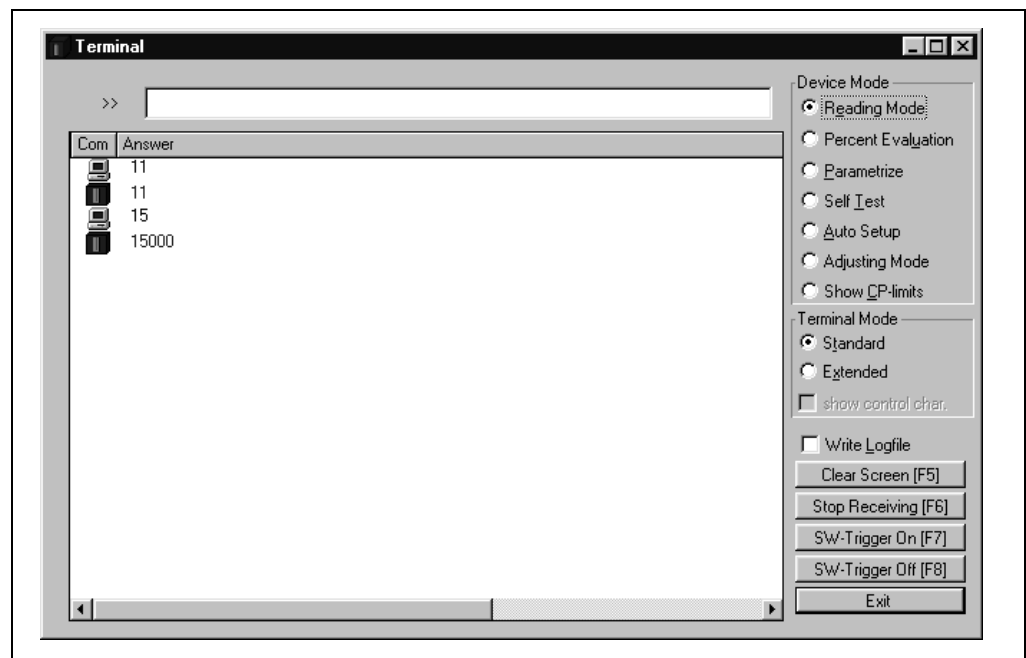
Fig. 6-13:   CLV Setup: displaying the self-test result in the Terminal Emulator

The code number "15**000**" means that the self-test was completed successfully and that no faults were diagnosed.

Chapter 8.3 "Error messages", Page 8-2, lists the error key together with the associated corrective measures.

6.5.10   Performing device functions of the CLV in the dialog box

CLV Setup enables a number of CLV 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:

- AutoSetup
- Match code Teach-in
- Show CP-limits
- Adjusting mode
- Analyze scanner network (only if the CAN interface is used)

➢   In the menu bar, select the desired function from TOOLS, DEVICE FUNCTIONS.

   – or –

   Press the [F2] key.
   The EXECUTE DEVICE FUNCTIONS dialog box is then displayed.
   Choose the desired function in the EXECUTE menu in the menu bar. CLV Setup starts the function and, where appropriate, prompts the user to carry out the necessary actions.

Fig. 6-14 shows an example of the dialog box that appears after AutoSetup has been started.
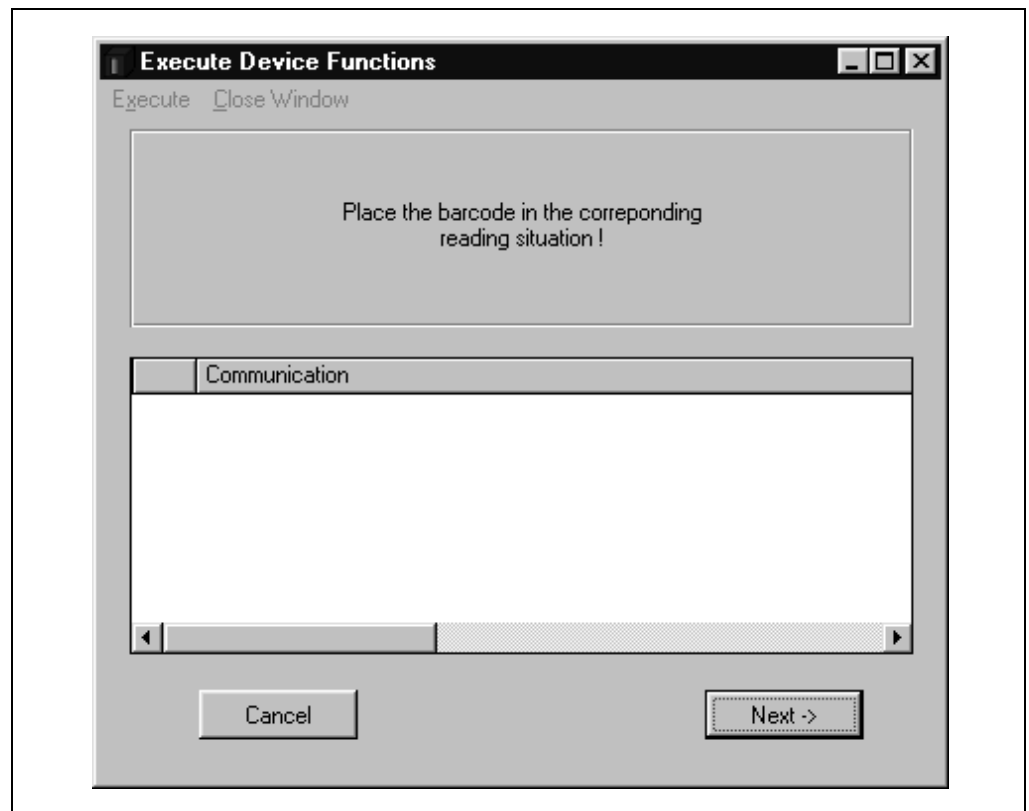
Fig. 6-14:   CLV Setup: dialog box for executing AutoSetup

6.6   CLV messages

The CLV outputs system messages, warnings and error messages in English in response to the actions carried out by the user. The messages are output in plain text via the terminal interface only.

6.6.1   Displaying messages

To display the messages on the PC in the CLV Setup user interface, proceed as follows:

1. Click 🖥 in the toolbar.
   The Terminal Emulator window is then displayed.
2. In the TERMINAL MODE group, click the EXTENDED radio button.

The CLV then outputs messages in response to events that occur while the bar code is being read. The messages are only output in the **extended mode** of the Terminal Emulator!

6.6.2   System messages

System messages confirm that an action has been carried out successfully, e.g. changing the operating mode. No other actions are required here.

Chapter 6.2 "Default setting", Page 6-1 explains the contents of the messages.

6.6.3   Warnings

Warnings indicate that it was not possible to perform an action or that the values set for the parameters can cause an error while the bar code is being read.

Table 6-10 lists the warning messages in alphabetical order together with the associated corrective measures.

Message	Meaning	Remedy
"Warning: Master Timeout"	Duration of the set master timeout is too short	Optimize the master timeout using the DEVICE CONFIGURATION tab in the user interface of CLV Setup. Download to the CLV! (see also *technical information "Master/Slave with CLV Bar Code Scanners", no. 8 007 675, English version*)

Table 6-10: Warning

6.6.4   Error messages

Error messages indicate the following error sources:

- A device defect
- Incorrect parameter settings
- Errors during data transfer to the host

Chapter 8.3 "Error messages", Page 8-2 lists the messages in alphabetical order together with the associated corrective measures.

          8 008 568/K949/10-06-2002

6.7   Switching off the CLV

1. If the parameter set was modified in CLV Setup or was only stored temporarily in CLV via a download, the parameter set must be stored permanently in the CLV 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 AMV/S 40 or pull the plug of the CLV from the connection module.

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

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 in order to assign the printout to the CLV. Confirm dialog box with "OK".
    The PRINT dialog box for configuring the printer is then displayed.

3. Edit the dialog box accordingly and confirm.
    CLV Setup prints out the current configuration file in the form of a table.

Notes

7   Maintenance

7.1   Cleaning during operation

To ensure optimum reading performance, the reading window of the CLV 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, abrasion, humidity, finger prints).

⚠ **WARNING**

Laser beam can cause blindness!

The CLV uses a class 2 red-light laser. Looking directly at the laser beam can seriously damage your eyesight.

➢ As with sunlight, never look directly into the laser beam.

➢ Switch off the device while it is being cleaned.

➢ Never look directly into the reading window while the device is in operation.

⚠ **CAUTION**

Damage to the reading window!

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

➢ Use a mild, non-scouring detergent.

➢ Never use scratching or scouring motions to clean the reading window.

Cleaning the 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.

Line/Raster scanner   Line scanner with oscillating mirror   Line/Raster scanner with angle attachment

Clean here: ➡
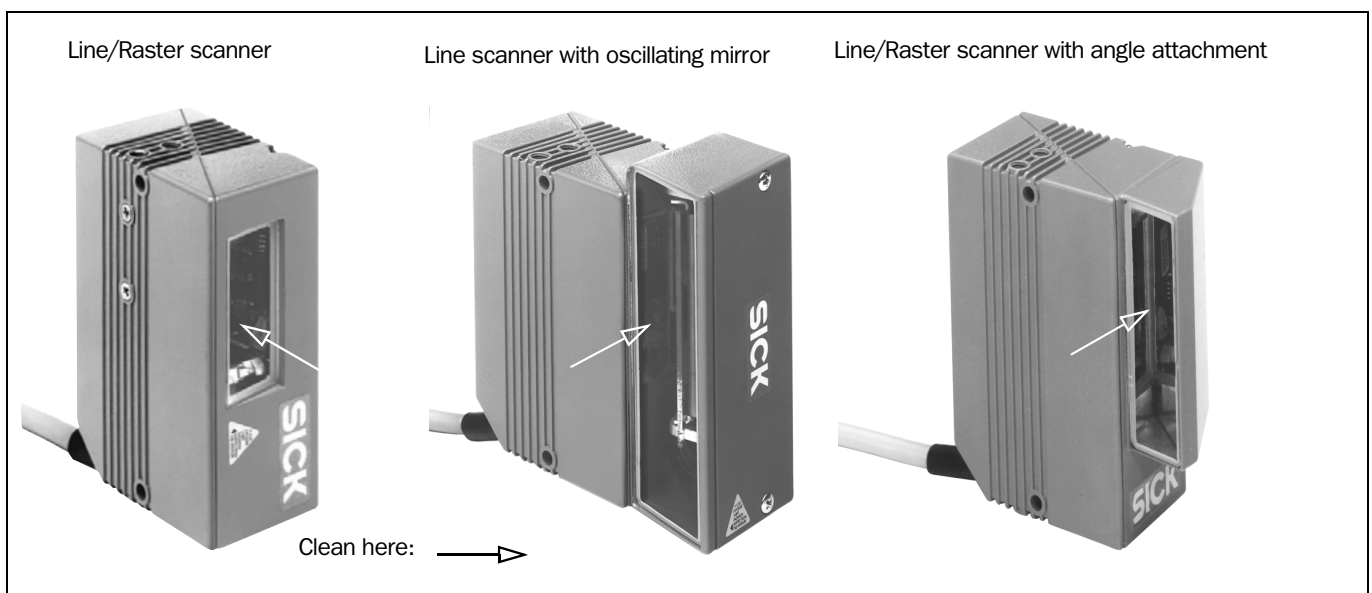
Fig. 7-1:   Cleaning the reading window

Cleaning other optical surfaces:

➢ If an external reading pulse generator and/or object-height detection sensors are used (e.g. photoelectric reflex switches), make sure to clean the relevant optical surfaces (*Fig. 7-2*). Contamination on these surfaces can cause switching errors.

➢ If the reading pulse is generated by reflector polling, make sure to clean the surface of the reflector.
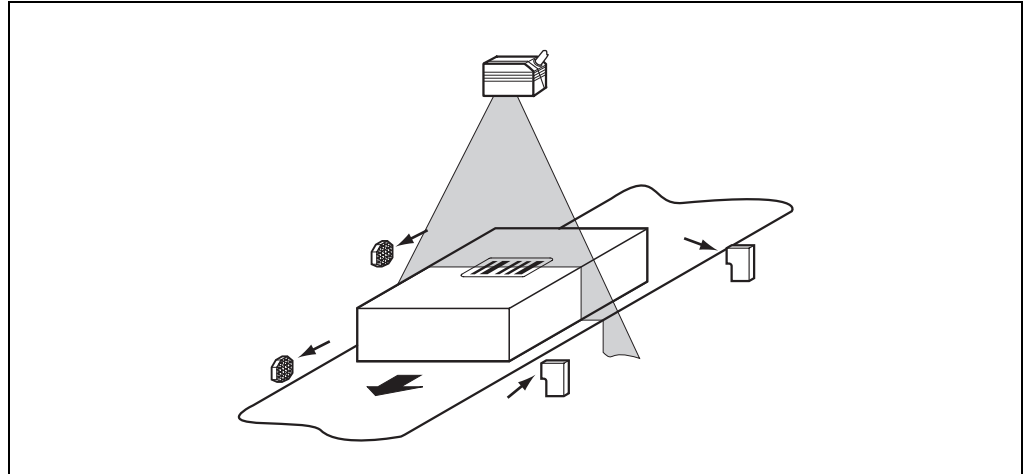
Fig. 7-2:   Cleaning the external optical sensors (reading pulse generator, object-height detector)

7.2   Maintenance

The CLV does not require any maintenance. Its self-monitoring functions ensure fault-free operation over long periods of time.

Any faults or malfunctions are displayed via the terminal interface. If they are plain text, they can be displayed on the PC screen in the extended mode of the Terminal Emulator in the CLV Setup program. Additional errors are displayed as number combinations in the fourth field from the left on the bottom, on the status line (see *Chapter 8.3 "Error messages", Page 8-2*).

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 CLV 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 to be recycled.
6.   Send the electronic modules and connection cable for disposal as special waste.

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

8   Troubleshooting

8.1   Overview of the possible errors and malfunctions

8.1.1   Installation errors

- CLV aligned incorrectly with the object carrying the bar code (e.g. blanking)
- Reading pulse sensor positioned incorrectly
- With dynamic focus control: sensor for object height detection positioned incorrectly

8.1.2   Electrical connection errors

- Interfaces on the CLV connected incorrectly (wiring error in AMV/S 40)
- Host interface on AMV/S 40 configured incorrectly

8.1.3   Parameterization errors

- Functions not adjusted to local conditions, e.g. communication parameters on the host interface are set incorrectly
- Technical limits of the device not taken into consideration, e.g. relationship between the scanning frequency and the reading distance

8.1.4   Malfunctions during operation

- Laser timeout for laser diode elapsed
- Device error (hardware/software)

8.2   Monitoring errors and malfunctions

The CLV is self-monitoring in operation:

- After the power supply has been switched on, the CLV 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 canceling Reading mode. For calling up, *see Chapter 6.5.9 "Self-test", Page 6-30.*
- If the CLV 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. Transfer is disabled in the default setting.
  The CLV displays the diagnosed error as a numeric combination in the fourth field from the left on the bottom, on the status line of CLV Setup (*Table 8-1*).
- While it is in operation, the CLV constantly monitors the laser diode and speed of the polygon mirror wheel. In addition, a watchdog circuit responds to error statuses.
- A timer automatically deactivates the laser diode 10 minutes (default setting) after a continuous reading pulse is initiated in Reading mode with switching input pulse modes "Sensor Input" and "Serial Interface" but it does not complete the Reading mode. In this case, the CLV outputs the message: „Laser safety timeout". The reading pulse must be terminated by resetting the pulse signal. The laser diode is activated again by the next reading pulse.

8.3   Error messages

The CLV outputs error messages in English on the **terminal interface** only. Additional errors are displayed as number combinations on the status line of CLV Setup. *Table 8-1* contains a list of the messages in alphabetical order.

For warnings, *see Chapter 6.6.3 "Warnings", Page 6-32.*

Displaying messages:

To display the messages on the PC in the CLV Setup user interface, proceed as follows:

1. Click 🖥 in the toolbar.
   The Terminal Emulator window is then displayed.

2. In the TERMINAL MODE group, click the EXTENDED radio button.

Message	Meaning	Possible cause	Remedy

"CLV SYS-Failure: xxx"
 011   RAM error
 012   RAM error
 013   RAM error
 051   Mirror wheel speed
         out of tolerance
 061   Mirror interval
         out of tolerance
 071   Error: laser shutter
 091 to 095 Error focus
         adjustment
         (CLV 44x)
 201 to 215 DSP error
	The CLV has diagnosed a system error.
	 The "Device Ready" LED does not light up or it extinguishes.
	 The system is restarted.
		Device fault	If this system error occurs again after the CLV is restarted: Contact the SICK Service department.

"EEPROM Check fault, default parameters loaded"	The CLV has diagnosed an irregularity in the EEPROM and downloads the entire default setting to the RAM instead of the permanently stored application-specific parameters.	Device fault	Contact the SICK Service department.
"EEPROM - reading fault"	The CLV cannot download the application-specific parameters, permanently stored in the EEPROM, to the RAM.	Device fault	Contact the SICK Service department.
"EEPROM - writing fault"	The CLV cannot write the current parameters in the RAM to the EEPROM.	Device fault	Contact the SICK Service department.
"Focus table inconsistent: defaults loaded"	The CLV has diagnosed an irregularity in the internal reference table for the focus positions selected by the user. It therefore downloads the default setting of the distance configurations.	Device fault	Contact the SICK Service department.

Table 8-1: Error message output on the terminal interface

Troubleshooting

CLV 43x/44x Bar Code Scanner

Message	Meaning	Possible cause	Remedy
"Host – receive fault"	The host has requested the data output string last sent by the CLV three times; NAK has been issued with each attempt.	• Host receive set incorrectly • Data transmission interrupted e.g. by cable break	• Check host. • Check connecting cable and monitor data transmission at the host interface. To do so, upload from the CLV using the CLV Setup program, select the AUX. INTERFACE tab and select MONITOR HOST INTERFACE in the drop-down list. Download to the CLV! Start the Terminal Emulator.
"Host – transfer too slow"	In the CLV, data is available for output faster than it is transmitted to the host.	• Baud rate too low • Incorrect protocol type selected • Protocol timeout too long for the reading pulse frequency	Check the configuration of the host interface.
"Host – transmit fault"	The CLV cannot correctly receive the data sent by the host.	• Host interface of the CLV configured incorrectly • Data transmission interrupted e.g. by cable break	• Check the CLV and host. • Check connecting cable and monitor data transmission at the host interface. To do so, upload from the CLV using the CLV Setup program, choose the AUX. INTERFACE tab and select MONITOR HOST INTERFACE from the drop-down list. Download to the CLV! Start the Terminal Emulator.
"Master/slave – trigger to soon"	The new reading pulse for the master is received before its timeout has elapsed.	Timeout for the master is too long	Check the coordination between reading pulse and timeout. To do so, upload from the CLV using the CLV Setup program, choose the DEVICE CONFIGURATION tab and change the MASTER TIMEOUT in the CLV ARRANGEMENT group. Download to CLV!
"More than one code found"	AutoSetup was not successful.	More than one bar code was presented to the CLV.	Repeat AutoSetup. Make sure that only one bar code is in the visible range of the CLV (in particular with oscillating mirror!)
"No polls?"	Network operation: The CLV is waiting for polls by the CLX 200 Network Controller.	• Data connection cables faulty • CLX 200 not ready • Incorrect device number parameterized • Inadvertently parameterized for network operation	• Check cables. • Switch on CLX 200. • Device number: parameterize 01 to 31. • Check the configuration of the host interface. To do so, upload from the CLV using the CLV Setup program, choose the HOST INTERFACE tab and check the settings in the INTERFACE PROTOCOL group. Download any changes to the CLV!

Table 8-1: Error message output on the terminal interface

Message	Meaning	Possible cause	Remedy
"No valid code found"	AutoSetup was not successful.	No bar code was presented to the CLV or the reading quality did not reach 75 %.	Repeat AutoSetup. Make sure that the bar code is located within the reading range of the CLV.
"Oscillating mirror faulty"	The CLV cannot operate the oscillating mirror or cannot initialize the mirror.	Device fault	Contact the SICK Service department.
"Slave string faulty"	Data transmission error between a slave and the master.	Data connection cables faulty	If the error continues to occur, check the connecting cable between all CLVs.
"Wrong number of slaves"	During the master timeout, the master receives more or fewer reading results from the slaves than expected from the number of slaves that the master has entered.	• The parameterized number of slaves does not match the actual number of connected slaves. • Timeout for the master is too short • The data connection between the slaves has been interrupted	• Check the entered number of slaves. To do so, upload from the CLV using the CLV Setup program, choose the DEVICE CONFIGURATION tab and check the NUMBER OF SLAVES in the CLV ARRANGEMENT group. Download any changes to the CLV! • As above, but check the timeout defined for the master • Check the cables between the slaves.
"Wrong parameters - master/ slave"	Individual parameters were changed after the master/slave arrangement was activated. These parameters were not compatible with the automatic settings for this function by the CLV.	Deviations from the following values: • Test string: no (slaves) • Aux. input: no (slaves) • Pulse: serial interface or switching input • RK 512: without response telegram	Check the correct settings on the DATA STRINGS, AUXILIARY INTERFACE, DEVICE CONFIGURATION, and HOST INTERFACE tabs in the CLV Setup program.

Table 8-1: Error message output on the terminal 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 CLV 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 bar code of the enabled code type found according to the evaluation criteria	• No bar code in the CLV's reading range during the reading pulse • Code type/length in the CLV not enabled for decoding • Reading window obstructed/dirty	• Synchronize the pulse of the CLV with the entry of a bar code into the reading range. • Correct the code configuration parameters. • Check the reading window.
3	Device fault	Device fault	Call up the self-test! (see *Chapter 6.5.9 "Self-test", Page 6-30*) 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 • Scanning frequency is too low • Ladder-type arrangement for bar code relative to the conveyor direction: code height (bar length) too poor • Print quality too poor	• Check the conveyor speed. • Adjust the scanning frequency. • Check the code height. • Check the print quality.
6	Master: Number of slave reading results does not match the parameterized number of slaves	• The parameterized number of slaves does not match the actual number of slaves available. • Timeout for the master is selected too short. • Data connection between slaves and/ or the master has been interrupted.	• Check the entered number of slaves. • Check the master timeout setting. • Check the cables between the slaves and the master.
7	The source of the reading result is the auxiliary input via the terminal interface.	The bar code was not detected by the reading function of the CLV, but was entered subsequently with the auxiliary function of the terminal interface and sent to the host in a separate data string.	–
9	The OUTPUT FILTER function is also activated for the code comparison. The CLV has detected valid bar codes. However, these do not match the active match code(s)	The scanned object does not have a bar code that matches the specified match code.	–
A	The CHECK MAX. NUMBER OF CODES function is active. The number of valid bar codes detected by the CLV in Reading mode exceeds that specified under NUMBER OF CODES: MAXIMUM. In place of bar codes it repeatedly outputs the defined error string until the number specified under NUMBER OF CODES: MINIMUM is reached.	One object in a set of objects with a constant number of bar codes, for example, contains more bar 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

Value	Meaning	Possible cause	Remedy
D	The "Code 32" evaluation option is activated for Code 39. The CLV 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 CLV outputs the defined error string instead.	–

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

8.5   Troubleshooting

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

- These operating instructions
- Tool
- A tape measure (up to 2 000 mm)
- A digital measuring device (ammeter/voltmeter)
- A PC running "CLV Setup"
- RS 232 data connection cable (pins 2 and 3 crossed), e.g. no. 2 014 054

8.5.1   General malfunction: CLV not ready

Malfunction	Possible cause	Remedy
1. The "Device Ready" LED is not lit. The "Result 1" switching output (default setting: "Device Ready") is not outputting a pulse.	After switching on the power supply (10 to 30 V DC): • The CLV has no power	• Check the wiring (power connector fitted securely to the AMV/S 40 Connection Module). Measure voltage at pin 1 and pin 5.
	• The CLV detected a device error during the self-test.	• Switch the CLV off and on again. Does the LED light up? If not, contact the SICK Service department.
	During operation: • The CLV is not in "Reading" mode	• Return to Reading mode using the CLV Setup program (see *Chapter 6.5.1 "Reading mode (standard operating mode)", Page 6-20*).
	• The CLV has deactivated the laser diode 10 min. (default setting) after the start of the current reading pulse (Pulse mode: sensor input/ serial interface).	• Terminate reading pulse. Check the reading pulse function. Parameterize new pulses or laser timeout duration using the CLV Setup user interface *(see Chapter 6.4.3 "Parameterization guide", Page 6-9)*.

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

8.5.2   Malfunctions in Reading mode: reading pulse errors

The "Device Ready" LED lights up. If not, see *Table 8-3, Page 8-7*.

Malfunction	Possible cause	Remedy
1. Pulse mode: **sensor input** (external sensor). The CLV cannot be pulsed: – The "Laser On" LED does not light up. – The scan line does not appear.	• Sensor not connected or connected to incorrect switching input • If sensor supplied by CLV: sensor not connected to ground potential • Incorrect reading pulse source parameterized on the CLV • Photoelectric switch not aligned with the reflector (photoelectric proximity switch/inductive sensor not dampened)	• Connect sensor to "Sensor 1" switching input. Check sensor wiring (*Fig. 5-4, Page 5-3*). Measure output signal on sensor • Insert jumper between pin 5 and pin 15 • Check in the CLV Setup program: Select the tab DEVICE CONFIGURATION and click the EDIT READING TRIGGER button. Sensor input selected? (active high: reading pulse starts when power applied) • Align sensor. Check functioning.
2. Pulse mode: **Reflector polling** The CLV cannot be pulsed: – The "Laser On" LED flickers but does not light up constantly. – The scan line is very faint.	• Incorrect reading distance (polling reflector) • Incorrect reflector type used • Incorrect pulsing sequence (reflector is not blocked to start the reading interval on the CLV) • CLV 44x or line scanner with oscillating mirror in oscillating mode used	• Check: reading distance of reflector in specified Reading range? • Check reflector type, *Table 4-2, Page 4-13* • Check sequence: Read: 1. Block reflector, 2. Read bar code, 3. Unblock reflector. • Trigger mode is not suitable for these devices/modes (see *Chapter 4.4.3 "Installing the polling reflector", Page 4-12*).

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

Malfunction	Possible cause	Remedy
3. Pulse mode: **Serial Interface** The CLV cannot be pulsed: – The "Laser On" LED does not light up. – The scan line does not appear.	• Incorrect reading pulse source parameterized on the CLV • The CLV is not receiving any command strings to start the reading interval on the data interface	• Check in the CLV Setup program: Select the tab DEVICE CONFIGURATION and click the EDIT READING TRIGGER button. In the MODE group: is serial interface selected? Group SERIAL INTERFACE: is trigger type correct? • Check data connection to host. Check in the CLV Setup program: Select the HOST INTERF. tab. In DATA FORMAT group: are the correct interface type (hardware) and data format selected? Group: INTERFACE PROTOCOL: are the correct start and stop characters selected? • Use the CLV Setup program to check the host command strings: Choose AUXILIARY INTERFACE tab. Select the MONITOR HOST INTERFACE function (see *Chapter 6.5.7 "Monitor host interface", Page 6-28*). Download temporarily to the CLV.
4. CLV does not respond to an external signal that ends the reading pulse (sensor input, reflector polling, serial interface)	Incorrect end of reading pulse parameterized on the CLV	Check in the CLV Setup program: Select the DEVICE CONFIGURATION tab and click the EDIT READING TRIGGER button. END OF READING INTERVAL group: is "Generated by Trigger Source" selected?

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

8.5.3   Malfunctions in Reading mode: result output errors

➢   Check whether the "Device Ready" LED illuminates.
     If the LED does not illuminate, follow *Table 8-3, Page 8-7*.
     For the following, the number of bar codes to be read is 1

Malfunction	Possible cause	Remedy
1. The "Result" LED (default setting: "Good Read") does not light up at the end of the reading pulse. – The "Result 2" switching output (default setting: "Good Read") is not outputting a pulse. – The CLV outputs the status ST=2 in the reading result on the host interface (if ST is enabled for the separator; this is not selected in the default setting).	• Read not successful, since there was no bar code in the reading field during the reading pulse	• Synchronize reading with an object in the reading field (see *Chapter 8.5.2 "Malfunctions in Reading mode: reading pulse errors", Page 8-8*).
	• Scan line positioned incorrectly	• Align CLV. Is bar code at center of scan line? Check in the CLV Setup program: check reading quality. Call up PERCENTAGE EVALUATION for this purpose (see *Chapter 6.5.2 "Percentage evaluation", Page 6-23*)
	• Evaluation range of the scan line is limited improperly (CP values)	• Check in the CLV Setup program: Choose the DEVICE CONFIGURATION tab, click the DISTANCE CONFIGURATION button. Are the min. and max. code position values correct? Check with SHOW CP-LIMITS (see *Chapter 6.5.4 "Show CP-limits", Page 6-25*).
	• Bar code presented at incorrect reading distance (CLV 43x)	• Check: reading distance of bar code in specified Reading range?
	• Incorrect focus position selected in distance configuration of the CLV 44x	• Check in the CLV Setup program: choose the DEVICE CONFIGURATION tab, click the DISTANCE CONFIGURATION/ ASSIGNMENT TABLE button. Does the focus position match the distance of the object?
	• With dynamic focus control (CLV 44x): trigger source parameterized incorrectly	• In the CLV Setup program, check: choose the READING CONFIGURATION tab, in the FOCUS TRIGGER SOURCE group. a) Trigger source: "Sensor 2" switching input: check functional assignment and connection of sensor *(see Fig. 5-5, Page 5-8*).

Table 8-5: Troubleshooting: result output errors in Reading mode

                   8 008 568/K949/10-06-2002

CLV 43x/44x Bar Code Scanner

Malfunction	Possible cause	Remedy
1. The "Result" LED (default setting: "Good Read") does not light up at the end of the reading pulse. – continued –	• With dynamic focus control (CLV 44x): trigger source parameterized incorrectly – continued –	• b) Trigger source: "Serial interface": check the data connection to the host. Use the CLV Setup program to check the host command strings: Choose AUX. INTERFACE tab. Select the MONITOR HOST INTERFACE function (see *Chapter 6.5.7 "Monitor host interface", Page 6-28*). Temporary download to CLV! c) Trigger source: "Timer": check switchover time.
	• The bar code is tilted excessively with respect to the scan line	• In the CLV Setup program: choose the CODE CONFIGURATION tab, DECODER group. Choose SMART decoder (but not for Raster scanners). Download to CLV!
	• The reading angles at which the bar code appears to the CLV are too large	• In the CLV Setup program: choose the CODE CONFIGURATION tab, DECODER group. choose Standard decoder. Download temporarily to CLV! Start PERCENTAGE EVALUATION, select distance configuration. Observe the reading quality (reading quality >70 %!). If necessary, realign CLV and/or reconfigure distance configuration. If ok, choose SMART decoder. Download to the CLV!
	• Bar code is in total reflection zone	• Optimize CLV alignment (scan line should strike the bar code at an angle of approx. 15°) Check in the CLV Setup program: check reading quality. Start PERCENTAGE EVALUATION (see *Chapter 6.5.2 "Percentage evaluation", Page 6-23*).

Table 8-5: Troubleshooting: result output errors in Reading mode

8 008 568/K949/10-06-2002   **8-11**

Malfunction	Possible cause	Remedy
1. The "Result" LED (default setting: "Good Read") does not light up at the end of the reading pulse. – continued –	• Evaluation criteria for bar code incorrect	• In the CLV Setup program: choose the CODE CONFIGURATION tab, CODES group. Enable all code types (except Pharmacode), set code lengths to FREE. Download temporarily to CLV! Start PERCENTAGE EVALUATION. Code type and length are displayed in the reading result. Enable recorded code type in the CODES group and disable all other types. Enter the code length under FIXED on the code type tab. Download to CLV!
	• Bar code quality not adequate	• Check: Are sufficient blank zones present? Is the print contrast adequate? Are the specified print tolerances exceeded? In the CLV Setup program: choose the READING CONFIGURATION tab and find the SEGMENTATION group: Is "Start/Stop" selected? Perform test read with a reference code in good condition.
2. The CLV is not transferring any reading results to the host.	• Reading pulse is not functioning correctly	• See *Chapter 8.5.2 "Malfunctions in Reading mode: reading pulse errors", Page 8-8*
	• Wiring fault in data connection	• Check wiring with *Fig. 5-2, Page 5-5*.
	• Voltage level incorrect	• Measure voltages.
	• Host interface in CLV parameterized incorrectly	• Check in the CLV Setup program: choose HOST INTERFACE tab, DATA FORMAT group: Are the correct interface type (hardware) and data format selected? Check settings in INTERFACE PROTOCOL group.
3. The CLV transfers the status ST=3 to the host in the reading result. (if ST is enabled for the separator; this is not selected by default)	The CLV has diagnosed a device error in the self-test.	Switch the CLV 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

Malfunction	Possible cause	Remedy
4. The data content of the bar code output by the CLV is incorrect or incomplete.	• The data format on the host interface is parameterized incorrectly in the CLV	• Check in the CLV Setup program: Select the HOST INTERFACE tab, DATA FORMAT group. Are the values correct?
	• The CLV suppresses the last character in the bar code.	• Check in the CLV Setup program: Select the CODE CONFIGURATION tab. Click the EDIT CODES button. Choose the tab for the relevant code. Is Transmit Check Digit activated? Change if necessary. Download to CLV!

