OPERATING INSTRUCTIONS

OPS400
OMNI Portal Scanner

SICK
Sensor Intelligence.

Software versions

Software/Tool	Function	Version
OPS400-20 (high density)	Firmware	V 5.0 RA32
OPS400-00 (standard density)	Firmware	V 5.0 RA32
OPS400-60 (low density)	Firmware	V 5.0 RA32
CLV Setup	Configuration software (windows-based)	V 4.4 QF16
CLV Setup Help	Online help (HTML)	V 4.4 QF16


ATTENTION

The OPS400 is exclusively intended for use in an industrial environment.

In case of use in residential areas, RF interference may occur.

Trademarks

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Latest manual version

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

OPS400 OMNI Portal Scanner

Quick Finder

Installation procedure (overview)

For "Tracking" reading mode (standard operating mode)

1. Check scope of delivery for completeness.
2. Install OPS400 and align with object possessing bar code.
3. Remove cover of connection area of OPS400. Cable connection via PG threaded joints.
4. Connect reading pulse sensor for trigger start to switching input "Trigger 1" of OPS400.
5. Connect incremental sensor to switching input "INC 1" of OPS400.
6. Connect host to terminal strip "Host" of OPS400.
7. Connect power supply 100 to 240 V AC, 50 to 60 Hz and switch on. OPS400 starts up. "Device Ready" LED in connection area illuminates.
8. Switch on PC and start Windows™ (at least Windows 95™ required).
9. Install accompanying configuration software CLV Setup and online help CLV Setup Help from CD-ROM (“Manuals & Software Bar Code Scanners“) to PC.
10. Connect PC to auxiliary interface of OPS400. Connect a 3-core RS 232 data cable (null modem cable, e.g. no. 2014054) to 9-pin D Sub plug "AUX" of OPS400.
11. Start user interface of CLV Setup software. CLV Setup contacts OPS400 and copies parameter set of OPS400 via an upload. Parameter set displayed on tabs.
12. Call up Terminal Emulator in CLV Setup.
13. Carry out test read with test bar code sample.
    Move object through reading field with conveyor.
    Reading result displayed in Terminal Emulator of CLV Setup.
14. Configure setting options on tabs in CLV Setup for application at hand. Copy modified parameter set temporarily to OPS400 via download.
    Do **not** switch off power supply to OPS400!
15. Run a test under realistic conditions.
16. Check proper data transfer of OPS400 to host.
17. Check and optimize set parameter values if necessary.
    Copy parameter set to OPS400 **permanently** via download.
18. Save parameter set as a "*.scl" configuration file in CLV Setup.

OPS400 contains **application-specific** settings and is ready for operation.

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Abbreviations

BMV/S Bus connection module with distributor (signal)/with additional power supply
DC **D**istance **C**onfiguration
DOF **D**epth **O**f **F**ield
EEPROM **E**lectrically **E**rasable **P**rogramable **R**ead **O**nly **M**emory
FIFO First in, first out
HD **H**igh **D**ensity
HTML **H**yper **T**ext **M**arkup **L**anguage (language of Internet websites)
LD **L**ow **D**ensity
LED **L**ight **E**mitting **D**iode
LIFO Last in, first out
MTBF **M**ean **T**ime **B**etween **F**ailure
OPS **O**MNI **P**ortal **S**canner
PLC **P**rogrammable **L**ogic **C**ontroller
RAM **R**andom **A**cces **M**emory
ROM **R**ead **O**nly **M**emory
RTF **R**ich **T**ext **F**ormat (standardized document format with format descriptions)
SD **S**tandard **D**ensity
SMART **S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology

Tables

Figures

1 Notes on this document

1.1 Function

This document contains instructions on the use of the OPS400 OMNI Portal Scanner in the following variants:

- OPS400-20, resolution from 0.2 mm (high density)
- OPS400-00, resolution from 0.3 mm (standard density)
- OPS400-60, resolution from 0.4 mm (low density)

This document provides information on

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

In the following text, the OMNI Portal Scanner and all of its variants are simply referred to as "OPS400". A distinction between the different variants is made only when necessary.

1.2 Target audience

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

1.2.1 Installation, electrical connection, maintenance and replacement

Electricians and service technicians

1.2.2 Startup, operation and configuration

Technicians and engineers

1.3 Information content

This document contains all of the information necessary for the installation, electrical connection and startup of the OPS400 with the **factory default settings**.

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

The OPS400 is configured for **specific applications** using the window-based CLV Setup program. Further assistance is also available in the form of the online help system CLV Setup Help. The procedure for installing and operating the software is described in the Appendix.

Additional information on the design of the OPS400 OMNI Portal Scanner and on bar code technology is available from the Auto Ident division of SICK AG.

Internet address: **www.sick.com**.

1.4 Symbols

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

Warning!
Warnings are provided to prevent injury to operating personnel or serious damage to the OPS400 OMNI Portal Scanner.

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

Reference Italics are used to refer to more detailed information elsewhere.

Note Notes indicate special features or characteristics.

Explanation Explanations provide background information on technical correlations.

Recommendation Recommendations help you carry out certain procedures more effectively.

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

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

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

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

Host receive fault This font indicates messages output via the auxiliary interface of the OPS400.

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

 This symbol refers to additional technical documentation.

➢ There is a procedure which needs to be carried out. This symbol indicates operational instructions which only contain one operational step or operational steps in warning notices which do not have to be followed in any particular order. Operational instructions comprising several steps are denoted using consecutive numbers.

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

2 Safety information

2.1 Authorized personnel

For the OPS400 to function properly and safely, it must be mounted and operated by sufficiently qualified personnel.

Repairs to the OPS400 should only be carried out by qualified and authorized SICK AG service staff.

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

The following qualifications are required for the various tasks involved:

2.1.1 Installation and maintenance

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

2.1.2 Electrical connection and replacement

- Practical training in electrical engineering
- Knowledge of the standard safety guidelines relating to electrical engineering
- 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 understanding of Windows 95™/98™, Windows NT4.0™, Windows 2000™ or Windows XP™
- Ability to use an HTML browser (e. g. Internet Explorer™)
- Basic understanding of data transfer methods
- Basic understanding of bar code technology

2.2 Intended use

The OPS400 automatically detects and decodes omnidirectional bar codes. It is located in a compact housing and reads bar codes on objects positioned on a conveyor belt, for example.
The OPS400 transfers the data content of the decoded bar codes via its host interface to a host for further processing.

Note Any warranty claims against SICK AG shall be deemed invalid in the case of other system use or system modifications, this includes modifications during installation and electrical installation, changes to the SICK software.

2.3 General safety precautions and protection measures

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

2.3.1 RF interferences

The OPS400 is exclusively intended for use in an industrial environment.

In case of use in residential areas, RF interference may occur.

2.3.2 Electrical installation

Risk of injury by electrical current!

The OPS400 is connected to the 100 to 240 V AC 50 to 60 Hz mains voltage.

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

2.3.3 Laser radiation

Laser beam can cause blindness!

The OPS400 uses two class 2 red-light lasers. Looking directly at the laser beam can seriously damage your eyesight.

The entire area of the glass windows acts as a laser outlet aperture.

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

- As with sunlight, never look directly into the laser beam.
- Do not direct the laser beam to the eyes of other persons.
- When installing and aligning the OPS400, avoid reflections caused by reflective surfaces.
- Do not open the housing.
  (Opening the housing does not stop activation of the laser diode by the reading pulse).
- Observe the laser protection specifications (latest version).

Laser power

The laser operates at a wavelength of $\lambda = 650$ nm (visible red light). The power output of the laser beam at the reading window is max. 2.8 mW.
The emitted beam is not dangerous to human skin.

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

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

Laser warning labels

The relevant laser warning labels (*Fig. 2-1*) are located on the OPS400 between the two reading windows:

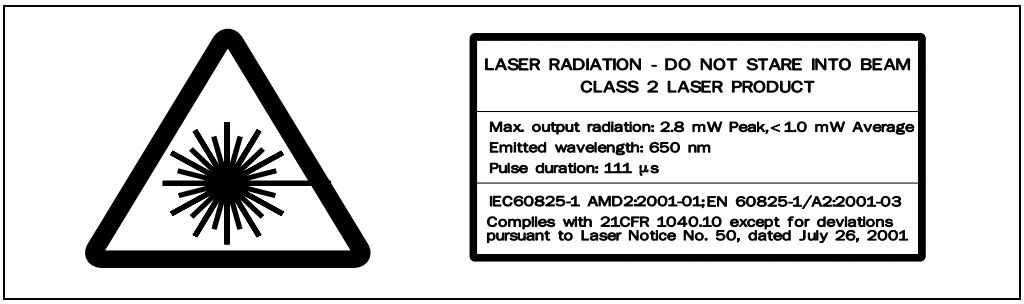


Fig. 2-1: Laser warning labels found on the OPS400

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

If the OPS is installed in a machine/shrouding in such a way that the laser warning labels are no longer visible, additional warning labels in the same language (not included in the scope of delivery) must be provided on the machine beside the emergence aperture of the laser beam!

Internal protective circuits

The OPS400 is equipped with monitoring circuits which deactivate the laser diode in the event of a malfunction in the beam generator.

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 "Trigger 1" and "Serial Interface". In this case, the OPS400 outputs the following message to the auxiliary interface:

"Laser safety timeout"

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

In the operating modes "Percentage Evaluation", "Adjusting Mode" and "Show Reading Angle Limits", and in the pulse mode "Free Running" in Reading mode, the laser diode is always switched on.

Note In Reading mode, the OPS400 carries out a reference measurement at regular intervals. For this purpose, it switches the laser diode on for max. 10 s each time.

2.4 Quick stop and quick restart

2.4.1 Switching off OPS400

➢ Switch off the power supply via the customer main power switch.

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

- the application-specific parameter set, if it was only stored **temporarily** in the OPS400
- the last reading result
- daily operating data
  (operating hours counter, number of reading intervals, Good Read count, No Read count, maximum duration trigger, minimum duration trigger, matchcode 1 count, matchcode 2 count, no match count)

2.4.2 Switching OPS400 back on

➢ Switch on the power supply via the customer main power switch.
The OPS400 resumes operation with the **last permanently stored** parameter set and resets the daily operating data.

2.5 Environmental information

The OPS400 is designed to cause minimum impact on the environment. Its surface does not contain any silicone-based materials.

2.5.1 Power requirements

The OPS400 typically consumes 30 W of power, but can consume max. 70 W.

The values are given for devices with disconnected switching outputs.

2.5.2 Disposal after final decommissioning

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 OPS400 can be separated into recyclable secondary raw materials and special-category waste (electronic scrap).

See also *Chapter 7.4 Disposal, Page 7-3*.

At present, SICK AG does not accept any unusable or irreparable devices.

3 Product description

3.1 Design

3.1.1 Scope of delivery

The OPS400 is supplied with the following:

- an information sheet (notes on device)
- an additional set of Class 2 laser warning labels (self-adhesive) in German/ US English and French/US English
- CD-ROM (no. 2029112) with
  - "CLV-Setup" program for Windows™ and the "CLV-Setup Help" online help system (HTML files)
  - "CLV Connect" PC software (HTML files showing terminal diagrams)
  - OPS400 Operating Instructions in English and German as PDF edition as well as additional publications (connections module, other SICK bar code scanners)
  - freely available "Acrobat Reader" PC software for reading PDF files

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

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

- OPS400 Operating Instructions in English and/or German (printed edition)

Chapter 10.9 Ordering Information, Page 10-31 provides an overview of the bus connection module, cables, plug-in connections, incremental encoder and sensors for reading pulse generation.

3.1.2 Variants

The OPS400 is available in the following variants:

Type	Order no.	Module width	Resolution
OPS400-20	1019692	high density	from 0.2 mm
OPS400-00	1019691	standard density	from 0.3 mm
OPS400-60	1019693	low density	from 0.4 mm

Table 3-1: OPS400 variants

3.1.3 System requirements

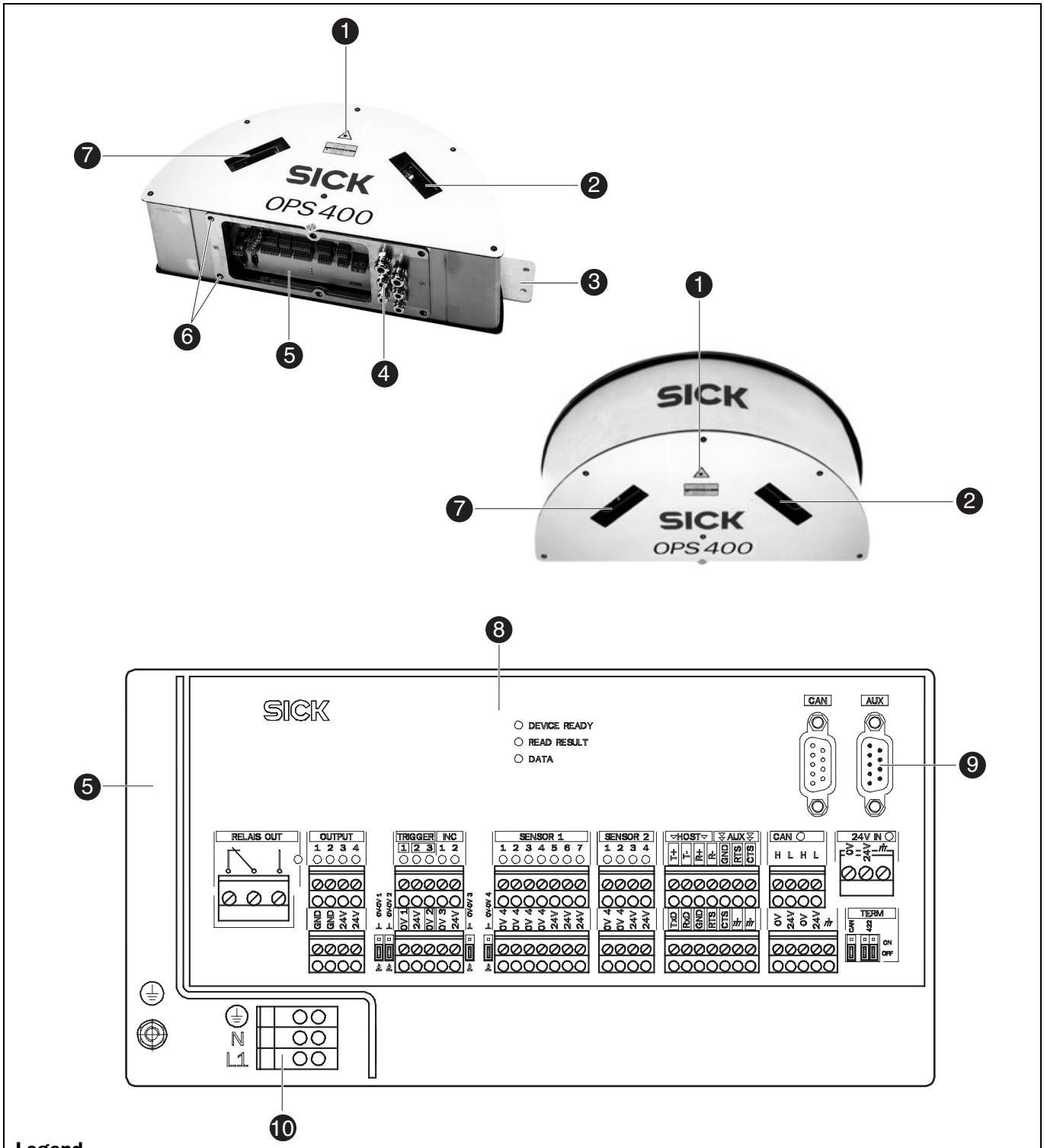
The following is required to start up and operate the OPS400:

1. Operating voltage/power output:
   100 to 240 V AC +10 %/–15 %, 50 to 60 Hz, at least 70 W
2. With external reading pulses via the "Trigger 1" switching input: a suitable reading pulse sensor for signaling the presence of an object with a bar code (trigger start), e.g. a photoelectric reflex switch no. 2034693.
3. For the reading mode "No Tracking", an additional reading pulse sensor (trigger stop) for connection to the switching input "Trigger 2", e.g. photoelectric reflex switch no. 2034693.
4. For the reading mode "Tracking" an incremental sensor with a resolution of 10 mm/increment with an object gap of at least 50 mm, e.g. no. 2022714.
5. For the detection of the object distance via switching inputs "Sensor 1-1 to 1-7":

suitable sensors for multi-level dynamic focus control, e.g. photoelectric reflex switches.

6. A higher-level computer (host) with a data interface of type RS-422/-485 or RS-232.
7. A PC (min. Pentium II, 350 MHz, 64 MB RAM, CD drive, a serial port (COM x), mouse (recommended)) with Windows 95™/98™, Windows NT™, Windows 2000™ or Windows XP™.
8. A 3-core RS 232 data cable (null modem cable) with two 9-pin D Sub sockets for connecting the PC to the auxiliary interface of the OPS400, e. g. no. 2014054. Pin 2 (RxD) and Pin 3 (TxD) are crossed.
9. An HTML browser, e. g. Internet Explorer™, for using the online help system CLV-Setup Help.
10. For connection of the OPS400 to the Interbus S, the Profibus DP or the DeviceNet: the corresponding BMV/BMH10 Bus Connection Module (on request).
11. Minimum distance between consecutive objects (see *Chapter 3.2.3 Reading modes, Page 3-6*).

3.1.4 View of device



Legend

- ❶ Laser warning labels
- ❷ Reading window 1 (scan part 1)
- ❸ Mounting plate with fastening holes
- ❹ PG threaded joints (4 x PG 9, 2 x PG 11)
- ❺ Connection area
- ❻ Threading for screws of the cover (6 x)
- ❼ Reading window 2 (scan part 2)
- ❽ Terminal strips and LEDs
- ❾ PC connection
- ❿ Power supply connection (100 to 240 V AC, 50 to 60 Hz)

Fig. 3-1: Design of the OPS400

3.2 Method of operation

The OPS400 first scans the bar code with two scan lines and then decodes it. The OPS400 forwards the data via the host interface (serial main data interface) to a host/PC for further processing. An overview of the OPS400 functions is provided in *Fig. 3-2*.