Table 8-5: Troubleshooting: result output errors in Reading mode

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

The "Device Ready" LED lights up. If not, see .

Malfunction	Possible cause	Remedy
1. The "Result 1" (default setting: "Device Ready") and "Result 2" (default setting: "Good Read") switching outputs are not outputting any pulses.	• The event of the assigned function for outputting the result status does not occur during the reading process • Incorrect switching mode parameterized in CLV	• Not applicable • Check in the CLV Setup program: choose the DEVICE CONFIGURATION tab. Click the EDIT RESULT OUTPUTS button. Are the outputs set to "Invert Output"? Change if necessary. Download to CLV!
2. The beeper is not confirming the output of the reading result (default setting: "Good Read")	Beeper deactivated	Check in the CLV Setup program: choose the DEVICE CONFIGURATION tab and find the BEEPER group: LOW or HIGH selected?

Table 8-6: Troubleshooting: errors in the result status output in Reading mode

8 008 568/K949/10-06-2002 **8-13**

8.5.5   Malfunctions in Reading mode: oscillating mirror errors

The "Device Ready" LED lights up. If not, see *Table 8-3, Page 8-7*.

Malfunction	Possible cause	Remedy
1. The oscillating mirror does not move.	• Incorrect operating mode set on the CLV	• Check in the CLV Setup program: choose the OSCILLATING MIRROR tab and the OSCILLATING MIRROR group. Is OSCILLATING MODE or OSCILLATING WITH VARIABLE AMPLITUDE selected?
2. The oscillating mirror oscillates with maximum deflection (40 CW), even though a variable amplitude of e.g. 10 CW is set in distance configuration 1	• OSCILLATING MODE set on the CLV by mistake • The oscillating amplitude is paramterized in the wrong distance configuration (here: no. 2) • Distance configuration not switched over	• From the OSCILLATING MIRROR tab, choose OSCILLATING WITH VARIABLE AMPLITUDE. Download to the CLV! • Check with user interface of CLV Setup: choose DEVICE CONFIGURATION tab and click the DISTANCE CONFIGURATION button. Is the amplitude value set in the correct distance configuration (here: no. 1)? • Check in the CLV Setup program: Choose DEVICE CONFIGURATION tab. Assignment Sensor 2: is dynamic focus control selected? Connect sensor to "Sensor 2" switching input. Check sensor wiring (see *Fig. 5-5, Page 5-8*). Measure output signal on sensor
3. One-shot: The one-shot function cannot be triggered (sensor correctly connected to the "Sensor 2" switching input)	• Trigger source incorrectly parameterized and/or switching input Sensor 2: function is not assigned.	• Check in the CLV Setup program: choose the OSCILLATING MIRROR tab. Trigger mode ok? Choose DEVICE CONFIGURATION tab. Assignment Sensor 2: is trigger one-shot selected?

Table 8-7: Troubleshooting: oscillating mirror errors in Reading mode

8.5.6 Malfunctions: configuration errors (parameterization)

Malfunction	Possible cause	Remedy
1. **AutoSetup:** the CLV does not read the presented, application-specific bar code (no confirmation from beeper).	• CLV not in "AutoSetup" mode.	• Check: Does the "Device Ready" LED light up? If so, the CLV is in "Reading" mode again. In CLV Setup program: restart AutoSetup from the VIEW menu.
	• If AutoSetup is started with profile bar code no. 10: wait time of 5 s after power-up has been exceeded	• Switch the CLV off and on again. Present profile bar code no. 10 within 5 s. Then present the application-specific bar code.
	• Bar code presented at incorrect reading distance	• Check: Is the reading distance of the bar code within the specified reading area?
	• Bar code is in total reflection zone	• Optimize bar code alignment (scan line should strike the bar code at an angle of approx. 15°)
	• Bar code quality not adequate	• (see *Malfunction 1, Table 8-5, Page 8-10*)
2. **Profile programming:** CLV does not read the presented profile bar code (no confirmation from beeper).	• Wait time of 5 s after power-up has been exceeded	• Switch the CLV off and on again. Present profile bar code within 5 s.
	• Wait time of 10 s after the first profile bar code was presented has been exceeded	• Once the first profile bar code has been read successfully, present the next bar code within 10 s etc.
	• In Reading mode: CLV not pulsed	• Clock the CLV accordingly and present the first profile bar code. Present the next bar code within 10 s etc.

Table 8-8: Troubleshooting: configuration errors (parameterization)

8.6 SICK support

If a system error occurs repeatedly ("CLV SYS-Failure: xxx", xxx = 000 to 215) or if you cannot correct an error using the above measures, the CLV may be defective. The CLV does not have any system components whose functionality can be restored by the user in person after a failure.

Please contact our local SICK office or subsidary:

- The telephone and fax numbers are listed on the *back page* of this manual.

➢ Do not send the device to the SICK service without first contacting us.

9   Technical data

9.1   Data sheet CLV 430/431/432 Bar Code Scanners (fixed focus): Line/Raster scanner

Type	CLV 430	CLV 431	CLV 432
Line scanner	CLV 430-0010	CLV 431-0010	CLV 432-0010
Raster scanner	CLV 430-1010	CLV 431-1010	CLV 432-1010
Line scanner with 105° angle attachment	–	CLV 431-2010	CLV 432-2010
Raster scanner with 105° angle attachment	–	CLV 431-3010	CLV 432-3010
Focus	Fixed focus		
Reading window	Line/Raster scanner: front Line/Raster scanner with angle attachment: side (angle of emergence 105°)		
Laser diode (wavelength)	Red light ($\lambda = 670$ nm)		
Service life of laser diode	MTBF 20 000 h		
Laser class	Class 2 (pursuant to DIN EN 60825-1), shutoff of laser diode after 10 min.[1]		
Usable aperture angle	Max. 50°		
Scanning/decoding frequency	300 to 800 Hz		
Resolution	0.2 to 1.0 mm		
Reading ranges	See reading field diagrams, *Chapter 10 "Appendix", Page 10-1*		
No. of distance configurarions (DC)[2]	Max. 8		
Trigger source for DC switchover	"Sensor 2" switching input/ serial interface/ timer		
Raster height	15 mm (8 lines) at a reading distance of 200 mm (front reading window)		
Bar code print contrast (PCS)	≥60 %		
Immunity to ambient light	2000 lx (on bar code)		
No. of bar codes per scan	1 to 20 (standard decoder), 1 to 6 (SMART decoder)		
No. of bar codes per reading interval[3]	1 to 50 (autodiscriminating)		
Bar code types (SMART decoder)[4]	Code 39, Code 128, Code 93, Codabar, EAN, EAN 128, UPC, 2/5 Interleaved		
Bar code length	Max. 50 characters[5] (max. 500 character across all bar codes per reading interval)		
Print ratio	2:1 to 3:1		
No. of multiple reads	1 to 99		
Visual indicators	Four LEDs (status indicators)		
Acoustic indicator	Beeper, can be deactivated and assigned with a function for result status indication		
Reading pulse	Reflector polling/ "Sensor 1" switching input/ free running/ serial interface		
"Host" data interface	RS 232 or RS 422/485, variable data output format		
Data transfer rate	300 to 57 600 bit/s		
Protocols	SICK Standard, SICK Network and 3964(R)		
Physical configurations	Standalone, SICK Network (Bus), Daisy Chain (Pass-through or Master/Slave)		

1)   in Reading mode with the "Switching input sensor 1" and "Serial interface" pulse types
2)   DC= Distance configuration (restriction of active evaluation range of the scan line by selecting the min. and max. values of the code position)
3)   Reading interval: time window generated internally for evaluating the code
4)   Standard decoder: also Pharmacode
5)   SMART decoder: Code 39: max. 30 characters; Codabar: max. 30 characters; Code 128, EAN 128: max. 48 characters (max. 96 "half characters");
    Code 93: max. 47 char.

Table 9-1: Technical specifications of the CLV 430/431/432 (Line/Raster scanner)

Type	CLV 430	CLV 431	CLV 432
"CAN" data interface	CANopen protocol, CAN scanner network		
Data transfer rate	10 Kbit/s to 1 Mbit/s		
"Terminal" data interface	RS 232, 9 600 bit/s, 8 data bits, no parity, 1 stop bit, fixed output format		
Switching inputs	2 ("Sensor 1", "Sensor 2") – Optodecoupled, $V_{imax} = 28$ V, non-interchangeable, can be connected to PNP output – "Sensor 1" (reading pulse): Max. internal delay 30 ms/reduced max 0.6 ms – "Sensor 2" (variable function): Max. internal delay 30 ms		
Switching outputs	2 ("Result 1", "Result 2") – PNP, $I_{omax} = 100$ mA, short-circuit-proof, variable pulse duration (stat., 10 to 990 ms) – Variable output function for result status		
Electrical connection	15-pin D-Sub HD plug, cable length 0.9 m		
Operating voltage/power consumption	10 to 30 V DC / 4 W		
Housing	Cast zinc die-cast, does not represent a problem in paint shops		
Enlosure rating/Protection class	IP 65 (to DIN 40 050)/ Class 3 (to VDE 0106/IEC 1010-1)		
EMC/ vibration / shock tested	To IEC 801/ to IEC 68-2-6 Test FC/ to IEC 68-2-27 Test EA		
Weight	420 g with connecting cable (with additional 105° angle attachment: 450 g)		
Operating/storage temperature	0 to +40 °C/–20 to +70 °C		
Max. rel. humidity	90 %, non-condensing		

Table 9-1: Technical specifications of the CLV 430/431/432 (Line/Raster scanner)

9.2 Data sheet CLV 430/431/432 bar code scanners (fixed focus) Line scanner with oscillating mirror

Technical data as CLV 430/431/432 Line/Raster scanner, with the exception of the following:

Type	CLV 430	CLV 431	CLV 432
Line scanner with oscillating mirror	CLV 430-6010	CLV 431-6010	CLV 432-6010
Reading window	Side		
Angle of emergence	Under 105° (neutral position CW = 50)		
Trigger source for DC switchover[6]	Also: oscillating mirror reversal points		
Usable aperture angle	Max. 50°		
Oscillating mirror functions	Permanent (variable position)/oscillating (amplitude per DC variable or fixed)/ One-shot[7]		
Oscillating frequency	0.5 to 4 Hz		
Max. angle of deflection	+20° to –20° (can be set with software)		
Reading ranges	See reading field diagrams, *Chapter 10 "Appendix", Page 10-1*		
Deflection ranges	See *Fig. 10-18, Page 10-20*		
Operating voltage/power consumption	10 to 30 V DC/max. 6.15 W		
Weight	620 g with connecting cable		

6) DC = Distance configuration (restriction of active evaluation range of the scan line by selecting the min. and max. values of the code position and the oscillating amplitude by selecting the CW value)
7) One-shot: one-off oscillating movement per reading pulse (start position and velocity can be selected for forward and return phase)

Table 9-2: Technical specifications for the CLV 430/431/432 (Line scanner with oscillating mirror)

9.3 Data sheet CLV 440 Bar Code Scanner (dynamic focus control) Line scanner

Technical data as CLV 43x Line/Raster Scanner with the following exceptions:

Type	CLV 440
Line scanner	CLV 440-0010
Focus control	Dynamic focus control
No. of distance configurations	Max. 8
Focus adjustment time	≤ 50 ms (from minimum to maximum focus position)
Focus trigger source	"Sensor 2" switching input/ serial interface/ timer
Reading ranges	See reading field diagrams, *Chapter 10 "Appendix", Page 10-1*
Operating voltage/power consumption	10 to 30 V DC / 5 W
Weight	480 g with connecting cable

Table 9-3: Technical specifications for the CLV 440 (Line scanner)

9.4 Data sheet CLV 440 Bar Code Scanner (dynamic focus control) Line scanner with oscillating mirror

Technical data as CLV 440 Line Scanner with the following exceptions:

Type	CLV 440
Line scanner with oscillating mirror	CLV 440-6010
Reading window	Side
Angle of emergence	Under 105° (neutral position CW = 50)
Trigger source for DC switchover[6]	Also: oscillating mirror reversal points
Usable aperture angle	Max. 50°
Oscillating mirror functions	Permanent (variable position)/oscillating (amplitude per DC variable or fixed)/one-shot[7]
Oscillating frequency	0.5 to 4 Hz
Max. angle of deflection	+20° to −20° (can be set with software)
Reading ranges	See reading field diagrams, *Chapter 10 "Appendix", Page 10-1*
Deflection ranges	See *Fig. 10-18, Page 10-20*
Operating voltage/power consumption	10 to 30 V DC/max. 6.15 W
Weight	620 g with connecting cable

6)   DC = Distance configuration (restriction of active evaluation range of the scan line by selecting the min. and max. values of the code position and the oscillating amplitude by selecting the CW value)
7)   One-shot: one-off oscillating movement per reading pulse (start position and velocity can be selected for forward and return phase)

Table 9-4: Technical specifications for the CLV 440 (Line scanner with oscillating mirror)

9.5 Data sheet CLV 442 Bar Code Scanner (dynamic focus control) High-density Line scanner

Technical data as CLV 440 Line scanner with the following exceptions:

Type	CLV 442
Line scanner	CLV 442-0010 (high density)
Resolution	0.15 to 0.25 mm
Reading Area	See reading field diagrams, *Chapter 10 "Appendix", Page 10-1*

Table 9-5: Technical specifications for the CLV 442 (high-density Line scanner)

8 008 568/K949/10-06-2002   **9-3**

9.6   Dimensioned drawings – CLV

9.6.1   Line/Raster scanner
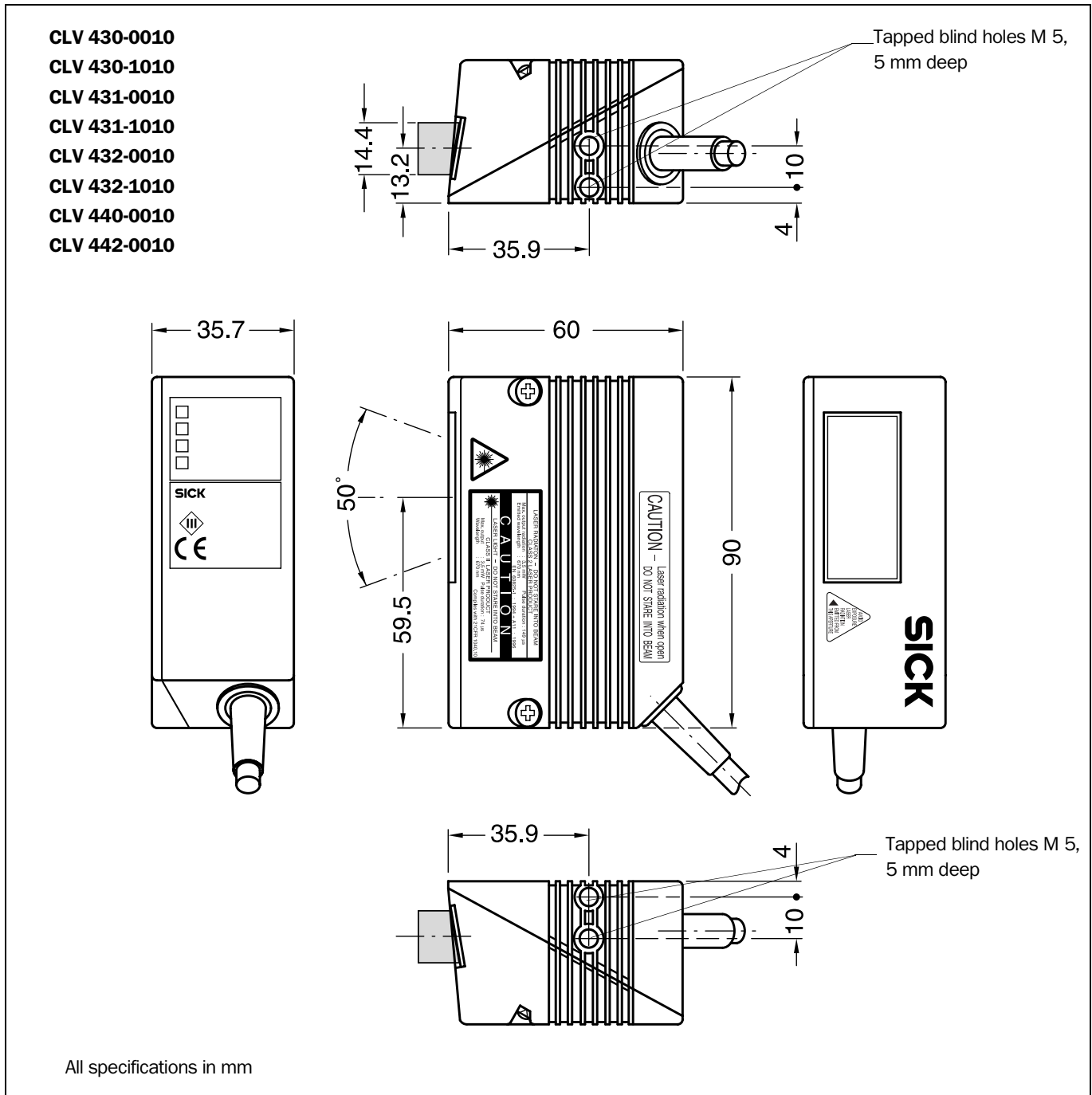
CLV 430-0010
CLV 430-1010
CLV 431-0010
CLV 431-1010
CLV 432-0010
CLV 432-1010
CLV 440-0010
CLV 442-0010

Tapped blind holes M 5, 5 mm deep

Tapped blind holes M 5, 5 mm deep

All specifications in mm

Fig. 9-1:   Dimensions of the CLV 43x/44x Line/Raster scanner

          8 008 568/K949/10-06-2002

9.6.2   Line/Raster scanner with 105° angle attachment

Fig. 9-2:   Dimensions of the CLV 43x/44x Line/Raster scanner with 105° angle attachment

9.6.3 Line scanner with oscillating mirror

CLV 430-6010
CLV 431-6010
CLV 432-6010
CLV 440-6010

All specifications in mm
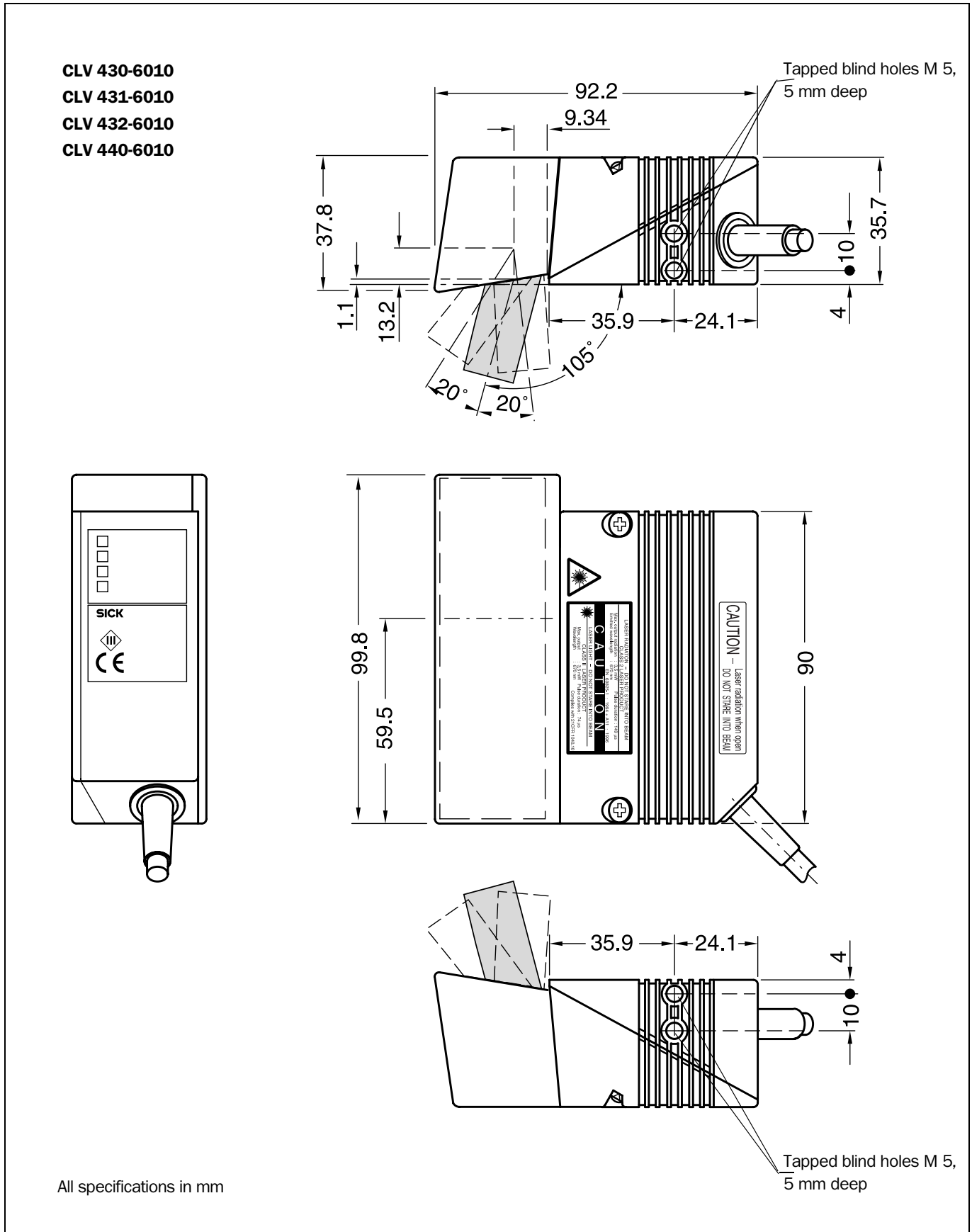
Fig. 9-3: Dimensions of the CLV 43x/440 Line scanner with oscillating mirror

 8 008 568/K949/10-06-2002

10   Appendix

10.1   Overview

The Appendix contains the following additional information:

- Specification diagrams
  - Line/Raster scanner
  - Line/Raster scanner with 105° angle attachment
  - Line scanner with oscillating mirror
- System messages
- Installation and operating instructions for the PC-based "CLV Setup" program
- Configuring the CLV with profile bar codes
- Configuring the CLV with command strings
- Calculating parameter values for setting the CLV
- Auxiliary tables
- Special applications and procedures
- Replacing a CLV (copying the parameter set)
- Available accessories
- Dimensional drawings of the accessories
- Supplementary documentation
- Glossary
- Copy of the EC Declaration of Conformity
- Index
- Scannable sample bar codes

10.2   Specification diagrams

10.2.1   Reading conditions for all diagrams

Test code	Code 39/ITF
Print ratio	2:1
Print contrast	> 90 %
Tilt	±10°
Ambient light	< 2000 lx
Good read rate	> 75 %

Table 10-1: Reading conditions for specification diagrams

10.2.2   Overview of diagrams

CLV 43x (fixed focus)

CLV type	Scan procedure	Diagram	Page
CLV 430-0010 CLV 430-1010	Line scanner Raster scanner	Reading field diagram: reading ranges (DOF)	*10-4*
CLV 430-6010	Line scanner with oscillating mirror	Reading field diagram: reading ranges (DOF)	*10-5*
CLV 431-0010 CLV 431-1010	Line scanner Raster scanner	Reading field diagram: reading ranges (DOF)	*10-6*
CLV 431-2010 CLV 431-3010	Line scanner with 105° angle attachment Raster scanner with 105° angle attachment	Reading field diagram: reading ranges (DOF)	*10-7*
CLV 431-6010	Line scanner with oscillating mirror	Reading field diagram: reading ranges (DOF)	*10-8*
CLV 432-0010 CLV 432-1010	Line scanner Raster scanner	Reading field diagram: reading ranges (DOF)	*10-9*
CLV 432-2010 CLV 432-3010	Line scanner with 105° angle attachment Raster scanner with 105° angle attachment	Reading field diagram: reading ranges (DOF)	*10-10*
CLV 432-6010	Line scanner with oscillating mirror	Reading field diagram: reading ranges (DOF)	*10-11*
CLV 43x-x010 CLV 43x-6010	Line scanner/Raster scanner Line scanner with oscillating mirror	Characteristics field scanning frequency	*10-20*
CLV 430-6010	Line scanner with oscillating mirror	Deflection range	*10-20*
CLV 431-6010	Line scanner with oscillating mirror	Deflection range	*10-21*
CLV 432-6010	Line scanner with oscillating mirror	Deflection range	*10-21*

Table 10-2: Overview of specification diagrams for the CLV 43x

CLV 440 (dynamic focus control)

CLV type	Scan procedure	Diagram	Page
CLV 440-0010	Line scanner	Reading field diagram: min. and max. reading distance for 0.20 mm	*10-12*
CLV 440-0010	Line scanner	Reading field diagram: min. and max. reading distance for 0.25 mm	*10-13*
CLV 440-0010	Line scanner	Reading field diagram: min. and max. reading distance for 0.35 mm	*10-14*
CLV 440-0010	Line scanner	Reading field diagram: min. and max. reading distance for 0.50 mm	*10-15*
CLV 440-0010	Line scanner	Reading field diagram: reading ranges (DOF) for 1.00 mm	*10-16*
CLV 440-6010	Line scanner with oscillating mirror	Reading field diagram: min. and max. reading distance for 0.25 mm	*10-17*
CLV 440-6010	Line scanner with oscillating mirror	Reading field diagram: min. and max. reading distance for 0.35 mm	*10-18*
CLV 440-6010	Line scanner with oscillating mirror	Reading field diagram: min. and max. reading distance for 0.50 mm	*10-19*
CLV 440-0010 CLV 440-6010	Line scanner Line scanner with oscillating mirror	Characteristics field scanning frequency	*10-20*
CLV 440-6010	Line scanner with oscillating mirror	Deflection range, focus position 280 mm	*10-20*
CLV 440-6010	Line scanner with oscillating mirror	Deflection range, focus position 215 mm	*10-21*
CLV 440-6010	Line scanner with oscillating mirror	Deflection range, focus position 140 mm	*10-21*

Table 10-3: Overview of specification diagrams for the CLV 440

CLV 442 (dynamic focus control)

CLV type	Scan procedure	Diagram	Page
CLV 442-0010	Line scanner	Reading field diagram: min. and max. reading distance for 0.15 mm	*10-22*
CLV 442-0010	Line scanner	Reading field diagram: min. and max. reading distance for 0.20 mm	*10-23*
CLV 442-0010	Line scanner	Reading field diagram: min. and max. reading distance for 0.25 mm	*10-24*
CLV 442-0010	Line scanner	Characteristics field scanning frequency	*10-25*

Table 10-4: Overview of specification diagrams for the CLV 442

10.2.3 Reading field diagram for CLV 430 Line/Raster scanner (front reading window)

CLV 430-0010
CLV 430-1010

Resolution
0.35 mm
0.5 mm

Scaninng frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Raster scanner: Raster height 15 mm at 200 mm reading distance

Reading conditions:
see Table 10-1, Page 10-1
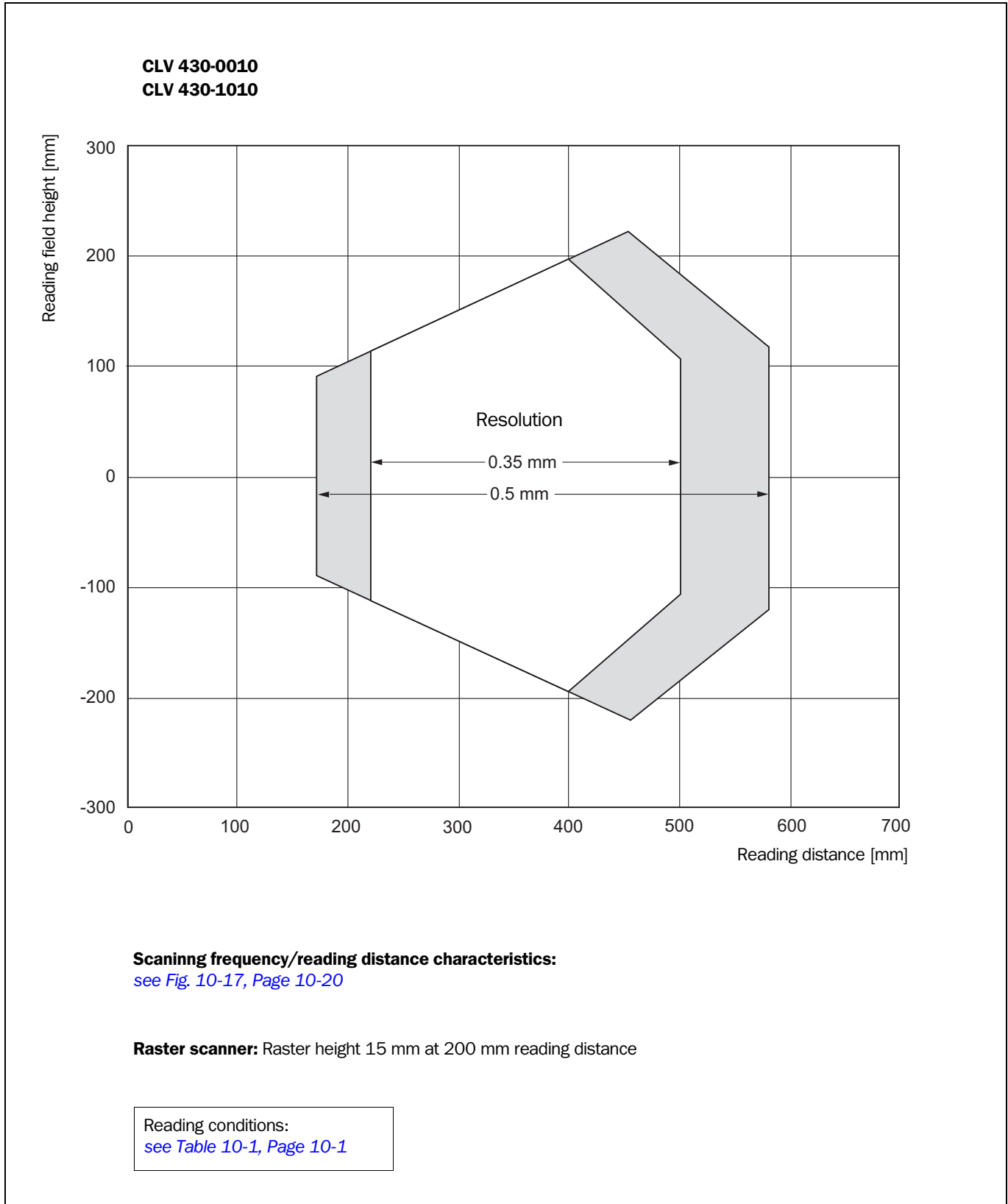
Fig. 10-1: CLV 430-0010/-1010: reading range (DOF) for Line/Raster scanner

CLV 43x/44x Bar Code Scanner

10.2.4   Reading field diagram for CLV 430 Line scanner with oscillating mirror (side reading window)
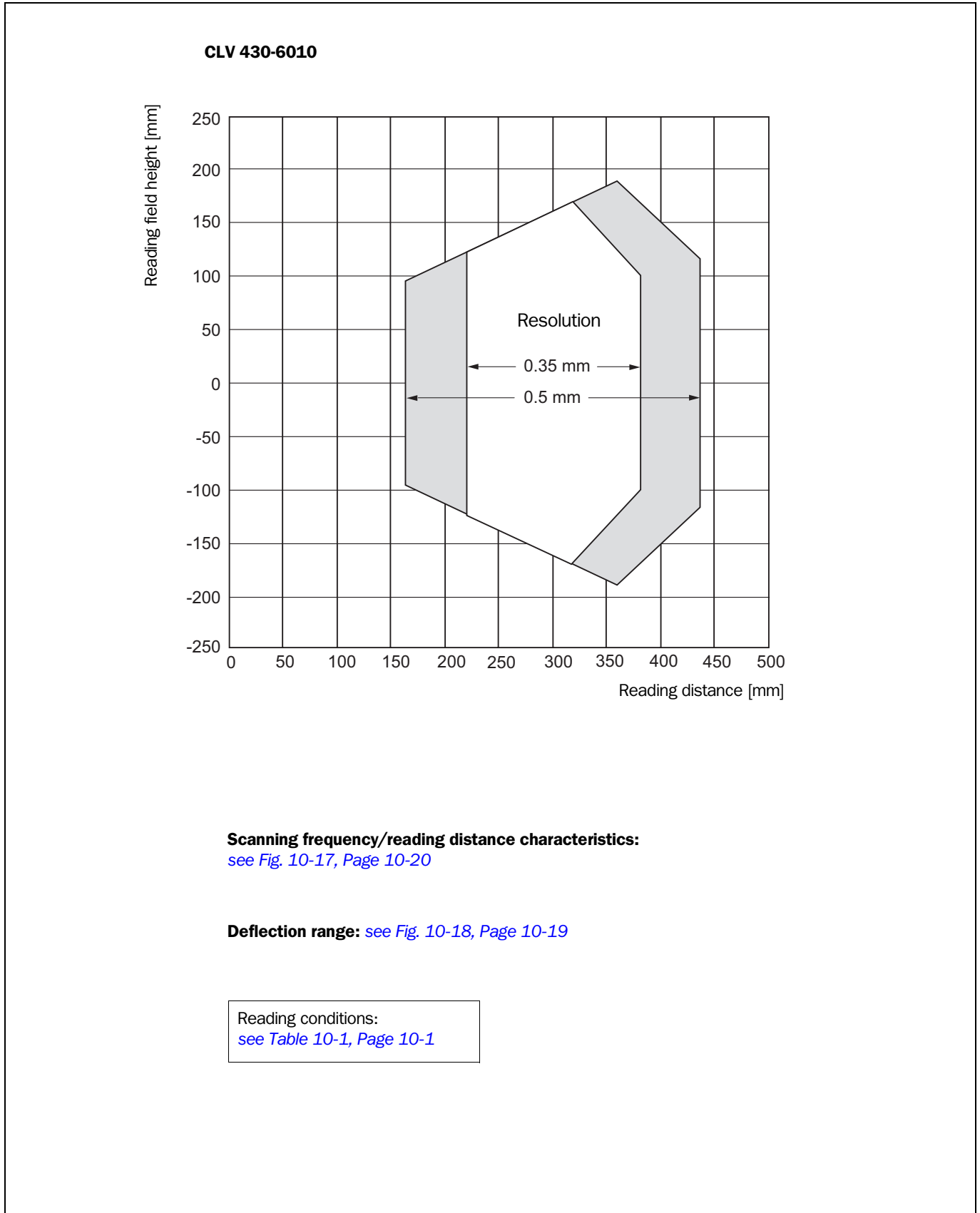
CLV 430-6010

Fig. 10-2:   CLV 430-6010: reading range (DOF) for Line scanner with oscillating mirror

Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Deflection range: *see Fig. 10-18, Page 10-19*

Reading conditions:
see Table 10-1, Page 10-1

10.2.5   Reading field diagram for CLV 431 Line/Raster scanner
(front reading window)

CLV 431-0010
CLV 431-1010

Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Raster scanner: Raster height 15 mm at 200 mm reading distance

Reading conditions:
see Table 10-1, Page 10-1
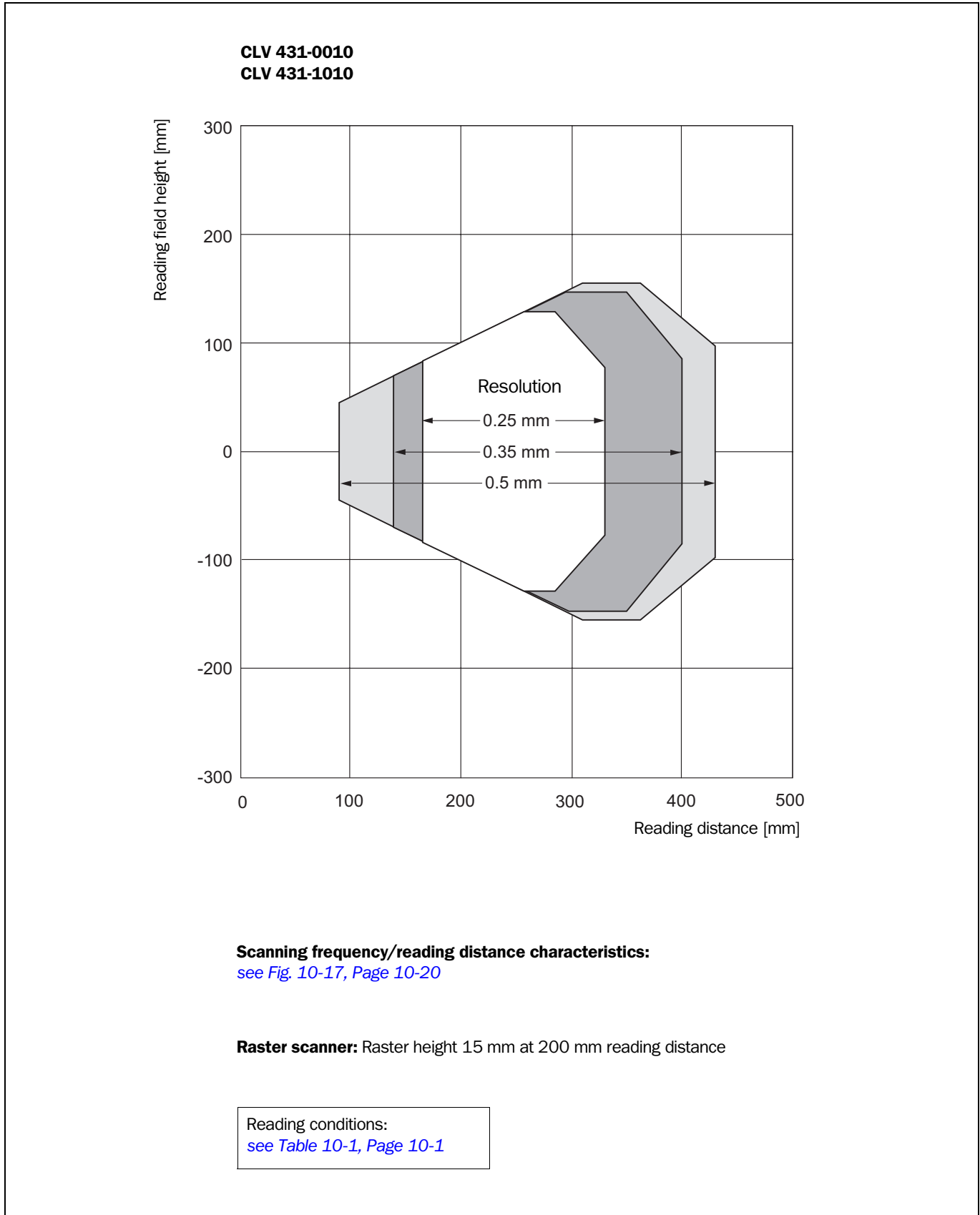
Fig. 10-3: CLV 431-0010/-1010: reading range (DOF) for Line/Raster scanner

8 008 568/K949/10-06-2002

**10.2.6   Reading field diagram for CLV 431 Line/Raster scanner
with 105° angle attachment (side reading window)**

**CLV 431-2010
CLV 431-3010**
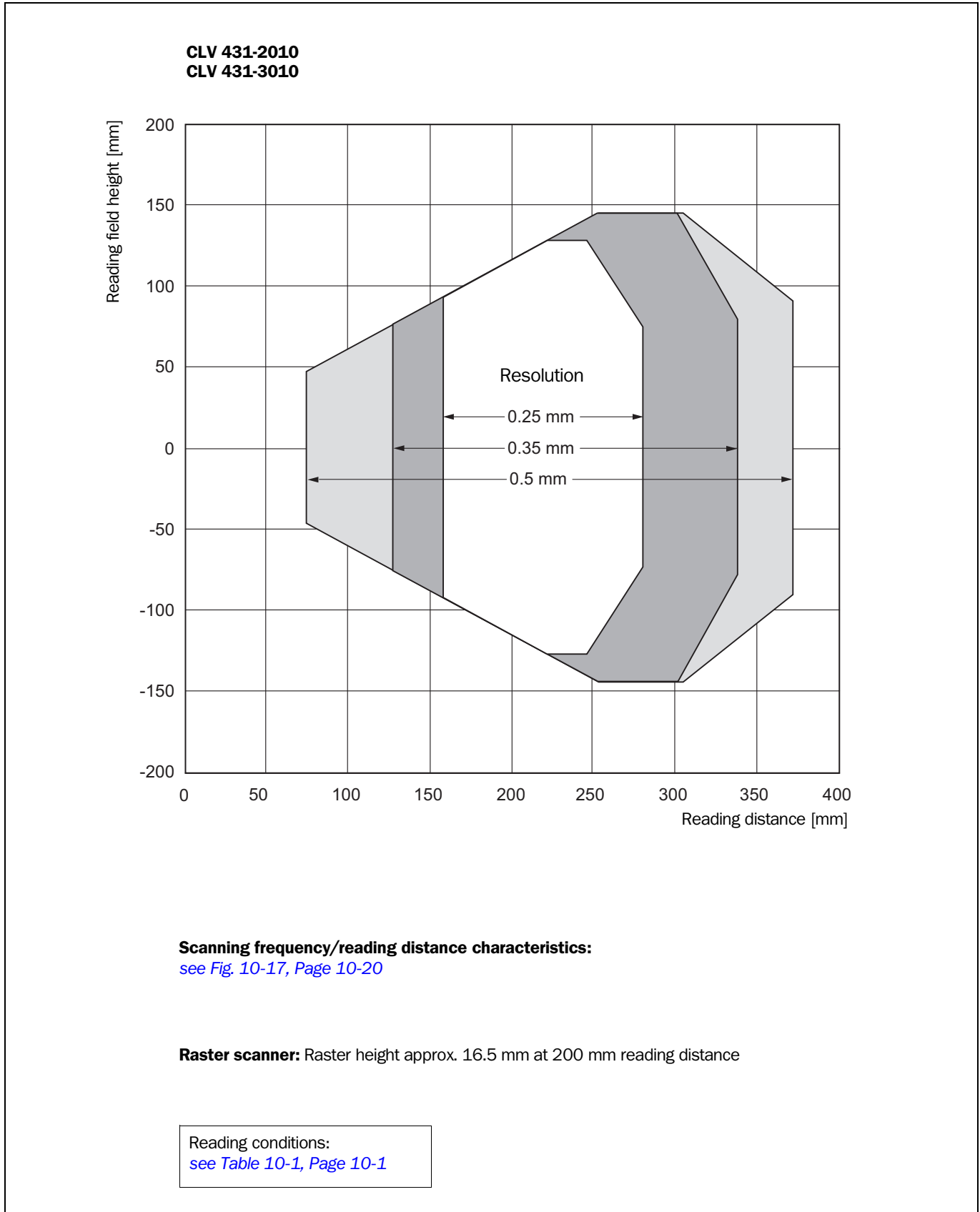
Fig. 10-4:   CLV 431-2010/-3010: reading range (DOF) for Line/Raster scanner with 105° angle attachment

10.2.7 Reading field diagram for CLV 431 Line scanner with oscillating mirror (side reading window)

CLV 431-6010

Reading field height [mm]

Resolution

0.25 mm

0.35 mm

0.5 mm

Reading distance [mm]

Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Deflection range: *see Fig. 10-18, Page 10-20*

Reading conditions:
see Table 10-1, Page 10-1
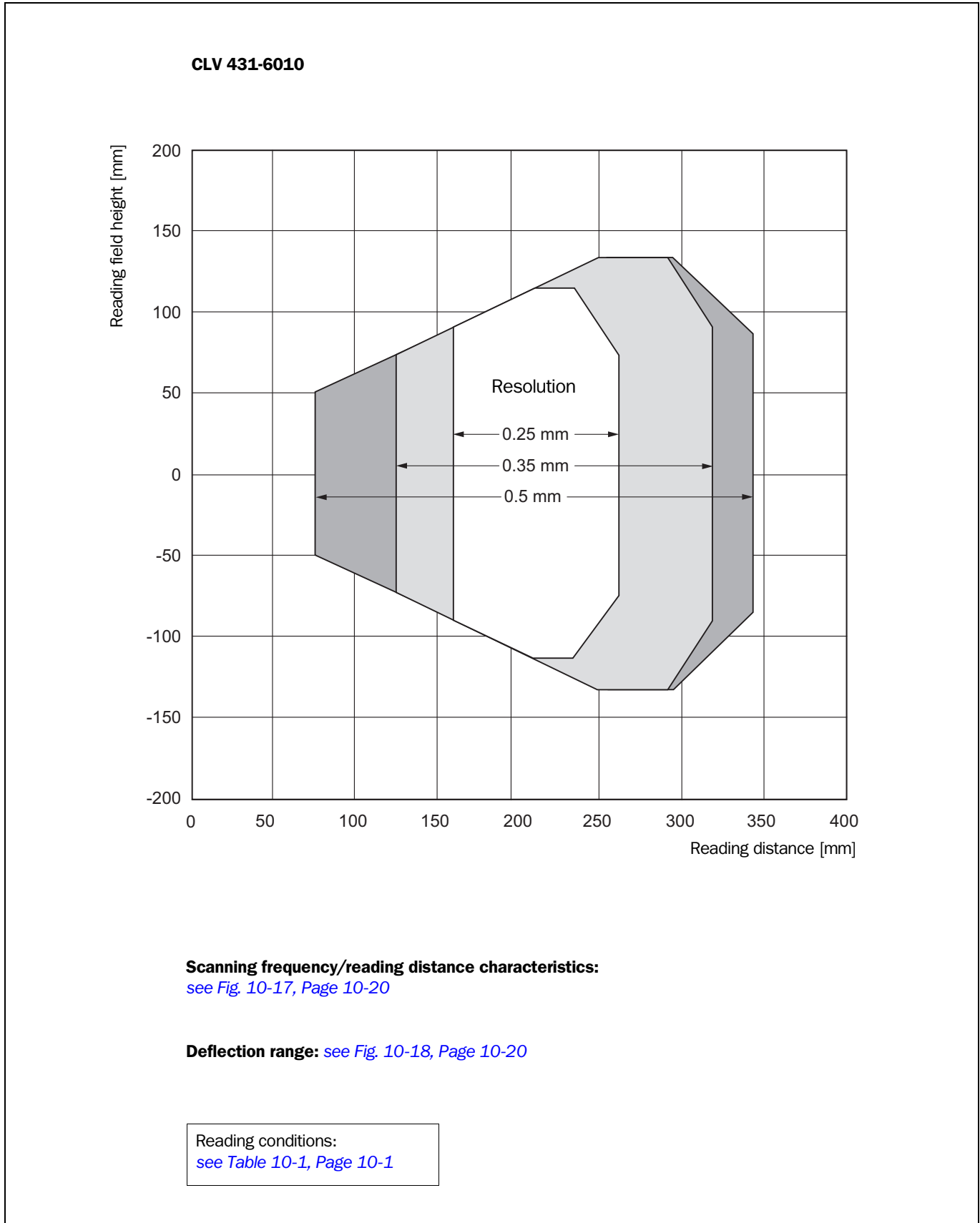
Fig. 10-5: CLV 431-6010: reading range (DOF) for Line scanner with oscillating mirror

10.2.8   Reading field diagram for CLV 432 Line/Raster scanner
(front reading window)

CLV 432-0010
CLV 432-1010

Resolution

0.2 mm
0.35 mm
0.5 mm

Reading field height [mm]

Reading distance [mm]

Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Raster scanner: Raster height 15 mm at 200 mm reading distance

Reading conditions:
see Table 10-1, Page 10-1
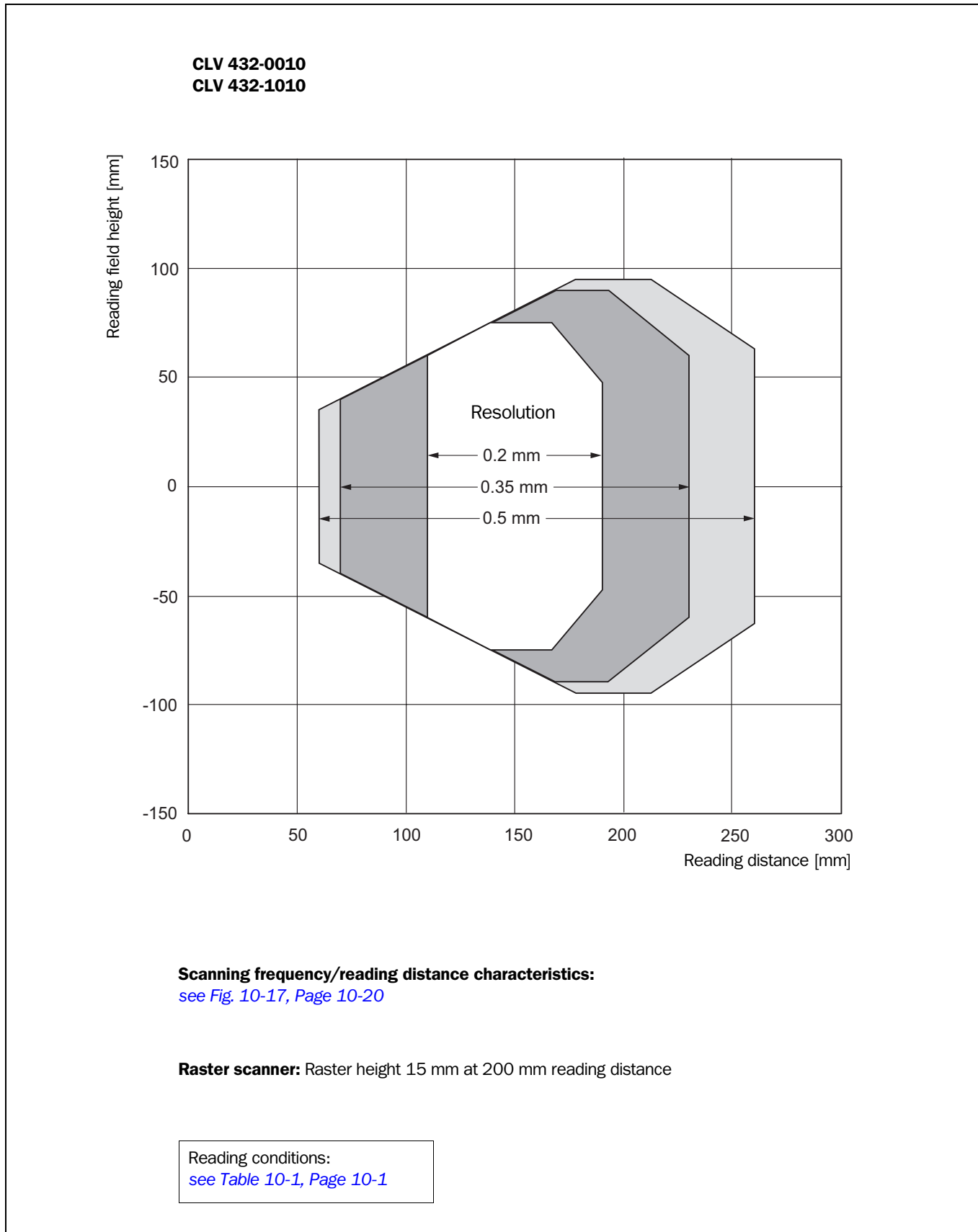
Fig. 10-6: CLV 432-0010/1010: reading range (DOF) for Line/Raster scanner

10.2.9   Reading field diagram for CLV 432 Line/Raster scanner with 105° angle attachment (side reading window)

CLV 432-2010
CLV 432-3010
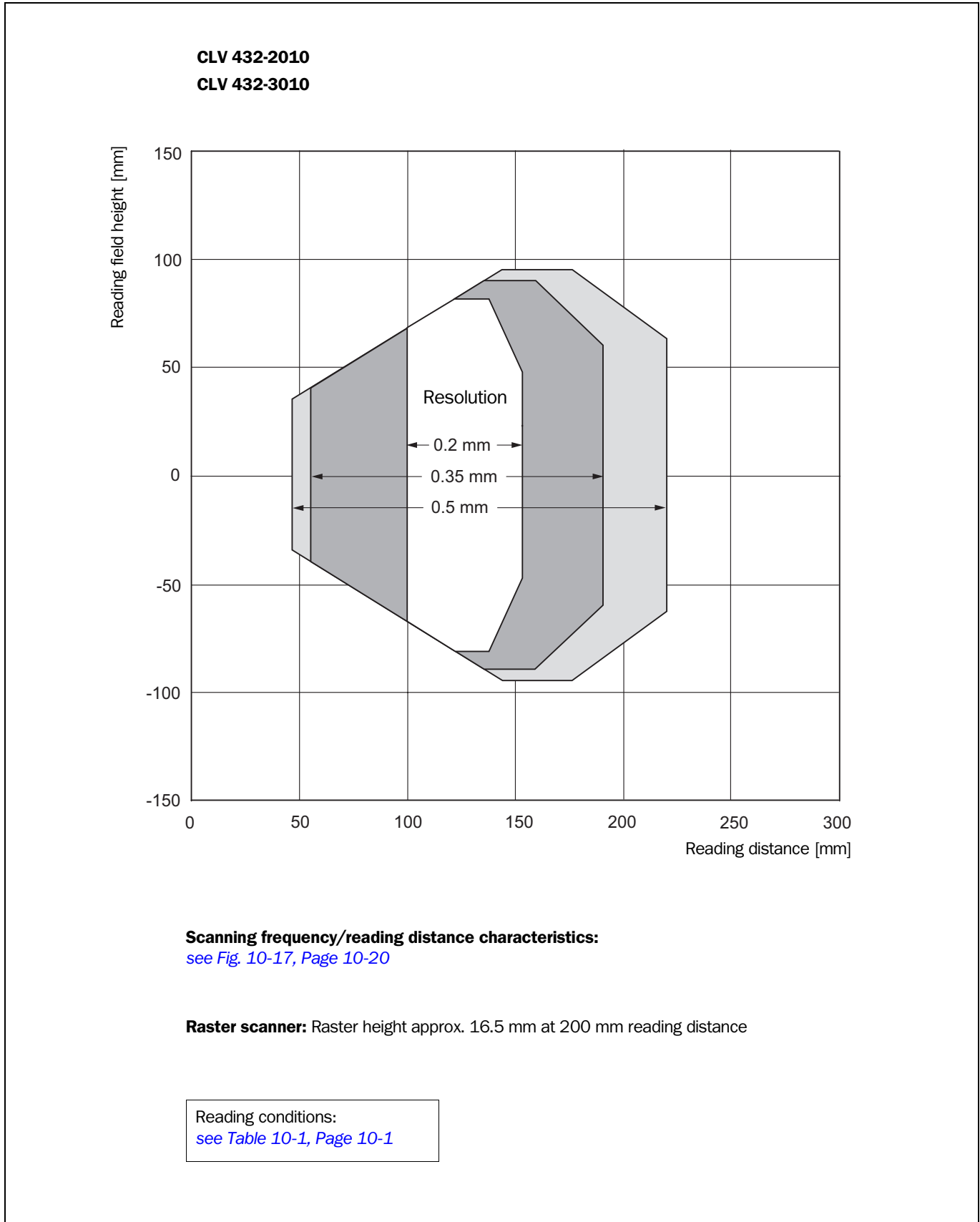
Fig. 10-7:   CLV 432-2010/-3010: reading range (DOF) for Line/Raster scanner with 105° angle attachment

Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Raster scanner: Raster height approx. 16.5 mm at 200 mm reading distance

Reading conditions:
see Table 10-1, Page 10-1

10.2.10 Reading field diagram for CLV 432 Line scanner with oscillating (side reading window)

CLV 432-6010

Reading field height [mm] axis (100, 50, 0, -50, -100) versus *Reading distance [mm]* (0, 50, 100, 150, 200, 250)

Resolution
0.20 mm
0.35 mm
0.5 mm

Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Deflection range: *see Fig. 10-18, Page 10-20*

Reading conditions:
see Table 10-1, Page 10-1
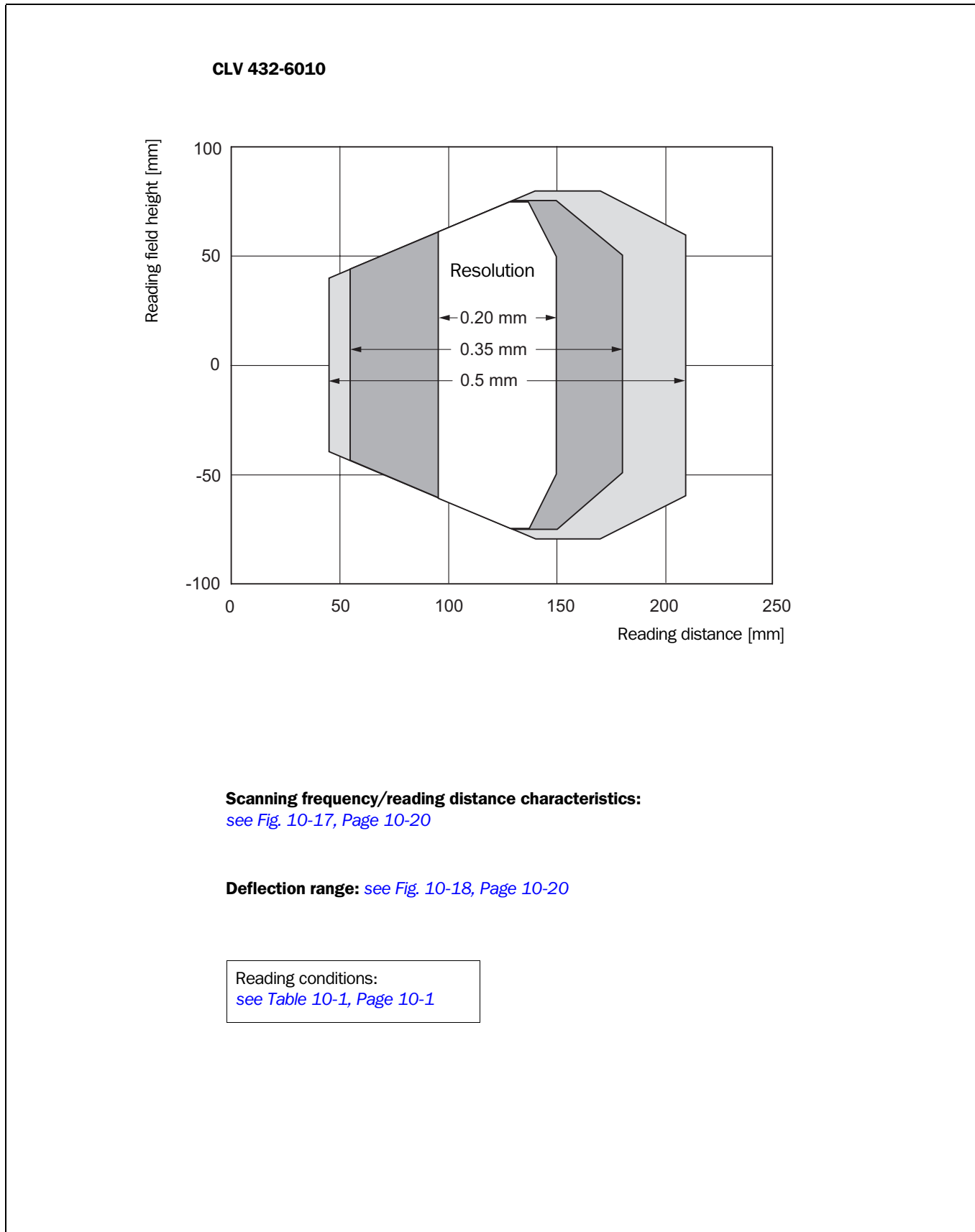
Fig. 10-8: CLV 432-6010: reading range (DOF) for Line scanner with oscillating mirror

10.2.11 Reading field diagrams for CLV 440 Line scanner (front reading window)
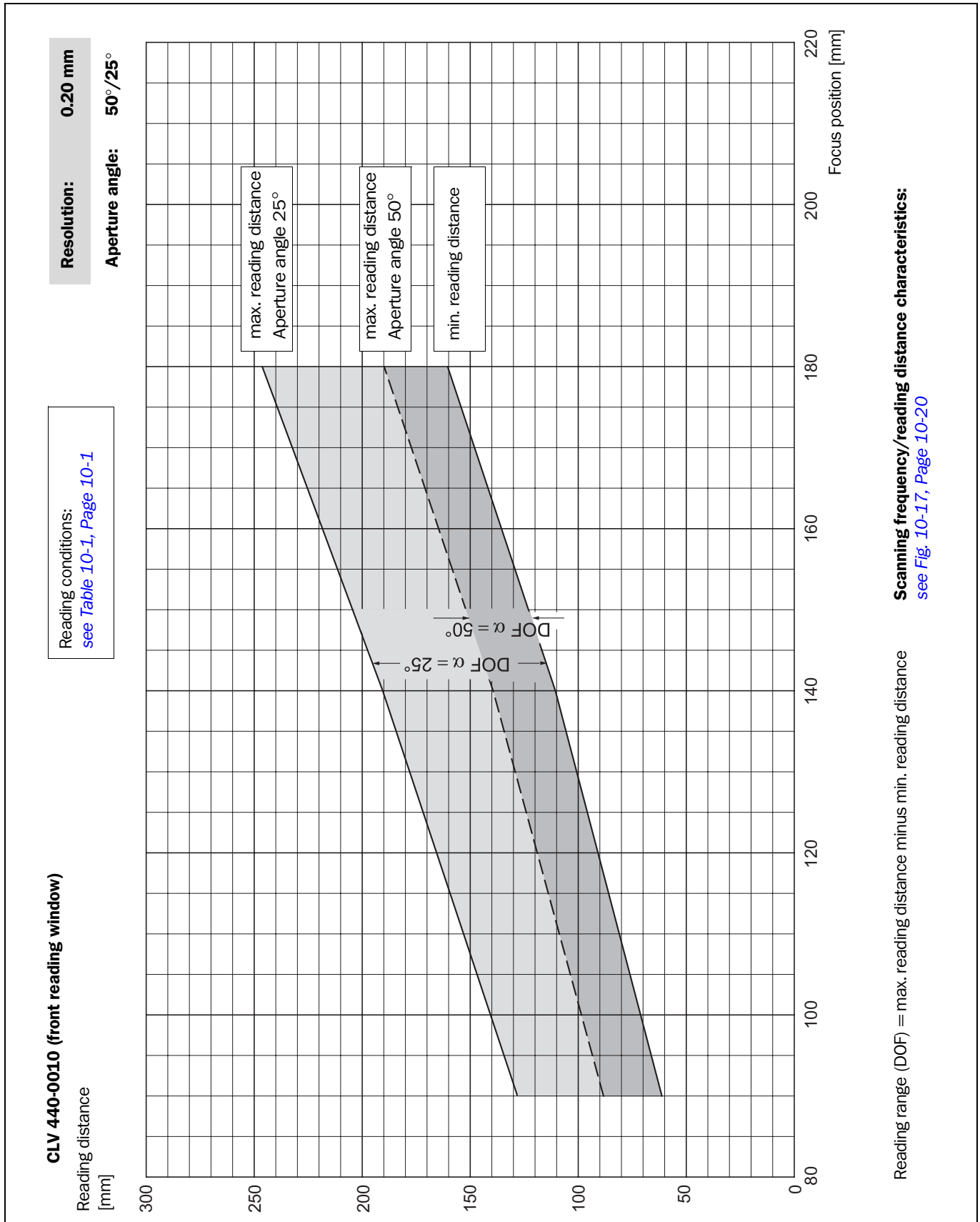
Fig. 10-9: CLV 440-0010: min. and max. reading distance for Line scanner as a function of the focus position at resolution 0.2 mm

8 008 568/K949/10-06-2002

Resolution: 0.25 mm

Aperture angle: 50°/25°

Reading conditions:
see *Table 10-1, Page 10-1*

CLV 440-0010 (front reading window)