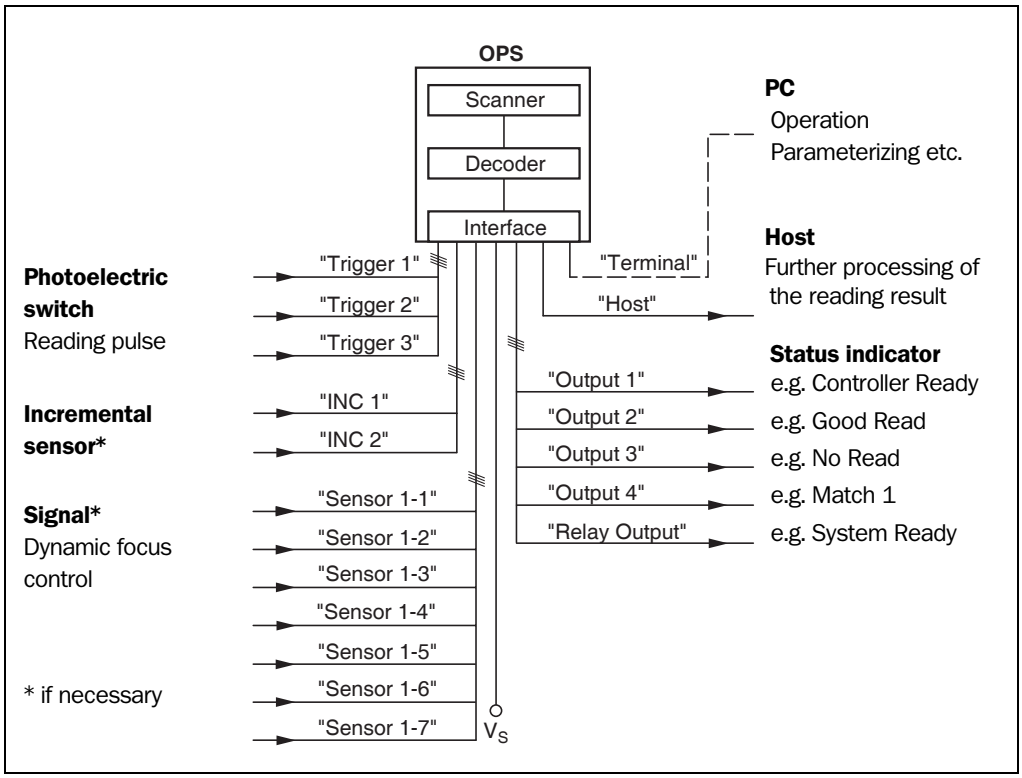


Fig. 3-2: Block diagram: OPS400 functions

The OPS400 is equipped with two decoders:

- the SMART decoder (**S**ICK **M**odular **A**dvanced **R**ecognition **T**echnology) for the decoding of bar codes with a small code height, bar codes with damaged or dirty code prints and bar codes which are tilted excessively (azimuth angle)
- the tried-and-tested standard decoders of the CLV series

The OPS400 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 separately for both scan lines in "Percentage Evaluation" mode.

To start a reading process when an object is located in the reading field, the OPS400 requires a suitable trigger. This opens a time window ("internal reading interval") in the OPS400 for the reading process. In the default setting, this trigger is supplied by an external reading pulse sensor.
Alternative trigger sources include Free Running mode and a command sent via one of the data interfaces. *See also Chapter 3.2.3 Reading modes, Page 3-6*.

The current operating status is indicated by LEDs.

With external reading pulse triggering via sensors, the switching inputs "Trigger 1 through Trigger 3" inform the OPS400 when it is to begin and end a reading. An incremental sensor can be connected to "INC 1" and "INC 2". The seven switching inputs "Sensor 1-1 to Sensor 1-7" alternatively switch the focus position over to the Autofocus function under event control.

The four switching outputs "Output 1 to Output 4" and the relay output can be assigned various functions and trigger external devices, such as an PLC or a relay.

The OPS400 is operated and configured via the auxiliary interface (serial auxiliary data interface) through the user interface of the CLV Setup program.

System and error messages help you configure the device and locate the source of errors during startup and in Reading mode.

3.2.1 Autofocus function

The Autofocus function enables the OPS400 to detect the distance of an object without the aid of external sensors and to automatically adjust the focus position. For this purpose, the OPS400 measures the object distance in its visible range, internally creates a distance profile using this information and focuses on the object.

3 operating modes cover the various applications:

- *Minimum distance:* The OPS400 focuses on the smallest distance in the distance profile. In doing so, it ignores the background of its visible range. Used e.g. with an unobstructed view of the object when no nearby items project into the reading level. There is only one object with (a) bar code(s) in the reading field per reading pulse.
- *Differential background:* The distance profile of the background of its visible range with no object is taught in to the OPS400. The OPS400 focuses on the object which it detects through subtraction with the background. Used e. g. with an unobstructed view of the object limited by items which project into the reading level.
  There is only one object with (a) bar code(s) in the reading field per reading pulse
- *Differential background and tracking.* If several objects at varying distances are located in the reading field at the same time (distance conflict), the OPS400 focuses on the next object which has not yet been passed at its internal point of dynamic focus control.

The distance profile of the background which is created can be displayed in CLV Setup. The visible range is defined through the selection of the autofocus range and the aperture angle. Among other things, the park position (preferred position) of the focus position from which it refocuses with each reading and a temporal or spatial delay (timeout or hysteresis) can be provided to the OPS400. The focus position to be set via measurement can be acted upon by an additional offset if necessary. Thus the radial depth of field in the direction of the scan line is optimized for the object using the V principle of beam deflection (*Fig. 3-3*).

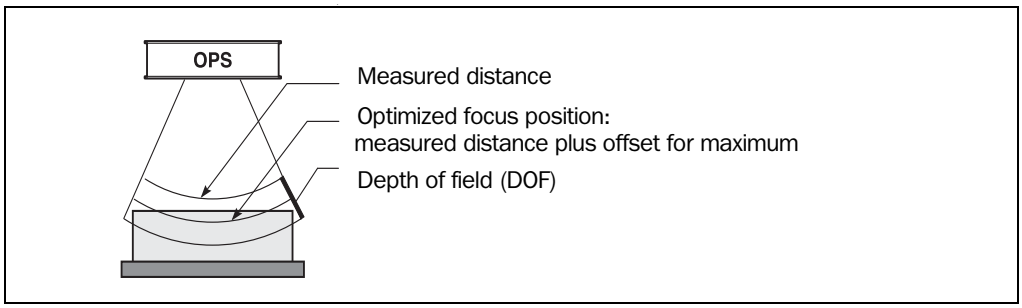


Fig. 3-3: Optimization of the depth of field to the object

3.2.2 Event-controlled dynamic focus control

As an alternative to the Autofocus function, the OPS400 allows event-controlled modification of its focus position and thus the ability to dynamically cover a large reading area. A maximum of eight reading areas can be defined here as distance configurations and can be approached in Reading mode in any order (*Fig. 3-4*).

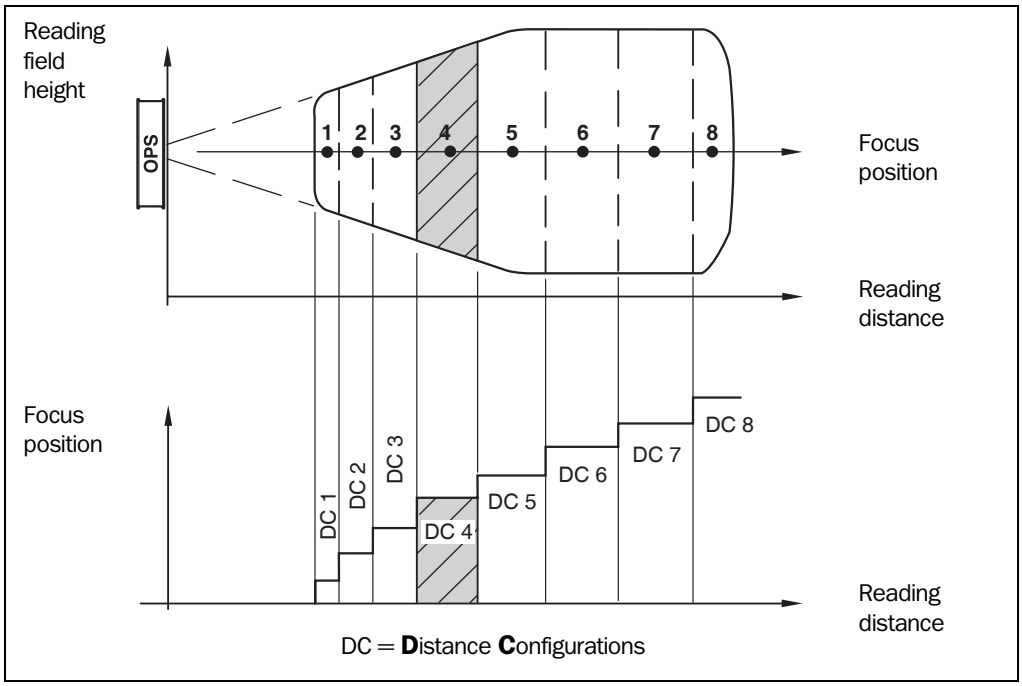


Fig. 3-4: Dynamic focus control

The switch takes place in response to changes in the object distance (with reads from above: object height detection). The trigger source for the switch can be a signal combination sent to the switching inputs "Sensor 1-1 to Sensor 1-7" or the integrated timer (e.g. for Search mode). The distance configurations are assigned to the switch sequence in Timer mode via a programmable assignment table. The focus positions are assigned directly for switching inputs. The object distance measurement of the Autofocus function can be approached when the distance configurations are defined.

3.2.3 Reading modes

“No Tracking” mode (Start/Stop mode)

During the reading process, only **one** object is located in the reading field in Start/Stop mode, i.e. all read bar codes can be clearly assigned to the object. As default, two reading pulse sensors at the beginning and the end of the reading field control the starting and stopping of the reading process (*Fig. 3-5*). The size of the reading field is determined by the required scan-line length for covering the path width and the resulting installation locations of the reading pulse sensors. The reading results are output either at the end of the reading pulse (the back edge of the object has left the end of the reading field) or during the reading pulse as a result of set, parameterizable conditions. The minimum distance between two consecutive objects depends on the path width to be covered and the depth of field of the OPS400 (extension of the reading field due to the skew offset of the scan lines. See also *Chapter 10.2 Specification diagrams, Page 10-1*. Alternatively, the reading process can be controlled with command strings via the data interface or can be left free running.

“Tracking” mode

During the reading process, **several objects** can simultaneously be located in the reading field (following each other) in Tracking mode (*Fig. 3-5*). The initiation of the reading process controls a reading pulse sensor at the beginning of the reading field as default. The end is defined by the setting of the object release point. The size of the reading field is determined by the required scan-line length for covering the path width, the installation location of the reading pulse sensor and the resulting object release point. In order to track the transport of objects in the reading field, a regularly-timed pulse is required. This is generated by an external incremental sensor which regularly supplies a pulse at least every 10 mm of movement in the conveyor direction. As a result, the distance between the reading pulse sensor and the object release point is clearly time-mapped in the OPS400. Fluctuations when approaching the conveyor or decreases in speed due to a heavy load with numerous conveyor objects are also recorded. An internal pulse sensor in the OPS400 also allows operation at a constant conveyor speed. A spacing of at least 50 mm is necessary for the clear separation of consecutive objects. The reading result for an object is output after the back edge of the object passes the object release point. Alternatively, the reading process can be started with a command string via the data interface or can be left free running.

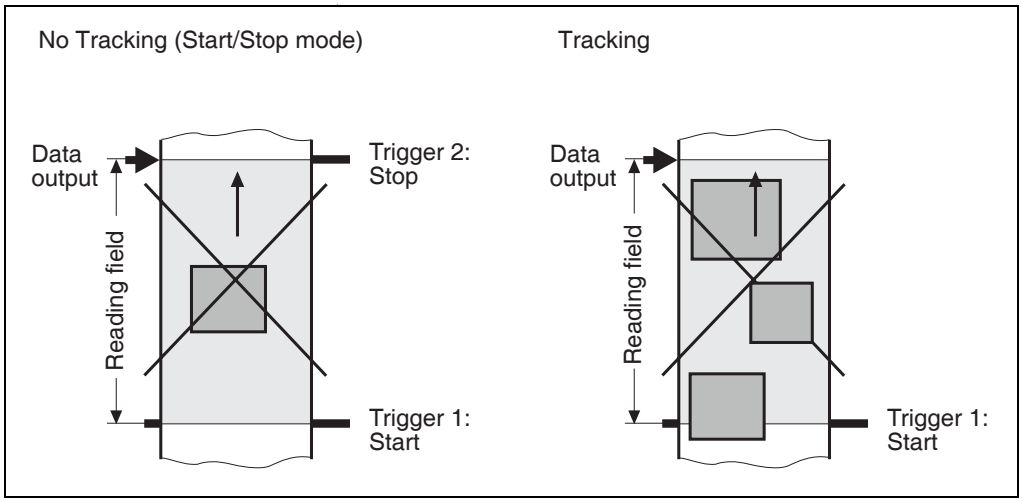


Fig. 3-5: Reading modes of the OPS400

3.3 Operating elements and indicators

3.3.1 Operating elements

The OPS400 is operated and configured with the CLV Setup program via the auxiliary interface (auxiliary data interface). A variety of parameter options allow you to adapt the device to a wide range of applications.

The following can be set:

- the Reading mode
- the type of dynamic focus control
- 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 auxiliary interface

Chapter 10.4 Installing and operating CLV Setup, Page 10-13, 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 6-4*.

3.3.2 Function of the LEDs

LEDs visually indicate the operating status, status of the reading result and data transfer on the host interface. The LED indicators (*Fig. 3-6*) are located in the connection area.

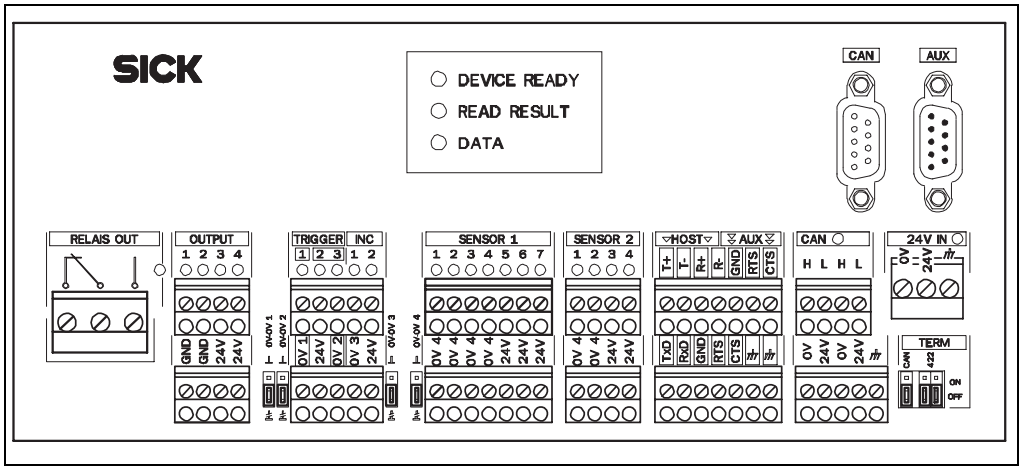


Fig. 3-6: LED indicators in the connection area

The meaning of the individual LED indicators in the different operating modes/functions is shown in *Table 3-2*.

LED	Indication	Function
Device Ready	*green*	• indicates that the OPS400 is ready for operation • illuminates after switch-on if the device is ready for operation • illuminates continuously • goes out with new operating mode/function
Read Result	*green*	LED is connected to the "Result 2" switching output. It indicates the selected result status for the set pulse duration of the output. • illuminates after a successful read (default setting: Good Read) • illuminates if code comparison is activated and the read barcode matches the predefined match code(s).
Data	*yellow*	• flickers while the OPS400 transfers data to the host on the host interface
Output (4x)	*yellow*	• illuminates when active
Relay Output (1x)	*yellow*	• illuminates when active
Trigger Input (3x)	*green/red *)*	• illuminates when active, Trigger 1: internal or external ground, Trigger 2 and 3: internal or external ground
INC Input (2x)	*green/red *)*	• illuminates when active, internal or external ground
Sensor Input 1 (7x)	*green/red *)*	• illuminates when active, internal or external ground
24 V Input (1x)	*green*	• illuminates when 24 V DC supply voltage is connected
CAN Input (1x)	*green*	• flickers when data is exchanged via the CAN bus
**)* red if polarity is reversed		

Table 3-2: Functions of the LED indicators

4 Installation

4.1 Overview of installation sequence

- Change the language version of the laser warning label (if necessary)
- Select the installation location for the OPS400
- Install the frame of the OPS400 over the reading position (if not present on the customer side)
- Install the OPS400 and align the OPS400 with the bar code
- Adjust the OPS400
- Install the reading pulse sensor for external triggering of the reading pulse (trigger start) (a second reading pulse sensor for trigger stop for the "No Tracking" reading mode)
- Install the incremental sensor for the "Tracking" reading mode (optional)
- Optional with event-controlled dynamic focus control:
  Install the sensors for external detection of the object distance

4.2 Preparing for installation

4.2.1 Laying out required components

- OPS400 OMNI Portal Scanner, approx. 10.7 kg
- Frame (if not already present)
- Photoelectric reflex switch(es) for external reading control
- Incremental sensor (optional/if not already present)

4.2.2 Laying out required materials

- Four M8 type screws for securing the OPS400
- Set of laser warning labels (if necessary)
- Tools
- A tape measure (up to 2 m)
- Protractor
- Plumb bob

4.2.3 Replacing laser warning label

If necessary, replace the laser warning label on the OPS400 in GB English/US English with the required language (*Fig. 4-1*).

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

- German/US English
- French/US English

See also *Chapter 2.3 General safety precautions and protection measures, Page 2-2*.

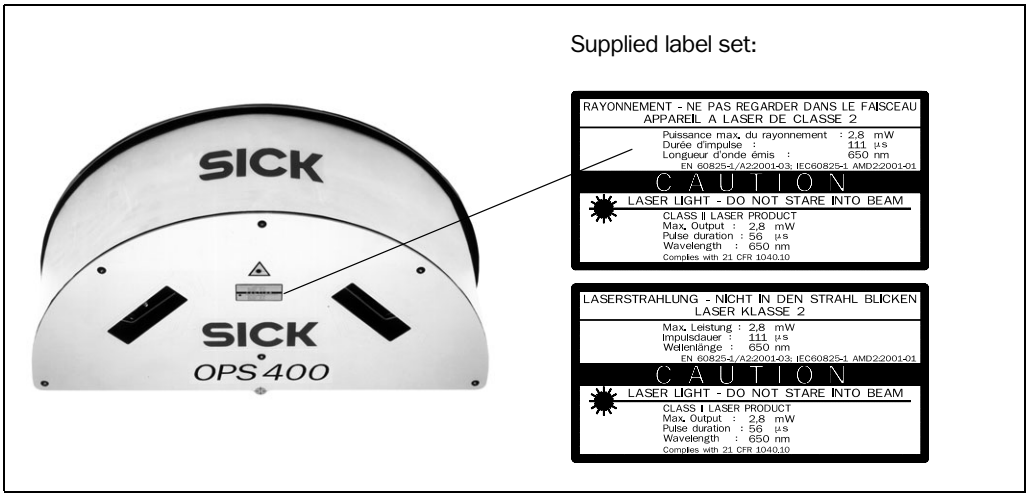


Fig. 4-1: Replacing the laser warning label

4.2.4 Selecting installation location

When selecting the installation location, pay close attention to the distance between the OPS400 and the host and between the OPS400 and the object.