Reading distance [mm]

max. reading distance Aperture angle 25°

max. reading distance Aperture angle 50°

min. reading distance

DOF α = 25°

DOF α = 50°

Focus position [mm]

Scanning frequency/reading distance characteristics:
see *Fig. 10-17, Page 10-20*

Reading range (DOF) = max. reading distance minus min. reading distance

Fig. 10-10: CLV 440-0010: min. and max. reading distance for Line scanner as a function of the focus position at resolution 0.25 mm

CLV 440-0010 (front reading window)

Resolution: **0.35 mm**

Aperture angle: **50°/25°**

Reading conditions:
see Table 10-1, Page 10-1

Reading distance [mm]

max. reading distance
Aperture angle 25°

max. reading distance
Aperture angle 50°

min. reading distance

DOF α = 25°

DOF α = 50°

Focus position [mm]

Reading range (DOF) = max. reading distance minus min. reading distance

Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Fig. 10-11: CLV 440-0010: min. and max. reading distance for Line scanner as a function of the focus position at resolution 0.35 mm

CLV 43x/44x Bar Code Scanner

CLV 440-0010 (front reading window)

Resolution: 0.50 mm

Aperture angle: 50°/25°

Reading conditions:
see *Table 10-1, Page 10-1*

max. reading distance
Aperture angle 25°

max. reading distance
Aperture angle 50°

min. reading distance

DOF α = 50°

DOF α = 25°

Reading distance [mm]

Focus position [mm]

Reading range (DOF) = max. reading distance minus min. reading distance

Scanning frequency/reading distance characteristics:
see *Fig. 10-17, Page 10-20*

Fig. 10-12: CLV 440-0010: min. and max. reading distance for Line scanner as a function of the focus position at resolution 0.50 mm

CLV 440-0010 (front reading window)

Resolution:	1.00 mm
Aperture angle:	**50°**
Scanning frequency:	**800 Hz**
Focus position:	**400 mm**
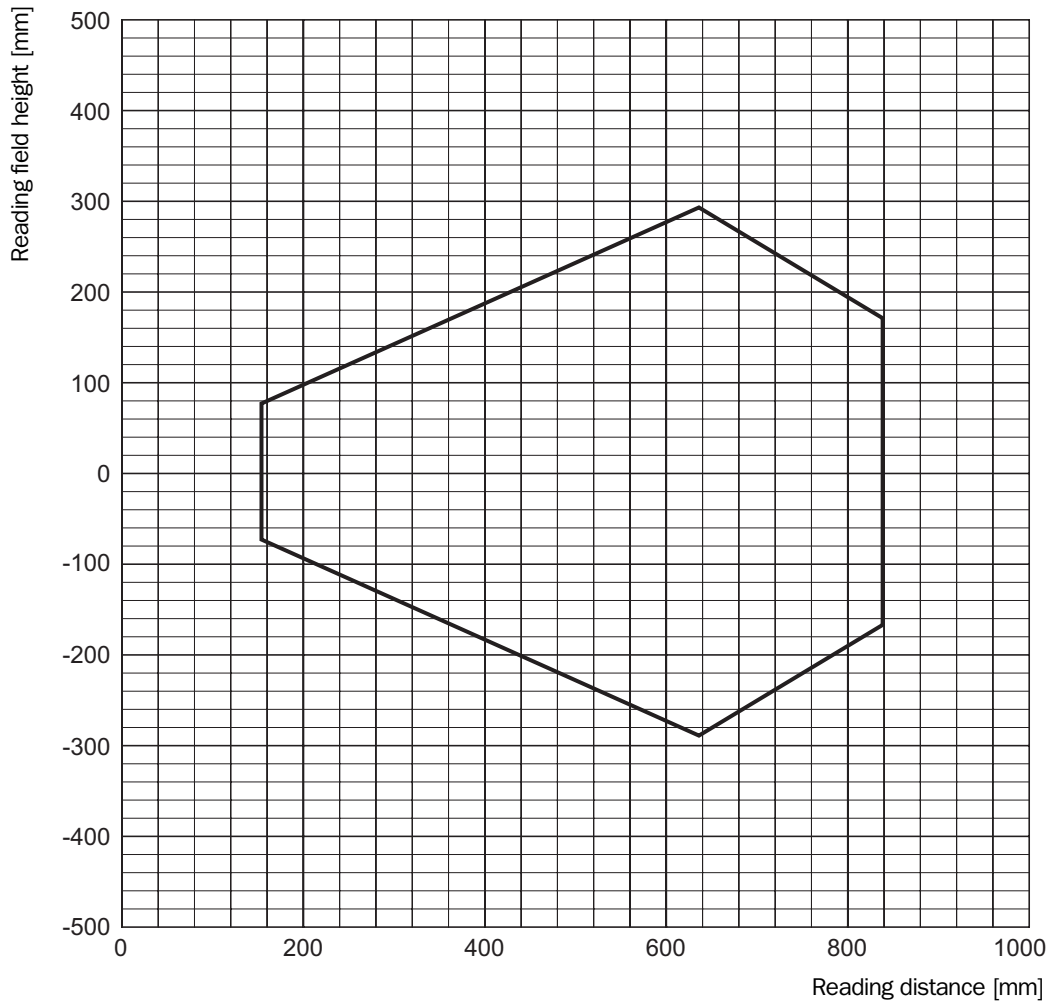
Scanning frequency/reading distance characteristics:
see Fig. 10-17, Page 10-20

Reading conditions:
see Table 10-1, Page 10-1

Fig. 10-13: CLV 440-0010: reading range (DOF) for Line scanners at resolution 1.0 mm

10.2.12 Reading field diagrams for CLV 440 Line scanner with oscillating mirror (side reading window)

Fig. 10-14: CLV 440-6010: min. and max. reading distance for Line scanner with oscillating mirror as a function of the focus position at resolution 0.25 mm

CLV 440-6010 (side reading window)

Resolution: 0.35 mm

Aperture angle: 50°/25°

Reading conditions: see *Table 10-1, Page 10-1*

max. reading distance Aperture angle 25°

max. reading distance Aperture angle 50°

min. reading distance

DOF α = 25°

DOF α = 50°

Reading distance [mm]

Focus position [mm]

Reading range (DOF) = max. reading distance minus min. reading distance

Scanning frequency/reading distance characteristics: see *Fig. 10-17, Page 10-20*

Deflection range: see *Fig. 10-18, Page 10-20*

Fig. 10-15: CLV 440-6010: min. and max. reading distance for Line scanner with oscillating mirror as a function of the focus position at resolution 0.35 mm

8 008 568/K949/10-06-2002

Fig. 10-16: CLV 440-6010: min. and max. reading distance for Line scanner with oscillating mirror as a function of the focus position at resolution 0.50 mm

10.2.13 CLV 43x/440 characteristics field of scanning frequency
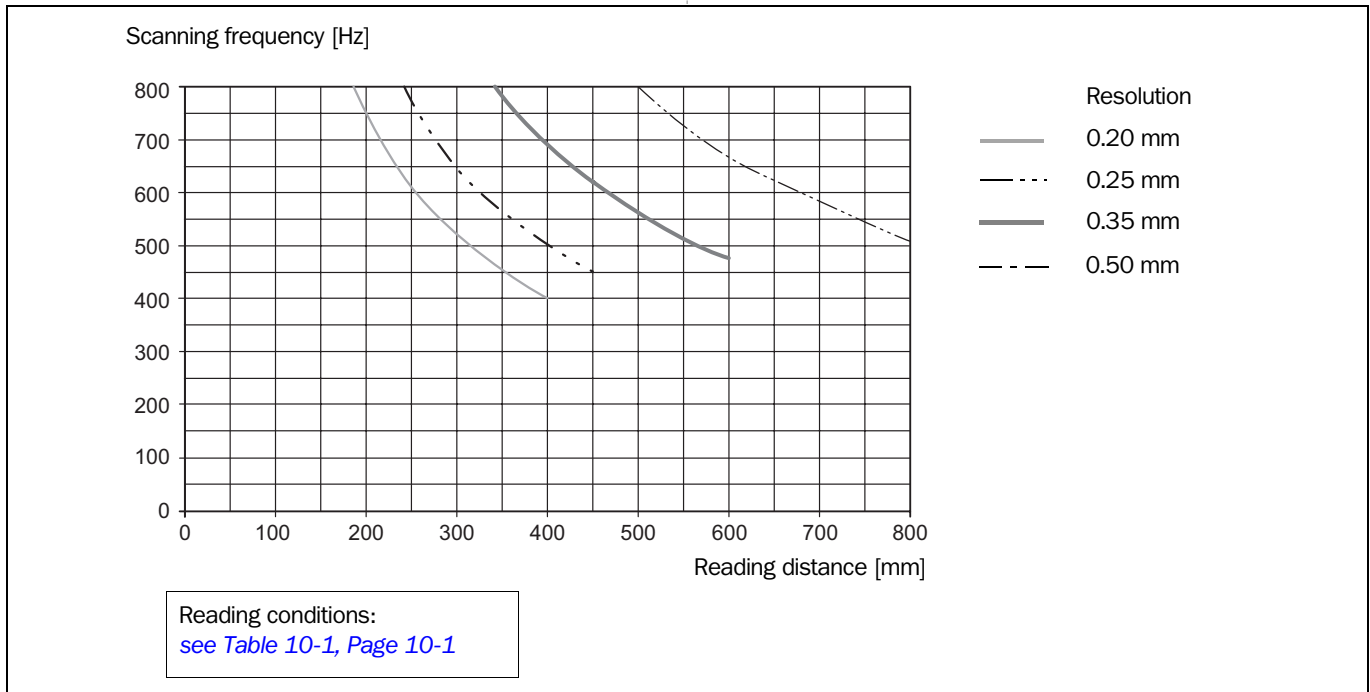
Fig. 10-17: CLV 43x/440: scanning frequency characteristic as a function of the reading distance and resolution

10.2.14 Deflection range of Line scanner with oscillating mirror
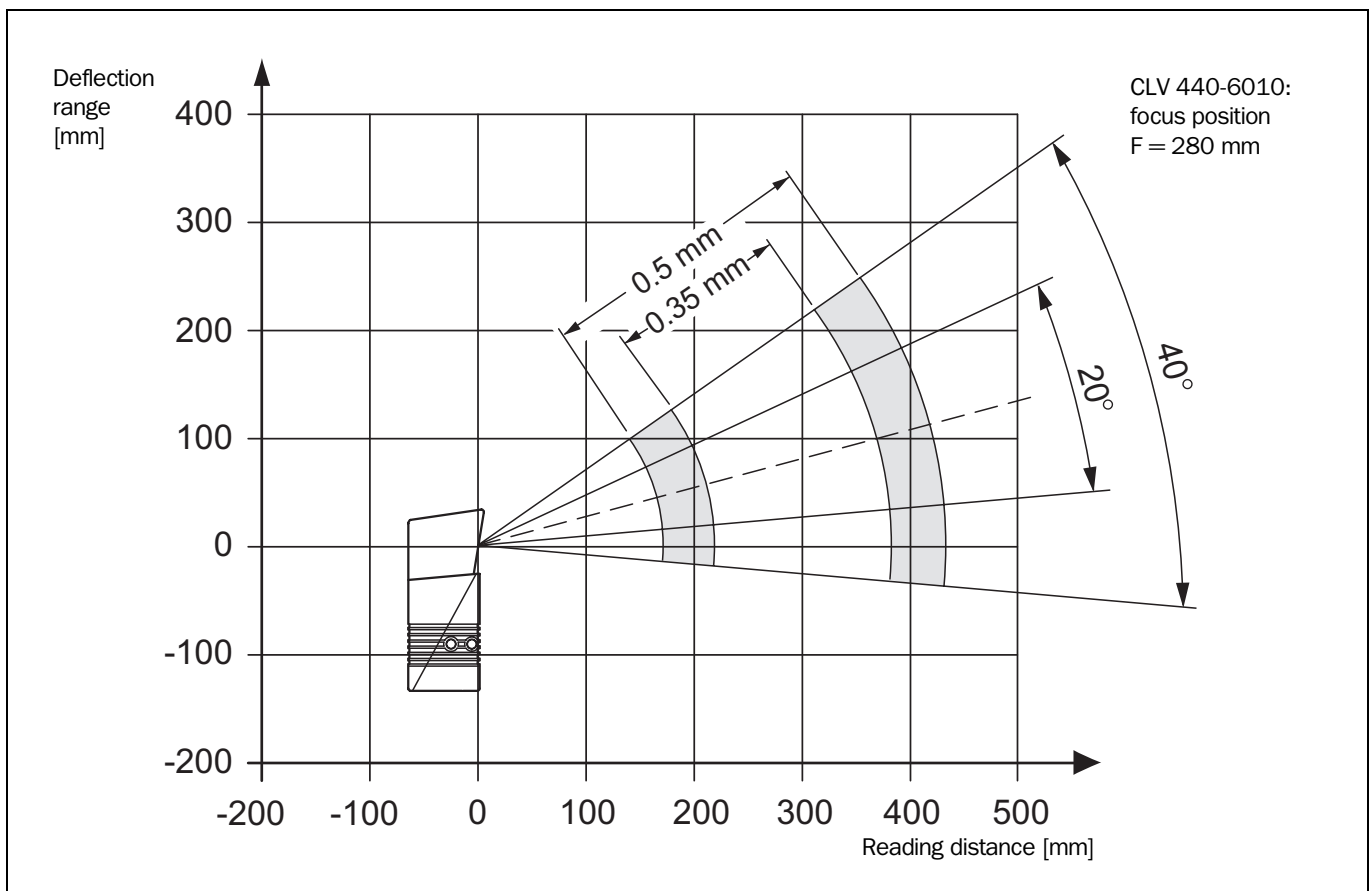
Fig. 10-18: CLV 430-/440-6010: deflection range as a function of the reading distance, deflection angle and resolution

                   8 008 568/K949/10-06-2002

CLV 43x/44x Bar Code Scanner
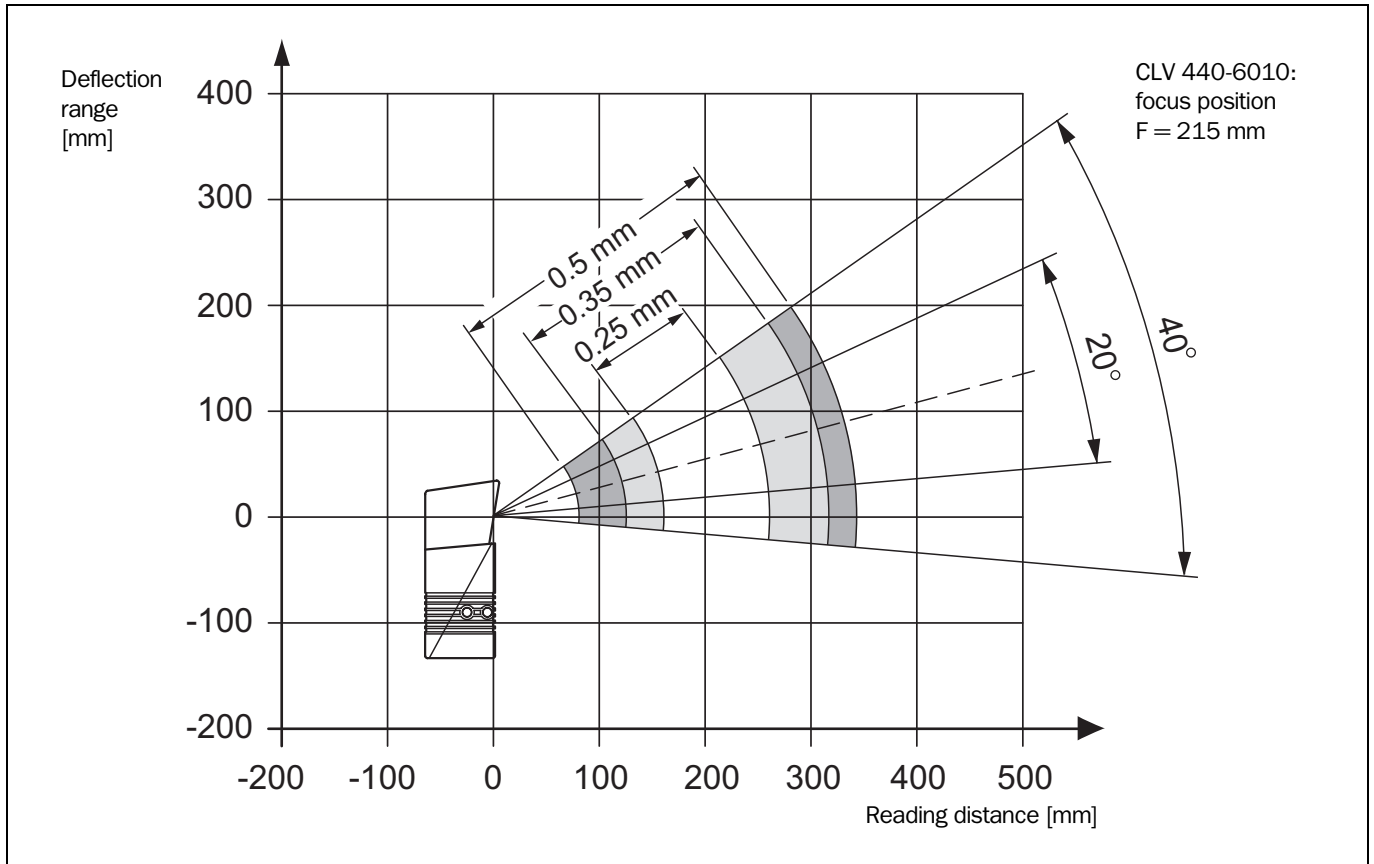
Fig. 10-19: CLV 431-/440-6010: deflection range as a function of the reading distance, deflection angle and resolution
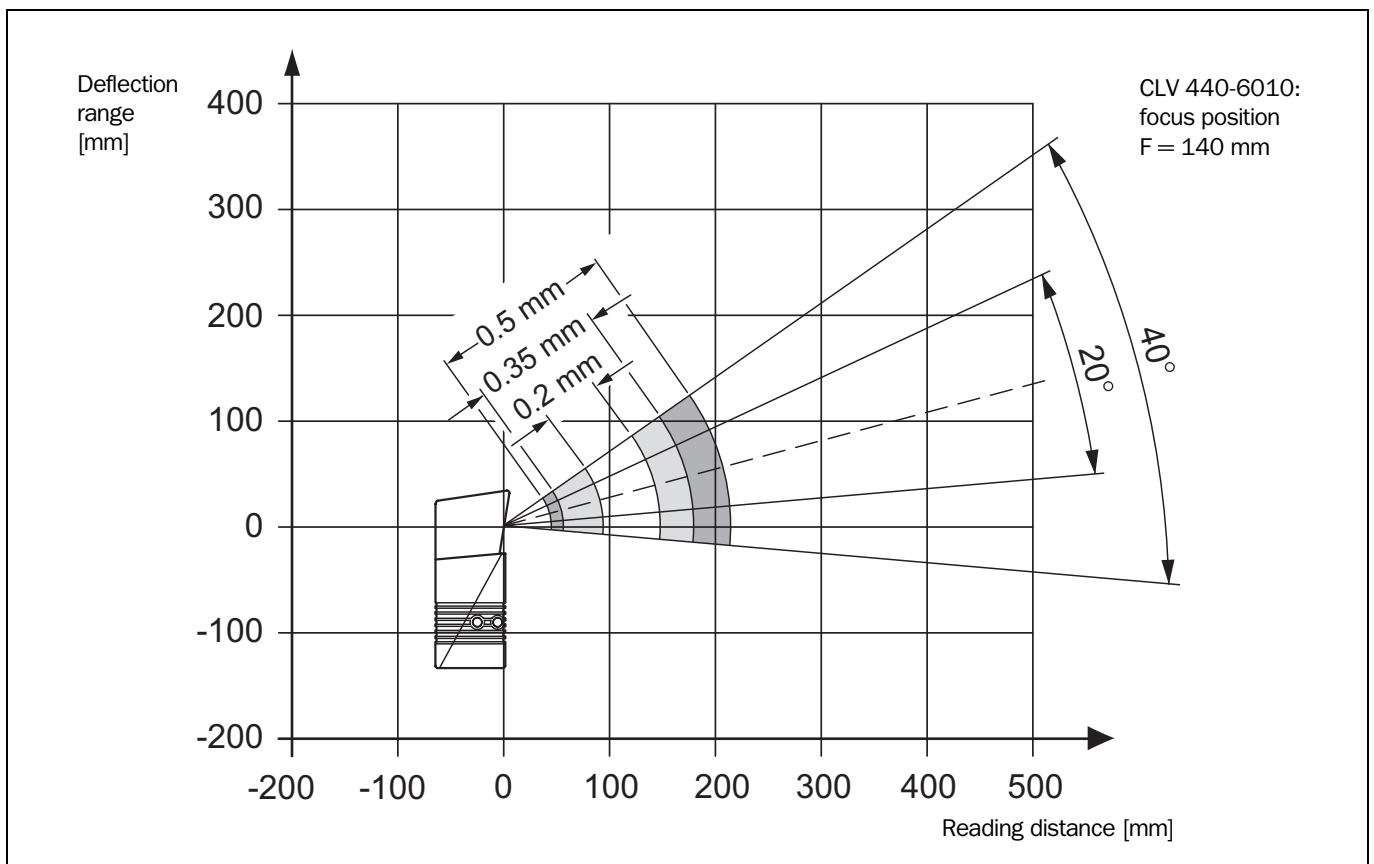
Fig. 10-20: CLV 432-/440-6010: deflection range as a function of the reading distance, deflection angle and resolution

10.2.15 Reading field diagrams for CLV 442 Line scanner
(front reading window)

CLV 442-0010 (front reading window)

Resolution: **0.15 mm**

Aperture angle: **25°**

Reading conditions:
see *Table 10-1, Page 10-1*

max. reading distance
Aperture angle 25°

min. reading distance
Aperture angle 25°

Reading distance [mm]

Focus position [mm]

Reading range (DOF) = max. reading distance minus min. reading distance

Scanning frequency/reading distance characteristics:
see *Fig. 10-24, Page 10-25*

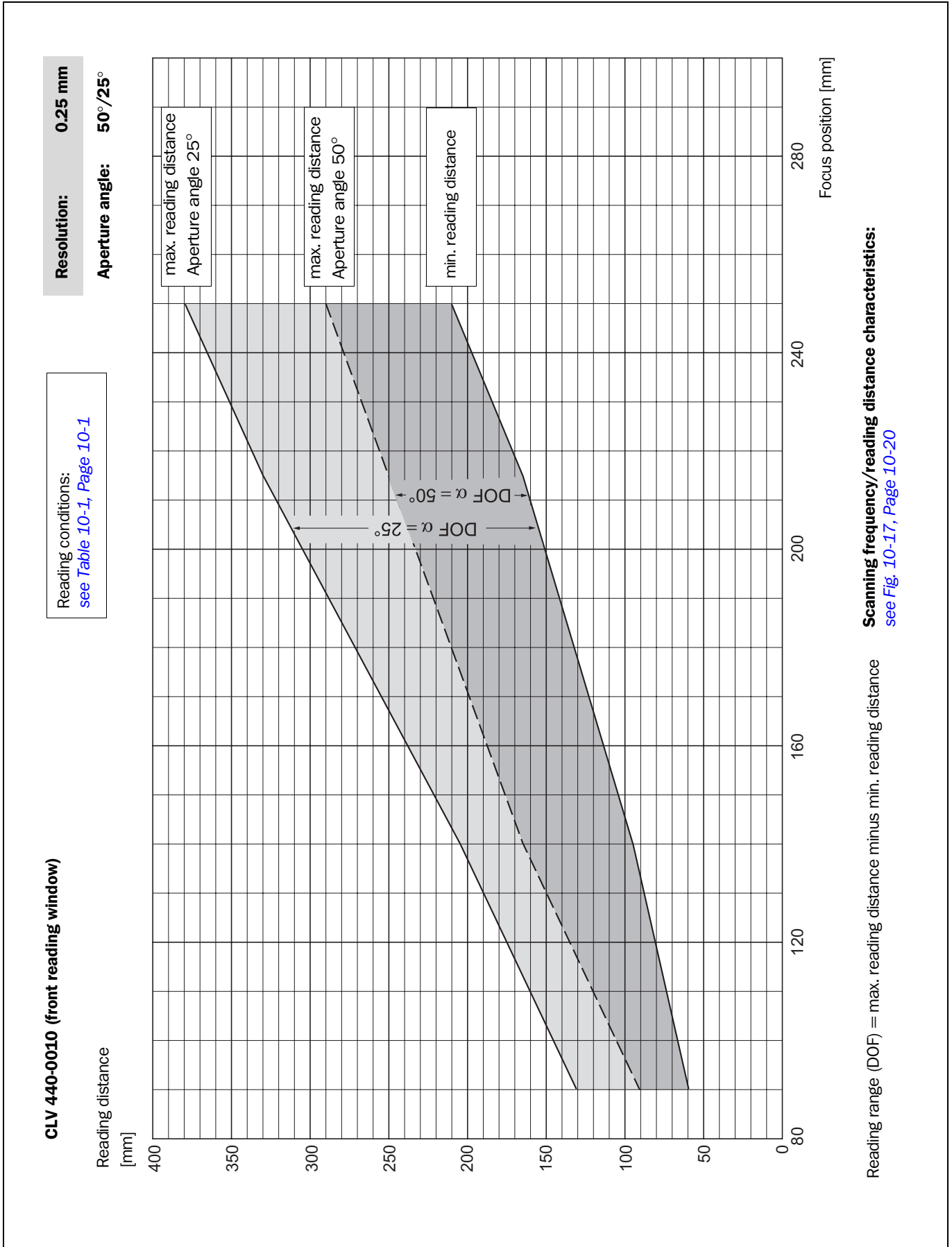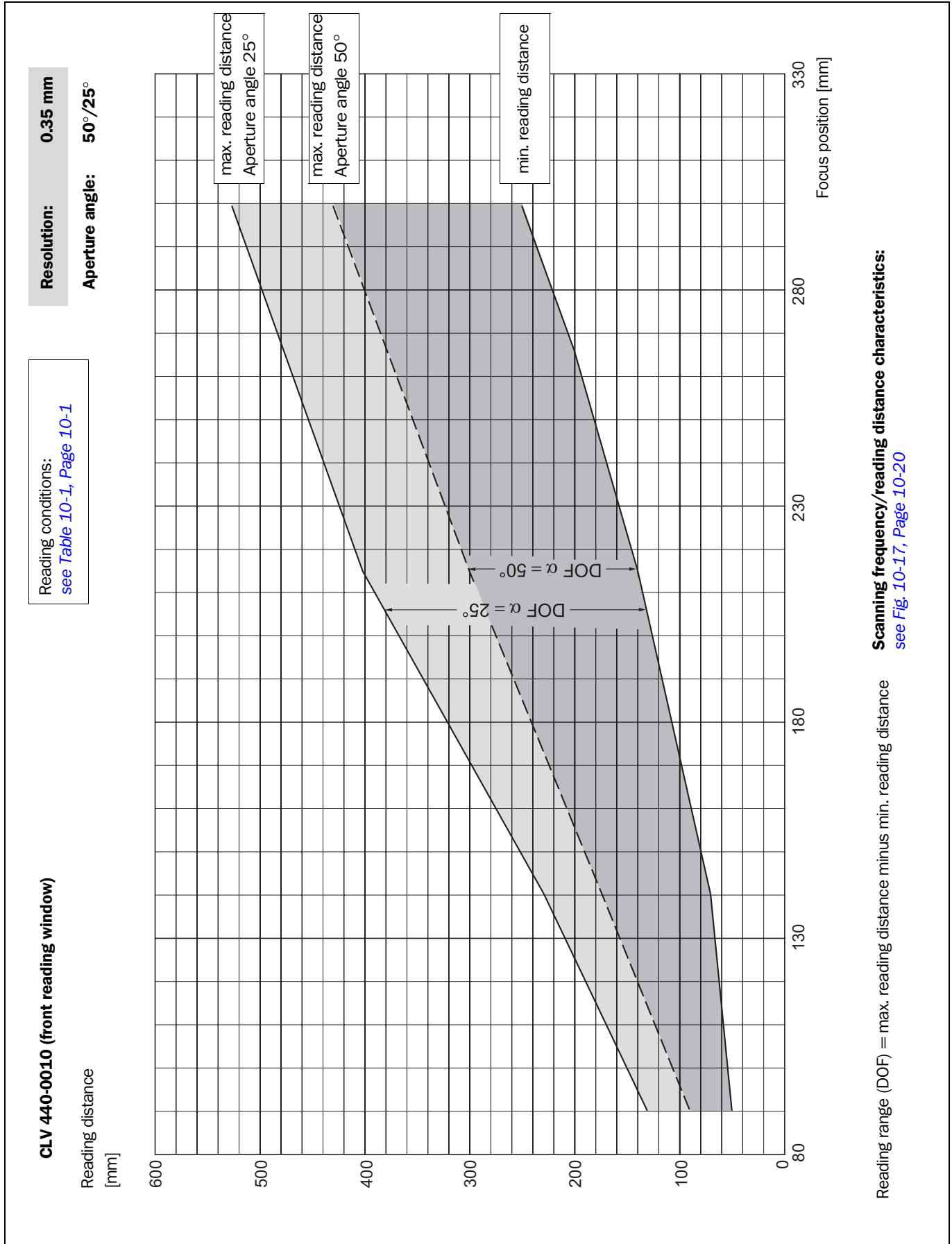Fig. 10-21: CLV 442-0010: min. and max. reading distance for Line scanner as a function of the focus position at resolution 0.15 mm

CLV 442-0010 (front reading window)

Reading distance [mm]

Resolution: 0.20 mm
Aperture angle: 25°

Reading conditions:
see *Table 10-1, Page 10-1*

max. reading distance
Aperture angle 25°

min. reading distance
Aperture angle 25°

Focus position [mm]

Scanning frequency/reading distance characteristics:
see *Fig. 10-24, Page 10-25*

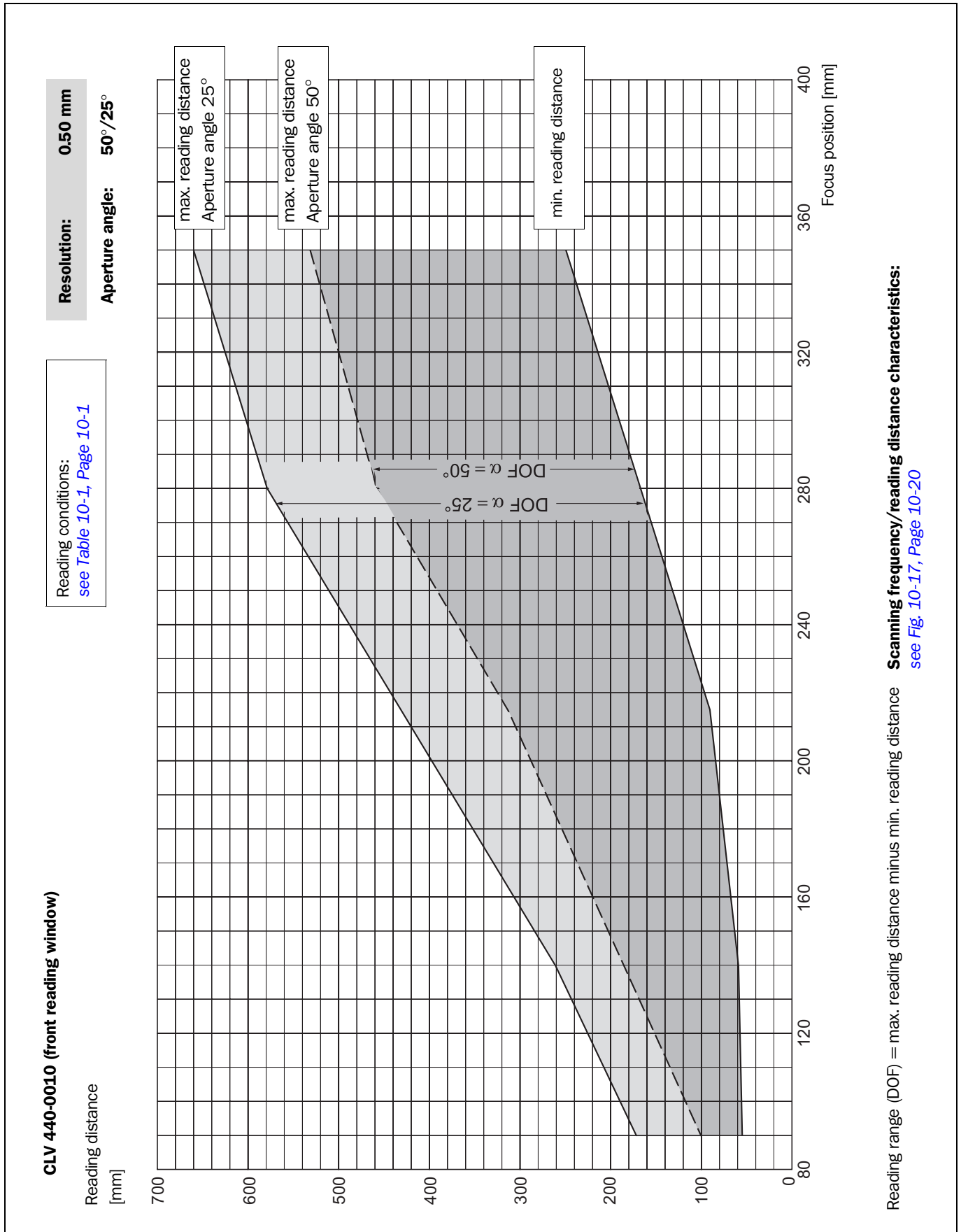Reading range (DOF) = max. reading distance minus min. reading distance

Fig. 10-22: CLV 442-0010: min. and max. reading distance for Line scanner as a function of the focus position at resolution 0.20 mm

**CLV 442-0010 (front reading window)**

Resolution: 0.25 mm

Aperture angle: 25°

Reading conditions:
see *Table 10-1, Page 10-1*

Reading distance [mm]

Focus position [mm]

max. reading distance
Aperture angle 25°

min. reading distance
Aperture angle 25°

Scanning frequency/reading distance characteristics:
see *Fig. 10-24, Page 10-25*
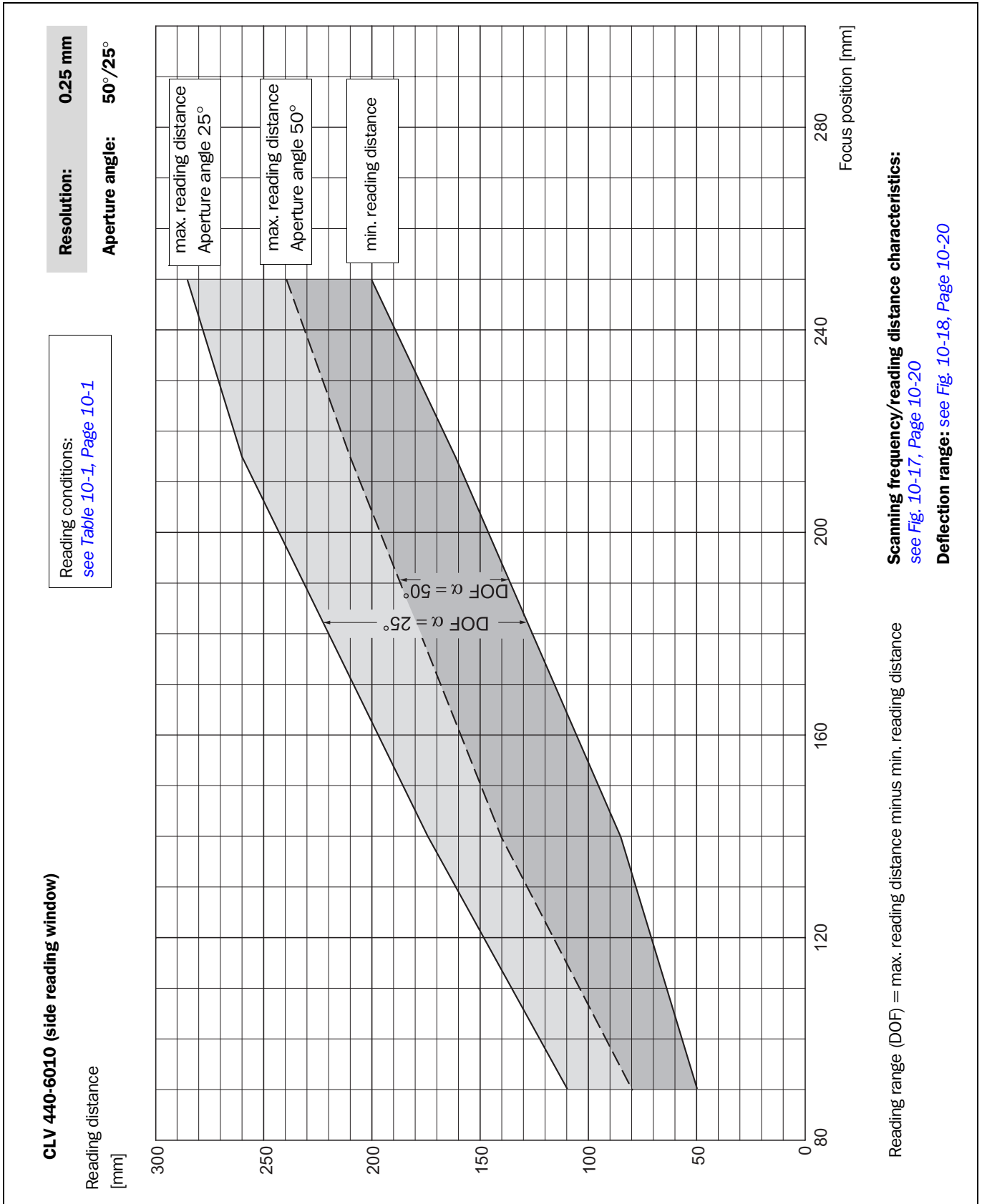
Reading range (DOF) = max. reading distance minus min. reading distance

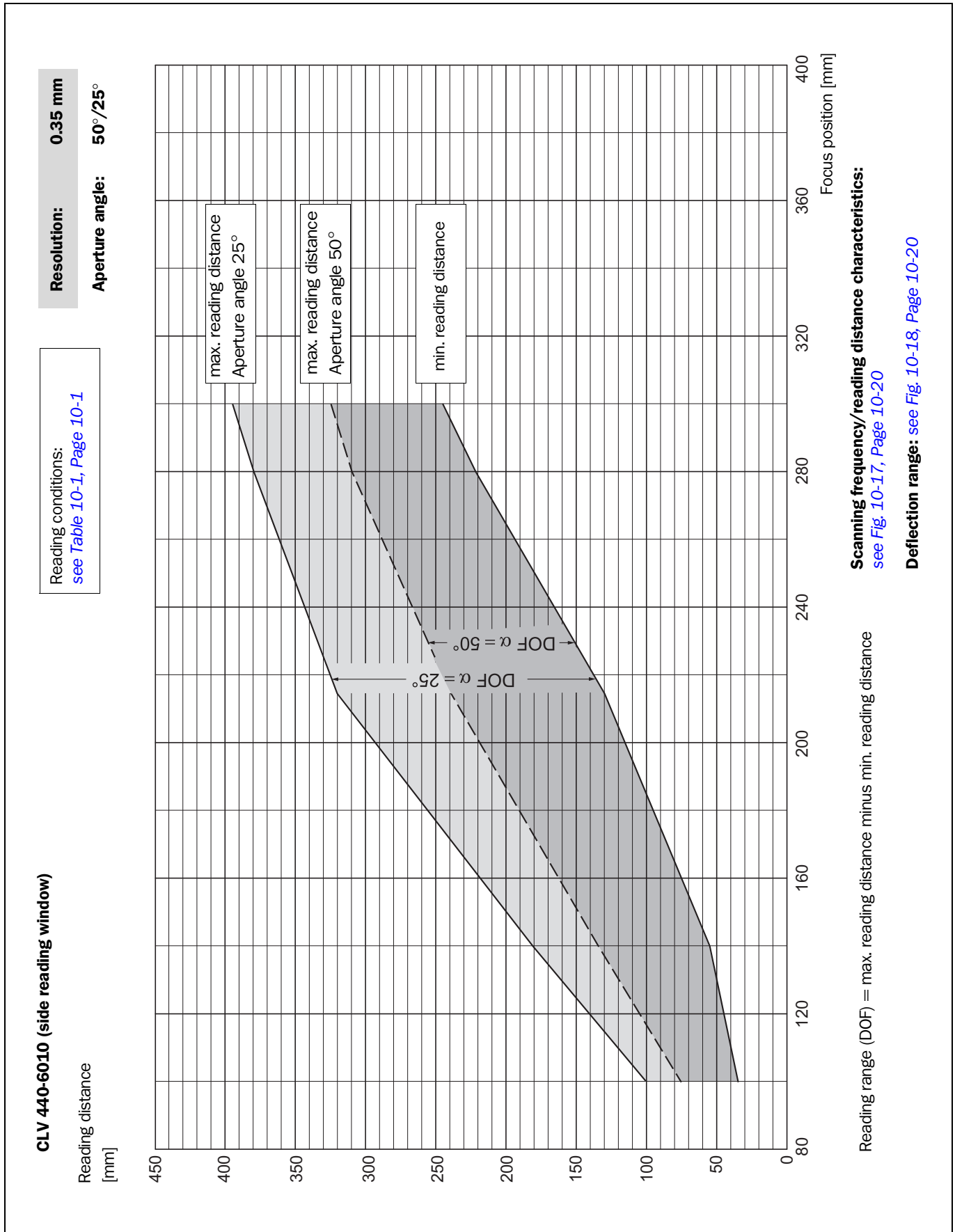Fig. 10-23: CLV 442-0010: min. and max. reading distance for Line scanner as a function of the focus position at resolution 0.25 mm
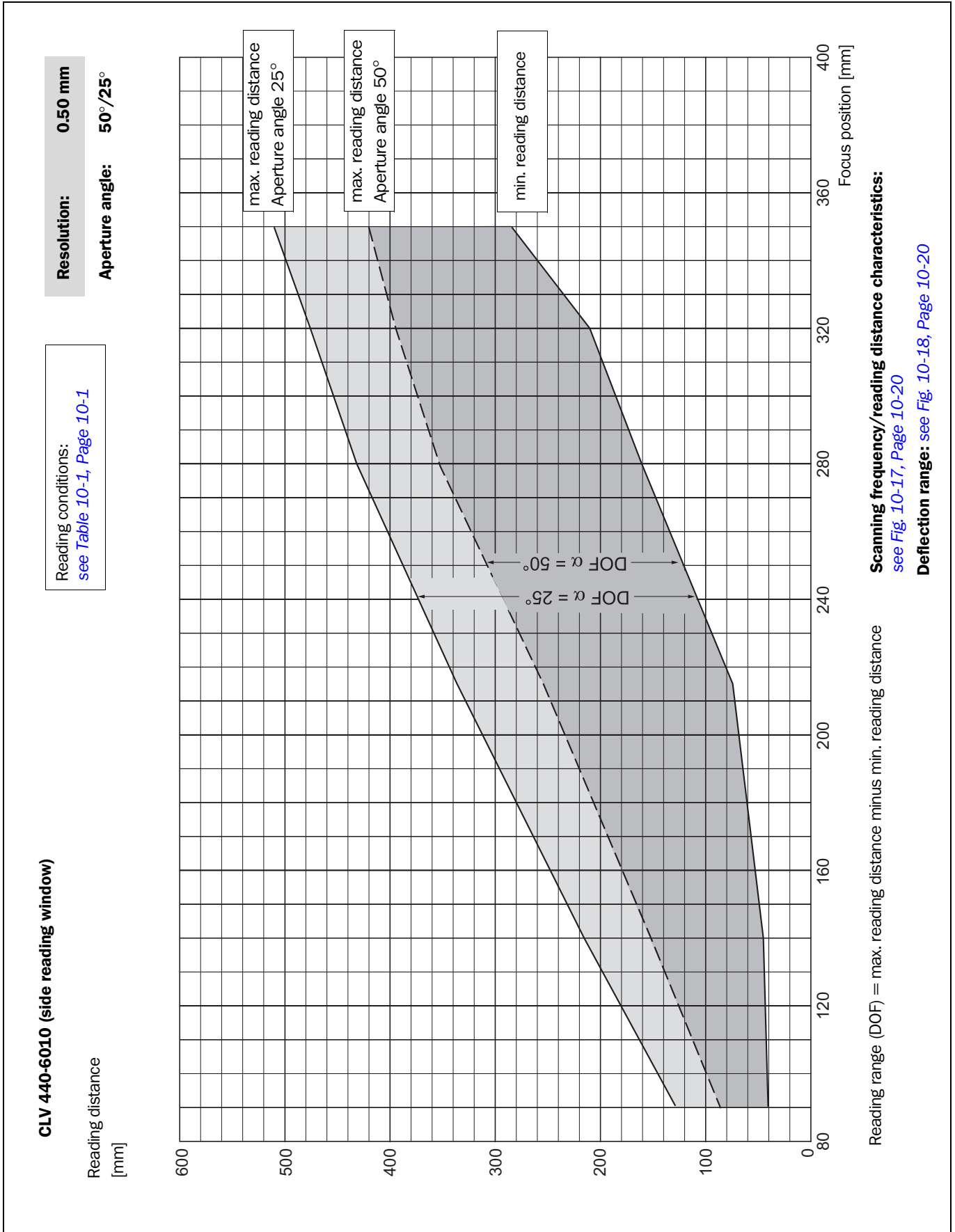
8 008 568/K949/10-06-2002

10.2.16 CLV 442 characteristics field of scanning frequency
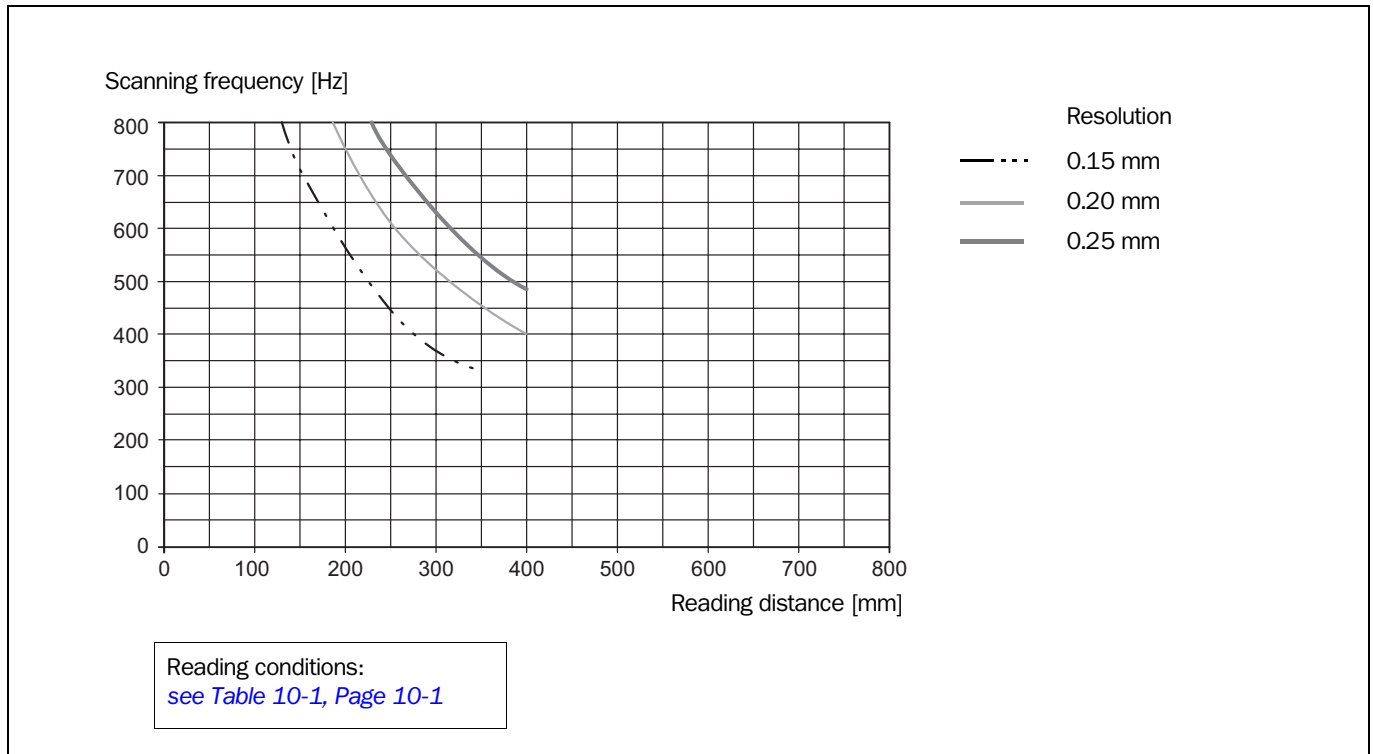
Fig. 10-24: CLV 442-0010: scanning frequency as a function of the reading distance and resolution

10.3   System messages

The CLV outputs all system messages in plain text via the terminal interface. The messages are in English and can be displayed in extended mode of the Terminal Emulator in the CLV Setup user interface *(see Chapter 6.6 "CLV messages", Page 6-32)*.

Message	Meaning
"CLV 440 Soft.Vers. V2.20 Rev. no. J934 Host: RS232"	The software version and revision is displayed when the power supply is switched on.
"no code"	In Reading/Parameter Evaluation mode, the CLV indicates that no codes matching the parameterized evaluation conditions were detected during the reading interval. (error status ST = 2 output on the host interface).
"laser safety timeout"	The CLV has deactivated the laser diode 10 minutes (default setting) after a reading pulse was initiated. The reading pulse is still active, even though the CLV is no longer reading. The reading pulse is to be terminated by resetting the pulse signal. The laser diode is activated again with the next reading pulse.
"cancel AutoSetup"	The CLV has terminated the AutoSetup, no valid bar code was found.

Table 10-5: CLV system messages

10.4   Installation and operating instructions for the PC-based "CLV Setup" program

The scope of delivery of the CLV includes a CD-ROM 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 W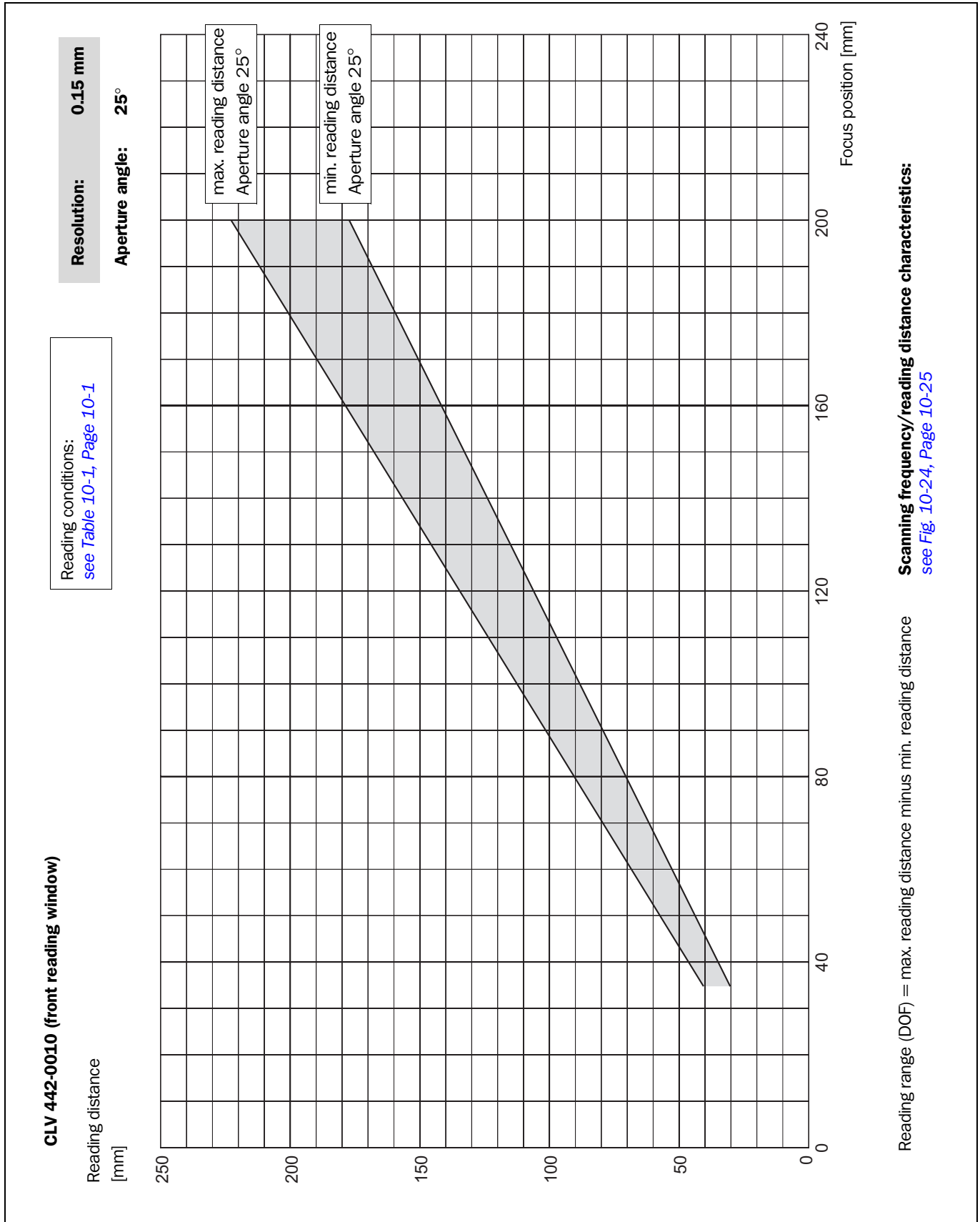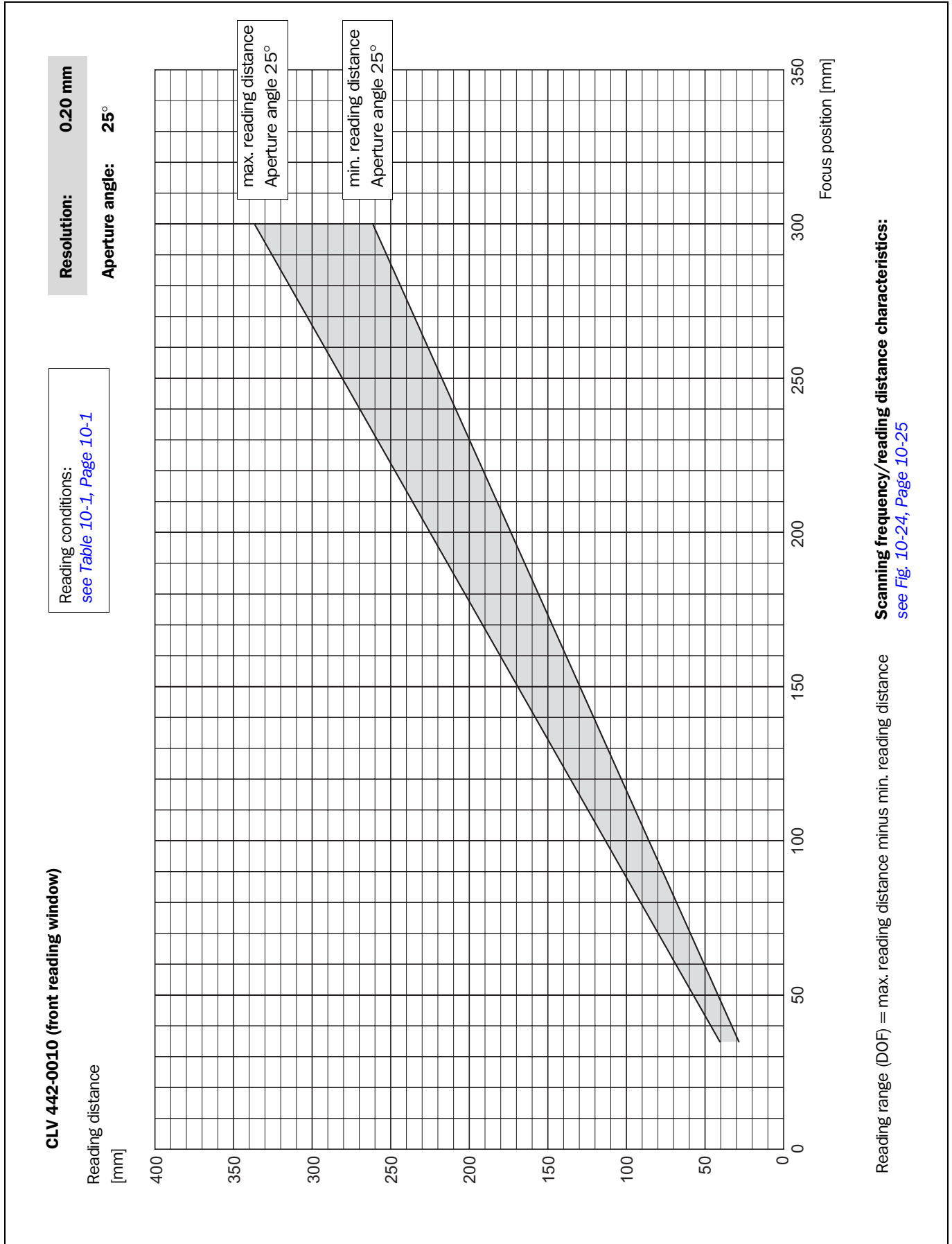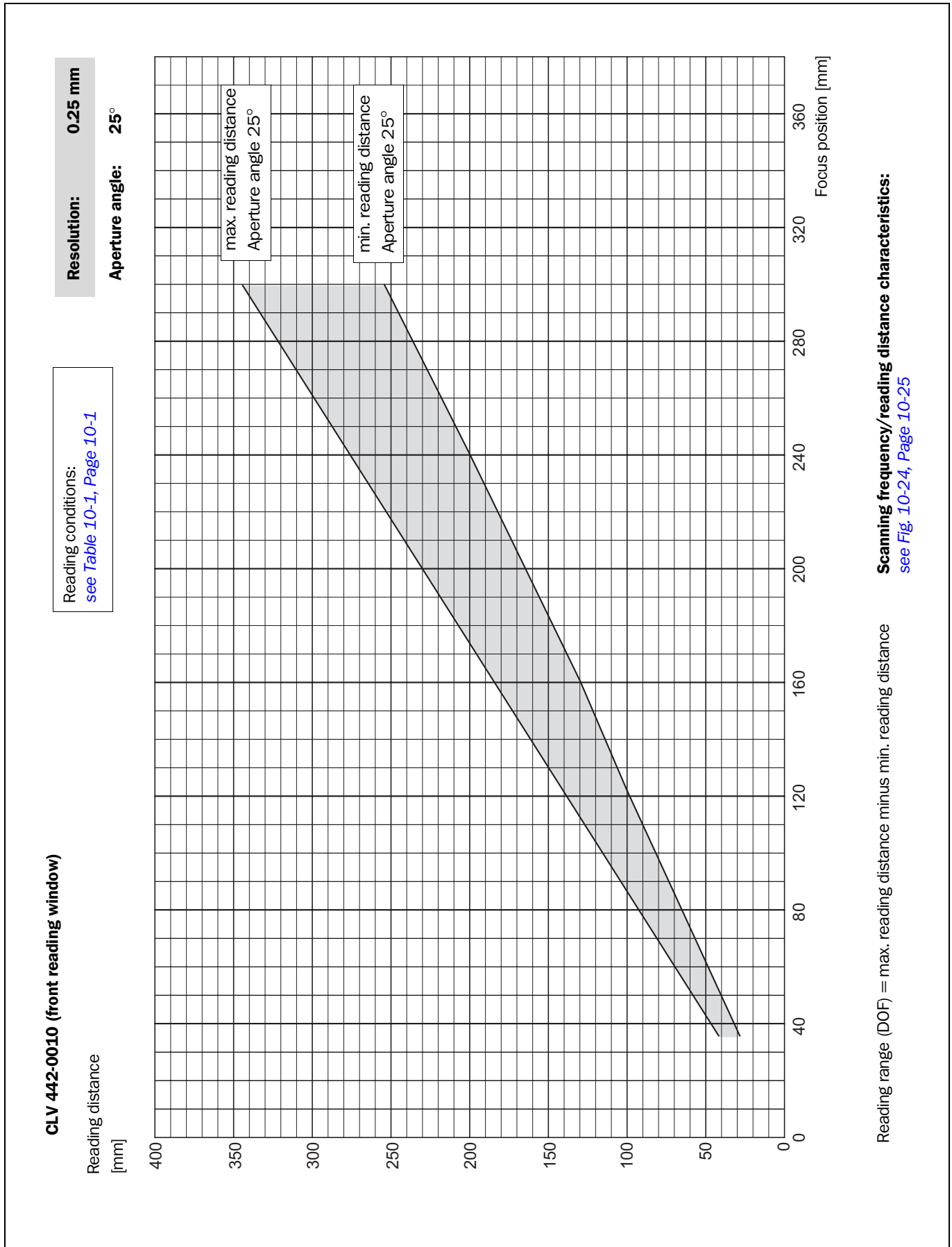indows 95^{TM}/ 98^{TM}, Windows NT^{TM} or Windows XP^{TM}. Approximately 26 MB of hard disk space is required to install "CLV Setup", "CLV Assistant", "CLV Setup Help" and the offline browser "I-ViewPro^{TM}".

10.4.1   Preparing for installation

1. Make sure you have the CD-ROM at hand.
2. Connect the CLV to the AMV/S 40 Connection Module (see *Chapter 5.5.3 "Connecting the power supply", Page 5-4)*.
3. Connect the PC to the terminal interface (port) of the CLV using an RS 232 data connection cable (AMV/S 40: connect the PC to the internal, 9-pin "Service" plug). *See Chapter 5.5.6 "Connecting the PC", Page 5-6*.
4. Switch on the power supply to the AMV/S 40.
    Once the CLV has started, it outputs a tone to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two tones to indicate that it has assumed Reading mode. The "Device Ready" LED lights up.
5. Switch on the PC and start Windows.

10-26   8 008 568/K949/10-06-2002

10.4.2   Performing installation

The CLV Setup installation program creates a 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.

Initial installation

1.   Close all Windows applications.

2.   Insert the CD-ROM in the CD drive.

3.   Call up the Run dialog box in Windows.
     In the Open drop-down list, enter: "X\setup.exe" (X= character of CD drive).
     Confirm the dialog box with "OK".

– or –

     Open Windows Explorer, open the CD drive and double-click the "setup.exe" file.

     The installation program is started and guides you step by step through the installation procedure. The program asks you for your user name and company name. This information appears as a header in printouts. "CLV Setup", "CLV Assistant" and the online help "CLV Setup Help" are installed based on the selected configuration.

4.   Install the "I-ViewPro^{TM}" HTML browser if necessary (the system asks you whether you want to do so).

If you choose not to install "I-ViewPro^{TM}", the system searches your hard disk for the "Netscape Navigator^{TM}" and uses it to display "CLV Setup Help".

5.   Please read the Readme file, as it contains the latest information and problems regarding CLV Setup.

6.   Then confirm the final installation message by clicking "OK".

7.   Restart the PC.
     DLL files may be updated in Windows.

The "CLV Setup" program and "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 the program and must not be deleted if you want to use the uninstaller at some time in the future.

Updating the 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" of the old version can be used in the new version and contain the CLV parameter sets. 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

When installing the new version over of the old version, the files of the old version must first be deleted (exception: the "*.scl" configuration files). They contain the parameter sets of the CLV.

The uninstaller of the old version removes the program files. You can use the uninstaller to 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 a different directory and copy them back to the "data" directory later.

1. From the Windows Start menu, choose "Programs" and the uninstaller for CLV Setup. The uninstaller starts and guides you step by step through the uninstall procedure.

2. Select the uninstall method (complete or custom).

3. Install the new version of CLV Setup as described under Initial installation. Select the same directory.

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

10.4.3   Starting "CLV Setup"

The "CLV Setup" program is launched with the following default setting:

Communication	COM 1, 9 600 bits/s, 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	I-ViewPro™ (if installed), alternatively Netscape Navigator™
Language	As selected for the installation
Company name	As entered for the installation
User name	As entered for the installation
Establish connection to CLV automatically	At startup: yes On scanner selection: yes When the Terminal Emulator is started/closed: yes
Initial screen	Yes
Storage confirmation prompt	Yes
Last type selected	CLV 41x
File storage location	"data" (configuration files for CLV)

Table 10-6: Default settings of CLV Setup (extract)

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 a CLV is connected to the **COM 1** port on the PC and whether the communication parameters on the PC match those on the CLV. If this is the case, the "Connected" status is displayed with the CLV specification on the right of the screen, below the status bar. The detected CLV type is displayed in the toolbar in the DEVICE drop-down list (in this case: CLV 43x/CLV 44x).