Distance between OPS400 and host

The OPS400 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 5-4, Page 5-3*.

4.2.5 Distance between OPS400 and object

For positioning of the bar code and OPS400 see *Chapter 10.2 Specification diagrams, Page 10-1*.

Alignment of OPS400

Optimum alignment of the OPS400 is achieved when the base of the OPS400 is attached parallel to the object being read. All possible reading angles that can exist between the scan line and the bar code must be taken into consideration (*Fig. 4-2* and *Table 4-1*).

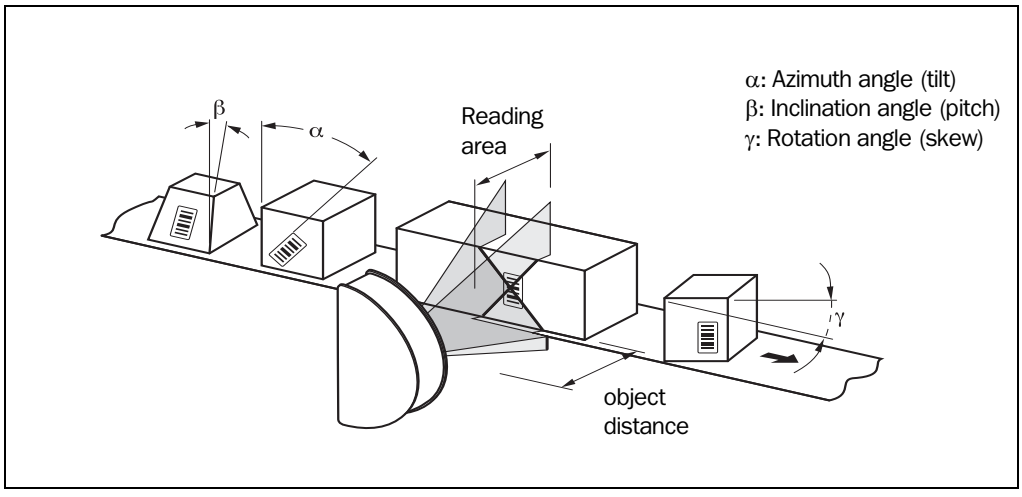


Fig. 4-2: Reading angles between the scan line and the bar code

Angle	Limit value
Azimuth α (tilt)	omnidirectional
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 surface reflection, the laser sources of the OPS400 are installed in such a way that the emitted light is tilted with respect to the perpendicular (with horizontal/vertical installation).

➢ Do not install the OPS400 at an angle.

4.2.6 Count direction of reading angle RA

Explanation

The OPS400 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 reading angle (RA value) of the center of the bar code within the scan line

Fig. 4-3 shows the count direction of the reading angle. The count direction of the reading angle is marked by the etched in arrows in the lengthwise direction of the reading windows.

By determining this data, the device can separate identical bar codes.

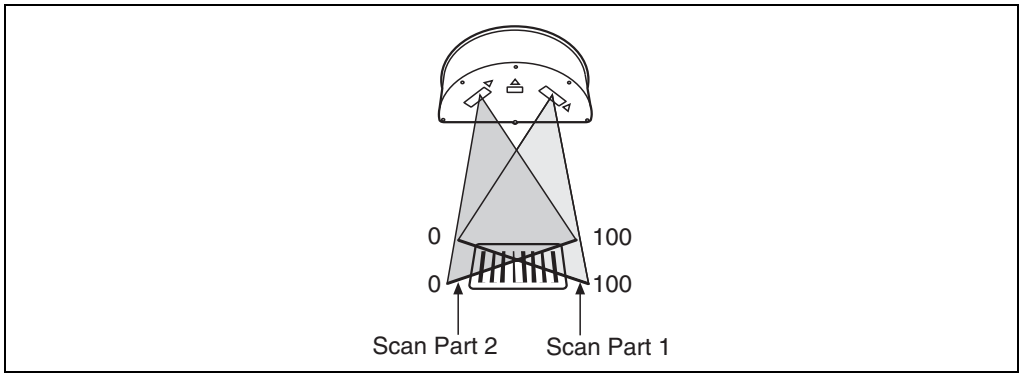


Fig. 4-3: Count direction of the reading angle RA within the scan lines

Tip

In the default setting, the OPS400 does not output the value "RA" in the reading result of the host interface. If this is required to evaluate the result in the host, the values can be included in the "Code-Info/Separator" block of the output string using the "CLV-Setup" program.

Configuring the Code-Info/Separator

1. Select the DATA STRINGS tab.
2. Click the CODE-INFO/SEPARATOR field.
   The EDIT PARAMETER: TFS dialog box is displayed.
3. In the drop-down list, click the RA parameter.
   RA then appears on the top line.
4. Confirm the dialog box with OK.
5. Perform a download to the OPS400. This is done by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
6. Confirm the dialog box by selecting the PERMANENT save option.

The OPS400 outputs the RA value for each bar code in the reading result via the host interface. The values are displayed as a 3-digit number in the associated "Code-Info/ Separator" block.

4.3 Installing and adjusting device

4.3.1 Installing OPS400

1. Place the object containing the bar code within the visible range of the OPS400 in the position at which it is to be read (with the conveyor switched off).
2. Align the OPS400 with its reading window parallel to the bar code surface. Pay attention to the positioning of the OPS400 relative to the conveyor direction. For orientating to the middle of the path, a plumb bob can be hung on the OPS400 in the slot on the top of the device at the height of the connection area.

   Take into account the reading of possible reading angles at a later time.
   See *Fig. 4-2, Page 4-2*.
3. If relevant to the evaluation, pay attention to the count direction of the reading angle if applicable.
   See *Fig. 4-3, Page 4-3*.
4. Insert M8 screws into the holes in the mounting plate of the OPS400 and lightly screw them into the provided securing threads on the other side, e.g. frame.
5. Adjust the OPS400 as described below.

4.3.2 Adjusting OPS400

The OPS400 can be adjusted in "Percentage Evaluation" mode. In this mode, the OPS400 displays the quality of the bar code reads that enter the OPS400 reading field statically (the object is not moved on the conveyor). The OPS400 performs 100 scans in Free Running mode and evaluates the reading quality statistically. It outputs the reading results continuously every 2 s via the auxiliary interface.

1. Switch on the power supply. See *Chapter 5.5.3 Connecting power supply, Page 5-4*. Once it has started, the OPS400 confirms the successful self-test and the start of Reading mode by illuminating the Device Ready LED in the connection area.
2. Connect the PC to the terminal interface of the OPS400. For this purpose, connect a 3-core RS 232 data cable (null modem cable) to the 9-pin D Sub plug "AUX". See *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
3. Start Windows and CLV Setup on your PC. See *Chapter 10.4.3 Starting CLV Setup, Page 10-16*.

Selecting standard decoder

4. Select the CODE CONFIGURATION tab.
5. In the DECODER group, click the STANDARD radio button.
6. Perform a download to the OPS400. This is done by clicking  in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
7. Confirm the dialog box by selecting the TEMPORARY save option.
   The OPS400 then uses the standard decoder.

Activating Percentage Evaluation mode

8. In the menu bar, select TOOLS, DEVICE FUNCTIONS, PERCENTAGE EVALUATION and the option SCAN PART 1 or SCAN PART 2. See also *Fig. 3-1, Page 3-3*, Legend. The dialog box for determining the valid distance configuration for percentage evaluation is displayed.
9. Click the appropriate distance configuration for the reading distance:
   – in Autofocus mode: distance configuration no. 1
   – for event-controlled dynamic focus control (Timer mode): distance configuration which corresponds to the reading distance of the object (default setting: no. 1, focus position F = 1,200 mm).
10. 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 6-20.
    Monitor the **reading quality (%)** during each of the subsequent steps!

Performing fine adjustment

11. To prevent interfering reflections, align the OPS400 with its reading window parallel to the bar code surface. Pay attention to the OPS400 position with regard to the conveyor direction.
12. If necessary, position the intersection point of the scan lines exactly on the bar code. See the next chapter.
13. Move objects carrying bar codes through the OPS400 reading field manually under realistic conditions and check the reading result. If the objects are aligned randomly, check if the bar code is located at different positions and ensure that the limit values of the permissible reading angles are not exceeded.
14. Adjust the OPS400 in such a way that the good read rate is between **70 and 100 %**. For event-controlled dynamic focus control, check the selected focus position for each defined reading area (distance configuration) and correct by parameterizing if necessary. *See Chapter 6.4.3 Parameterization guide, Page 6-7.*
15. Tighten the screws on the OPS400.
    The OPS400 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 both scan lines on the object. To do so, the OPS400 masks out one half of each of the scan lines from the center (reading angle RA = 50 to RA = 100). This happens regardless of whether the OPS400 is being operated in Autofocus mode or with distance configurations for event-controlled dynamic focus control. *Fig. 4-4* shows the resulting appearance of the scan line. It is possible to select both scan lines, Scan part 1 or Scan part 2, simultaneously.

For information on calling up the "Adjusting mode" operating mode, see *Chapter 6.5.3 Adjusting mode, Page 6-22*.

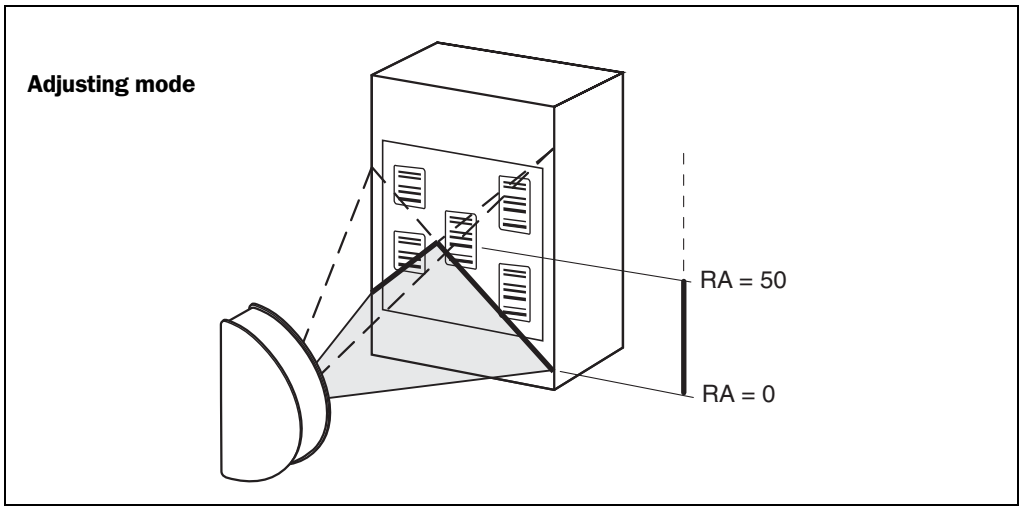


Fig. 4-4: Appearance of the scan lines in the “Adjusting mode” operating mode.

Show Reading Angle Limits

The “Show Reading Angle Limits” 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 OPS400 alternately masks out a certain part of the scan lines corresponding to the selected minimum and maximum values of the reading angle. It is possible to select both scan lines, Scan part 1 or Scan part 2, simultaneously.

For information on calling up this operating mode and for checking procedures, see *Chapter 6.5.5 Show Reading Angle Limits, Page 6-25*.

4.4 Mounting the external components

4.4.1 Installing external reading pulse sensor

If the reading process is initiated via an external sensor (e.g. photoelectric reflex switch), this sensor must be installed against the direction of the conveyor belt in front of the OPS400. If another sensor terminates the reading process in the reading mode "No Tracking", it is to be installed in the direction of the conveyor behind the OPS400 (the second sensor is not necessary for the reading mode “Tracking”, as an external incremental sensor is required here). The exact positioning of the sensors regarding the OPS400 are listed in *Chapter 10.2 Specification diagrams, Page 10-1* based on path width and resolution of the various OPS400 types.

In the default setting, the switching input "Trigger 1" is selected as the trigger source for the start. The default setting for debouncing is 30 ms.

1. Attach the reading pulse sensor to the installation location.
2. Connect reading pulse sensor for trigger start to switching input "Trigger 1" of the OPS400. See *Chapter 5.5.4 Connecting reading pulse sensor(s), Page 5-4*.
3. Connect reading pulse sensor for trigger stop to the switching input "Trigger 2" of the OPS400 (for the reading mode "No Tracking").
4. Switch on the power supply. See *Chapter 5.5.3 Connecting power supply, Page 5-4*. Once it has started, the OPS400 confirms the successful self-test and the start of Reading mode by illuminating the Device Ready LED in the connection area.
5. Connect the PC to the auxiliary interface of the OPS400. For this purpose, connect a 3-core RS 232 data cable (null modem cable) to the 9-pin D Sub plug "AUX". See *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.

6. Start Windows and CLV Setup on your PC.
   See *Chapter 10.4.3 Starting CLV Setup, Page 10-16*.

7. From the VIEW menu, select TERMINAL EMULATOR.
   The Terminal Emulator is launched. The OPS400 is in Reading mode (default setting: SMART/standard decoder).
   Monitor the reading result during each of the subsequent steps!
8. For the reading mode "No Tracking", manually guide objects with bar codes consecutively through the reading field of the OPS400 under realistic conditions and pass both sensors, checking the reading result accordingly.
   Then repeat the procedure with the conveyor switched on. Check whether the reading procedure is synchronized with the approaching objects.
9. For the reading mode "Tracking", the output time is dependent on the object release point (default setting 2,000 mm from reading pulse sensor for trigger start). The increment signal must be available to the OPS400 for output of the reading result, however. This means that the reading pulse triggering can only be tested with the conveyor switched on. Check whether the reading procedure is synchronized with the approaching objects.

Parameterizing external reading pulse sensor as trigger source for trigger start

If the OPS400 is operated with the default settings, this parameterizing is not necessary.

1. Select the DEVICE CONFIGURATION tab.
2. Click the READING TRIGGER PARAMETERS button.
   The READING TRIGGER PARAMETERS dialog box is displayed.
3. In the TRIGGERMODE section, select the ACTIVE ON TRIG1 HIGH option in the drop-down list.
4. Confirm the dialog box with OK.
5. Perform a download to the OPS400. This is done by clicking  in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
6. Confirm the dialog box by selecting the PERMANENT save option.
   The OPS400 operates with the "Trigger 1" switching input as an external trigger source for trigger start. The reading pulse starts when power is applied.

4.4.2 Installing incremental sensor

In the reading mode "Tracking", an incremental sensor is required for determining which bar codes belong to which objects.

1. Install the incremental sensor (e.g. no. 2022714) near the OPS400 but in front of it, preferably against the direction of the conveyor belt. The increment pulses must originate from the area of the conveyor belt which the OPS400 is reading.
2. Ensure that the incremental sensor is contacting the conveyor and that the friction wheel turns without slipping.
3. Connect incremental sensor to "INC 1" switching input of the OPS400. See *Chapter 5.5.5 Connecting incremental sensor, Page 5-6*.

4.4.3 Installing external sensors for object distance detection

If the dynamic focus control of the OPS400 is triggered (event-controlled) by external sensors, the corresponding distance sensors (e.g. photoelectric reflex switches) must be installed near the OPS400. *Fig. 4-5* shows an example for reading from above. The sensors are to be installed in such a way that the heights of all of the approaching objects can be classified clearly and that overlapping reading areas are created that can be mapped with the depths of field of the OPS400. A maximum of seven switching inputs are available for this.

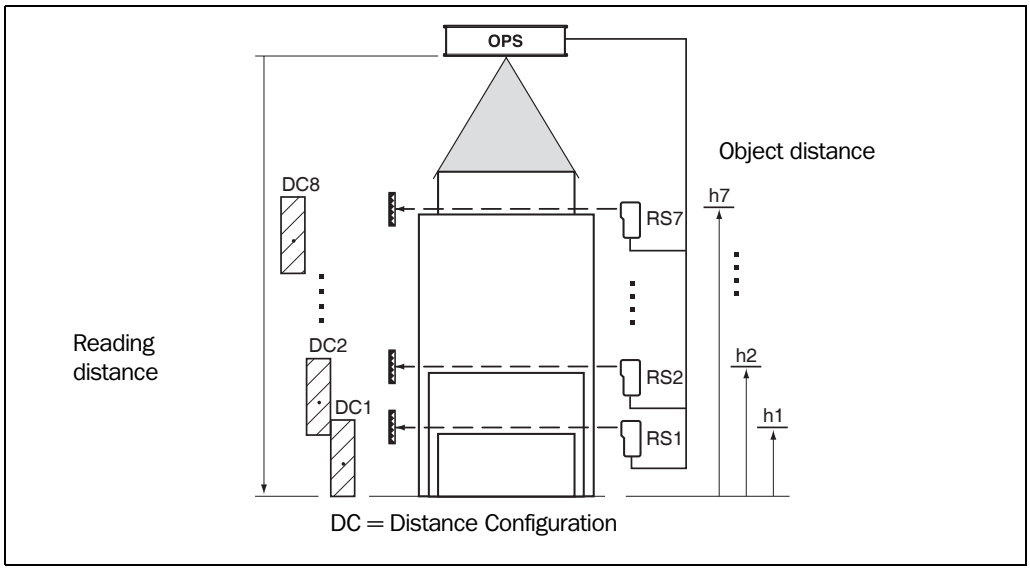


Fig. 4-5: Installation example for positioning of object distance detection

Determining required focus positions

1. In the case of varying object sizes and therefore varying reading distances, use a sample bar code to determine the entire required depth of field of the OPS400 for the given resolution of the bar code.
   For this purpose, call up the standard decoder and Percentage Evaluation mode as described in *Chapter 4.3.2 Adjusting OPS400, Page 4-4*.
2. Plumb to find out in which reading area the OPS400 reliably scans the bar code for the selected focus position in the default setting (F 1 to F 8 = 1,200 mm) across the entire length of one of the scan lines (reading rate > 70 %). Check if the focus position must be changed and if more than one focus position is required for covering the entire depth of field.
3. To change the focus position of the default setting or to define more than one focus position, end "Percentage Evaluation" mode and select the READING CONFIGURATION tab.
4. In the FOCUS CONTROL group, select the TIMER option in the drop-down list.
5. Click the DISTANCE CONFIGURATIONS button.
   The DISTANCE CONFIGURATIONS dialog box is displayed.
6. Change the values in the fields under FOCUS POSITION on the DISTANCE CONFIGURATION tab card accordingly so that overlapping reading areas result. Close the dialog box.
7. Perform a download to the OPS400 with the option TEMPORARY.
8. Call up Percentage Evaluation mode and check the depth of field of the modified focus positions using the sample bar code. To activate the defined focus positions consecutively in Percentage Evaluation mode, exit Percentage Evaluation mode and call it up again. Record the final selected focus positions.