The software then loads the internal device description of the CLV 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 CLV. This is displayed on the tabs instead of the default setting.

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

Troubleshooting

If CLV Setup cannot establish a connection with the CLV, it displays "No connection" in the status field on the bottom, right-hand side. There are two possible causes for this. Either the CLV is not connected or the communication parameters on the CLV do not match those on the PC. In this case, CLV Setup enters the CLV 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 setting of the parameter values from its database and displays these on the tabs.

1. Connect the PC to the terminal interface (port) of the CLV using an RS 232 data connection cable (AMV/S 40: connect the PC to the internal, 9-pin "Service" plug). *See Chapter 5.5.6 "Connecting the PC", Page 5-6.*

2. Click 🖧 (AutoBaud detect) in the toolbar or choose Options, AUTOBAUD DETECT.
   CLV Setup scans the serial interface by varying the communication parameters and sends a telegram to the CLV repeatedly. As soon as a reply from the CLV is detected, CLV Setup conveys the values found for the communication parameters.
   Fig. 10-25 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 CLV type in a separate dialog box and asks you whether you want to upload the current parameter set from the CLV.

4. Confirm the dialog box with YES.
   CLV Setup then copies the current parameter set from the RAM of the CLV to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.
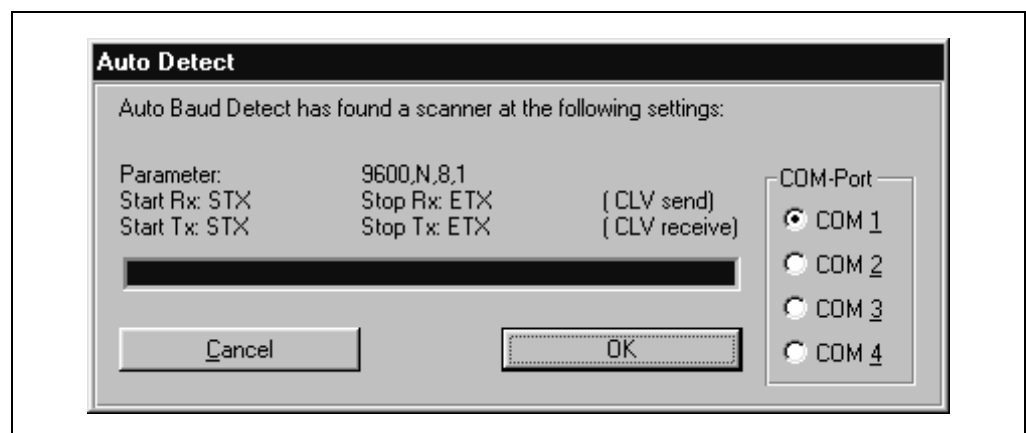
Fig. 10-25: CLV Setup: results of the AutoBaud detect function

– or –

1. Select the menu item SERIAL INTERFACE under EXTRAS in the menu bar.

CLV Setup displays the current communication parameter settings of the PC in the COM PARAMETERS dialog box.

2. Ensure that the communication parameters of the PC and CLV are identical **(connected COM port, 9 600 bits/s, 8 data bits, 1 stop bit, no parity).**

3. Confirm the dialog box with "OK".
   CLV Setup attempts to communicate with the CLV again.
   If it is successful, CLV Setup displays "Connected" in the status bar on the bottom, right-hand side.

4. Click 🖳 in the toolbar.
   CLV Setup then copies the current parameter set from the RAM of the CLV to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

                   8 008 568/K949/10-06-2002

10.4.4   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 HELP, PROGRAM INFORMATION. The GUI is shown in *Fig. 10-26* below.

The GUI 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
- 9 tabs (READING CONFIGURATION, DEVICE CONFIGURATION etc.). 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 CLV, display of interface parameters of the PC, error display field (system errors) of the CLV, device specification field and status display for the connection to the CLV.

Fig. 10-26: User interface of the "CLV Setup" software

10.4.5   Functions

The CLV Setup program features functions to carry out the following:
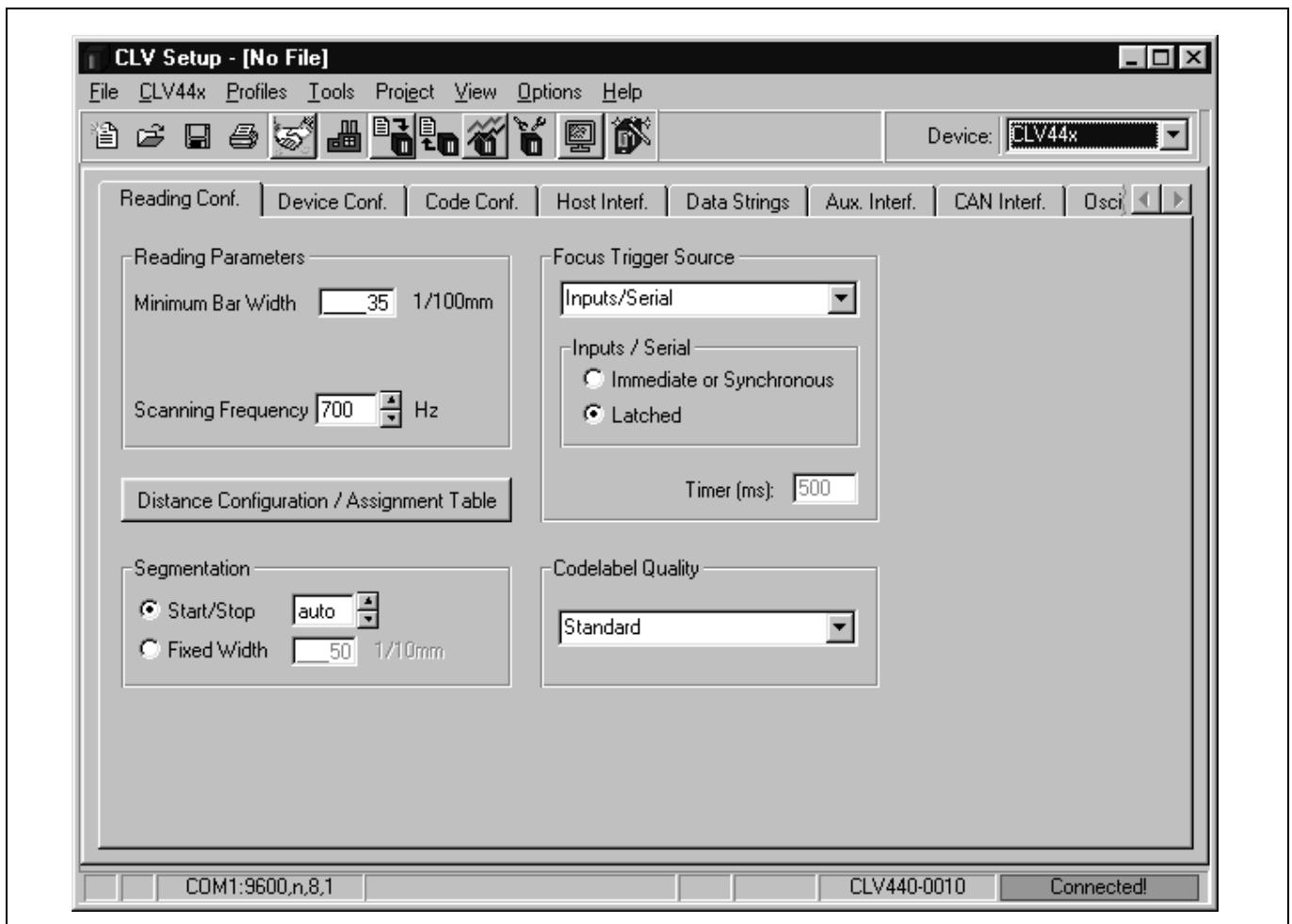
- Loading the default setting of the parameter set from the database
- Automatic communication attempt with the CLV when the program is started
- Automatic software compatibility check in the CLV
- Uploading parameter set stored in the CLV
- Changing the parameter values on the tabs
- CLV Assistant for simplified parameterization
- Saving the changes to the parameter set in the CLV (download)
- Saving the changes to the parameter set as a configuration file "*.scl"
- Printing the configuration files
- Exporting the configuration files in RTF format
- Printing the parameter set in the form of profile bar codes
- Direct access to the CLV via a Terminal Emulator (select operating mode, start operating functions, log file for communication between the CLV and CLV Setup, extended terminal mode, e.g. for displaying CLV messages)
- AutoBaud detect for automatic communication setup with the CLV
- Selecting the COM port for adapting the data transfer parameters
- Monitoring the data communication of the CLV host interface
- Selecting the display language
- Selecting the units of measure
- Displaying the last 10 configuration files that were processed
- Saving the CLV type that was selected last
- Automatic storage confirmation prompt when changes are made to the configuration file
- Wizards for individual functions
- Setting switches for starting the program in the "CLVmain.ini" file
- Hot keys [F keys] for essential functions (program operation without a mouse)
- Starting program with SCL file as argument
- Context-sensitive help via the [F1] key

10.4.6   "CLV Setup Help" online 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. Netscape Navigator^{TM}, Microsoft Internet Explorer^{TM} or the accompanying I-ViewPro^{TM}). You can call up context-sensitive help on each parameter as well as a description of its function and permissible values.

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 (e.g. lviewpro32.exe in the "lview" directory).
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. To display information on a tab, click the tab in the top, horizontal frame. The vertical frame on the left-hand side of the screen then displays a list of parameters.

6. Click on a parameter for a description.
    CLV Setup Help then displays the associated help text in the right-hand frame and jumps to the parameter heading.

10.4.7 Transferring parameter sets between CLV Setup and the CLV

See Chapter 6.4.1 "Configuring CLV with the user interface of CLV Setup", Page 6-5.

10.4.8 Unknown parameters

Uploading from the CLV

If the CLV Setup program does not recognize the parameters or parameter values of the CLV transferred during the upload, it outputs a warning message. Unknown parameters/ parameter values can result from the following, for example: The CLV is a special device or the version of CLV Setup is older than the software of the CLV. 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 CLV 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 CLV.

Downloading to the CLV

If the CLV 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. The is due to the fact that one of the CLV Setup software versions is newer than the software in the CLV, and it contains new parameters/values arising from the continued development of this CLV type. The effected CLV contains an older software version which does not recognize these parameters/values, however.

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

1. Check whether the CLV functions correctly after the parameter set is downloaded.

2. Click ![icon] in the toolbar.
    CLV Setup loads the default setting from the database.

3. Click ![icon] in the toolbar.
    CLV Setup copies the problem parameter set from the CLV.

4. Click ![icon] 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 CLV.

6. Click ![icon] 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 CLV 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.

10.4.9 Log file in Terminal Emulator

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

CLV -->:   CLV sending to CLV Setup

--> CLV: CLV 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.

10.4.10 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_430.scl /INI user.ini"

CLV Setup is launched with the initialization data contained in the "user.ini" file and loads the configuration file "Set1_430.scl" from the "data" directory right 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 a CLV is not connected.

10.4.11 CLV Assistant

CLV Assistant simplifies parameterization and testing of the CLV, among other things. It carries out configuration of the CLV for a user-specific reading situation with **one** bar code in individual steps. The determined settings are transferred to CLV Setup.

10.5 Configuring the CLV with profile bar codes

10.5.1 Activating AutoSetup with a profile bar code

Profile programming uses special bar codes to parameterize the CLV via the optical interface (reading window) and to initiate device functions. The profile bar codes contain encoded parameter values or commands.
It is not necessary to connect a PC to the CLV in order to carry out profile programming.

Profile bar code no. 10 on the card supplied starts and ends AutoSetup. It can be presented to the CLV either immediately after the power supply has been switched on, during the wait time in the Free Running mode or during a reading pulse in the Reading mode.

Preparing AutoSetup

1. AutoSetup overwrites important values in the current parameter set of the CLV.
   If the CLV has already been configured for a particular application, it is advisable to save the existing parameter set as a configuration file "*.scl" in CLV Setup *(see Chapter 6.4.1 "Configuring CLV with the user interface of CLV Setup", Page 6-5).*

2. Have card no. 8 008 085 with the 12 preprinted profile bar codes ready.

Running AutoSetup after switching on the power supply

1. Fold the card with the profile bar codes in such a way that only profile bar code no. 10 is visible.

2. Switch on the power supply of the AMV/S 40 Connection Module (of the CLV).
   The CLV confirms that the self-test has been completed successfully by outputting a tone via the beeper. The "Device Ready" LED lights up. It then switches to the Free Running mode for 5 seconds. The scan line appears when the "Laser On" LED lights up.

   Line scanner with oscillating mirror:
   In AutoSetup mode, the CLV behaves as follows:

   – In "Oscillating" mode (default setting: oscillating with fixed Amplitude) switches to Oscillating mode and positions the scan line at the angle CW = 50 (corresponds to an angle of emergence under 105°). This position cannot be changed.
   – In "One-shot" mode, it also positions the scan line under the angle CW = 50.
   – In "Fixed Position" mode, on the other hand, the selected scan line position remains unchanged.

3. Present profile bar code no. 10 within **5 seconds**.
   The CLV confirms that AutoSetup has started by outputting a tone via the beeper. It temporarily activates the standard decoder. The "Device Ready" LED is extinguished.

4. Present the application-specific bar code at the maximum reading distance for the application. Note the limit values of the CLV here (refer also to the reading field graphs in *Chapter 10.2 "Specification diagrams", Page 10-1).*
   To prevent surface reflections, rotate the bar code towards the CLV approximately 15° away from the vertical axis (see *Fig. 4-8, Page 4-6*).
   Leave the bar code in this position.

5. The CLV confirms that AutoSetup has been completed successfully by outputting two consecutive acoustic signals via the beeper and activating the "Result" LED for 100 ms (default setting).
   It overwrites the appropriate parameter values in the current parameter set in the RAM and stores these permanently in the EEPROM. The CLV returns to the Reading mode with the decoder parameterized for this purpose. The "Device Ready" LED lights up. The CLV only evaluates the presented code type and length the next time a bar code is read.

Running AutoSetup in the Reading mode

1. Fold the card with the profile bar codes in such a way that only profile bar code no. 10 is visible.

2. Start the reading pulse: block the light path of the photoelectric switch or close the switch.
   The "Laser On" LED lights up. The scan line then appears.

3. Present profile bar code no. 10.
   The CLV confirms that AutoSetup has started by outputting a tone via the beeper. It temporarily activates the standard decoder. The "Device Ready" LED is extinguished.

Continue AutoSetup from Step 4 as in *Running AutoSetup after switching on the power supply, Page 10-35*.

AutoSetup canceled by the CLV in the event of a No Read

If the CLV was not able to execute AutoSetup successfully, it cancels the search mode by outputting a long acoustic signal via the beeper. The current parameter set in the CLV does not change.

The CLV returns to the Reading mode with the decoder parameterized for this purpose.

The "Device Ready" LED lights up.

Running AutoSetup again

1. Switch the power supply of the connection module (of the CLV) off and on again.

2. Present profile bar code no. 10 again after the first tone from the beeper.
   The CLV confirms that AutoSetup has started by outputting an acoustic signal via the beeper. It temporarily activates the standard decoder. The "Device Ready" LED is extinguished.

– or –

1. Start the reading pulse again: block the light path of the photoelectric switch or close the switch. The "Laser On" LED lights up. The scan line then appears.

2. Present profile bar code no. 10.
   The CLV confirms that AutoSetup has started by outputting an acoustic signal via the beeper. It temporarily activates the standard decoder. The "Device Ready" LED is extinguished.

Continue AutoSetup as described in Step 4 in *Chapter "Running AutoSetup after switching on the power supply", Page 10-35*.

➢ If AutoSetup is unsuccessful again, check whether the CLV is able to read the bar code correctly (reading distance, tilt, more than one bar code in the reading field).

Terminating AutoSetup prematurely

➢ Present profile bar code no. 10 again during AutoSetup.
   The CLV confirms that AutoSetup has been aborted by outputting a long tone via the beeper.
   The current parameter set in the CLV does not change.
   The CLV returns to the Reading mode with the decoder parameterized for this purpose.
   The "Device Ready" LED lights up.

      8 008 568/K949/10-06-2002

Checking the determined read and code configurations

Check the CLV settings with a percentage evaluation. A PC with the "CLV Setup" program installed on it has to be connected for this purpose.

See also *Chapter "Activating AutoSetup via the user interface of CLV Setup", Page 6-16*.

10.5.2   Profile programming

Profile programming uses special bar codes to parameterize the CLV via the optical interface (reading window). The profile bar codes contain encoded parameter values. It is not necessary to connect a PC to the CLV in order to carry out profile programming.

The profile bar codes are presented to the CLV individually for reading. It copies the parameter values to the current parameter set. The changes are permanently valid after programming has been completed; in some cases, they also have an immediate effect on the reading and output characteristics of the CLV. The profile bar codes can be presented to the CLV either immediately after the power supply has been switched on, during the wait time in the Free Running mode or during a reading pulse in the Reading mode. During profile programming, the CLV does not output a reading result and does not respond to an external reading pulse.

Profile bar codes are created and printed via the user interface of CLV Setup after the application-specific parameter set has been compiled (*see Section "Printing profile bar codes"*).

The enclosed card no. 8 008 085 ("Configuration Profiles for CLV 41x Bar Code Scanners") contains 12 preprinted profile bar codes. They can be used to parameterize tested settings or to trigger specific functions (e.g. AutoSetup). *Table 10-7, Page 10-40* explains the meanings of the individual profile bar codes. Profile bar codes no. 11 and no. 12 on the card are of no significance for CLV 43x/44x.

Preparing profile programming

1. Profile programming overwrites values in the current parameter set of the CLV.
    If the CLV has already been configured for a particular application, it is advisable to save the existing parameter set as a configuration file "*.scl" in CLV Setup
    (see *Chapter 6.4.1 "Configuring CLV with the user interface of CLV Setup", Page 6-5*).

2. Have the printed profile bar codes of the compiled parameter set or card no. 8 008 085 ready.

Performing profile programming after switching on the power supply

1. Switch on the power supply of the AMV/S 40 Connection Module (of the CLV).
    The CLV confirms that the self-test has been completed successfully by outputting a tone via the beeper. The "Device Ready" LED lights up. It then switches to the Free Running mode for **5 seconds**. The scan line appears when the "Laser On" LED lights up.

    Line scanner with oscillating mirror:

    The CLV behaves as follows:

    – In "Oscillating" mode (default setting: oscillating with fixed Amplitude) switches to Oscillating mode and positions the scan line at the angle CW = 50 (corresponds to an angle of emergence under 105°). This position cannot be changed.

    – In "One-shot" mode, it also positions the scan line under the angle CW = 50.

    – In "Fixed Position" mode, on the other hand, the selected scan line position remains unchanged.

8 008 568/K949/10-06-2002   **10-37**

2.   Present the first profile bar code in the printed sequence (or the desired profile bar code from the card) within 5 seconds. Fold the printout/card in such a way that only one profile bar code is visible at any one time.
The CLV confirms that the bar code has been read successfully by outputting a tone via the beeper and waits **10 seconds** for the next profile bar code.
It copies the new parameter value(s) to the current parameter set in the RAM.

3.   Present the next profile bar code within 10 seconds.
The CLV confirms that the bar code has been read successfully as described in Step 2.

4.   Allow 10 seconds to pass after the last profile bar code has been read.
The CLV exits the programming mode and saves the new parameter values permanently in the EEPROM. It also switches off the laser diode.
Following this, it returns to the Reading mode and confirms this by outputting two consecutive acoustic signals via the beeper. The "Device Ready" LED lights up.

The CLV then uses the new parameter values.

Performing profile programming in the Reading mode

1.   Start the reading pulse: block the light path of the photoelectric switch or close the switch.
The "Laser On" LED lights up. The scan line then appears.

2.   Present the first profile bar code in the printed sequence (or the desired profile bar code from the card).
Fold the printout/card in such a way that only one profile bar code is visible at any one time.
The CLV confirms that the bar code has been read successfully by outputting a tone via the beeper and waits **10 seconds** for the next profile bar code.
It copies the new parameter value(s) to the current parameter set in the RAM.

Continue profile programming from Step 3 in .

Note   When the profile bar code is presented to the CLV, note that the changes caused by the new parameter values in the RAM can have an immediate effect on the reading character-istics of the CLV. Under unfavorable conditions, the CLV will only be able to read profile bar codes with great difficulty or not at all.
Changes to the active evaluation range of the scan line (min./max. CP value), increases in the scan frequency and changes to the focus position for each profile bar code must be handled with care.
If the CLV is not able to read any further profile bar codes, it must be corrected accordingly on the tabs via the user interface of CLV Setup. A PC must be connected to the CLV for this purpose.

Canceling profile programming

➢   Switch off the power supply of the CLV within 10 seconds of presenting the last profile bar code.
The temporary changes to the current parameter set in the RAM are lost.
After the power supply has been switched on again, the CLV uses the values from the last parameter set that was stored permanently.

Printing profile bar codes

Profile bar codes are created and printed out via the user interface of CLV Setup. It is not necessary to connect a PC to the CLV if the current parameter set of the CLV has been saved as a configuration file "*.scl" in CLV Setup.

CLV Setup creates a minimum set of profile bar codes using the parameter values in the tabs and the default setting of the CLV.

This comprises:

*   A standard profile (all codes types active or all code types locked)
*   A host interface profile
*   A greater or smaller number of profile bar codes depending on the difference between the two above-mentioned profiles and the current setting of the entire parameter set.

CLV Setup prints out the bar codes in a defined sequence. The size, position and number of codes on the page can be set.

1. Open the configuration file "*.scl" of the current parameter set.
    CLV Setup displays the parameter values of the CLV on the tabs.
2. If desired, make any necessary changes to the parameter set.
    Save the new parameter set in the configuration file "*.scl" under a new name.
3. In the menu bar, choose PROFILES and CONFIGURE PRINTING.
    Confirm the print option default setting for the profile bar codes or define new ones *(see below)*.
4. In the menu bar, choose PROFILES and PRINT PROFILES.
    CLV Setup determines the required number of bar codes.
    The PRINT dialog box is then displayed.
5. Specify the number of printouts.
    Define the page format if necessary. For this purpose, click the PROPERTIES button.
    Relatively long profile bar codes must be printed in landscape format!
6. Confirm the dialog box with "OK".
    CLV Setup then prints out the profile bar codes.

Defining print options for profile bar codes

1. In the menu bar, choose PROFILES and CONFIGURE PRINTING.
    The BARCODE PRINTING OPTIONS dialog box is then displayed.
2. Choose the desired print options in the BARCODE and PAGE LAYOUT tabs and confirm the dialog box.
    CLV Setup then asks if the print options are to be saved.
3. To save the print options, confirm this prompt with "OK".
    The SAVE SETTINGS AS... dialog box is then displayed.
4. Enter a file name in the "*.prf" format: Confirm the dialog box with SAVE.
    CLV Setup saves the print options in a configuration file in the directory "CLV".

The default setting of the print options is active when CLV Setup is started.

Preprinted profile bar codes

The enclosed card no. 8 008 085 ("Configuration Profiles for CLV 41x Bar Code Scanners") contains 12 preprinted profile bar codes. They can be used to parameterize tested settings or to trigger specific functions (e.g. AutoSetup). The individual segments of the card can be folded in such a way that the CLV only reads the desired profile bar code. The profile bar

codes are explained in *Table 10-7, Page 10-40*, and the functions of the individual parameters in "CLV Setup Help".

Bar code	Function
Profile 1	Default setting of CLV for all parameter values. Code configuration: all code types, except for Pharmacode, enabled for evaluation. **Overwrites a code configuration created by AutoSetup!**
Profile 2	Only changes configuration of host interface: – Data transfer rate: 38 400 bits/s – Data format: 8 data bits, no parity, 1 stop bit – Handshake: none
Profile 3	Only changes configuration of host interface: – Activation of RS 422/485 interface – SICK network protocol (standard) – Data transfer rate: 38 400 bits/s – Data format: 7 data bits, parity odd, 1 stop bit – Device number: 99
Profile 4	Only changes configuration of host interface: Reading result is output as soon as evaluation criteria are fulfilled
Profile 5	Only changes configuration of host interface: – Output of error status "ST" in separator – Output of CLV: <CR><LF> in terminator (jumps to start of new line after each code)
Profile 6	Parameterizes CLV as master in master/slave configuration – No. of slaves: 1 – Timeout: automatic
Profile 7	As profile 6, but no. of slaves: 2
Profile 8	Parameterizes CLV as slave in master/slave configuration
Profile 9	Parameterizes CLV for pass-through mode: output of " / " and device number in header
Profile 10	Starts and ends CLV AutoSetup
Profile 11	No function for CLV 43x/44x
Profile 12	No function for CLV 43x/44x

Table 10-7: Functions of preprinted profile bar codes on card no. 8 008 085

10-40

8 008 568/K949/10-06-2002

10.6   Configuring the CLV with command strings

The CLV can be parameterized and operated via the terminal 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 CLV parameters to be configured which may not be recognized by the CLV Setup program if this is older than the software on the CLV. The CLV Setup user interface is based on the command language.

The command language accesses the CLV command interpreter directly. It must be used carefully. The commands sent to the CLV 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 CLV. 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 CLV to be parameterized directly with command strings. *Fig. 10-27* contains the initial screen of the terminal emulator with the command field and output window which shows how the PC and CLV communicate with each other.

1. Click 🖥 in the toolbar.
    The Terminal Emulator window is then displayed. The CLV is in Reading mode.
2. Click the PARAMETERIZE radio button in the DEVICE MODE group.
    The CLV cancels Reading mode. The "Device Ready" LED is extinguished.
    CLV Setup switches the CLV 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 ①and press the [Return] key.
    The command is then sent to the CLV.
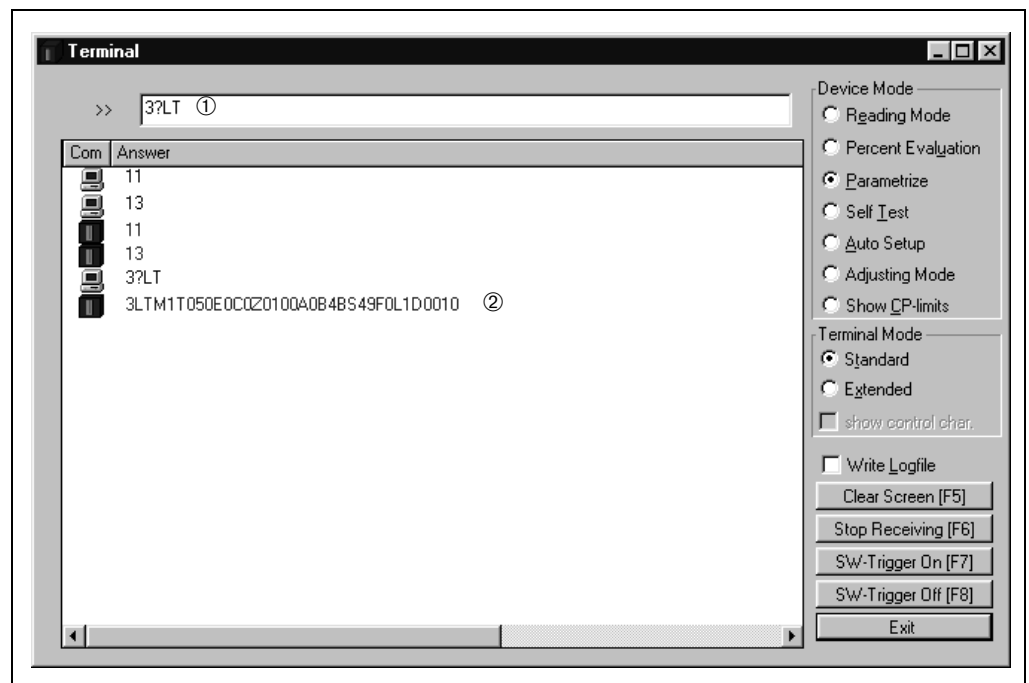   With a few exceptions, the CLV replies to a command with correct syntax with an echo.

Fig. 10-27: CLV Setup: entering commands in the Terminal Emulator

Example:
Entering "3?LT" causes the CLV 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.

Note   Changes that are made directly to parameter values in the CLV using command strings are only registered and displayed in CLV Setup after the current parameter set has been uploaded from the CLV.

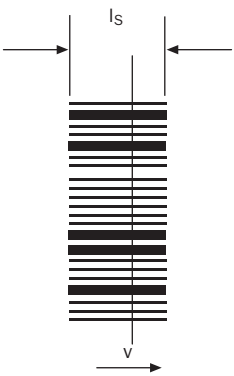A list of command strings is available on request.

10-42   8 008 568/K949/10-06-2002

10.7   Calculating parameter values for setting the CLV

10.7.1   Calculating the number of scans (for standard decoders)

The maximum number of scans possible for a bar code depends on the conveyor velocity v.

Line scanner: ladder-type bar code arrangement

Line scanner: side reading at object

Calculation for standard decoder!

$$v = \frac{s}{t}$$

$$v = \frac{l_s}{n \times t_{scan}}; \quad t_{scan} = \frac{1}{f}$$
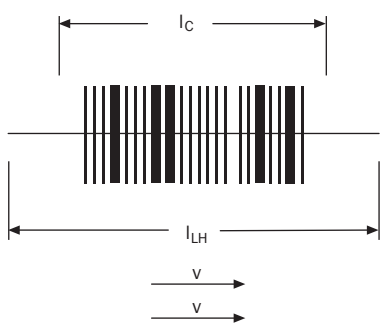
$$v = \frac{l_s}{n} \times f$$

$$n = \frac{l_s}{v} \times f$$

Specifications:
Number of scans n = ?
Conveyor velocity v = 1.5 m/s
Bar length l_s = 20 mm
Scanning frequency f = 600 Hz
Barcode 100 % readable

$$n = \frac{0.02 \text{ m}}{1.5 \text{ m/s}} \times 600/s \qquad \underline{\mathbf{n = 8}}$$

Fig. 10-28: Line scanner: calculating the number of scans for ladder-type bar code arrangements

Line scanner: fence-type bar code arrangement

Line scanner: side reading at object

Line

Calculation for standard decoder!

$$v = \frac{s}{t}$$

$$v = \frac{(l_{LH} - l_c)}{n \times t_{scan}}; t_{scan} = \frac{1}{f}$$

$$v = \frac{(l_{LH} - l_c)}{n} \times f$$

$$n = \frac{(l_{LH} - l_c)}{v} \times f$$

Specifications:
Number of scans n = ?
Conveyor velocity v = 2 m/s
Code length with rest zone l_c = 150 mm
Reading field height l_{LH} = 400 mm
Scanning frequency f = 600 Hz
Bar code 100 % readable, all scans on the code,
Code window s = l_{LH} -l_c

$$n = \frac{(0.4 - 0.15) \text{ m}}{2 \text{ m/s}} \times 600/s \qquad \underline{\mathbf{n = 75}}$$

Fig. 10-29: Line scanner: calculating the number of scans for fence-type bar code arrangements

Line scanner with oscillating mirror: fence-type bar code arrangement

Line scanner with oscillating mirror: side reading at object
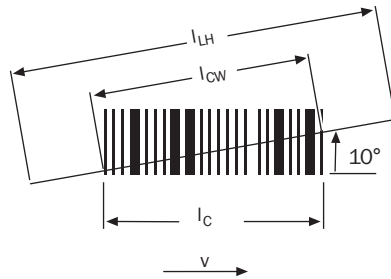
Calculation for
Standard decoder

Specifications:
Number of scans n = ?
Conveyor velocity v = 0.5 m/s
Code length with rest zone l_C = 100 mm

Code length under 10°: $l_{CW} = \dfrac{100 \text{ mm}}{\cos 10} = 102$ mm

Reading field height l_{LH} = 500 mm
Scanning frequency f = 600 Hz
Bar code 100 % readable, all scans on the code
Code window s = l_{LH} - l_C

1. Dwell time of the bar code in the reading field:

$$t = \frac{s}{v}$$

$$t = \frac{(l_{LH} - l_{CW})}{v}$$

$$t = \frac{(0.5 - 0.102)}{0.5 \text{ m/s}}$$

$\underline{t = 796 \text{ ms}}$

2. Required oscillating mirror frequency:

$$f_{SW} = \frac{1}{t}$$

$$f_{SW} = \frac{1}{0.796 \text{ s}}$$

$$f_{SW} = 1.26 \text{ Hz}$$

3. Number of possible scans (Passover calculation):

$$n = \frac{f}{f_{SW}}$$

$$n = \frac{600 \text{ Hz}}{1.26 \text{ Hz}}$$

$\underline{\mathbf{n = 476}}$

Fig. 10-30: Line scanner with oscillating mirror: calculating the number of scans for fence-type bar code arrangements

10.7.2 Calculation of required distances between bar codes when reading several bar codes per object

SMART decoder:
For bar codes with identical code type and identical or varying data content.