9. Exit Percentage Evaluation mode and select the READING CONFIGURATION tab.

Assigning focus positions to switching inputs

10. In the FOCUS CONTROL group, select the AUTOFOCUS/SENSOR INPUTS option in the drop-down list.
11. Switch to the DEVICE CONFIGURATION tab.
12. Click the SENSOR INPUT PARAMETERS button.
    The SENSOR INPUT PARAMETERS dialog box is displayed.
13. Enter the recorded values for the various focus positions one under the other in the fields under FOCUS POSITION; this assigns them to sensor inputs.
    Record which switching inputs were assigned. Close the dialog box.
14. Perform a download to the OPS400. This is done by clicking  in the toolbar.
    The DOWNLOAD PARAMETERS dialog box is displayed.
15. Confirm the dialog box by selecting the PERMANENT save option.
    The focus positions are assigned to the switching inputs and switching through the inputs is prepared.

Installing and connecting sensors

16. For the determined number of focus positions to be switched, connect the corresponding number of distance sensors to the installation location one above the other in a row. We recommend that you install the distance sensors opposite the direction of the conveyor belt at a distance of approx. 100 mm in front of the reading pulse sensor for trigger start.
    The distance sensors are to then switch to the defined focus positions if another focus position is required for the size of an object, i.e. at the upper end of the respective range.
17. Connect distance sensors to the switching inputs "Sensor 1-1 to Sensor 1-7". See *Chapter 5.5.6 Connecting sensors for distance detection (optional), Page 5-7*.

Checking for correct functioning of arrangement

18. From the VIEW menu, call up the TERMINAL EMULATOR.
    The Terminal Emulator is launched. The OPS400 is in Reading mode.
19. To check the successful cooperation between varying object sizes and switching of the focus position, manually guide objects with bar codes consecutively through the reading field of the OPS400 under realistic conditions and pass both reading pulse sensors (in the "No Tracking" reading mode), checking the reading result accordingly.
    Then repeat the procedure with the conveyor switched on.
20. For the "Tracking" reading mode, check switching using objects of varying sizes with the conveyor switched on (increment signal required).
21. If switching is synchronized, exit the Terminal Emulator and select the CODE CONFIGURATION tab.
22. In the DECODER group, click the SMART/STANDARD radio button.
23. Perform a download to the OPS400. This is done by clicking  in the toolbar.
    The DOWNLOAD PARAMETERS dialog box is displayed.
24. Confirm the dialog box by selecting the PERMANENT save option.
    The OPS400 then uses the SMART decoder again.

Note Using the integrated timer, the OPS400 can switch between max. 8 distance ranges for slow search runs.

4.5 Removing device

1. Switch off the power supply to the OPS400.
2. Open the cover of the connection area.
3. Disconnect all wires (from cables lead in from outside) from the terminals.
4. Loosen PG threaded joints and unplug the cables from the OPS400.
5. Unscrew the OPS400 from the holder.

When removing the device from service for the last time, please dispose of it in an environmentally-friendly manner, as described in *Chapter 7.4 Disposal, Page 7-3*.

5 Electrical connection

5.1 Overview of connection procedure

- Connect the data and function interfaces of the OPS400
- Connect the PC to the OPS400 (via terminal interface of the OPS400)
- Connect the OPS400 to the power supply

5.2 Electrical connections and cables

The electrical connection of the OPS400 consists of 14 plug-in terminal strips, two D Sub plug connections and a terminal screw strip in the connection area (*Fig. 5-1, Page 5-3*). The line connection is carried out via six PG threaded joints made of metal.

The following interfaces are supplied by the connection elements:

Plug-in terminal strips

- Host interface RS 232 or RS 422/485 (main data interface)
- Auxiliary interface RS 232 (auxiliary data interface for testing, diagnosis and parameterizing)
- Three switching inputs "Trigger 1 to 3" for external reading pulse sensors
- Two switching inputs "INC 1 to 2" for external incremental sensors
- Seven switching inputs "Sensor 1-1 to 1-7" for external distance detection
- Four switching outputs "Output 1 to 4" for the output of event status functions
- Relay switching output for output of an event status function

The four switching inputs "Sensor 2-1 to 2-4" have no function.

D Sub plug connections

- 9-pin plug "AUX": host interface/auxiliary interface as above
- 9-pin socket "CAN": CAN interface for testing and diagnosis (for SICK Service only)

Terminal screw strip

- OPS400 power supply

5.2.1 Wire diameters

➢ All connections (exception: power supply and relay switching output) wired via copper cables with a wire diameter of at least 0.125 mm^2.

➢ Connections for the relay switching output wired with a wire diameter of at least 1 mm^2.

➢ Connection for the power supply wired with a wire diameter of at least 0.2 mm^2.

OPS400 power supply

Current-carrying capacity per terminal: 30 A. PVC cables are suitable for the connection; no ablation-free or halogen-free cables are required.

Cable	Wire diameter
Rigid	0.2 to 4 mm^2
Flexible	0.2 to 4 mm^2

Table 5-1: Diameter of the power supply cable of the OPS400

PG threaded joints

- 4 x PG 9: for cables ∅ 3.5 to 8 mm
- 2 x PG 11: for cables ∅ 4 to 10 mm

5.3 Pin and terminal assignment of connections

5.3.1 "AUX" connection

Pin	Signal	Function
1	T+ (RS 422/485)	Host interface (RS 422/485)
2	RxD_T	Auxiliary interface (RS 232)
3	TxT_T	Auxiliary interface (RS 232)
4	R+ (RS 422/485)	Host interface (RS 422/485)
5	GND	Ground
6	T- (RS 422/485), TxD (RS 232)	Host interface (RS 422/485)
7	RTS_T	Auxiliary interface (RS 232)
8	CTS_T	Auxiliary interface (RS 232)
9	R- (RS 422/485), RxD (RS 232)	Host interface (RS 422/485)

Table 5-2: Pin assignment of the 9-pin D Sub plug "AUX"

In addition to the 9-pin plug, the individual connections for the host and auxiliary interface (AUX) on two plug strips are available. See *Fig. 5-1, Page 5-3*.

5.3.2 "CAN" connection

Pin	Signal	Function
1		
2	CAN L	CAN-Bus (IN/OUT)
3	GND	Ground
4		
5		
6		
7	CAN	CAN-Bus (IN/OUT)
8		
9		

Table 5-3: Pin assignment of the 9-pin D Sub socket "CAN"

5.3.3 Terminal strips

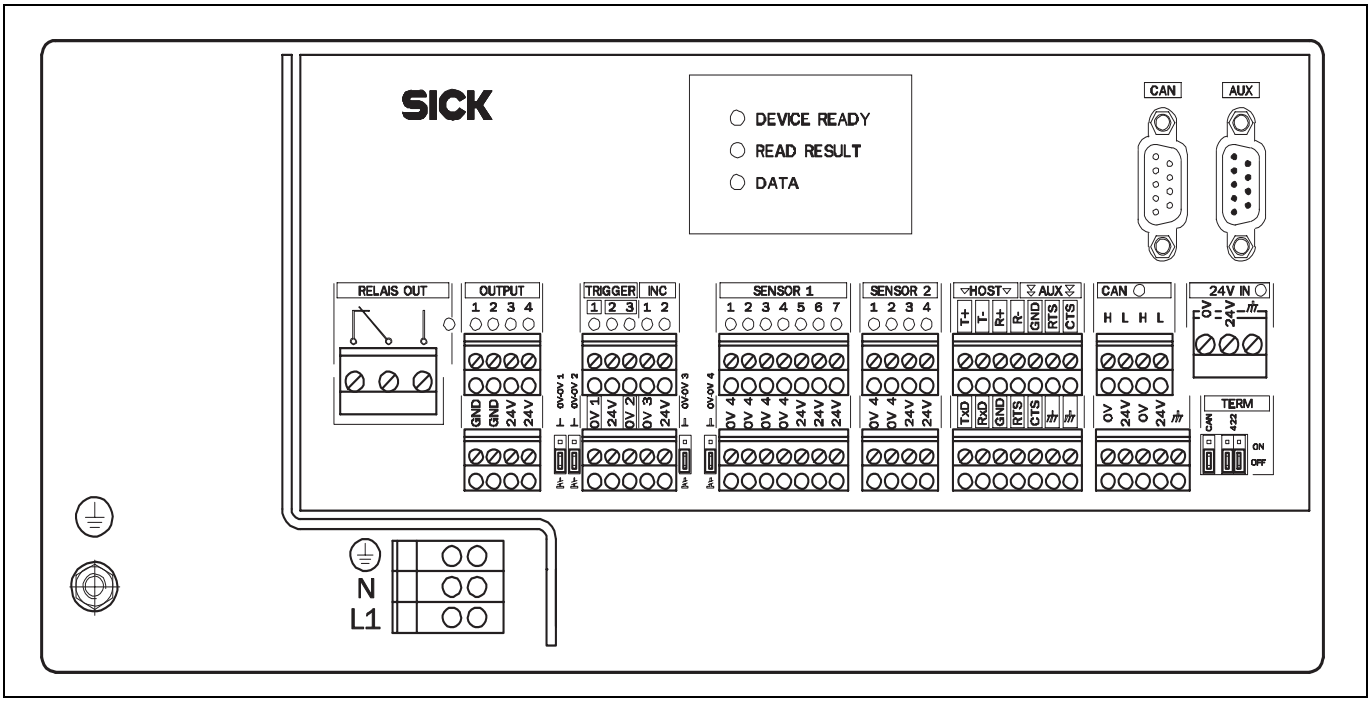


Fig. 5-1: OPS400 connections

5.4 Preparation for electrical connection

5.4.1 Requirement for host interface

The host interface of the OPS400 can be operated as an RS 422/485 interface or as an RS 232 interface. *Table 5-4* shows the recommended maximum cable length, dependent on the data transfer rate.

Interface type	Transfer rate	Distance from host
RS 232	up to 19,200 bps 38,400 to 57,600 bps	max. 10 m max. 3 m
RS 422/485[1)]	max. 38,400 bps	max. 1,200 m
1) with suitable line termination according to specifications		

Table 5-4: Maximum cable lengths between the OPS400 and host

Alternatively, bus connection modules could be used. See *Chapter 10.9.2 Accessories: Bus connection modules, Page 10-31*.

➢ 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 OPS400 requires an operating voltage of 100 to 240 V AC, +10 %/–15 %, 50 to 60 Hz with protective grounding.

5.5 Performing electrical connection

5.5.1 Overview of connection procedure

- Connect the power supply
- Connect the reading pulse sensor(s)
- Connect the incremental sensor
- Connect the sensors for distance detection (optional)
- Connect switching outputs and relay output (optional)
- Connect the host interface
- Connect the auxiliary interface (connect the PC)

5.5.2 Tools

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

5.5.3 Connecting power supply

Terminal	Signal
Ground	Protective ground
N	Neutral
L1	Phase

Table 5-5: Terminal assignment for power supply

5.5.4 Connecting reading pulse sensor(s)

Switching inputs "Trigger 1 to 3"

If an external reading pulse sensor is to trigger the reading process of the OPS400 with the "trigger start" signal, the sensor is to be connected to the switching input "Trigger 1". This trigger mode is selected in the default setting. *Fig. 5-2* shows the connection of the input, *Table 5-6* contains the characteristic data of the inputs "Trigger 1 to 3".

Jumper bridge "0V - 0V 1" connects the ground potential of the reading pulse sensor "Trigger 1" with the ground potential of the OPS400 (upper setting of jumper bridge), if it is supplied with power via the OPS400. The power supply (24 V DC) is available at the terminal strip at the connection "Trigger". If the sensor is powered externally, the existing external potential is to be assigned to the sensor (lower setting of jumper bridge).

A second reading pulse sensor for the signal "trigger stop" is required for the "No Tracking" reading mode. It is connected to the switching input "Trigger 2" correspondingly. It's ground potential can also be assigned, via jumper bridge "0V - 0V 2".

It is also possible to connect a third reading pulse sensor to the input "Trigger 3". It's ground potential is identical to that of the input "Trigger 2"

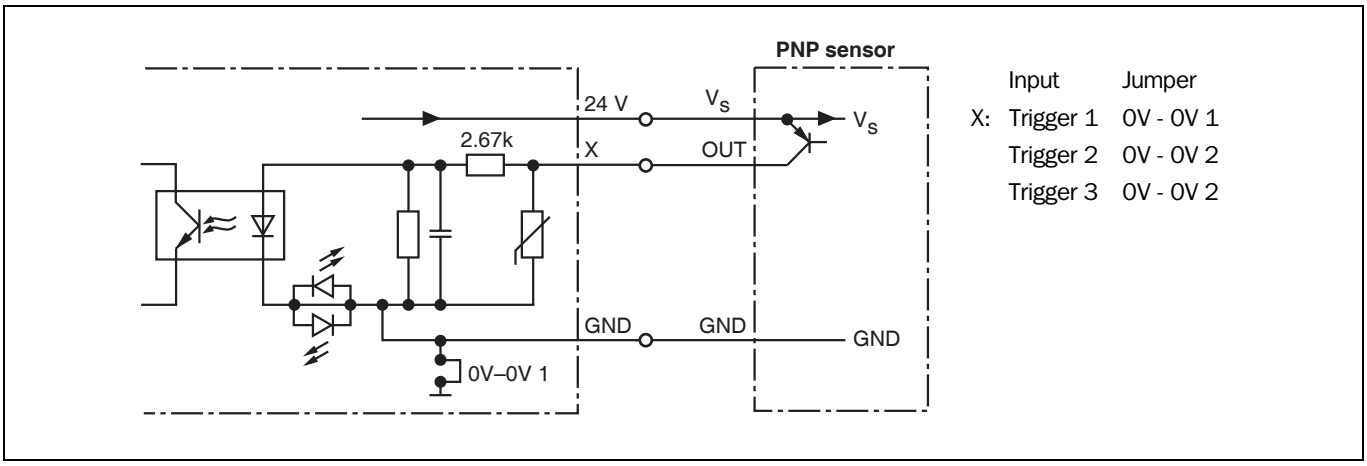


Fig. 5-2: Connection of the inputs "Trigger 1 to 3"

➢ Connect the reading pulse sensor as shown in *Fig. 5-2*.

Switching mode	Start of the reading interval when power is applied to the input (default setting: active high, debouncing: standard).
Characteristics	Optodecoupled, non-interchangeable
Electrical values	Low: $-10\ V \le U_{in} \le +10\ V$; $-3\ mA \le I_{in} \le +3\ mA$ High: $-30\ V \le U_{in} \le -15\ V$; $-10\ mA \le I_{in} \le -5\ mA$ High: $+30\ V \le U_{in} \le +15\ V$; $+10\ mA \le I_{in} \le +5\ mA$

Table 5-6: Characteristic data of the inputs "Trigger 1 to 3"

Wiring color assignment of cable of assembly no. 2034693

If assembly no. 2034693 is used as the reading pulse sensor, cable no. 6027559 is to be connected to the OPS400 as follows:

Photoelectric switch signal	Wiring color	OPS400 connection
24 V DC	brown	24 V
Out 1 (Q)	black	Trigger 1
not used	white	–
GND	blue	0V 1

Table 5-7: Wiring color assignment of the cable no. 6027559 in the assembly no. 2034693

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

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

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

5.5.5 Connecting incremental sensor

Switching inputs "INC 1 to 2"

Connection of an incremental sensor is required for the "Tracking" reading mode. Using the path information, the OPS400 can determine which barcodes belong to which objects in the reading field. The incremental sensor is connected to the input "INC 1". *Fig. 5-3* shows the terminal assignment of the input, *Table 5-8* contains the characteristic data.

Jumper bridge "0V - 0V 3" connects the ground potential of the incremental sensor “INC 1” with the ground potential of the OPS400 (upper setting of jumper bridge), if it is supplied with power via the OPS400. The power supply (24 V DC) is available at the terminal strip at the connection "INC". If the incremental sensor is powered externally, the existing external potential is to be assigned to it (lower setting of jumper bridge).

It is also possible to connect a two-channel incremental sensor to the input "INC 1" and "INC 2". The OPS400 then evaluates both phase-shifted signals. The ground potential of "INC 2" is identical to that of input "INC 1".

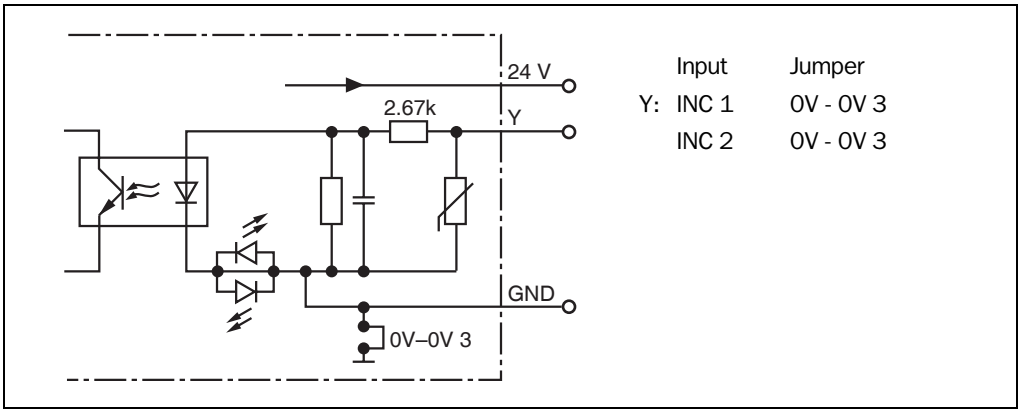


Fig. 5-3: Connection diagram of the inputs "INC 1 to 2"

Switching mode	Provision of an incremental signal at a distance of 10 to 15 mm per increment. Generally, four to five increments should be available for the smallest object gap.
Characteristics	Optodecoupled, non-interchangeable
Electrical values	Low: $-10\ V \le U_{in} \le +10\ V$; $-3\ mA \le I_{in} \le +3\ mA$ High: $-30\ V \le U_{in} \le -15\ V$; $-10\ mA \le I_{in} \le -5\ mA$ High: $+30\ V \le U_{in} \le +15\ V$; $+10\ mA \le I_{in} \le +5\ mA$

Table 5-8: Characteristic data of the inputs "INC 1 to 2“

Wiring color assignment of cable of incremental sensor no. 2022714

If the incremental sensor no. 2022714 is used as the incremental sensor, it is to be connected as follows:

Incremental sensor signal	Wiring color	OPS400 connection
24 V DC	red	24 V
Out	white	INC 1
GND	blue	0V 3

Table 5-9: Wiring color assignment: Cable of the incremental sensor no. 2022714

Tip The increment mode can be changed via the DEVICE CONFIGURATION tab of the CLV Setup user interface. The input "INC 1" is, as standard, prepared to receive incremental signals.

➢ Click the TRACKING PARAMETERS button.
Edit dialog box.

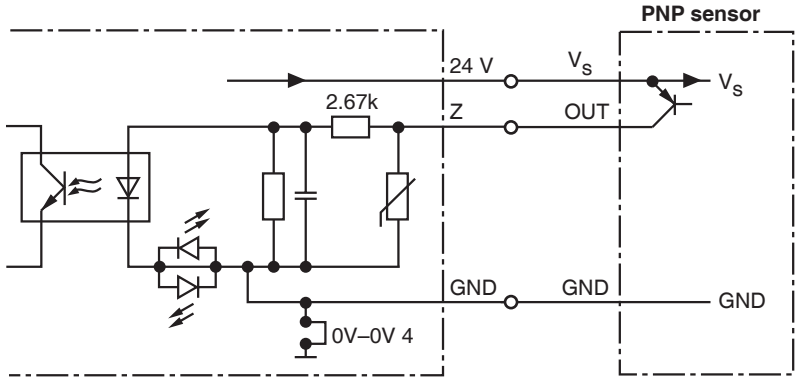
Note An incremental sensor is not required for "Percentage Evaluation" mode (no operation with conveyor).

5.5.6 Connecting sensors for distance detection (optional)

Switching inputs "Sensor 1-1 to 1-7"

If the Autofocus function of the OPS400 is not used and dynamic focus control is to be performed by external sensors, the sensors are connected to the seven inputs "Sensor 1-1 to 1-7" depending on the number of required focus positions. *Fig. 5-4* shows the connection of the inputs, *Table 5-10* contains the characteristic data.

Jumper bridge "0V - 0V 4" connects the ground potential of the inputs "Sensor 1-1 to 1-7" with the ground potential of the OPS400 (upper setting of jumper bridge), if it is supplied with power via the OPS400. The power supply (24 V DC) is available at the terminal strip at the connection "Sensor 1". If the sensors are powered externally, the existing external potential is to be assigned to them all together (lower setting of jumper bridge).



	Input	Sensor
Z:	Sensor 1-1	0V - 0V 4
	Sensor 1-2	0V - 0V 4
	Sensor 1-3	0V - 0V 4
	Sensor 1-4	0V - 0V 4
	Sensor 1-5	0V - 0V 4
	Sensor 1-6	0V - 0V 4
	Sensor 1-7	0V - 0V 4

Fig. 5-4: Connection of the inputs "Sensor 1 to 1-7"

➢ Connect the distance sensors as shown in *Fig. 5-4*.

Switching mode	Switches a focus position when power is applied to the input (default setting: active high, debouncing: standard).
Characteristics	Optodecoupled, non-interchangeable
Electrical values	Low: $-10\ V \le U_{in} \le +10\ V$; $-3\ mA \le I_{in} \le +3\ mA$ High: $-30\ V \le U_{in} \le -15\ V$; $-10\ mA \le I_{in} \le -5\ mA$ High: $+30\ V \le U_{in} \le +15\ V$; $+10\ mA \le I_{in} \le +5\ mA$

Table 5-10: Characteristic data of the inputs "Sensor 1 to 1-7"

Tip The required focus positions are to be assigned to the inputs via the DEVICE CONFIGURATION tab of the CLV Setup user interface.

➢ Click the SENSOR INPUT PARAMETERS button.
Edit dialog box.

See also *Chapter 4.4.3 Installing external sensors for object distance detection, Page 4-8*.

Note The focus positions which can be set for Timer mode on the READING CONFIGURATION tab under DISTANCE CONFIGURATION have nothing to do with the switching inputs.

5.5.7 Connecting outputs (optional)

The four switching outputs and the relay switching output can be linked with different functions for result status output independently of each other. If the assigned event occurs during the reading process, the corresponding switching output becomes live at the end of the reading pulse for the selected pulse duration. The pulse duration is identical for all outputs.

Switching outputs "Output 1 to 4"

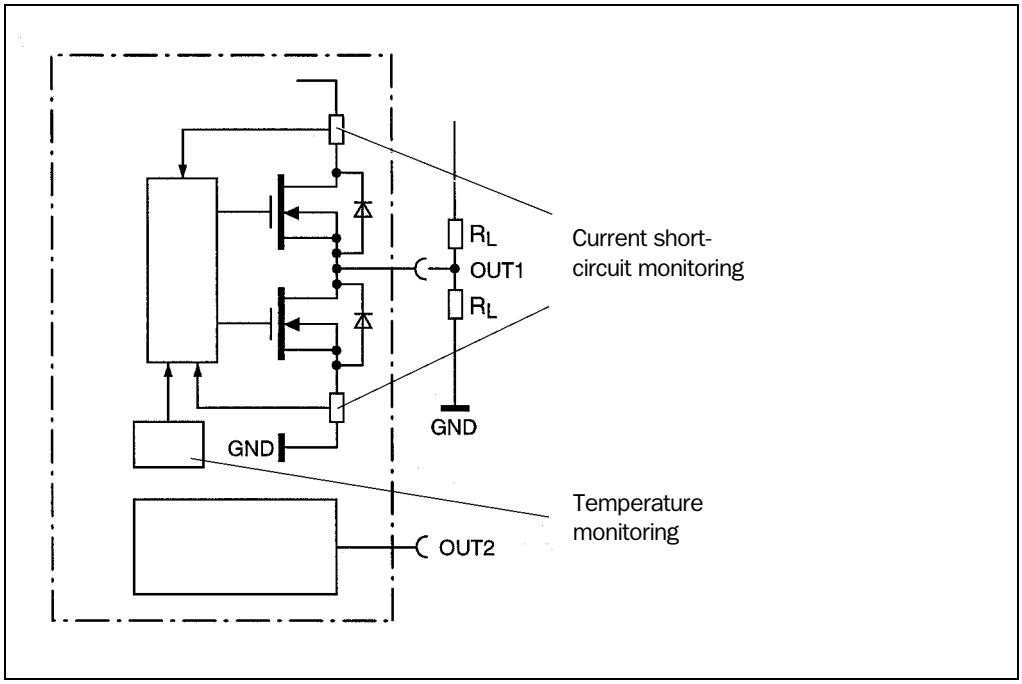


Fig. 5-5: Connection of the four switching outputs (output 1 shown in detail)

➢ Connect the switching outputs as shown in the example in *Fig. 5-5*.

Switching mode	Switches with respect to the power supply V_S and the grounding
Characteristics	Short-circuit-proof, temperature protected, not electrically isolated from V_S
Functional assignment (default setting)	Output 1: "Controller Ready" (static), Output 2: "Good Read" (100 ms) Output 3: "No Read" (100 ms) Output 4: "Match 1" (100 ms)
Electrical values	$0\ V \le V_{out} \le V_S$ guaranteed: $V_{out} \ge V_S - 2.5\ V$ at $I_{out} \le 100\ mA$ $I_{out} \le 100\ mA$

Table 5-11: Characteristic data of the four switching outputs "Output 1 to 4"

This data is identical for the four outputs.

Note The "Read Result" LED is linked to the "Output 2" output and illuminates in reading mode for the selected pulse duration and function of the result status display (default setting: "Good Read", 100 ms).

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

- Click the RESULT OUTPUT PARAMETERS button.
  Edit dialog box.

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.

Relay switching output "Relay out"

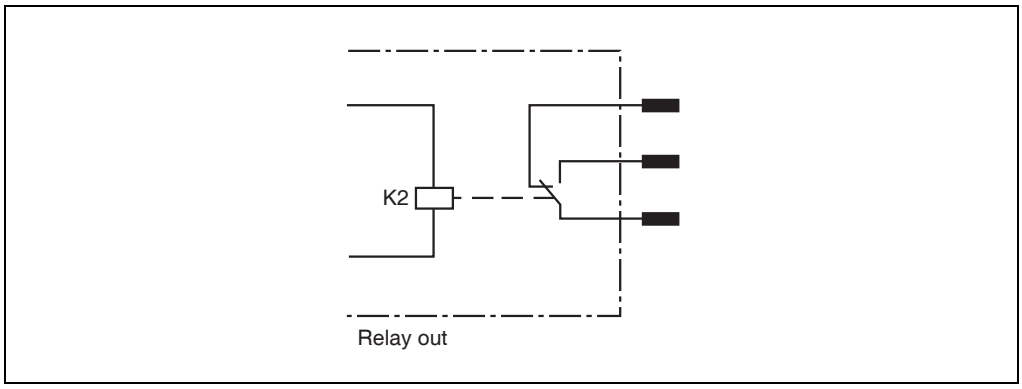


Fig. 5-6: Connection diagram of the relay output

Characteristics	Not short-circuit-proof, not temperature protected, electrically isolated, no potential
Functional assignment (default setting)	"System Ready" (static)
Electrical values	0 V AC/DC ≤ V_{SWITCH} ≤ 250 V AC/DC in accordance with VDE 0110 Group C Max. current: 1.5 A at 24 VDC Max. current: 0.2 A at 250 VDC Max. current: 1.5 A at 250 VAC

Table 5-12: Characteristic data of the relay output

Note Although the relays are of the best quality, the contacts are subject to wear. For this reason, SICK recommends that the relay output only be used for functions where numerous switching cycles are necessary (e. g. Good Read), if the application absolutely requires it. The max. current in this case is 1.5 A.

In accordance with the manufacturer's specifications:

Typical life span of a relay at maximum power (220 V AC/8 A): 100,000 switching cycles

Typical mechanical life span (w/o power): 30,000,000 switching cycles

5.5.8 Connecting host interface

ATTENTION

Damage to the electronic components in the OPS400

Electrical components in the OPS400 can be damaged if the host interface is connected incorrectly.

- ➢ Connect the host interface properly.
- ➢ Check the connection carefully before you switch on the OPS400.

- ➢ Connect the host interface of the OPS400 to the host using shielded cables (EMC requirements). Ensure that the maximum cable lengths are not exceeded (see *Table 5-4, Page 5-3*).

In the default setting, the OPS400 communicates via the RS 422/485 interface of the host interface using the following values:

Parameter	Value
Data transfer rate	9,600 bd
Data bit	8
Parity	None
Stop bit	1
Protocol	SICK (start character: STX, stop character: ETX, Handshake: none, timeout: 50 ms)

Table 5-13: Default setting of the host interface communication parameters

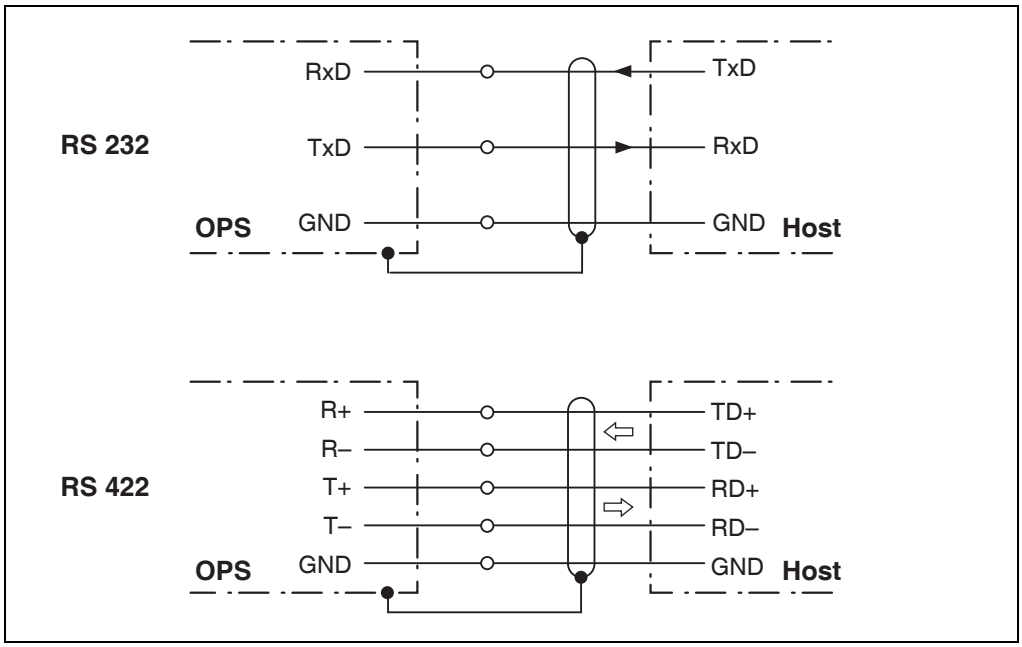


Fig. 5-7: Connection of the host interface

Terminating RS 422/485 interface

To terminate the host interface, use the two jumper bridges which are located on the right-hand side under the marking "TERM RS 422" (*Fig. 5-1, Page 5-3*).

- RS 422: set both jumpers to OFF
- RS 485: set both jumpers to ON

Activating RS 232 interface

The RS 232 interface can be activated via the user interface of 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 OPS400. This is done by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
4. Confirm the dialog box by selecting the PERMANENT save option.
   The OPS400 uses the RS 232 version of the host interface.

Assignment of terminal designation for RS 232

Only the terminal designation for the RS 422 interface is labeled under "Host" on the terminal strip. The following assignment to the connection of the RS 232 interface is required:

RS 422:	**RS 232**
T–	TxD
R–	RxD

Table 5-14: Assignment of the RS 232 signals to the RS 422 interface

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

5.5.9 Connecting auxiliary interface (connecting PC)

The auxiliary interface is the auxiliary data interface over which the user operates and configures the OPS400 using the CLV Setup program. As opposed to the host interface, its data format and data transfer rate are fixed.

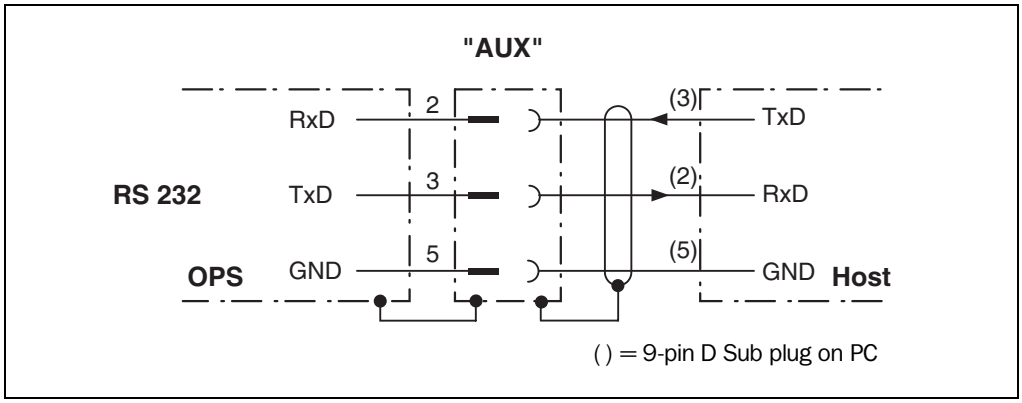


Fig. 5-8: Connecting the auxiliary interface

1. Connect the PC to the 9-pin D Sub plug "AUX".
   For this purpose, use a 3-core RS 232 data cable (null modem cable), e.g. 2014054 (RxD and TxD crossed). The cable length is not to exceed 10 m.
   – or –
   Connect the PC to the corresponding terminals in the terminal block "AUX" in accordance with *Fig. 5-8*.

2. Set the communication parameters of the PC port to the following values:

Parameter	**Value**
Data transfer rate	9,600 bd
Data bit	8
Parity	None
Stop bit	1

Table 5-15: Values of the auxiliary interface communication parameters

In the default setting, the auxiliary interface operates in the "Auxiliary input" mode.
The operating mode can be changed via the AUXILIARY INTERFACE tab of the CLV Setup user interface. The other operating modes which are available are described in *Chapter 6.5 Operating modes and output of reading result, Page 6-19*.

6 Operation

6.1 Overview of startup procedure

- Start up the OPS400 with the factory default settings (quick start).
  With this configuration, the OPS400 can be operated without being connected to a PC.
- Connect the PC (see *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*) and install the CLV Setup program (see *Chapter 10.4 Installing and operating CLV Setup, Page 10-13*).
- Configure (parameterize) the OPS400 for use with CLV Setup.

6.2 Default settings

Table 6-1 shows an overview of the factory default settings of the OPS400. The default parameters were selected intentionally so that the OPS400 can be put into operation either straight away or following a few minor adjustments. A PC is not required for startup with the default settings.

The values of the default settings are stored permanently in both the OPS400 (ROM) and the CLV Setup database. They can be loaded into the memory (RAM) of the OPS400 or displayed on the tabs of the CLV Setup program at any time.

Displaying and printing out complete default settings in CLV Setup

1. To save the current settings to the parameter set:
   From the FILE menu, select the menu item SAVE AS and enter a file name in the dialog box.
   CLV Setup saves the current settings in a configuration file "*.scl".
2. Click  in the toolbar.
   CLV Setup loads the default settings 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 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 settings in the form of a table. The header contains the company and user names that were entered during the CLV Setup installation routine.