Distance dx: min. 60 x module width
e.g. 30 mm with module width of 0.5 mm

Distance dy: 10 x d_{scan}
with d_{scan} = vertical distance between two consecutive scan lines

e.g. scan line 90° to bar code, scanning frequency 800 Hz, v = 2 m/s

$$d_{scan} = \frac{V}{f} \qquad d_{scan} = \frac{2\,000\ mm/s}{800\ /s} = 2.5$$

$$dy = 10 \times 2.5\ mm = 25\ mm$$

Standard decoder:
The distances listed above are also required if bar codes of the same name (identical data content and identical code type) are to be read.

Requirement for the separation of bar codes of the same name:
1. Correct parameterization of the CODE DISTANCE between bar codes (DEVICE CONFIGURATION tab, EDIT TRACKING) button
2. Activation of code position comparison (CODE CONFIGURATION tab, CODE POSITION group)

Bar code lines in the conveyor direction:
If the scan line records bar codes with the same name at the same code position, an external incremental sensor for path information is required for the separation of bar codes.

Rule of thumb: Area around bar code should be blank!

Fig. 10-31: Required distances between the bar codes on an object

10.7.3 Calculation of the start position and mirror speed for the forward and return phase of the one-shot function

Line scanner with oscillating mirror

Theoretical view: Reading from front (Object moves toward the CLV)

Calculation for standard decoder!
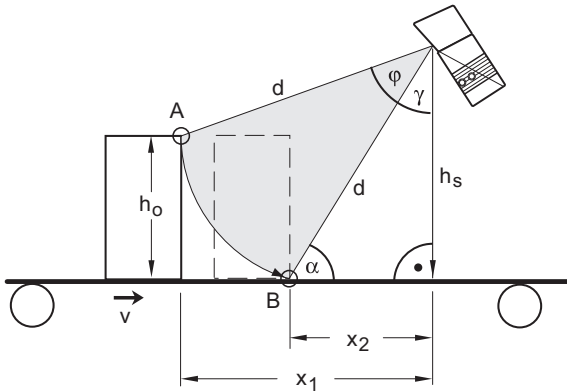
(Scan direction on the code level)

Information:

h_0 = max. object height
h_s = distance of CLV above conveyor level
φ = oscillation angle
α = max. angle of impact on bar code (skew)
Start phase 1: point A
Start phase 2: point B

Specifications:

$h_s > h_0$
$\alpha \leq 45°$ ($\alpha \leq 30°$ would be better)
Set max. deflection angle: ±20°
$\Rightarrow$ Determine distances via measurement
x_1 = distance at start phase 1
x_2 = distance at start phase 2

1. Focus position for distance configuration

$$\sin \alpha = \frac{h_s}{d} \qquad \Rightarrow \qquad d = \frac{h_s}{\sin \alpha}$$

2. Oscillation angle φ

$$\gamma = 90° - \alpha$$

$$\cos(\varphi + \gamma) = \frac{(h_s - h_0)}{d}$$

$$\varphi = \arccos\left(\frac{(h_s - h_0)}{d}\right) - \gamma$$

➤ Enter φ symmetrically to CW = 50:

$$\text{StartPos 1} = 50\,\text{CW} + \left(\frac{\varphi}{2} \times \frac{1\,\text{CW}}{0.5}\right)$$

$$\text{StartPos 2} = 50\,\text{CW} - \left(\frac{\varphi}{2} \times \frac{1\,\text{CW}}{0.5}\right)$$

3. Mirror speed $\varphi^{*)}$

$$v = \frac{\Delta x}{\Delta t}; \quad \Delta x = x_1 - x_2$$

$$\varphi* = \frac{\Delta \varphi}{\Delta t}$$

During time Δt, where the object moves from x_1 to x_2, the oscillating mirror must also pass through the angle $\Delta \varphi$.

$$\Rightarrow \frac{\Delta x}{v} = \frac{\Delta \varphi}{\varphi*}$$

$$\varphi* = \Delta \varphi \times \frac{v}{\Delta x} \quad \text{mit } 1 \text{ /s} = 2 \text{ CW/s}$$

Take the following into account when entering the values:
– Debounce time of switching input "Sensor 2" (one-shot trigger)
– Startup time of oscillating mirror (movement of the object)

➤ Choose the mirror speed of the return phase depending on the distances between the objects in such a way that the scan line is located in the start position (point A) again.
➤ Check the theoretically obtained values locally and adjust if necessary.

Fig. 10-32: One-shot: Line scanner with oscillating mirror: calculating the number of scans for fence-type bar code arrangements

10.8   Auxiliary tables

10.8.1   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 10-8*.

1. Count the bars and gaps as specified in *Table 10-8*. 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	$l_{Code} = \dfrac{Number - 10}{5}$	Calculated code length
2/5 Interleaved	Number of wide elements (bars and gaps)	$l_{Code} = \dfrac{Number - 1}{2}$	Calculated code length
EAN	Not applicable	13 characters (normal version) 8 characters (short version)	Activate 13-digit Activate 8-digit
UPC	Not applicable	12 characters (UPC A, normal version) 6 characters (UPC E, short version)	Activate version A Activate version E
Codabar	Number of bars	$l_{Code} = \dfrac{Number - 8}{4}$	Calculated code length
Code 128 (character set A)	Number of bars	$l_{Code} = \dfrac{Number - 10}{3}$	Calculated code length
Code 93	Number of bars plus separator after the stop character	$l_{Code} = \dfrac{Number - 13}{3}$	Calculated code length
EAN 128	Number of bars	$l_{Code} = \dfrac{Number - 10}{3}$	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 CLV 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
   CLV can be larger than the number of characters in the printed code because it comprises several character sets.

Table 10-8: Formulas for calculating the code length of a bar code

10.9　Special applications and procedures

10.9.1　Triggering the Teach-in match code 1 via the "Sensor 2" switching input

In Reading mode, the CLV compares to two match codes with the bar 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 CLV only outputs those bar codes that have the same code type, code length, and data content as the match code(s). A match code can contain max. 50 characters in the range 32 to 137 dec. and must be a code type that can be evaluated by the CLV.

Using the "Sensor 2" switching input, the CLV 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 CLV is switched off.

Before the match code can be read, a switch must be connected (*Fig. 10-33*), the functional assignment of the switching input changed and Teach-in mode selected.
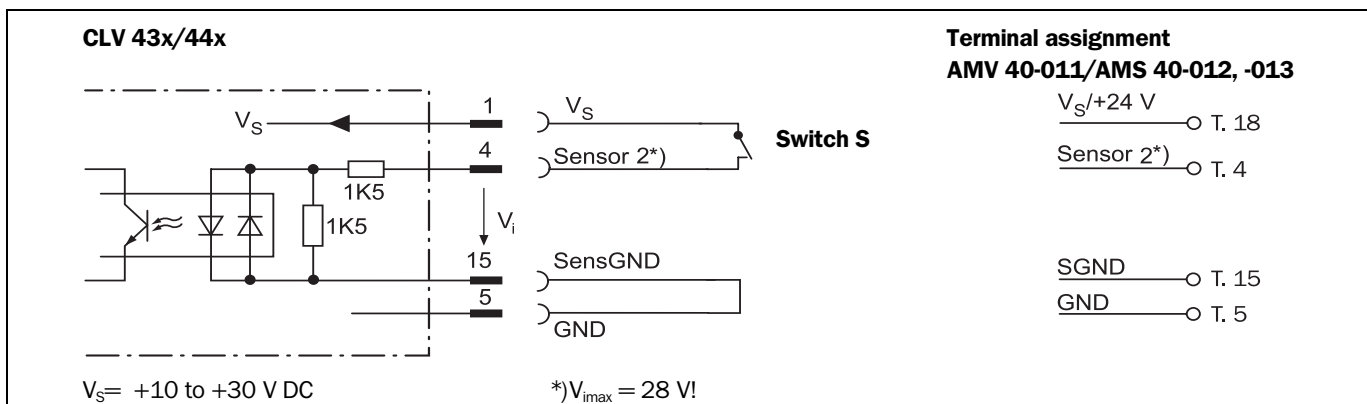

Fig. 10-33: "Sensor 2" switching input configuration for triggering the teach-in match code 1

There are two modes for teaching in match code 1:

• **Dynamic teach-in of match code 1**
This method is supported by SMART and standard decoders (*Raster scanner* only with standard decoder). The code type that corresponds to the match code must be activated for the evaluation in the CLV. The CLV must be pulsed manually so that it can read the match code. After the teach-in procedure has been successfully completed, the CLV still continues to output bar codes of all the code types that were previously enabled.

• **Static teach-in of match code 1 with/without Pharmacode**
The CLV only uses the standard decoder temporarily. The CLV can also read a match code whose code type is implemented, but not yet enabled for evaluation. A reading pulse starts automatically at the start of the teach-in procedure. The CLV 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 code types are locked. To ensure that the match code is read reliably, the CLV 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 CLV can essentially interpret every 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 CLV using the CLV Setup program!

With static teach-in, the CLV 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 CLV 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.

Preparing teach-in

1. Switch off the power supply to the AMV/S 40 Connection Module.

2. Connect the switch in the AMV/S 40 Connection Module at the "Sensor 2" switching input of the CLV as shown in *Fig. 10-33*. Connect the "SensGND" and "GND" signals.

3. **Open the switch!** ("Sensor 2" switching input must be at zero current)

4. Connect the PC to the terminal interface of the CLV.
   For this purpose, connect the RS 232 data connection cable to the internal 9-pin "Service" plug of the module *(see Chapter 5.5.6 "Connecting the PC", Page 5-6)*.

5. Switch on the power supply to the AMV/S 40 Connection Module.
   Once the CLV has started, it outputs an acoustic signal to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two acoustic signals to indicate that it has assumed Reading mode. The "Device Ready" LED lights up.

   Line scanner with oscillating mirror:
   In the Reading mode, the CLV deflects (by default) the scan line about the position $CW = 50$ at a frequency of 1 Hz and a maximum angle of $\pm 20°$.

6. Start Windows and "CLV Setup" on your PC *(see Chapter 10.4.3 "Starting "CLV Setup"", Page 10-29)*.

7. Upload the parameter set that was last stored permanently on the CLV.
   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: changing the reading pulse for teach-in
1. Select the DEVICE CONFIGURATION tab.
2. Click the DYNAMIC option in the TEACH-IN group.
3. From the ASSIGNMENT SENSOR 2 drop-down list, choose the MATCHCODE TEACH-IN option.
4. If necessary proceed as follows to activate the output filter in the CODE COMPARISON group:
    – Click the CODE #1 ACTIVE checkbox.
    – Click the FILTER FOR OUTPUT checkbox.
    – Click the CODE #1 ACTIVE checkbox again.
      The code comparison is now no longer permanently activated. The output filter, however, remains active.
5. Click the EDIT READING TRIGGER button.
6. Click the SERIAL INTERFACE radio button in the MODE group.
7. Click the EDIT RESULT OUTPUTS button.
8. In the dialog box under RESULT FUNCTIONS, choose MATCH 1 in the drop-down list for Result 2 ("Result" LED).
9. Select the CODE CONFIGURATION tab.
10. *Raster scanners only:*
    Click the STANDARD radio button in the DECODER group.
11. Activate the code type of the match code in the CODES group.
12. Click the EDIT CODES button.
13. Choose the code type tab and click the FREE radio button in the CODE LENGTH group.
14. Perform a download to the CLV. This is done by clicking 🖼 in the toolbar.
    The DOWNLOAD PARAMETER dialog box is displayed.
15. 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 CLV 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 CLV switches to Parameter mode.
4. Click READING MODE under DEVICE MODE.
   The CLV 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 (CLV) off and on again. The CLV 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 CLV activates teach-in mode for match code 1.
6. Click the SW-TRIGGER ON button or press [F7].
   The CLV starts the reading interval and waits for the match code.
7. Present the match code.

8. Click the SW-TRIGGER OFF button or press [F8].
   The CLV 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 CLV 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 CLV 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 CLV:

1. Switch the power supply of the connection module (of the CLV) off and on again.

2. Perform an upload from the CLV. This is done by clicking 📇 in the toolbar.

3. The code type and data content of match code 1 are shown in the CODE COMPARISON group on the DEVICE CONFIGURATION tab.

Resetting the reading pulse:

1. Select the DEVICE CONFIGURATION tab.

2. Click the EDIT READING TRIGGER button.

3. Click the current option in the MODE group on the dialog box.

4. Perform a download to the CLV. This is done by clicking 📇 in the toolbar.

5. Confirm the dialog box by selecting the PERMANENT save option.
   The CLV then uses the reading pulse type that was set before the teach-in procedure.

b) Static teach-in procedure

Configuring the static teach-in procedure:

1. Select the DEVICE CONFIGURATION tab.

2. Click the STATIC WITHOUT PHARMACODE, or STATIC WITH PHARMACODE to read a Pharmacode, in the TEACH-IN group.

3. If necessary, click the WITH COUNTER RESET option in the COUNTER RESET group.

4. From the ASSIGNMENT SENSOR 2 drop-down list, choose the MATCHCODE TEACH-IN option.

5. If necessary proceed as follows to activate the output filter in the CODE COMPARISON group:
   – Click the CODE #1 ACTIVE checkbox.
   – Click the FILTER FOR OUTPUT checkbox.
   – Click the CODE #1 ACTIVE checkbox again.
     The code comparison is now no longer permanently activated. The output filter, however, remains active.

6. Click the EDIT RESULT OUTPUTS button.

7. In the dialog box under RESULT FUNCTIONS, choose MATCH 1 in the drop-down list for Result 2 ("Result" LED).

8. Perform a download to the CLV. This is done by clicking 🖥 in the toolbar.

9. The DOWNLOAD PARAMETERS dialog box is then displayed.

10. 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 CLV must be identical. This is done with the PERMANENT saving option. If you select the TEMPORARY option instead, the CLV loads the default setting after the teach-in function has been carried out and the power supply switched off.

Carrying out the static teach-in procedure:

1. Click 🖥 in the toolbar.
    The Terminal Emulator is launched. The CLV 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 CLV switches to Parameter mode.

4. Click READING MODE under DEVICE MODE.
    The CLV 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 (CLV) off and on again. The CLV 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 CLV activates teach-in mode for match code 1.
    It starts the reading interval automatically and waits for the match code.

6. Present the match code.
    The CLV 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 CLV 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.
    If the CLV was not able to read the match code, the reading interval is terminated when the switch is closed. The previously set code configuration remains intact.

8. **Keep the switch closed**.
    The CLV 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 CLV:

Proceed as described in Steps 1 to 3 in "*a) Dynamic teach-in procedure*", *Page 10-50.*

Activating/deactivating the code comparison via the "Sensor 2" switching input

*   Prerequisite: assignment of the MATCHCODE TEACH-IN function to the "Sensor 2" switching input

Activating the code comparison function:

1. Close the switch before switching on the power supply to the CLV.

2. Switch on the power supply.
    The CLV activates the code comparison function.

3. Do not open the switch while the CLV is starting up.

Deactivating the code comparison function:

1. Switch off the power supply to the CLV.

2. Open the switch.

3. Switch on the power supply.
    The CLV starts Reading mode without the code comparison.

Assigning result functions to the "Result 1", "Result 2" ("Result" LED) switching outputs and beeper

CLV can output the result of the code comparison in the following functions:

–   No match (code does not match either match code)

–   Match 1 (matches match code 1)

–   Mismatch 1 (does not match match code 1)

–   Match 2 (matches match code 2)[*]

–   Mismatch 2 (does not match match code 2)[*]

–   Match 1 or 2 (matches match code 1 or 2)

–   Match 1 and 2 (matches match code 1 and 2)[*]

[*] only relevant if match code 2 is active

When configuring the Teach-in function for match code 1, define the following settings:

1. Select the DEVICE CONFIGURATION tab.

2. Click the EDIT RESULT OUTPUTS button.

3. Choose the required option for Result 1, Result 2 and beeper from the RESULT FUNCTIONS drop-down list.

4. Perform a download to the CLV. This is done by clicking 🖳 in the toolbar.
    Confirm the dialog box by choosing the PERMANENT storage option.

10.9.2   Auxiliary input via terminal interface

If the CLV cannot read a bar code in Reading mode (e.g. if there is no bar code on the object), the data content of the bar code can be sent subsequently to the host by using the "Auxiliary input" function. In this way, the sequence of reading results can be completed if necessary.

The auxiliary input function uses the terminal interface of the CLV 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 CLV via an internal or external decoder of the device

Fig. 10-34 shows the flow of auxiliary input.

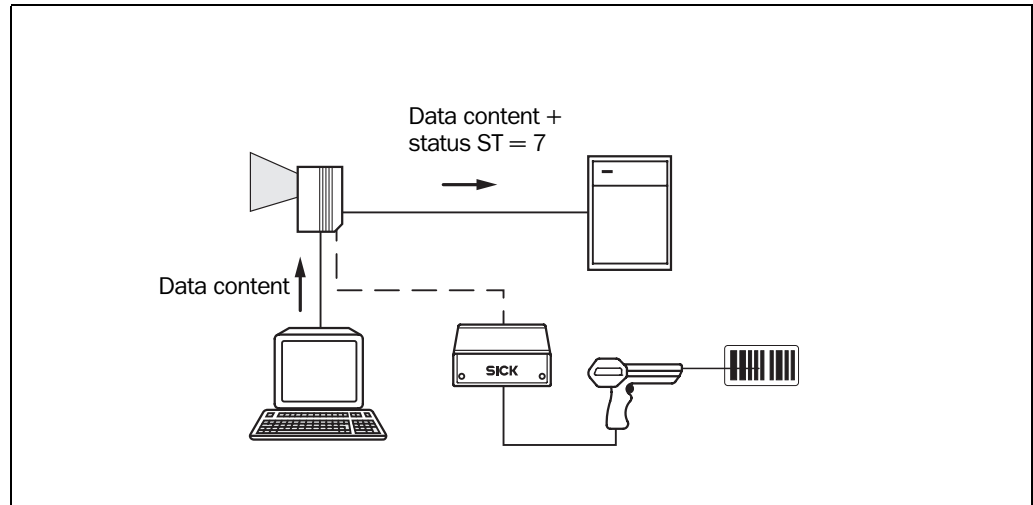8 008 568/K949/10-06-2002   **10-53**

Fig. 10-34: Auxiliary input via the terminal interface of the CLV

The CLV sends the data content of the bar code that it receives via the terminal interface to the host in the same format as the other reading results on the host interface. Each string can contain the data content from a bar code with a maximum length of 50 characters. The CLV automatically enters the status ST = 7 if the error status has been enabled for transfer. The values of the other reading diagnosis data in the data string are of no significance.

To enable the CLV to receive the data content of the bar code on the terminal interface, you must switch the operating mode on the interface to "auxiliary input".

1.   Connect the PC to the terminal interface (port) of the CLV using an RS 232 data connection cable (AMV/S 40: connect the PC to the internal, 9-pin "Service" plug). See *Chapter 5.5.6 "Connecting the PC", Page 5-6*.

2.   Start "CLV Setup" on your PC. See *Chapter 10.4.3 "Starting "CLV Setup"", Page 10-29*.

3.   Choose the AUXILIARY INTERFACE tab.

4.   Choose the AUXILIARY INPUT option from the drop-down list.

5.   Perform a download to the CLV. This is done by clicking 🖥️ in the toolbar. The DOWNLOAD PARAMETER dialog box is displayed.

6.   Confirm the dialog box by selecting the TEMPORARY save option.

The terminal interface then operates temporarily in "Auxiliary Input" mode.

Entering bar code using the Terminal Emulator in CLV Setup

1.   Click 🖥️ in the toolbar. The Terminal Emulator window is then displayed. The CLV 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. 10-35* shows the Terminal Emulator window in extended mode.

3.   Use the drop-down list to set the start and stop characters to NUL.

4.   Enter the data content of the bar code (character string) via the keyboard. Use the backspace key to correct input errors. The data content may not contain control characters.

5.   Press [RETURN] or [ENTER]. The CLV then interprets all further characters as a new data string.

CLV Setup sends the character string to the CLV and deletes the entry in the text field. The CLV does not send an echo.

6. Once the active reading pulse has ended, the CLV sends the data received from the PC to the host via the host interface.
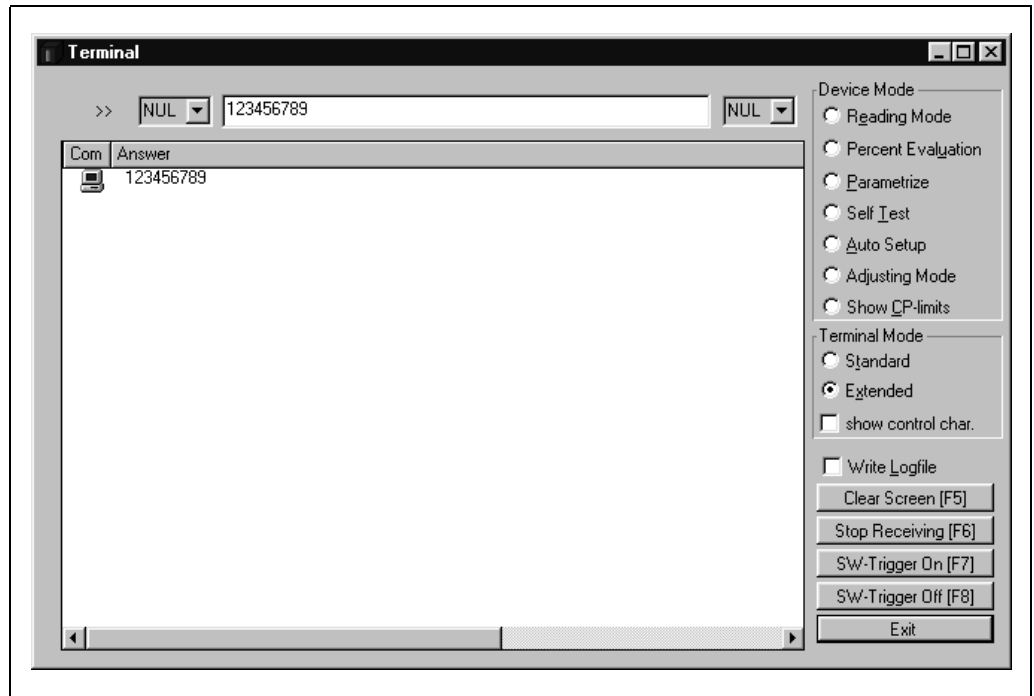

Fig. 10-35: CLV Setup: auxiliary input via the Terminal Emulator

Entering a bar code using a terminal/PC keyboard

1. Connect the terminal / PC with Terminal Emulation program to the terminal interface on the CLV (via AMV/S 40). For the pin assignment, see *Chapter 5.5.6 "Connecting the PC", Page 5-6*.

2. Set the communication parameters and data output format as shown in *Table 10-9*.

Parameter	Value
Data transmission rate	9 600 bits/s
Data bits	8
Parity	None
Stop bits	1
Data output format	Data terminator e.g. *1234 CR*

Table 10-9: Communication parameter settings for the terminal/PC for the auxiliary input

3. Enter the data content of the bar code via the keyboard.
    The terminal sends the individual characters to the CLV immediately.
    Use the backspace key to correct input errors.

4. Terminate the data content with the control character [CR].
    The CLV then interprets all further characters as a new data string.
    The CLV ignores other control characters. The data content itself may not contain any control characters.

5. Once the active reading pulse has ended, the CLV sends the data received from the PC to the host via the host interface.

Entering bar codes using a handheld scanner with decoder

1. Connect the handheld scanner with decoder to the terminal interface of the CLV (via AMV/S 40). For the pin assignment, *see Chapter 5.3 "Connector pin assignment", Page 5-2*.

2. Set the data format and communication parameters on the handheld scanner as shown in *Table 10-9*.

3. Read the bar code with the handheld scanner.
   Once the active reading pulse has ended, the CLV sends the data received from the PC to the host via the host interface.

If you are using the ST 1100 decoder from SICK, for example, set the communication parameters and data output as shown in *Table 10-10*.

Parameter	Value
Terminal ID	Unassigned
WA Network	No
ACK/NAK	No
Baud rate	9 600 bits/s
Data bits	7
Parity	Space
Configuration	RS 232
Preamble (Header)	Clear
Postamble (Terminator)	CR

Table 10-10: Communication parameter settings for the ST 1100 decoder

10.9.3 Structure of a daisy chain configuration (data forwarding or master/slave arrangement)

See *Technical Information "Master/Slave with Bar Code Scanners from the CLV Series"* *(order no. 8 007 675, English edition)*

10.9.4 Structure of a SICK network (RS 485)

See *"CLX 200 Network Controller" Technical Description* *(order no. 8 007 157, German/English edition)*

10.9.5 Connection to Profibus DP

See *"BMV/BMH 10 for Profibus DP" Operating Instructions* *(order no. 8 008 825, English edition)*

10.9.6 Connection to DeviceNet

See *"BMV/BMH 10 for DeviceNet" Operating Instructions* *(order no. 8 008 972, English edition)*

10.9.7 Connection to Interbus S

See *"BMS 10/20 for Interbus S" Technical Information* *(order no. 8 007 546, English edition)*

10.9.8 Connection to Ethernet

See *"BMV/BMH 10 for Ethernet" Operating Instructions* *(order no. 8 008 398, English edition)*

10.9.9   Structure of a CAN scanner network

See "*Application of the CAN interface*" *Operating Instructions*
(order no. 8 009 180, English edition)

10.10   Replacing a CLV (copying the parameter set)

There are two methods of replacing a CLV and transferring the current parameter set to the
new device:

- By using the profile bar codes
- By downloading the parameters from CLV Setup

The parameter set can only be transferred between identical device types (e.g. from one
CLV 430 to another CLV 430 etc.).

10.10.1 Transferring the parameter set using the profile bar codes

To transfer the parameter set using the profile bar codes, you do not need to connect the
device to a PC. The parameter set of the CLV that is to be replaced must be available in the
form of archived profile bar codes or at least as a configuration file in CLV Setup. Otherwise,
the replacement device must be configured from scratch.

The procedure for printing out the profile bar codes is described in *Chapter 10.5.2 "Profile*
programming", Page 10-37.

1. Disconnect the power supply to the AMV/S 40 Connection Module (of the CLV).
2. Disconnect the CLV plug from the AMV/S 40.
3. Remove the CLV from the bracket.
    Before doing so, mark the position and alignment on the bracket/station.
4. Install, align, and connect the replacement device.
5. Switch on the power supply to the AMV/S 40.
    The "Device Ready" LED lights up. The CLV outputs a tone to indicate that it is ready to
    read the profile bar codes.
6. Present the first profile bar code **within 5 seconds**.
    The CLV confirms that the bar code has been read successfully by outputting a tone via
    the beeper and waits **10 seconds** for the next profile bar code.
7. Present all of the other profile bar codes consecutively in the **printed sequence**.
8. Then allow the final wait time (10 seconds) to elapse.
    The CLV outputs two consecutive tones to indicate that it has switched to Reading
    mode.

The new CLV is now ready to use the transferred parameter set.

Troubleshooting

If the software version on the replacement device is older than the version on the old device
(e.g. new device is from warehouse stock), the profile bar codes may contain coded
parameters or parameter values that cannot be interpreted by the older software. The CLV,
however, reads all of the profile bar codes. But this does not indicate that the CLV can use
all the parameters or parameter values.

➢ Use the CLV Setup program to check whether the new CLV is functioning correctly. To
    do so, connect the PC to the terminal interface on the CLV. Check whether all of the
    parameter settings used are necessary to configure the CLV 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 one, the default setting in the imported parameter set will include parameters that were not contained in the old version.

➢ Upload the parameter set with the CLV Setup program and check whether the new parameters are relevant for configuring the CLV for the current reading application. If necessary, change the parameter values and download the parameter set to the CLV again. Save the new parameter set as a configuration file in CLV Setup and print it out as profile bar codes for archiving purposes.

See also .

10.10.2 Downloading the parameter set

To download the parameter set, you must connect a PC running the CLV Setup software to the replacement device. The parameter set of the CLV that is to be replaced must be available as a configuration file in CLV Setup, otherwise the device must be configured from scratch.

1. Disconnect the power supply to the AMV/S 40 Connection Module (of the CLV).
2. Disconnect the CLV plug from the AMV/S 40.
3. Remove the CLV 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 terminal interface (port) of the CLV using an RS 232 data connection cable. (AMV/S 40: connect the PC to the internal, 9-pin "Service" plug). See .
6. Switch on the power supply to the AMV/S 40.
   Once the CLV has started, it outputs an acoustic signal to indicate that the self-test was successfully completed. Shortly afterwards, it outputs two acoustic signals to indicate that it has assumed Reading mode. 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 CLV are identical, CLV Setup uploads the parameter set from the CLV 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 CLV.
10. Confirm the dialog box by choosing the TEMPORARY storage option.
11. Check whether the CLV reads the bar codes correctly.
    Correct the parameter settings if necessary.
12. Finally, download the tested parameter set to the CLV 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.

10-58   8 008 568/K949/10-06-2002

Troubleshooting

If the software version on the replacement device is older than the version on the old device (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 CLV 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 one, the default setting in the imported parameter set will include parameters that were not contained in the old version.

➢ Upload the parameter set and check whether the new parameters are relevant for configuring the CLV for the current reading application. If necessary, change the parameter values and download the parameter set to the CLV again. Save the new parameter set as a configuration file in CLV Setup.