Parameter	**Default setting**
Decoder	SMART/standard
Active codes types	Code 39, 2/5 Interleaved, Code 128
Code length	freely assignable (2/5 Interleaved: interval 4 to 50 characters)
Start/Stop ratio	automatic
Min./max. reading angle	5/95 RA
Multiple read	3
Min./max. no. codes	1
Scanning frequency	800 Hz
Distance measurement	active
Autofocus mode	Differential background and tracking
Range	400 to 2,200 mm
Scanning angle	–27 ... +27
Focus trigger source	Autofocus/Sensor inputs, immediate switching (synchronous)
Reading mode	Tracking
Reading pulse source	Start: switching input "Trigger 1" (active: high); end: see output time (host interface)
Switching inputs	"Trigger 1": start of reading interval "INC 1": reception of path increment signals (resolution: 10 mm/pulse) "Sensor 1-1 to 1-7": dynamic focus control (without function for Autofocus)
Switching outputs	not inverted; pulse duration: 100 ms
Status output function	Output 1: "Controller Ready" (static); Output 2: "Good Read", Output 3: "No Read"; Output 4: "Match 1"; Relay out: "System Ready"
Arrangement to host	Standalone
Device number	1
Host interface (type)	RS 422/485
Protocol	NAK; start character: STX, stop character: ETX, timeout: 50 ms
Transfer rate	9,600 bd
Data format	8 data bits, no parity, 1 stop bit
Output format	Good Read: Header: blank, Code Info/Separator: blank, Splitter: blank, Terminator: blank Reading data on No Read: output: yes, contents: Code Info/Separator and Error string Error string: NOREAD
Output sorting	in accordance with reading angle
Output time	2,000 mm after reading pulse sensor (trigger start)
Test string	not activated
Auxiliary interface	RS 232 9,600 bd, 8 data bits, no parity, 1 stop bit (values cannot be changed)
Function	Auxiliary input

Table 6-1: Extract: Default settings of the OPS400 parameter values

6.3 Quick start

A PC need not be connected when the OPS400 is operated with the factory default settings.

1. Connect reading pulse sensor for trigger start (e.g. photoelectric reflex switch, switch) to the switching input "Trigger 1" of the OPS400. See *Chapter 5.5.4 Connecting reading pulse sensor(s), Page 5-4*.
2. Connect incremental sensor (e.g. assembly from SICK, no. 2022714) to "INC 1". Resolution: 10 mm/pulse. This corresponds to the default setting in CLV Setup. See *Chapter 5.5.5 Connecting incremental sensor, Page 5-6*.
3. Start the reading pulse: Move the object through the reading field past the reading pulse sensor using the conveyor. The "Trigger 1" LED in the connection area illuminates. The OPS400 switches the laser diodes on, and the scan lines appear.
4. Pass the object with the sample bar code from *Fig. 6-1* under the OPS400 at a distance of approx. 1 m (place the operating instructions on top).
5. The "Trigger 1" LED goes out after the object has left the reading field (default setting 2 m after leaving the reading pulse sensor for trigger start).
   If the reading was successful, the "Read Result" LED illuminates for 100 ms.
   Output 2 ("Good Read") switches for the duration of 100 ms.
   Ensure that the bar code is the closest object to the OPS400. Otherwise, the default setting "Autofocus for dynamic focus control" would cause the OPS400 to focus on closer objects and not on the bar code.

The OPS400 can now be operated with the factory default settings.

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)

6.4 Configuration (parameterizing)

The OPS400 is configured locally based on the application at hand. The read, evaluation and output characteristics can be parameterized as required. The factory default settings or an application specific OPS400 parameter set are in effect before changes are made.

Configuration is carried out with the CLV Setup program (setting the parameter values via the serial interface).

The OPS400 does not output reading results in Parameter mode.

6.4.1 Configuring OPS400 with user interface of CLV Setup

In order to use the CLV Setup software, a PC must be connected and the software must be installed to this computer. Connecting the PC to the OPS400 is described in *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*. Installation and startup of CLV Setup and operation of the user interface are described in the appendix (*Chapter 10.4 Installing and operating CLV Setup, Page 10-13*).

Transferring parameter set between CLV Setup and OPS400

Upload

When the OPS400 is being parameterized, CLV-Setup runs in the **offline mode**. To be able to modify the current parameter set of the OPS400, this first has to be loaded to CLV-Setup from the OPS400. This procedure is referred to as an **upload** ("Upload from CLV" in the OPS400 menu or [F3] key) during which CLV-Setup always loads a complete copy of the current OPS400 parameter set. This parameter set remains unchanged until it is overwritten by CLV-Setup.

With the help of the **context menu** (right mouse button), only the parameter just edited can be loaded ("Upload parameter") or from version 3.6 all parameters of one tab or one dialog box ("Upload parameters of this view") from the OPS400's memory (RAM).

Download

Changes made to the current parameter set in CLV-Setup do not take effect until the parameter set has been transferred to the OPS400. CLV-Setup always sends a copy of the complete parameter set to the OPS400, i. e. all of the existing parameter values in the OPS400 are overwritten. The procedure for transferring and saving the parameter values in the OPS400 is referred to as a **download** ("Download to CLV" in the OPS400 menu or [F4] key).

With the help of the **context menu** (right mouse button), only the parameter just edited ("Download parameter") or from version 3.6 all parameters of one tab or one dialog box ("Download parameters of this view") will be **temporarily** loaded into the OPS400's memory (RAM). To finish the parametrization done by this way all parameters must be download again to the OPS400 with the "**Permanent**" option.

Loading complete parameter set from OPS400 (Upload)

➢ Click in the toolbar or press [F3] key.
CLV-Setup loads the current OPS400 parameter set from the RAM of the OPS400 to its database and displays the values in the tabs.
The "Device Ready" LED in the connection area is extinguished during the upload.

If the "CLV-Setup" program does not recognize parameters transferred during the upload, it outputs a warning message. Unknown parameters can be edited in the EXTRAS tab by following the conventions for command strings. When the parameter set is then saved, these parameters are also saved.

Transferring and saving entire parameter set to OPS400 (Download)

1. Click in the toolbar or press [F4] key.
The "Device Ready" LED in the connection area is extinguished.
CLV-Setup copies the parameter set to the RAM of the OPS400. The DOWNLOAD PARAMETERS dialog box with the storage options is then displayed.
PERMANENT: CLV-Setup copies the parameter set to the RAM **and** to the EEPROM of the OPS400.
TEMPORARY: CLV-Setup copies the parameter set to the RAM only. The changes are lost when the OPS400 supply voltage is switched off.
2. Confirm the dialog box with the desired storage option.
The "Device Ready" LED in the connection area lights up again.

The new parameter set is stored in the OPS400 either permanently or temporarily dependent of the selected option.

Saving 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.
TThe SAVE AS ... dialog box is then displayed.
2. Enter the file name in the dialog box (file extension "*.scl") and confirm the entry.

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

6.4.2 Function of tabs in CLV Setup (overview)

Reading Configuration

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

- the scanning frequency
- the start/stop ratio
- Reading area (reading angle limits or three-dimensional reading space when the conveyor is running)
- the Autofocus function (object distance measurement, preference focus distance, delay of the dynamic focus control, depth of field optimization, autofocus space, reading area, limitations)
- the reading distance configurations (focus position, scan-line evaluation range, assignment table) with the setting "Timer" or "Static/No Trigger"
- Adjustment to bar code quality caracteristics, background (scattered print) and relative module width

Device Configuration

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

- the device number
- the reading pulse source (sensor inputs/incremental sensor)
- the laser timeout
- the output time of the reading result based on the start of the reading pulse
- the reading mode (Tracking or Start/Stop mode)
- position parameters (spatial position of the OPS400)
- tracking parameters
- the output filtering of the reading result using match codes (host interface)
- the assignment of sensor inputs "Sensor 1-1 to Sensor 1-7" to focus positions
- the functional assignment of switching outputs "Output 1 to Output 4" and the Relay output

Code Configuration

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

- the type of active decoder (SMART and/or standard decoder)
- the activation of evaluation routines for individual code types
- the number of identical reads (multiple reads)
- the minimum and maximum number of bar codes to be read/output
- the start/stop character recognition type
- the activation of comparison of reading angle for the separation of identical bar codes
- Special parameters of the SMART decoder

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:

- the active physical interface (RS 422/485 or RS 232)
- the data format and transfer rate
- the data transfer protocol

- the start and stop characters of the interface protocol

Data Strings

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

- the data output format of the host interface (telegram structure)
- Constants and reading diagnosis data in the "Header", "Code info/separator", "Splitter" and "Terminator" blocks
- Arrangement of the "Code info/separator" blocks in the data string
- the output format for No Reads and contents of the error string
- the Test string function (heartbeat)
- the output sequence and sort criteria for reading more than one bar code per reading pulse
- activating the format mask and its structure

Auxiliary Interface

This tab is used to set the following:

- the operating mode of the auxiliary interface

Extras

This tab is used to edit parameters that were not recognized by CLV Setup after an upload from the OPS400.

Note CLV Setup Online Help contains a detailed description of the functions of the parameters and their valid entries. (For information on calling up Help, see *Chapter 10.4.8 Online help program CLV Setup Help, Page 10-20*)

6.4.3 Parameterization guide

Overview of parameterization procedure

- Select reading mode (Tracking or Start/Stop mode)
- Set up reading pulse/incremental sensor
- Parameterize laser timeout
- Enter spatial position and orientation of the OPS400 to the conveyor system (scanner position)
- Select the focus trigger source type
- Parameterize the optical reading characteristics of the OPS400
- Parameterize the evaluation characteristics of the decoder
- Parameterize the output characteristics of the host interface (protocol, data content)
- Parameterize the output characteristics of the switching outputs (result status function)
- Set the auxiliary interface (auxiliary data interface) function

When the OPS400 is started up for the first time, the **factory default settings are in effect**. In this case, the following parameters are to be set:

a) Selecting reading mode

The reading mode to be selected depends on the number of objects which are located in the OPS400 reading field per reading process (reading pulse) at the same time. It does not, however, depend on the number of bar codes on each object.

➢ **One object:** Select the "No Tracking" reading mode (Start/Stop mode)

➢ **Several objects:** Select the "Tracking" reading mode

"No Tracking" reading mode (Start/Stop mode)

Action	Procedure in CLV Setup
1. Activate the "No Tracking" reading mode	⇨ DEVICE CONFIGURATION tab ⇨ TRACKING PARAMETERS OPERATING MODE – No tracking active, output at end of reading gate. Alternatively: – No tracking active, output if number of codes equals minimum or – No tracking active, output if number of codes equals maximum
2. Select delay for data output	⇨ TIMEOUT – Value

Table 6-2: Guide: Setting up the "No Tracking" reading mode (Start/Stop mode)

Note Signals for trigger start and stop are required for this reading mode. For external reading pulses, connect the sensors to the switching inputs "Trigger 1" and "Trigger 2".

➢ Continue with *Table 6-4*

"Tracking" reading mode

Action	Procedure in CLV Setup
1. Activate the "Tracking" reading mode	⇨ DEVICE CONFIGURATION tab ⇨ TRACKING PARAMETERS OPERATING MODE – Tracking
2. Select output time for the reading result	⇨ RELEASE POINTS – Object release point – Based on object back edge or – Based on object front edge
3. Select time for focus release [1)]	⇨ RELEASE POINTS – Focus release point
4. Select Increment mode	See *Table 6-6*
1) Point in the reading field in the direction of the conveyor at which the OPS400 no longer focuses on the respective object	

Table 6-3: Guide: Setting up the "Tracking" reading mode

Note A signal for trigger start and a continuous incremental signal are required for this reading mode. For external reading pulses, connect the sensor to the switching input "Trigger 1". Connect the incremental sensor to switching input "INC 1".

➢ Continue with *Table 6-5* and *Table 6-6*

b) Setting up reading pulse/incremental sensor

Depending on the selected reading mode, the following parameters are to be parameterized for reading pulses:

"No Tracking" reading mode (Start/Stop mode)

Action	Procedure in CLV Setup
1. Select the trigger mode for the "Trigger start" and "Trigger stop" signals	⇨ DEVICE CONFIGURATION tab ⇨ READING TRIGGER PARAMETERS READING TRIGGER SOURCE – Start: positive edge TRIG 1 End: negative edge TRIG 2 or – Start: negative edge TRIG 1 End: positive edge TRIG 2 or – Serial interface
2. Pulse source "Trigger 1/Trigger 2": Select debouncing and response at first trigger	⇨ SENSOR DEBOUNCING – Standard or – Fast or – User defined ⇨ FIRST TRIGGER – Dynamic or – Static
3. Pulse source "Serial interface": Select trigger characters for start and stop	⇨ SERIAL INTERFACE – Standard trigger or – Single character

Table 6-4: Guide: Parameterizing the reading pulse source for "No Tracking" mode (Start/Stop mode)

➢ Continue with *Table 6-7*

"Tracking" reading mode

Reading pulse

Action	Procedure in CLV Setup
1. Select trigger mode for the "Trigger start" signal	⇨ DEVICE CONFIGURATION tab ⇨ READING TRIGGER PARAMETERS READING TRIGGER SOURCE – Active if TRIG 1 is high or – Active if TRIG 1 is low or – Serial interface
2. Pulse source "Trigger 1": Select debouncing and response at first trigger	⇨ SENSOR DEBOUNCING – Standard or – Fast or – User defined ⇨ FIRST TRIGGER – Dynamic or – Static
3. Pulse source "Serial interface": Select trigger character for start and stop	⇨ SERIAL INTERFACE – Standard trigger or – Single character

Table 6-5: Guide: Parameterizing the reading pulse source for "Tracking" mode

Increment mode

Action	Procedure in CLV Setup
1. Select incremental signal source	⇨ DEVICE CONFIGURATION tab ⇨ TRACKING PARAMETERS INCREMENT MODE – INC 1 or – Direction recognition INC 1, INC 2 or – Doubled rate INC 1 or – Half rate INC 1 or – Disabled (internal 10 ms increment)
2. Select resolution of the incremental sensor	⇨ LENGTH INCREMENT VECTOR – Value[1)]
1) Default setting (1,000 x 1/100 mm = 10 mm) corresponds to the resolution of the incremental sensor no. 2022714	

Table 6-6: Guide: Setting up the incremental sensor for "Tracking" mode

➢ Continue with *Table 6-7*

c) Parameterizing laser timeout

Action	Procedure in CLV Setup
1. Select the duration for the laser timeout – or –	⇨ DEVICE CONFIGURATION tab ⇨ READING TRIGGER PARAMETERS ⇨ 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) Entering spatial position and orientation of OPS400 to conveyor system

Depending on the selected reading mode, the following parameters are to be parameterized for spatial assignment of the OPS400:

"No Tracking" reading mode (Start/Stop mode)

Parameterization in accordance with *Table 6-8* is only necessary if the dynamic focus control is triggered by the Autofocus function or the switching inputs.

"Tracking" reading mode

Action	Procedure in CLV Setup
1. Enter direction of the OPS400 relative to the conveyor direction	⇨ DEVICE CONFIGURATION tab ⇨ SCANNER POSITION PARAMETERS ⇨ ORIENTATION section – Against conveying direction or – Into conveying direction
2. Enter spatial position[1)] relative to conveyor belt	⇨ COORDINATES section – x-coordinate and – y-coordinate and – z-coordinate
1) Reference point: Right edge of the conveyor belt at the height of the reading pulse sensor for trigger start. Reference point on OPS400: Target marking on housing cover at the height of the connection area	

Table 6-8: Guide: Assigning the scanner position relative to the conveyor direction

e) Selecting focus trigger source

Four trigger types are available for the focus trigger source:

- Static (no trigger)
- Autofocus
- Timer
- Switching inputs "Sensor 1-1 to 1-7"

These are parameterized as follows, independent of the selected reading mode:

1. Static (dynamic focus control inactive)

Reading mode: No Tracking or Tracking

Application:
One focus position of the OPS400 is sufficient to cover the required depth of field (object size is uniform or varies only slightly)

Action	Procedure in CLV Setup
1. Deactivate dynamic focus control (focus trigger source)	⇨ READING CONFIGURATION tab ⇨ FOCUS CONTROL – Static/No Trigger
2. Set up distance configuration 1	⇨ READING CONFIGURATION tab ⇨ DISTANCE CONFIGURATION ⇨ DISTANCE CONFIGURATIONS TAB – FOCUS POSITION – MINIMUM READING ANGLE – MAXIMUM READING ANGLE

Table 6-9: Guide: Setting up the static reading area

Note The minimum and maximum values for the active evaluation range of the red scan line (MIN. and MAX. READING ANGLE) can be checked in the SHOW READING ANGLE LIMITS mode.
See *Chapter 6.5.5 Show Reading Angle Limits, Page 6-25*.

2. Autofocus

Application:
The OPS400 sets its focus position to the object distance automatically using internal distance measurement (each object has a different size).

Reading mode: No Tracking (Start/Stop mode)

Action	Procedure in CLV Setup
1. Activate the Autofocus function	⇨ READING CONFIGURATION tab ⇨ FOCUS CONTROL – Autofocus/Sensor Inputs
2. Select focusing time (based on start of reading pulse)	⇨ FOCUS CONTROL AUTOFOCUS/SENSOR INPUTS – Immediate or Synchronous – Latched
3. Select the Autofocus mode	⇨ AUTOFOCUS ⇨ MODE – Minimum distance or – Differential background

Table 6-10: Guide: Setting up the Autofocus function, part 1 for "No Tracking"

Action	Procedure in CLV Setup
4. Autofocus mode "Differential background": Set up the OPS400 for distance measurement (define visible range)	⇨ READING AREA ⇨ READING ANGLE LIMITS DISTANCE CONFIGURATIONS – DISTANCE CONFIGURATIONS TAB Maximum READING ANGLE Minimum READING ANGLE – or – ⇨ READING AREA ⇨ EDIT READING SPACE – Distances
5. Enter spatial position relative to conveyor belt	See *Table 6-8*

Table 6-10: Guide: Setting up the Autofocus function, part 1 for "No Tracking" (contd.)

➢ Continue with *Table 6-12*

"Tracking" reading mode

Action	Procedure in CLV Setup
1. Activate the Autofocus function	⇨ READING CONFIGURATION tab ⇨ FOCUS CONTROL – Autofocus/Sensor Inputs
2. Select focusing time (based on start of reading pulse)	⇨ FOCUS CONTROL AUTOFOCUS/SENSOR INPUTS – Immediate or Synchronous – Latched
3. Select the Autofocus mode	⇨ AUTOFOCUS ⇨ MODE – Differential background and tracking
4. Set up OPS400 for distance measurement (define visible range)	⇨ READING AREA ⇨ READING ANGLE LIMITS DISTANCE CONFIGURATIONS – DISTANCE CONFIGURATIONS tab Maximum READING ANGLE Minimum READING ANGLE – or – ⇨ READING AREA EDIT READING SPACE – Distances

Table 6-11: Guide: Setting up the Autofocus function, part 1 for "Tracking"

Note The minimum and maximum values for the active evaluation range of the red scan line (MIN. AND MAX. Reading Angle) can be checked in the SHOW READING ANGLE LIMITS mode. See *Chapter 6.5.5 Show Reading Angle Limits, Page 6-25*.

For the Autofocus modes "Differential background" and "Differential background and tracking", the background of the OPS400's visual range can be taught in to the OPS400 to limit the defined scan range to a higher degree and for faster and more effective evaluation. See *Chapter 6.5.4 Background Teach-in, Page 6-23*.

➢ Continue with *Table 6-12*

Set up the Autofocus function

Action	Procedure in CLV Setup
Set up the Autofocus function	⇨ AUTOFOCUS ⇨ EDIT AUTO FOCUS – Preference focus distance – Focus release ⇨ AUTO FOCUS LIMITS PARAMETERS tab – Autofocus limitation – Scan angle limitation – Auto focus space See *Table 6-13* ⇨ AUTO FOCUS OPTIMIZATION PARAMETERS tab – Delay of focus change – Depth of field optimization – Distance Measurement: active! – Source of distance information

Table 6-12: Guide: Setting up the Autofocus function; part 2

Parameter	Minimum distance	Differential background	Differential background and tracking
Condition	One object in reading field per reading pulse	One object in reading field per reading pulse	Number of objects in reading field per reading pulse ≥ 1
1. Limits: Auto focus limitation	✖	❍	❍
2. Limits: Scan angle limitation	✖	❍	❍
3. Limits: Auto focus space	–	❍	❍
4. Scanner Position Parameters: Orientation	–	✖	✖
5. Scanner Position Parameters: Coordinates x, y, z	–	✖	✖
6. Tracking Parameters: Focus release point	–	–	✖
7. Background Teach-in	–	❍	❍
✖ : required ❍ : optional			

Table 6-13: Guide: Overview of parameters to be set for the Autofocus function

Fig. 6-2 shows a 2-D example of how the visual range of the OPS400 is adapted using the parameters "Limits: Scan angle limitation" and "Limits: Auto focus space".

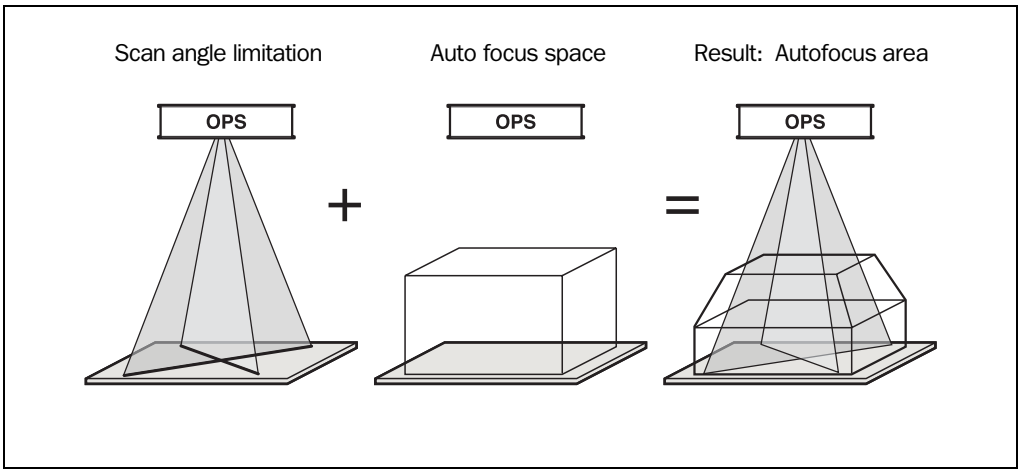


Fig. 6-2: Limiting the visual range using limits

3. Timer

Reading mode: No Tracking or Tracking

Application:
The OPS400 switches between two or more focus positions (time independent).

Action	Procedure in CLV Setup
1. Active Timer mode	⇨ READING CONFIGURATION tab ⇨ FOCUS CONTROL – Timer ⇨ TIMER – Value
2. Set up the distance configurations	⇨ READING CONFIGURATION tab ⇨ DISTANCE CONFIGURATION ⇨ DISTANCE CONFIGURATIONS tab – Focus position – Maximum READING ANGLE – Minimum READING ANGLE ⇨ ASSIGNMENT TABLE tab – Index (Sequence) – Valid Configurations

Table 6-14: Guide: Setting up focus trigger source in Timer mode

Note The minimum and maximum values for the active evaluation range of the red scan line (MIN. AND MAX. Reading Angle) can be checked in the SHOW READING ANGLE LIMITS mode. See *Chapter 6.5.5 Show Reading Angle Limits, Page 6-25*.

4. Switching inputs "Sensor 1-1 to 1-7"

Application:
The OPS400 switches the focus position based on the external distance information.

Reading mode: No Tracking

Action	Procedure in CLV Setup
1. Activate the switching inputs as triggers for dynamic focus control	⇨ READING CONFIGURATION tab ⇨ FOCUS CONTROL – Autofocus/Sensor Inputs
2. Select focusing time (based on start of reading pulse)	⇨ FOCUS CONTROL AUTOFOCUS/SENSOR INPUTS – Immediate, Synchronous or – Latched
3. Select the number of sensors by assigning focus positions, and set Trigger mode and application time of the switching statuses	⇨ DEVICE CONFIGURATION tab ⇨ SENSOR INPUT PARAMETERS – Focus position – Triggermode – Use focus information
4. Select the Autofocus mode	⇨ AUTOFOCUS ⇨ MODE – Minimum distance or – Differential background
5. Modify the Autofocus function	⇨ AUTOFOCUS ⇨ EDIT AUTO FOCUS ⇨ ADJUSTMENTS tab – Preference focus distance: Fix focus distance[1)] – Focus release ⇨ AUTO FOCUS LIMITS PARAMETERS tab – As in the default setting ⇨ AUTO FOCUS OPTIMIZATION PARAMETERS tab – Distance Measurement: active! – Source of distance information: **external**!
6. Enter spatial position relative to conveyor belt	See *Table 6-8*

1) dependent upon the available depth of field; typical setting: approx. 100 mm above the smallest object size

Table 6-15: Guide: Dynamic focus control via the "No Tracking" switching inputs

"Tracking" reading mode

Action	Procedure in CLV Setup
1. Activate the switching inputs as triggers for dynamic focus control	⇨ READING CONFIGURATION tab ⇨ FOCUS CONTROL – Autofocus/Sensor Inputs
2. Select focusing time (based on start of reading pulse)	⇨ FOCUS CONTROL AUTOFOCUS/SENSOR INPUTS – Immediate or Synchronous – Latched

Table 6-16: Guide: Dynamic focus control via the "Tracking" switching inputs

Action	**Procedure in CLV Setup**
3. Select the number of sensors by assigning focus positions, and set Trigger mode and application time of the switching statuses	⇨ DEVICE CONFIGURATION tab ⇨ SENSOR INPUT PARAMETERS – Focus position – Trigger mode – Use of focus information
4. Select the Autofocus mode	⇨ AUTOFOCUS ⇨ MODE - Differential background and tracking
5. Modify the Autofocus function	⇨ AUTOFOCUS ⇨ EDIT AUTO FOCUS ⇨ ADJUSTMENTS tab – Preference focus distance: Fix focus distance (approx. 100 mm above the smallest object size) – Focus release ⇨ AUTO FOCUS LIMITS PARAMETERS tab – As in the default setting ⇨ AUTO FOCUS OPTIMIZATION PARAMETERS tab – Distance measurement: active! – Source of distance information: **external**!

Table 6-16: Guide: Dynamic focus control via the "Tracking" switching inputs (contd.)

f) Parameterizing optical reading characteristics

- Scanning Frequency ⇨ READING CONFIGURATION tab ⇨ Reading Parameters
- Rest zone ⇨ READING CONFIGURATION tab ⇨ Start/Stop Ratio
- Poor quality bar code print ⇨ READING CONFIGURATION tab ⇨ Code label Quality
- Relative module width ⇨ READING CONFIGURATION tab ⇨ Relative module width

g) Parameterizing evaluation characteristics

- Select decoder type ⇨ CODE CONFIGURATION tab ⇨ Decoder
- Activate code types for evaluation ⇨ CODE CONFIGURATION tab ⇨ Codes and Edit Codes
- Activate code comparison ⇨ DEVICE CONFIGURATION tab ⇨ Match Codes Parameters
- Set output time of the reading result ⇨ DEVICE CONFIGURATION tab ⇨ Reading Trigger Parameters and Output for Good Read group

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

Number of bar codes per object	Stationary conveyor object	Moving conveyor object
Number n > 1: – Same code type – Contents different or identical	⇨ CODE CONFIGURATION tab ⇨ CODE SUMMARIZATION section – **Activate** "Seperate codes dependent on reading angle" – Min. distance between labels ⇨ NUMBER OF CODES section – Minimum – Maximum	⇨ CODE CONFIGURATION tab ⇨ CODE SUMMARIZATION section – **Activate** "Seperate codes dependent on reading angle" – Min. distance between labels ⇨ NUMBER OF CODES section – Minimum – Maximum ⇨ DEVICE CONFIGURATION tab ⇨ SCANNER POSITION PARAMETERS button ⇨ ORIENTATION ⇨ TRACKING PARAMETERS ⇨ DISTANCE PER ENCODER PULSE section

Table 6-17: Guide: Parameterizing the separation of identical bar codes

Note If the number n>1, the minimum distances are to be kept between bar codes on the objects if

- the SMART decoder reads codes of the same code type which contain identical or varying data content
- the standard decoder is to read and separate bar codes with the same name (identical code type and identical data content)

Chapter 10.5.1 Calculating the necessary capture area for the bar code if several bar codes are read on each object, Page 10-23 lists the corresponding calculations.

h) Parameterizing output characteristics

Result status: switching outputs

- Set the function of the result status output of switching outputs "Output 1 to Output 4" and the Relay output: ⇨ DEVICE CONFIGURATION tab ⇨ Result Output Parameters

Main data interface: general

- Sorting of the reading result ⇨ DATA STRINGS tab ⇨ Output Sequence Sort
- Masking of the reading result ⇨ DATA STRINGS tab ⇨ Format Mask

Host interface

- Physical interface ⇨ HOST INTERFACE tab ⇨ Data Format
- Communication parameters ⇨ HOST INTERFACE tab ⇨ Data Format
- Protocol ⇨ HOST INTERFACE tab ⇨ Interface Protocol

Data output string

- Choose contents of "Header", "Code Info/Separator", "Splitter" and "Terminator" blocks ⇨ DATA STRINGS tab ⇨ OUTPUT FORMAT section
- Position of "Code Info/Separator" blocks in data output string ⇨ DATA STRINGS tab ⇨ POSITION OF CODE INFO/SEPARATOR section

- Set wrong read format ⇨ DATA STRINGS tab⇨ Wrong Read Format, Character Count and Error String
- If necessary, parameterize/activate test string ⇨ DATA STRINGS tab ⇨ Test String
- Parameterize special functions ⇨ DATA STRINGS tab ⇨ Specials
- Output external data string as reading result ⇨ DATA STRINGS tab ⇨ EXTERNAL DATA STRING PARAMETERS button

i) Parameterizing auxiliary data interface (auxiliary interface) function

- AUXILIARY INTERFACE tab

6.5 Operating modes and output of reading result

The following OPS400 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

- Parameterizing (configuration)
  See *Chapter 6.4.1 Configuring OPS400 with user interface of CLV Setup, Page 6-4*.
- Teach-in for background
- Show Reading Angle Limits

For monitoring purposes/correcting faults

- Displaying and editing operating data
- Monitor host interface
- Auxiliary input
- Code statistics for RDT400
- I/O monitor in incremental pulse
- Background analysis

6.5.1 Reading mode (standard operating mode)

The OPS400 performs a self-test after it has been switched on. The "Device Ready" LED in the connection area illuminates and signals the start of Reading mode.

In the default setting, the OPS400 operates in the "Tracking" reading mode. In this case, the switching input "Trigger 1" is the external trigger source for the reading pulse start (trigger start). An incremental sensor with resolution 10 mm/pulse (OPS400 default setting) must be connected to switching input "INC 1" and transmit signals. Otherwise, the OPS400 cannot detect the end of the reading pulse.

Depending of the configuration, the "Result 1" to "Result 4" switching outputs and the relay output become live for the predefined pulse length when defined events occur during the reading process (e. g. Good Read).

When the objects are moving on the conveyor, the OPS400 outputs the reading result via the host interface (default setting: object release point is 2 m behind reading pulse sensor).

Note The OPS400 only outputs multiple bar codes for a reading result if the parameterized MIN. and MAX. NUMBER OF BAR CODES is > 1 and if it has been presented with multiple bar codes. The number of bar codes to be read/output for each reading interval can be selected in the CODE CONFIGURATION tab in the NUMBER OF CODES group.

The reading result of the **host interface** can be displayed via the auxiliary interface. *Chapter 6.5.7 Monitor Host Interface, Page 6-28* describes the procedure for this, as well as the structure of the read result in the default setting.

6.5.2 Percentage Evaluation

In Percentage Evaluation mode, the quality of the reading of bar codes which are brought statically into the reading field of the OPS400 is assessed (no conveyor movement).

The OPS400 performs 100 scans in the Free Running mode and evaluates the reading quality. It outputs the reading result continuously every 2 s via the **auxiliary interface**. The reading results can be displayed in the Terminal Emulator of CLV Setup.

The "Result 1" to "Result 4" switching outputs and the relay output do not become live.

The standard decoder must be set temporarily for Percentage Evaluation mode.

Percentage Evaluation can be called up in the menu bar under TOOLS, DEVICE FUNCTIONS, PERCENTAGE EVALUATION, SCAN PART 1 or SCAN PART 2 by pressing [F2] or via the OPEN DEVICE FUNCTIONS button in the Terminal Emulator.

1. Select the CODE CONFIGURATION tab.
2. In the DECODER group, click the STANDARD radio button.
3. Perform a download to the OPS400. This is done by clicking  in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
4. Confirm the dialog box by selecting the TEMPORARY save option.
   The OPS400 then uses the standard decoder.
5. Click  in the toolbar.
   The Terminal Emulator window is then displayed.
   The OPS400 is in Reading mode.
6. Click the OPEN DEVICE FUNCTIONS button.
   The DEVICE FUNCTIONS dialog box is then displayed.
7. Select the option PERCENTAGE EVALUATION, SCAN PART 1 or SCAN PART 2 from the EXECUTE menu.
   The dialog box for selection of the distance configuration is then displayed.
8. Click the appropriate distance configuration for the reading distance:
   – in Autofocus mode, distance configuration no. 1
   – for event-controlled dynamic focus control (Timer mode), the distance configuration which corresponds to the reading distance of the object (default setting: no. 1, focus position F1 = 1,200 mm).
9. Confirm the dialog box with OK.
   The "Device Ready" LED in the connection area extinguishes. The OPS400 initiates the percentage evaluation and outputs the reading results continuously. An example is shown in *Fig. 6-3*.
10. Present the bar code sample from *Fig. 6-1, Page 6-3* and monitor the reading results in the DEVICE FUNCTIONS window.
11. To return to Reading mode, click CANCEL and exit the DEVICE FUNCTIONS dialog box with CLOSE.
    The OPS400 returns to Reading mode. The "Device Ready" LED in the connection area illuminates.

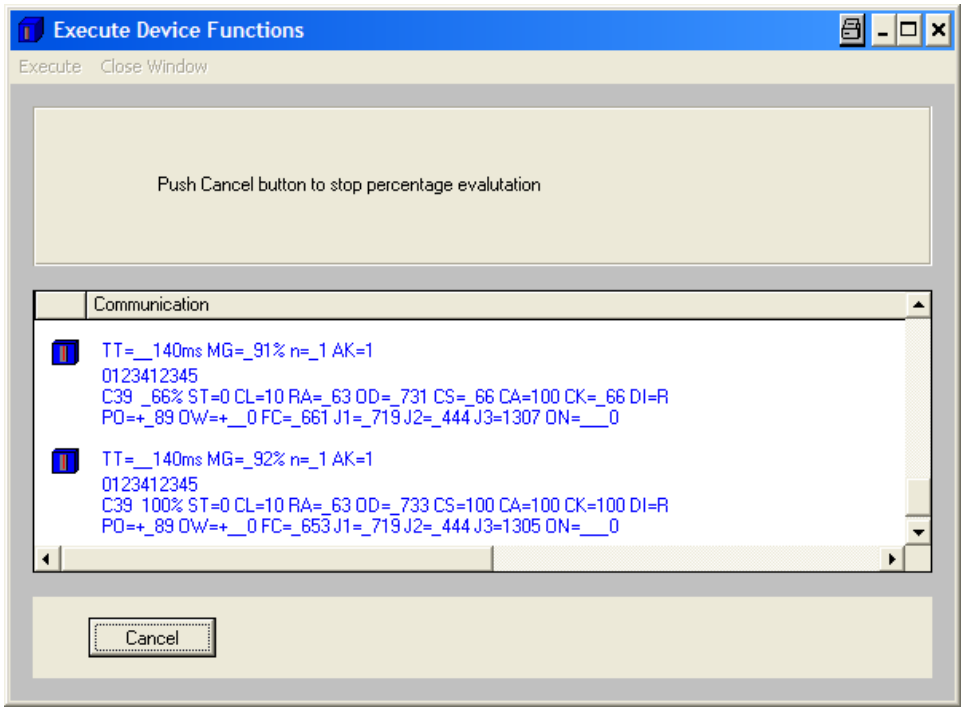


Fig. 6-3: CLV Setup: Display of the percentage evaluation in the "Device Functions" dialog box

The reading result comprises the data contents of the bar code(s) and the reading diagnosis data. *Fig. 6-4* explains the structure and function of the reading diagnosis data.

Successful read (Good Read):

```
TT=_ 140 ms   MG=_92 %   n=_1   AK=1
0123412345
C39   100%   ST=0   CL=10   RA=_63   OD=_733   CS=100   CA=100   CK=100   DI=R
PO=+_89   OW=+_ _ 0   FC=_653   J1=_719   J2=_444   J3=1305   ON= _ _ _0
```

with:

1st line:	TT =	Duration of the reading interval (ms)
	MG =	Temporal mean value of the identification quality (%)
	n=	Number of detected bar codes
	AK=	No. of the used distance configuration[1)]
2nd line:	**0123412345** =	Data content of the bar code
3rd line:	C39 =	ID: Code type code 39
	100% =	Identification quality (%)
	ST =	Error status (ST=0: Good Read)
	CL =	Code length (character count)
	RA=	Reading angle
	OD=	Object distance, (radial from OPS400) in mm
	CS =	Code security
	CA =	Scanning expenditure
	CK =	Code continuity
	DI =	Decoding direction (F = in scanning direction, R = against scanning direction)
4th line:	PO=	Exact reading angle (3-digit, in °)(unit 0,1°)
	OW=	Exact oscillating angle (3-digit, in °)(unit 0,1°), not relevant to OPS400
	FC =	Current focus position (4-digit) in mm
	ON=	Consecutive object number

1) not relevant for autofocus function

Fig. 6-4: Reading result of the Auxiliary interface: Structure for "Good Read"

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 4-5* describes the procedure performed after Adjusting mode is started. The OPS400 does not output a reading result in this mode. The "Result 1" to "Result 4" switching outputs and the relay output do not become live.