See also *Chapter 10.4.8 "Unknown parameters", Page 10-33.*

10.11 Accessories

10.11.1 Installation accessories

Part No.	Description	Fig.
2 020 410	Mounting bracket with installation accessories	*Fig. 10-36, Page 10-62*
2 022 564	Mounting bracket (hoop shaped), with installation accessories	*Fig. 10-37, Page 10-62*
2 023 691	Round rod bracket for round rods and tubes with a diameter of 12 to 20 mm, with installation accessories	*Fig. 10-38, Page 10-63*

Table 10-11: Accessories: installation accessories

10.11.2 Connection modules

Part No.	Type	Description
1 017 132	AMV 40-011	Connection module for CLV 43x/44x with 15-pin D-Sub HD device socket, terminal strips (signal distributors) for wiring the data and functional interfaces, internal 9-pin D Sub "Service" plug, cable grips, polycarbonate housing, enclosure rating max. IP 54. Operating voltage 10 to 30 V DC
1 017 135	AMS 40-013	As AMV 40-011 with additional integrated 230 V AC 50 Hz/24 V DC power supply
1 017 136	AMS 40-012	As AMV 40-011 with additional integrated 115 V AC 50/60 Hz/24 V DC power supply
1 017 385	AMS 40-023	As AMS 40-013, with additional 2-row LCD
2 020 825	–	Interface converter RS 422 on CL 20 mA, for a CLV; for optional installation in the AMV 40-011, AMS 40-013, AMS 40-012 and AMS 40-023
1 019 160	AMV 70-081	Connection module for CLV 43x/44x with 15-pin D-Sub HD device socket, spring-resistance terminals (signal distributors) for wiring the data and functional interfaces, internal 9-pin D-Sub "Service" plug, plastic cable screwed connections, polycarbonate housing, enclosure rating max. IP 30. With address function for network operation, operating voltage 10 to 30 V DC
6 021 105	AMV 100-011	Universal connection module for max. two CLV 43x/44x, each with a 15-pin D-Sub HD device socket, terminal strips (signal distributors) for wiring the data and functional interfaces, two internal 9-pin D-Sub "Service" plugs, cable grips, pressed aluminum housing, enclosure rating max. IP 54 (enclosure rating max. IP 65 with a plug hood), operating voltage 10 to 30 V DC

Table 10-12: Accessories: connection modules

Part No.	Type	Description
6 021 106	AMV 200-011	As AMV 100-011, but for max. four CLV 43x/44x
6 007 655	–	Power cable, 3-wire, length 2 m, with 3-pin connector (grounding) and one open end (stripped)

Table 10-12: Accessories: connection modules

10.11.3 Bus connection modules

Part No.	Type	Description
6 020 896	BMV 10-0111	Bus connection module for connection of max. two CLVs to a **Profibus DP**; for the CLV 43x/44x with a 15-pin D-Sub HD device socket. With 9-pin D-Sub socket for the bus, terminal strips (signal distributors) for wiring the RS 232 data interface and the functional interfaces, two internal 9-pin D-Sub "Service" plugs, cable grips, die-cast aluminum housing, enclosure rating max. IP 54 (protection type max. IP 65 with plug hood), operating voltage 20 to 30 V DC
6 020 893	BMH 10-0111	Bus module for connection of a CLV to **Profibus DP**, with terminal screws, a 9-pin D-Sub socket for the bus, no housing, for top-hat rail installation, enclosure rating max. IP 20, operating voltage 10 to 30 V DC
6 021 190	BMV 10-0311	Bus connection module for connection of max. two CLVs to the **DeviceNet**, terminal strip for the bus connection, otherwise as with BMV 10-0111
6 021 188	BMH 10-0311	Bus module for connection of a CLV to the **DeviceNet**, otherwise as with BMH 10-0111
1 012 672	BMS 10-0113	Bus connection module for connection of a CLV to an **Interbus S**, for the CLV 43x/44x with a 15-pin D-Sub HD device socket. With two 9-pin bus connections (in/out), terminal strips (signal distributors) for wiring the data and functional interfaces, internal 9-pin D-Sub "Service" plug, integrated 230 V AC 50 Hz/24 V DC power supply, cable grips, enclosure rating max. IP 54
1 012 680	BMS 10-0112	as BMS 10-0113, but with integrated 115 V AC 50/60 Hz/24 V DC power supply
6 025 757	BMV 10-0411	Bus connection module for connection of max. two CLVs to **Ethernet**. TCP/IP communication, data transmission rate 10 Mbit/s. For the CLV 43x/44x with a 15-pin D-Sub HD device socket. With an 8-pin RJ 45 bus socket, terminal strips (signal distributors) for wiring the RS 232 data interface and the functional interfaces, two internal 9-pin D-Sub "Service" plugs, cable grips, die-cast aluminum housing, enclosure rating max. IP 54 (enclosure rating max. IP 65 with plug hood), operating voltage 20 to 30 V DC
6 025 756	BMH 10-0411	Bus module for connection of a CLV to **Ethernet**. TCP/IP communication, data transmission rate 10 Mbit/s. With terminal screws, an 8-pin RJ 45 bus socket, no housing, for top-hat rail installation, enclosure rating IP 20, operating voltage 10 to 30 V DC
6 022 140	BMV 10-0431	As with BMV 10-0411, but with FTP communication, data transmission rate 10/100 Mbit/s
6 025 748	BMH 10-0431	As with BMH 10-0411, but with FTP communication, data transmission rate 10/100 Mbit/s
6 007 655		Power cable, 3-wire, length 2 m, with 3-pin connector (grounding) and one open end (stripped)

Table 10-13: Accessories: bus connection modules

10.11.4 Cables and plug-in connections

Part No.	Description	Wires	Length	Connection
6 010 075	Extension cable for data and functional interfaces, 6.5 mm dia., shielded, with 15-pin D-Sub HD socket and plug	15	2 m	CLV 43x/44x to AMV/S 40
6 010 137	Connection cable for data and functional interfaces, 6.5 mm dia., with 15-pin D-Sub HD socket and one open end (stripped)	15	2 m	CLV 43x/44x to external power pack
2 014 054	Data connection cable RS 232, 5 mm dia., shielded, with two 9-pin D-Sub sockets (Pin2 (RxD) and Pin 3 (TxD) crossed)	3	3 m	PC to AMV/S 40
6 010 088	Data cable, 6.6 mm dia., shielded, for connection cables up to 3 m long	15 x 0.09 mm^2	Bought to size	free
6 007 508	Data cable, 8.5 mm dia., twisted pair, shielded	2 x 2 x 0.23 mm^2	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			

Table 10-14: Accessories: cables and plug-in connections

10.11.5 Reading pulse generators

Part No.	Description
4 030 794	Polling reflector, white (included in scope of delivery)
4 030 795	Polling reflector, blue, with removable protective film (included in scope of delivery)

Table 10-15: Accessories: reading pulse generators (polling reflectors)

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)

10.11.6 Network controller

Part No.	Type	Description
On request	CLX 200	Network controller with LCD, touch-sensitive keypad, integrated power pack and 9-pin D-Sub connections for network, host and terminal, enclosure rating IP 31

Table 10-16: Accessories: network controller

10.12 Dimensional drawings of the accessories
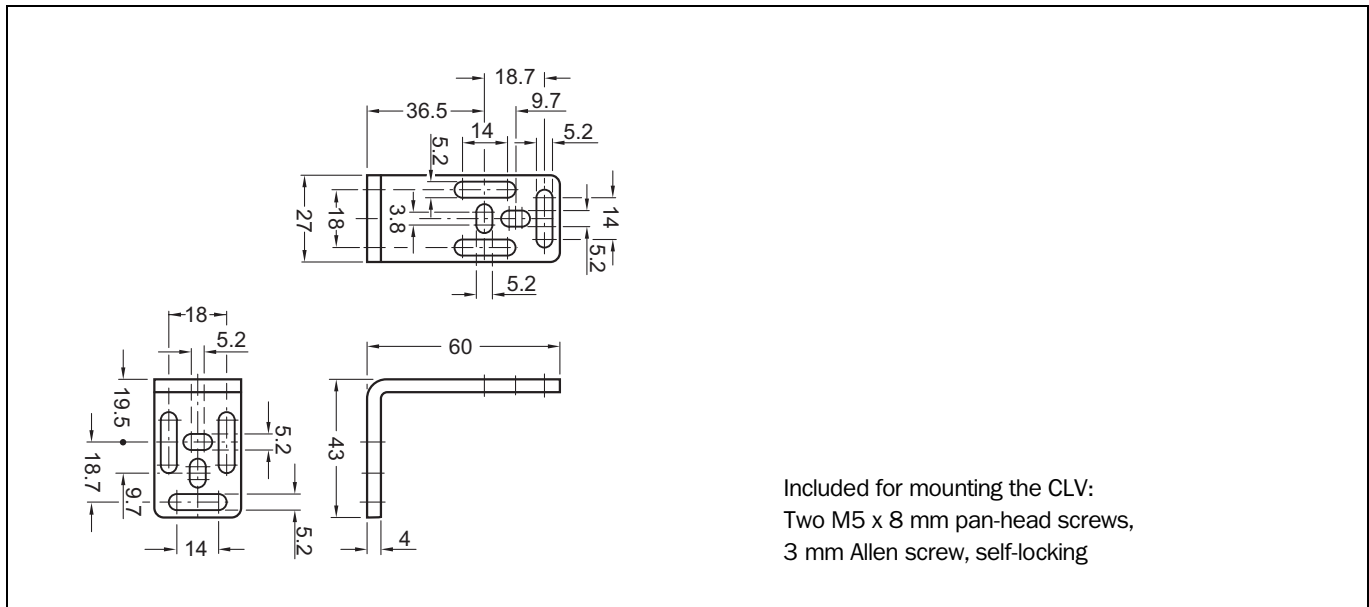
10.12.1 Mounting bracket no. 2 020 410

Included for mounting the CLV:
Two M5 x 8 mm pan-head screws,
3 mm Allen screw, self-locking

Fig. 10-36: Dimensions of the mounting bracket no. 2 020 410

10.12.2 Mounting bracket no. 2 022 564

Included for mounting the CLV and bracket:
– Three M5 x 8 mm pan-head screws,
  3 mm Allen screw, self-locking
– Three spring washers A5
– Two hexagon bolts M5 x 12 mm
– Two washers A5.3

Fig. 10-37: Dimensions of the mounting bracket no. 2 022 564

                       8 008 568/K949/10-06-2002

10.12.3 Round rod bracket no. 2 023 691

Included for mounting the CLV:
– Three M5 x 8 mm pan-head screws,
   3 mm Allen screw, self-locking
– Three spring washers A5

Fig. 10-38: Dimensions of the round rod bracket no. 2 023 691

10.13 Supplementary documentation

Part No.	Title	Contents
2 020 824	Technical Documentation Set	– CLV 43x/44x Operating Instructions in German and English – 1 CD-ROM with the "CLV-Setup", CLV Assistant, Online Help software "CLV-Setup Help" and the HTML browser "I-ViewPro^{TM}" – Card with 12 profile bar codes
8 008 292	"AMV/S 40" Operating Instructions	Description for wiring the CLV to the host/the PLC/the sensor via the AMV/S 40 Connection Module
8 009 154	"AMV 70/71" Operating Instructions	Description for wiring the CLV to the SICK network/the PLC/the sensor via the AMV 70 Connection Module
8 008 879	"AMV 100/200" Operating Instructions	Description for wiring two (four) CLVs to the host/the PLC/the sensor via the AMV 100 (AMV 200) Connection Module
8 007 675	Technical information "Master/Slave with CLV bar code scanners"	Description of the structure of a "daisy-chain configuration" (master/slave or data forwarding)
8 007 157	Technical Description "Network Controller CLX 200"	Description of a SICK Network (RS 485) with CLV Bar Code Scanners
8 008 825	Operating Instructions "BMV/BMH 10 for Profibus DP"	Description of the connection of the CLV to the Profibus/the PLC/the sensor via the bus connection module BMV/BMH 10
8 008 972	Operating Instructions "BMV/BMH 10 for DeviceNet"	Description of the connection of the CLV to the DeviceNet/the PLC/the sensor via the BMV/BMH 10 Bus Connection Module BMV/BMH 10
8 007 546	Technical information "BMS 10/20 for Interbus S"	Description of the connection of the CLV to the Interbus S/the PLC/the sensor via the BMS 10/20 Bus Connection Module
8 009 398	Operating Instructions "BMV/BMH 10 for Ethernet"	Description of the connection of the CLV to the Ethernet/the PLC/the sensor via the BMV 10 Bus Connection Module/BMH 10 Bus Module
8 009 180	Operating instructions "Application of the CAN interface"	Description of building a SICK scanner network (electrical connection, configuration of the CLV, functions)
On request	Command strings	Description of the CLV command strings

Table 10-17: Supplementary documentation (English versions)

10.14 Glossary

For additional terms, see also *"CLV Setup Help" online help*

Adjusting mode

Special operating mode that enables the center of the scan line to be positioned exactly on the object containing the bar code.

Aperture angle α

Angle within whose limits the laser beam is deflected by the polygon mirror wheel. A V-shaped range perpendicular to the scan direction, which must contain the bar code, is formed in front of the reading window. If only part of this aperture angle is used (part of the scan line symmetric around the center point), the depth of field for the focus position and resolution is greater.

Aspect ratio

Ratio of the code height (bar length) to the code length (number of characters). The SMART decoder can also read bar codes with extremely small aspect ratios.

AutoSetup

Function that allows the code and reading configuration of the CLV to be adapted automatically to the application at hand. The CLV uses the standard decoder to search for a bar code that is presented at a fixed distance and attempts to determine the optimum scanning rate and focus position (CLV 44x). It enters the code type and code length and disables all other code types and lengths.

Auxiliary input

Special function on the ⇨ terminal interface. Used to enter bar code data subsequently in order to complete reading results sent to the host.

Capture range

Zone around a moving bar code created by the CLV using the increment management and code position comparison functions. Enables bar codes with identical content and code type to be separated.

Christmas tree effect

Effect caused by limiting the active scan line range (CP values) and oscillating amplitude (CW values) on the ⇨ Line scanner with oscillating mirror. In this way, a uniform "sharply defined window" can be created in the reading field for each distance configuration, independent of the reading distance.

CLV Assistant

The Assistant simplifies parameterization and testing of the CLV, among other things. It carries out configuration of the CLV for a user-specific reading situation with **one** bar code in individual steps. The determined settings are transferred to CLV Setup.

CLV Setup

PC program which runs under Windows 95™/98™ and Windows NT™. Used for offline parameterizing (adjustment to the reading application at hand) and the online operation of the CLV. The ⇨ parameter set is exchanged with the CLV via ⇨ uploading and ⇨ downloading.

CLV Setup Help

Online help function that provides support for using the "CLV Setup" program. The help function contains explanations of the CLV parameters and their valid entries. Can be launched directly from CLV Setup in an HTML browser such as Netscape Navigator™ or I-ViewPro™ supplied with the program.

Code angle (CW value)

Current deflection range of the scan line (oscillating mirror) perpendicular to the scan direction when a bar code is recorded. Calculated by the CLV for each scan and used, for example, to define a capture range so that bar codes with identical data contents in a given range can be separated.

Code geometry

Length and height dimensions of the bar code.

Code position (CP value)

Position of the first dark bar in a detected bar code along the ⇨ scan line. Calculated by the CLV for each scan and can be used, for example, to separate bar codes with identical data contents. The active evaluation range in the scan line can be restricted for ⇨ decoding purposes by specifying the maximum and minimum CP value for the application.

Command strings, commands

CLV user interface – alternative to the "CLV Setup" program. Basic, yet clearly structured command language for modifying the CLV parameter sets online. Accesses the CLV command interpreter directly. Special programming activities are required to use the command strings from the host.

Configuration file

File in the "CLV Setup" program that archives the entire ⇨ parameter set of the CLV. Can be printed out in the form of a table.

Data output string

Structured data telegram ⇨ in the reading result output by the CLV on the ⇨ host interface. 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 ⇨ terminal interface, on the other hand, cannot be changed.

Data forwarding

Option of forwarding data sent by the host transparently to a terminal via the CLV 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.

Decoder, decoding

Code-type-specific evaluation routine for reconstructing the read bar code in electronic form in order to decode its data content.

Deflection range

Deflection of the scan line caused by the ⇨ oscillating mirror, perpendicular to the scan direction about the center position CW = 50 at each side (corresponds to a deflection angle of 105°). Also referred to as oscillating amplitude. The maximum deflection range is set in Oscillating Mode. In Oscillating with variable Amplitude mode, the deflection range is set for each distance configuration using the Oscillating mirror tab in the CLV Setup program.

Deflection angle

Angle about each side of the center position CW=50 (equal to 0°) that the ⇨ scan line sweeps when it is deflected by the oscillating mirror. Also referred to as the oscillating angle.

Distance configuration

Data record in the CLV for defining a ⇨ focus position for the laser beam for ⇨ dynamic focus control. The focus position as well as the maximum and minimum ⇨ code position must be entered on the Reading Configuration tab in the CLV Setup program for this purpose. In the case of the Line scanner with oscillating mirror, the ⇨ oscillating amplitude (deflection range) is also required. The depths of field for the individual focus positions are shown as a function of the resolution values in the specification diagrams.

Distance detector

System for recording the distance of objects with a bar code in front of the CLV in 2 stages. When the bar code is read from above, for example, the distance is detected by installing a photoelectric reflex switch beside the conveyor belt. The two ranges for ⇨ dynamic focus control are defined by using the distance detector as well as the "Sensor 1" switching input and the assignment table for the ⇨ distance configurations.

Download

Method of transferring the ⇨ parameter set that was modified with the ⇨ CLV Setup program offline from the PC to the RAM of the CLV. CLV Setup either always transfers a complete copy to the memory (RAM) of the CLV (Download to CLV) or just the parameter previously processed using the context menu of the right mouse button (Download Parameter). You can overwrite the existing parameter set in EEPROM of the CLV by choosing the "Permanent" save option.

Dynamic focus control

Function in the CLV 44x for shifting the focal point of the laser beam across a wide range in the reading plane. The dynamic focus control function is event controlled (e.g. by the ⇨ distance detector).

Error messages

Messages in ⇨ plain text that are used to identify a malfunction on the CLV in Reading mode. The messages are output via the terminal interface only. Exception: ST=3 (device error), which is also output on the host interface. The error messages can be displayed in extended mode of the Terminal Emulator in the user interface of the CLV Setup program.

Error status

Identifier output with the reading result by the CLV for errors that were diagnosed while the bar code was being read. The entry for the host interface is made in the separator of the ⇨ data output string and must be enabled using the parameters (disabled by default in the CLV 43x/44x).

Focus position

Distance of the focal point of the emitted laser beam in front of the reading window. Can be varied using the optical components in the CLV 44x. Creates a distance-specific depth of field (DOF) in which the bar code can be recorded.

Functional interfaces

Switching inputs and outputs on the CLV.

Good Read

The CLV successfully detected a bar code or the required number of bar codes specified by the evaluation parameters during the ⇨ reading pulse.

Header

Data block in the reading result of the ⇨ host interface. Used as a header in the ⇨ data output string for the subsequent data content of the bar code. Contains reading diagnosis data and/or constants (e.g. letters), depending on the configuration. The header is empty in the default setting of the CLV 43x/44x.

Host interface

Main data interface on the CLV with configurable data output format. Used to output the ⇨ reading result in telegram form to the host/PLC. Integrates the CLV in the SICK network or builds a master/slave arrangement. Can be physically switched to RS 232 or RS 422/485. It supports various transfer protocols.

Increment management

Used in certain applications to separate bar codes with identical contents that move during the reading procedure and assign them to the objects.

Line scanner

Scanner that uses a polygon mirror wheel with paraxial mirrors to deflect a focused laser beam extremely fast. As a result, it creates a light spot in the reading plane that moves along a straight line, which appears to the naked eye as a stationary scan line.

Line scanner with oscillating mirror

Line scanner that also deflects the laser beam about a central position, on both sides and perpendicular to the scan direction using an oscillating mirror. By doing so, the CLV can search for bar codes in larger areas. In addition to basic deflection with the maximum oscillating amplitude, optimum oscillating mirror functions are also possible (variable deflection per distance configuration, ⇨ one-shot).

Master/slave configuration

Special arrangement for connecting up to max. 10 CLVs in the CAN scanner network to one reading station (e.g. left/right read). Thanks to the master, the entire network appears as one device to the host.

8 008 568/K949/10-06-2002   **10-67**

Multiple read

Variable number of reading operations that must provide identical reading results (data content) of the same bar code before the CLV outputs the result.

No Read

The CLV failed to detect a bar code or the required number of bar codes specified by the evaluation parameters during the ⇨ reading pulse.

No Read format

Special, parameterizable data block as a substitute for bar codes, which were expected but not detected, in the data output string on the host interface for ⇨ no reads. Comprises a variable combination of the error string and the ⇨ separator.

Object height detector

See distance detector.

One-shot

Selective, one-time deflection of the oscillating mirror for each ⇨ reading pulse. Usually comprises a slow forward phase (read) and a fast return phase (return to starting position).

Oscillating mirror reversal point

Deflection point of the oscillating mirror at which it changes direction. Can be used to trigger ⇨ dynamic focus control for slow applications (search mode).

Parameter set

Data record used to initialized and activate the functions implemented in the CLV. With ⇨ downloading and ⇨ uploading, the parameter set is transferred from CLV Setup to the CLV or from the CLV to CLV Setup.

Percentage evaluation

Special operating mode in which the quality of the reads (but not the bar codes) is assessed statistically. The bar codes must be stationary. The CLV carries out 100 scans and evaluates the reading quality. It then outputs the reading results on the ⇨ terminal interface every 2 sec together with the ⇨ reading diagnosis data.

Plain text

Legible form of a CLV message. The CLV outputs special messages in coded form, e.g. the result of the self-test is represented as three digits.

Profile bar code

Special bar codes that are created and printed using the ⇨ CLV Setup program. They contain coded parameter values from the parameter set. The profile bar codes can be used to configure the CLV with its optical interface (reading window) instead of a PC.

Raster height

Distance between the first and last of the eight parallel scan lines for the ⇨ Raster scanner. The raster width is the distance between two adjacent scan lines.

Raster scanner

Scanner that uses a polygon mirror wheel with eight tilted mirrors to deflect its focused laser beam extremely quickly. As a result, it creates a light spot that moves quickly in eight rows across the reading plane. Each light spot repeatedly moves along a straight line. It thereby appears to human eyes as one of eight stationary scan lines.

Reading diagnosis data

Data directly derived from the reading procedure by the CLV. This data enables the quality of the read to be assessed. The data is always output on the ⇨ terminal interface together with the reading result. Only output on the host interface if enabled on the DATA STRINGS tab in the CLV Setup program (disabled by default for CLV 43x/44x).

Reading field height

Length of the ⇨ scan line that is available for detecting the bar code in the reading plane. Due to the V-principle of beam generation, the reading field height is dependent on the reading distance.

Reading interval

Timeslot in which the CLV activates the laser diode and attempts to detect valid bar codes from the information read. The reading interval may be shorter than the external reading pulse, depending on the selected output mode for the reading result.

Reading range (DOF)

Depth of field around the focal point of the laser beam on two sides. The extent of the reading range depends on the resolution and reading distance.

Reflector polling

Reading pulse generated automatically by the CLV using a special bar code that serves as a reflector for the laser beam. The bar code is positioned opposite the CLV. The CLV polls the reflector at regular intervals. When it is concealed by an object, the CLV starts the reading interval. It stops the reading interval once it detects the reflector again. Not suitable for the Line scanner with oscillating mirror in OSCILLATING mode nor for the CLV 44x with dynamic focus control.

Reading pulse

Pulse applied externally to the CLV 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 bar code 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 terminal interface has a fixed format (content and output format); the reading result on the host interface can be configured separately for good reads and no reads. Special characters can also be added if necessary.

Result status output

Function of the "Result 1" and "Result 2" switching outputs 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 on the DEVICE FUNCTION tab in the user interface of CLV Setup. The "Result" LED is linked to the "Result 2" output.

Scan line

See Line scanner.

Separator

Data block in the reading result of the ⇨ host interface. Used to separate the data content of the bar codes. Can be attached to the bar code as a prefix or suffix. Contains reading diagnosis data and/or constants (e.g. letters), depending on the configuration. The separator is empty in the default setting of the CLV 43x/44x.

SICK network

Special, high performance network of max. 31 CLVs with high data transfer rates via the RS 485 interface. The CLVs are coordinated (polling) and connected to the host via the CLX 200 Network Controller.

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.

Specification diagrams

Diagrams for reading the resolution-specific depth of field (DOF) for specific focus positions.

Standard decoder

Tried-and-tested ⇨ decoder from the CLV product family. Suitable for applications with an adequate code height, limited tilt, and high-quality code prints.

Storage in the CLV

The application-specific ⇨ parameter set can be stored temporarily or permanently in the CLV. 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 CLV 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).

Switching sequence

Focus control function. Sequence of focus positions to be set consecutively with associated depths of field. The numbers of the active ⇨ distance configurations are entered at the required position in the assignment table for this purpose.

System messages

Messages ⇨ in plain text used to output the operating status of the CLV. The messages are output via the terminal interface only. The messages can be displayed in extended mode of the TERMINAL EMULATOR in the user interface of the CLV Setup program.

Teach-in

Method of programming the information required to adjust the CLV to the reading application in Parameter mode. Example: teaching-in match code 1 or teaching-in the application-specific bar code in ⇨ AutoSetup.

Terminal interface

Auxiliary interface (RS 232) on the CLV with fixed data output format. Used to connect the "CLV Setup" program to the CLV so that it can operate and configure the device. Also used to output ⇨ system and error messages. Can be assigned various functions.

Terminator

Data block in the reading result of the ⇨ host interface. Used to terminate the data content of the bar code. Contains reading diagnosis data and/or constants (e.g. letters), depending on the configuration. The terminator is empty in the default setting of the CLV 43x/44x.

Transmission time

Point at which the reading result is output with respect to the start of the ⇨ reading pulse and the internal ⇨ reading interval.

Upload

Method of transferring the ⇨ parameter set from the CLV 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 CLV (UPLOAD TO CLV) or just the parameter previously processed using the context menu of the right mouse button (UPLOAD PARAMETER). Displays the current parameter values on the tabs. Prerequisite for modifying the current parameter set.

User interface

Windows-based PC software "CLV Setup" for operating and configuring the CLV.

8 008 568/K949/10-06-2002   **10-71**

10.15 Copy of the EC Declaration of Conformity

SICK

EC Declaration of Conformity

In Compliance with the EC Directive on Electromagnetic Compatibility 89/336/EEC

We hereby declare that the devices (see page 2)

of the product family CLV43.
CLV44.

comply with the basic requirements of the EC Directive specified under Point 1. If an item of equip-ment listed overleaf is modified without our approval then this declaration loses its validity for this equipment.

We employ a quality system certified by the DQS (German Quality Assurance Society), No. 19 462-01, as per ISO 9001 and have therefore observed the regulations in accordance with module H as well as the following EC directives and EN standards during development and production:

1. *EC directives*	EC EMC directive 89/336/EEC as per 92/31/EEC, 93/68/EEC, 93/465/EEC		
2. *Harmonized standards used*	EN 50081-2	Emitted interference, industry	Ed. 93-08
	EN 50082-1	Immunity, residential, commercial and light industry	Ed. 97-08
	EN 50082-2	Immunity, industry	Ed. 95-03

Conformance of a type sample belonging to the above-mentioned product family with the regulations from the listed EC directives has been certified by:

Test authority The tests were carried out and documented on our own responsibility.

Reute, 1999-08-17

i. V. Pierenkemper
(Manager Development Division Auto Ident)

i. V. Walter
(Manager Production Division Auto Ident)

The declaration certifies conformance with the listed directives, but does not guarantee product characteristics. The safety instructions contained in the product documentation must be observed.

Mat. No.: 9 050 298
Page 3, engl.
Update no.: see page2

SICK AG	Telefon (0 7641) 469-0	Aufsichtsratsvorsitzender:	Sitz: Waldkirch i.Br.
Nimburger Str. 11	Telefax (0 76 41) 469-149	Dr. Horst Skoludek	Handelsregister
D-79276 Reute		Vorstand:	Emmendingen HRB 355 W
		Volker Reiche (Vors.)	
		Anne-Kathrin Deutrich	
		Dieter Fischer	

Fig. 10-39: Copy of the EC Declaration of Conformity (scaled down, Page 1)

CLV 43x/44x Bar Code Scanner

SICK

The EC Declaration of Conformity No. 9050298 is valid for the following types of the product family CLV43.
and CLV44.:

Type	Id.-No.
1017585	CLV430-0010
1017997	CLV430-0010S01
1016976	CLV430-0910S01
1016705	CLV430-1010
1017981	CLV430-6010
1016836	CLV430A0010
1016837	CLV430A1010
1017985	CLV430A6010
1017622	CLV431-0010
1016679	CLV431-1010
1016746	CLV431-2010
1016747	CLV431-3010
1017982	CLV431-6010
1016840	CLV431A0010
1016841	CLV431A1010
1016842	CLV431A2010
1016843	CLV431A3010
1017986	CLV431A6010
1017623	CLV432-0010
1018185	CLV432-0010S01
1016680	CLV432-1010
1016748	CLV432-2010
1016749	CLV432-3010
1016995	CLV432-3910S01
1017983	CLV432-6010
1016844	CLV432A0010
1016845	CLV432A1010
1016846	CLV432A2010
1016847	CLV432A3010
1017987	CLV432A6010
1017588	CLV440-0010
1018146	CLV440-0010S01
1018238	CLV440-2010S01
1017984	CLV440-6010
1016848	CLV440A0010
1017988	CLV440A6010
1017595	CLV442-0010
1016850	CLV442A0010

-end of list-

Mat.-No.: 9 050 298
Page 2
Update no.: J822

Fig. 10-40: Copy of the EC Declaration of Conformity (scaled down, Page 2)

10.16   Index

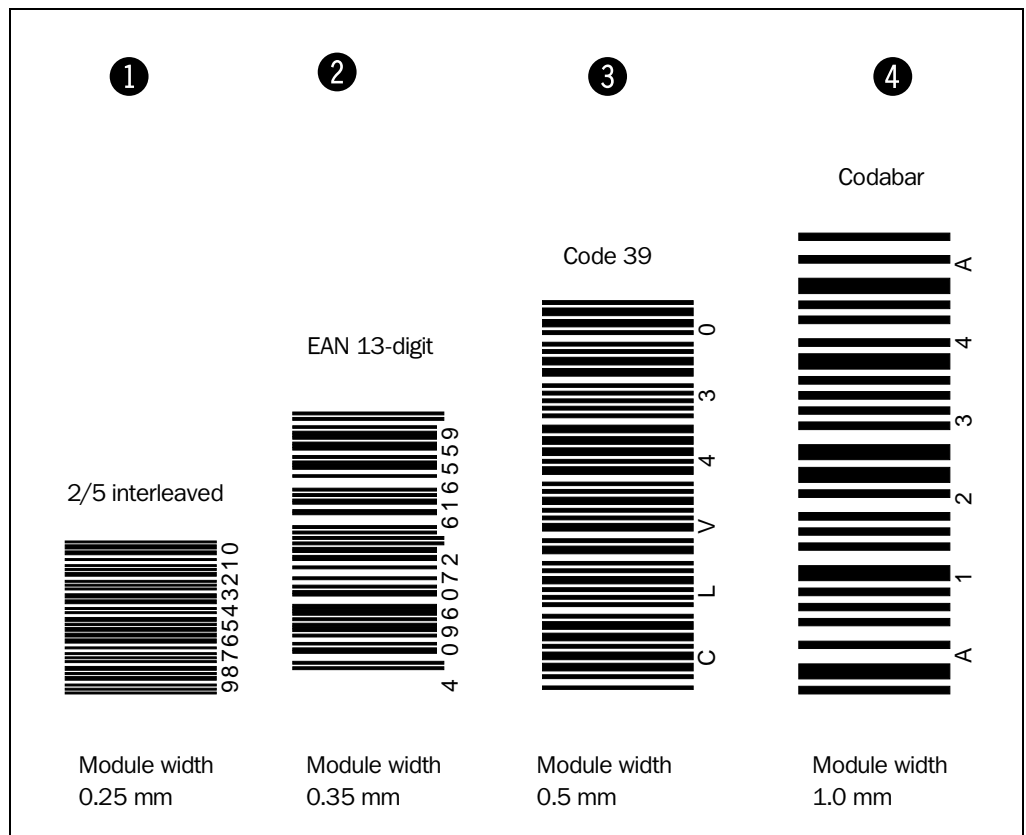## 10.17 Bar code samples

Fig. 10-41: Scannable bar codes with various module widths (print ratio 2:1)

Australia
Phone +61 3 9497 4100
        1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Belgium/Luxembourg
Phone +32 (0)2 466 55 66
E-Mail info@sick.be

Brasil
Phone +55 11 5091-4900
E-Mail sac@sick.com.br

Ceská Republika
Phone +420 2 57 91 18 50
E-Mail sick@sick.cz

China
Phone +852-2763 6966
E-Mail ghk@sick.com.hk

Danmark
Phone +45 45 82 64 00
E-Mail sick@sick.dk

Deutschland
Phone +49 (0)2 11 53 01-270
E-Mail info@sick.de

España
Phone +34 93 480 31 00
E-Mail info@sick.es

France
Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Great Britain
Phone +44 (0)1727 831121
E-Mail info@sick.co.uk

India
Phone +91–22–2822 7084
E-Mail info@sick-india.com

Italia
Phone +39 02 27 40 93 19
E-Mail info@sick.it

Japan
Phone +81 (0)3 3358 1341
E-Mail info@sick.jp

Nederlands
Phone +31 (0)30 229 25 44
E-Mail info@sick.nl

Norge
Phone +47 67 81 50 00
E-Mail austefjord@sick.no

Österreich
Phone +43 (0)22 36 62 28 8-0
E-Mail office@sick.at

Polska
Phone +48 22 837 40 50
E-Mail info@sick.pl

Republic of Korea
Phone +82-2 786 6321/4
E-Mail kang@sickkorea.net

Republika Slowenija
Phone +386 (0)1-47 69 990
E-Mail office@sick.si

Russia
Phone +7 95 775 05 30
E-Mail info@sick-automation.ru

Schweiz
Phone +41 41 619 29 39
E-Mail contact@sick.ch

Singapore
Phone +65 6744 3732
E-Mail admin@sicksgp.com.sg

Suomi
Phone +358-9-25 15 800
E-Mail sick@sick.fi

Sverige
Phone +46 8 680 64 50
E-Mail info@sick.se

Taiwan
Phone +886 2 2365-6292
E-Mail sickgrc@ms6.hinet.net

Türkiye
Phone +90 216 388 95 90 pbx
E-Mail info@sick.com.tr

USA/Canada/México
Phone +1(952) 941-6780
        1 800-325-7425 – tollfree
E-Mail info@sickusa.com

More representatives and agencies
in all major industrial nations at
www.sick.com

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

SICK
Sensor Intelligence.