Adjusting mode can be called up in the menu bar under TOOLS, DEVICE FUNCTIONS, ADJUSTING MODE, BOTH (scan lines), SCAN PART 1 or SCAN PART 2 by pressing [F2] or by clicking the OPEN DEVICE FUNCTIONS button in the Terminal Emulator.

1. Click  in the toolbar.
   The Terminal Emulator window is then displayed.
   The OPS400 is in Reading mode.
2. Click the OPEN DEVICE FUNCTIONS button.
   The DEVICE FUNCTIONS dialog box is then displayed.
3. Select the option ADJUSTING MODE, BOTH (scan lines), SCAN PART 1 or SCAN PART 2 in the EXECUTE menu.
   The "Device Ready" LED in the connection area extinguishes.
   The OPS400 cancels Reading mode and masks out both scan lines from the reading angle RA = 50 to the reading angle RA = 100.
4. To return to Reading mode, click CANCEL and exit the DEVICE FUNCTIONS dialog box with CLOSE.
   The OPS400 returns to Reading mode. The "Device Ready" LED in the connection area illuminates.

6.5.4 Background Teach-in

If the Autofocus function is used in the modes DIFFERENTIAL BACKGROUND or DIFFERENTIAL BACKGROUND WITH TRACKING, the **background** of the OPS400's visual range can be taught in to the OPS400 in order to limit the defined visual range to a higher degree. When creating the internal distance profile, **no object which is to be read** may be located in the visual range of the OPS400. The OPS400 does not output a reading result in this mode.

Background Teach-in can be called up in the menu bar under TOOLS, DEVICE FUNCTIONS, BACKGROUND, TEACH-IN, BOTH (scan lines), SCAN PART 1 or SCAN PART 2 by pressing [F2] or by clicking the OPEN DEVICE FUNCTIONS button in the Terminal Emulator.

1. Install the OPS400 on site in the reading station and align it with an object with a bar code.
2. Remove the object and provide the OPS400 with an unobstructed view of the background.
3. From the TOOLS menu, select DEVICE FUNCTIONS, BACKGROUND, TEACH-IN BOTH (scan lines), SCAN PART 1 or SCAN PART 2.

The "Device Ready" LED in the connection area extinguishes. The OPS400 starts the function, scans its visual range, is taught-in the background and creates a corresponding distance profile. After a successful teach-in, the OPS400 signals the completion of the action via a dialog box. An example is shown in *Fig. 6-5*.
The background for the selected scan line(s) has been taught in to the OPS400.

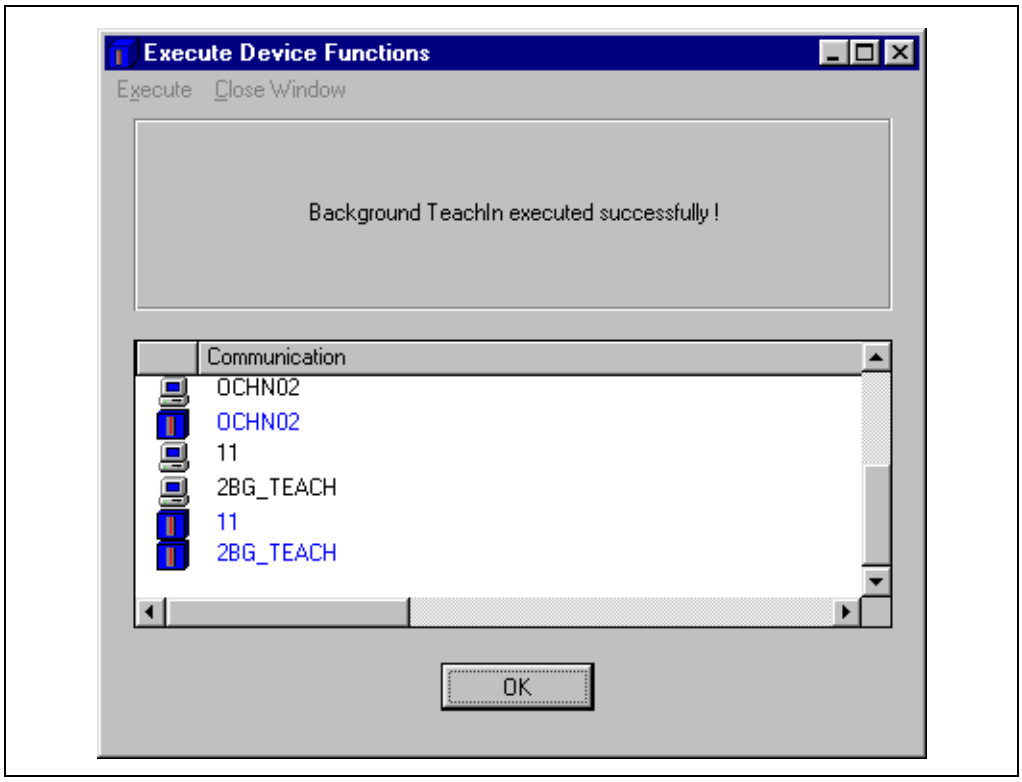


Fig. 6-5: CLV Setup: Dialog box for executing "Background Teach-in"

4. To return to Reading mode, click OK and exit the DEVICE FUNCTIONS dialog box with CLOSE.

If parameters in the OPS400 were changed by the teach-in, CLV Setup inquires in another dialog box whether the changed parameters are to be copied from the OPS400 via upload and displayed.

5. Confirm the dialog box with YES.
   The dialog box closes automatically.
   The OPS400 returns to Reading mode.
   The "Device Ready" LED in the connection area illuminates.

The taught-in distance profile of the scan line background can be displayed in CLV Setup after being uploaded.

1. Select the READING CONFIGURATION tab.
2. Click the SHOW BACKGROUND button in the AUTOFOCUS group.
   The SHOW BACKGROUND dialog box is then displayed.
   Fig. 6-6 shows an example of a taught-in distance profile for Scan part 2.

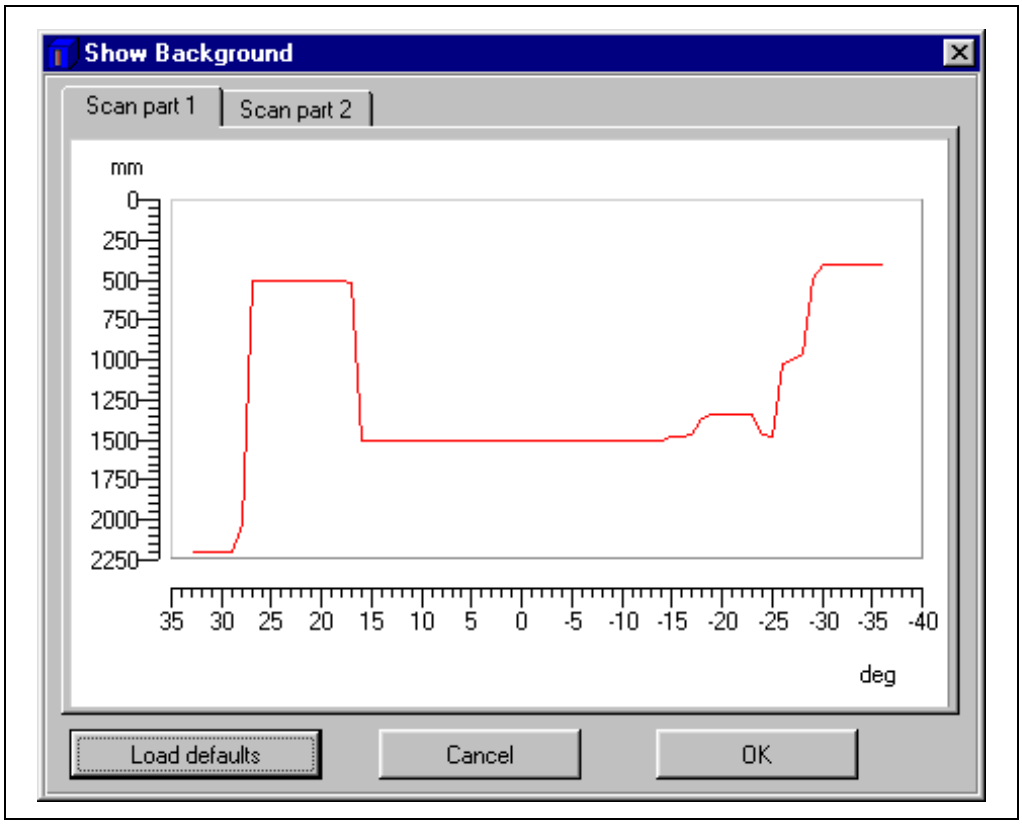


Fig. 6-6: CLV Setup: Display of the taught-in background

6.5.5 Show Reading Angle Limits

In this operating mode, the OPS400 masks certain parts of the red scan lines so that any limits defined for the active evaluation range of the scan lines 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 lines into account. The range is limited by entering appropriate values for MINIMUM READING ANGLE and MAXIMUM READING ANGLE in the DISTANCE CONFIGURATIONS dialog box in the READING CONFIGURATION tab.

The OPS400 does not output a reading result in this mode.

"Show Reading Angle Limits" allows checking of whether the following are true for the selected setting:

- the visual range of the OPS400 is defined accordingly in Autofocus mode
- the limitation of each active distance configuration is parameterized with regard to the distance ("Christmas tree effect") in the case of event-controlled dynamic focus control (Timer mode)

"Show Reading Angle Limits" can be called up by selecting TOOLS from the menu bar, then DEVICE CONFIGURATIONS, SHOW READING ANGLE LIMITS, BOTH (scan lines), SCAN PART 1 or SCAN PART 2 by pressing [F2] or by clicking the OPEN DEVICE CONFIGURATIONS in the Terminal Emulator.

The OPS400 masks the selected scan line(s) alternately from the set value for RA_{min} and from the set value for RA_{max}. An example is shown in *Fig. 6-7*. The switchover is made continuously at intervals of one second. The part of the scan line that remains active for reading is the area between RA_{min} and RA_{max}.

Example:
Default setting: Evaluation set for the area from $RA_{min} = 5$ to $RA_{max} = 95$
The OPS400 masks out from $RA_{min} = 5$ (short scan line) and from $RA_{max} = 95$ (long scan line).

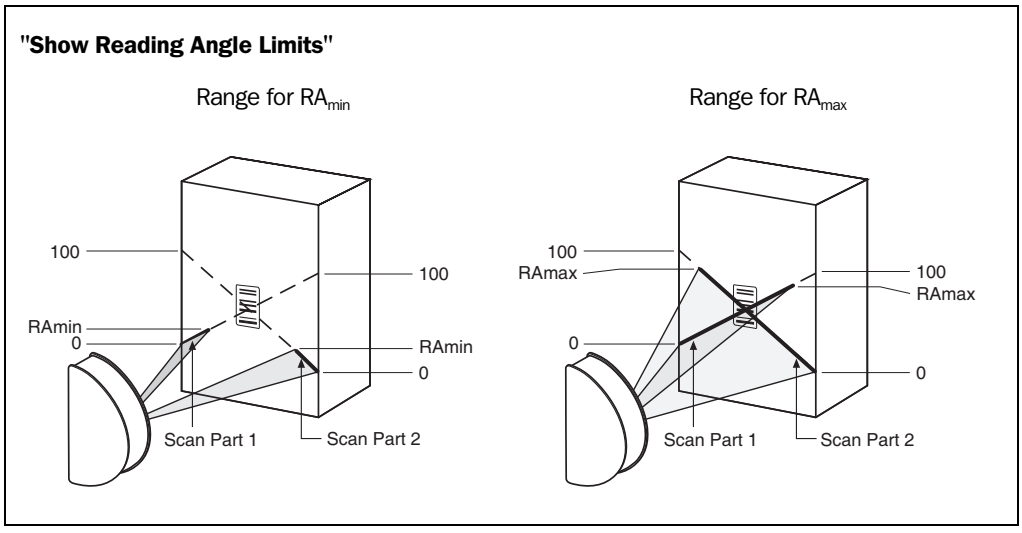


Fig. 6-7: Appearance of both scan lines in the "Show Reading Angle Limits" mode

Proceed as follows to check the limited evaluation range:

1. Click in the toolbar.
   The Terminal Emulator window is then displayed. The OPS400 is in Reading mode.
2. Click the OPEN DEVICE FUNCTIONS button.
   The DEVICE FUNCTIONS dialog box is then displayed.

3. Select the option SHOW READING ANGLE LIMITS, BOTH (scan lines), SCAN PART 1 or SCAN PART 2 in the Execute menu.
4. Click the distance configuration for which the active evaluation range of the scan line has been limited (DC-specific).
   The "Device Ready" LED in the connection area extinguishes. The OPS400 cancels the Reading mode and masks the scan line(s) alternately (as described above) from RA_{min} and RA_{max}.
5. Check *Step 2 and 3* for each active distance configuration to determine whether the bar code is located centrally in the area between the end of the shorter scan line (RA_{min}) and the end of the longer scan line (RA_{max}) or, if there are several bar codes, to determine whether the center of the field of all the codes is within range.
6. If necessary, correct RA_{min} and RA_{max} accordingly. Perform a download to the OPS400.
7. To return to Reading mode, click CANCEL and exit the DEVICE FUNCTIONS dialog box with CLOSE.
   The OPS400 returns to Reading mode. The "Device Ready" LED in the connection area illuminates.

Note In the Reading mode, the OPS400 does not actually mask the scan line visually, but instead takes the values specified for the limited evaluation range into account when the data contents are decoded.

6.5.6 Displaying and editing operating data

This function enables statistical operating data, which the OPS400 maintains in the form of counters during reading, to be displayed and reset.
The OPS400 does not output a reading result in this mode.

1. Click in the toolbar.
   The OPS400 cancels Reading mode.
   The "Device Ready" LED in the connection area extinguishes.
   The OPERATING DATA dialog box appears (*Fig. 6-8*).
2. After reading/resetting the desired counters, click OK to confirm the dialog box.
   The OPS400 returns to Reading mode. The "Device Ready" LED in the connection area illuminates.

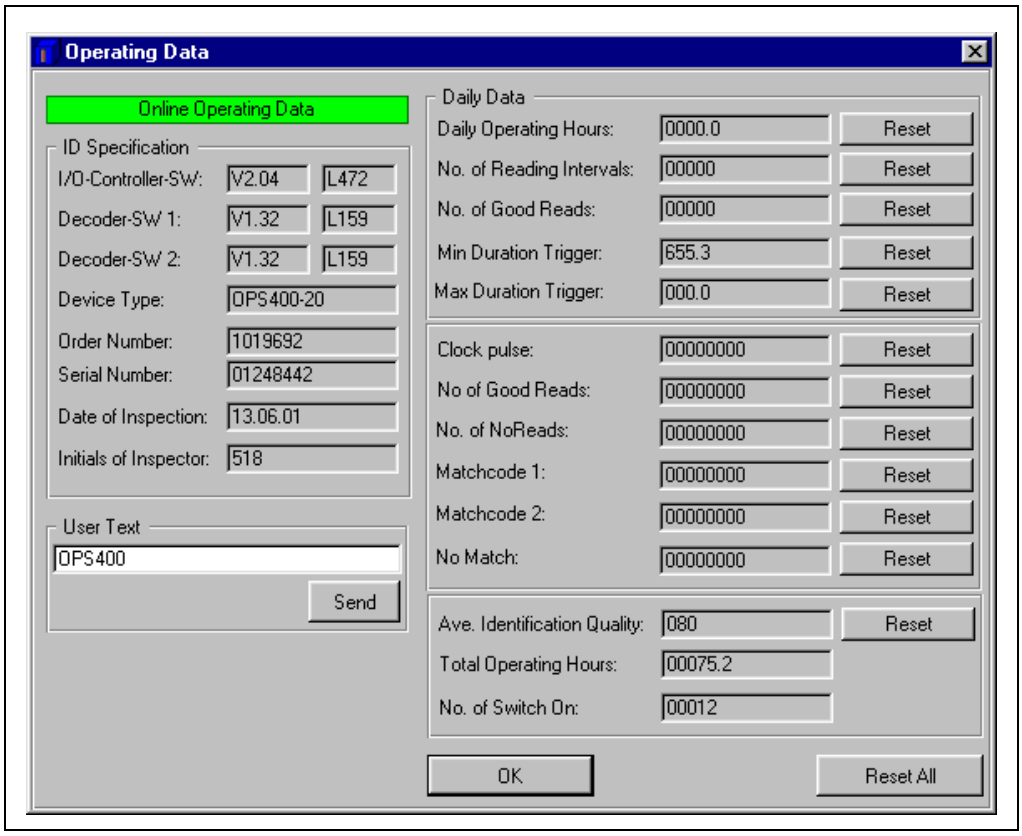


Fig. 6-8: CLV Setup: "Operating Data" dialog box

6.5.7 Monitor Host Interface

Function of the **auxiliary interface**. In this mode, the OPS400 outputs the data traffic of its host interface via the auxiliary interface. Protocol driver handshakes and protocol-specific data, such as start and stop characters, are suppressed here. Each data string is displayed on a separate line on the screen.

Mode	Direction of data	Output format	Representation on screen
"Monitor Host Interface"	OPS400 receives from host OPS400 sends to host	<STX> **I** data <CR> <LF> <ETX> <STX> **O** data <CR> <LF> <ETX>	I data O data

Table 6-18: "Monitor Host Interface" function

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

1. In the AUXILIARY INTERFACE drop-down list, select MONITOR HOST INTERFACE.
2. Perform a download to the OPS400. This is done by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
3. Confirm the dialog box by selecting the TEMPORARY save option.

The auxiliary interface then operates in "Monitor Host Interface" mode until the OPS400 is switched off again.

Displaying data traffic of host interface in Terminal Emulator

The data traffic of the host interface can be displayed in the Terminal Emulator of CLV Setup. *Fig. 6-9* shows an example of how the reading result can be output.

In order for this traffic to be displayed in the "Tracking" reading mode (default setting), reading must be successful with the conveyor running so that the OPS400 receives increment signals for calculating the end of the reading pulse.

If the data traffic is to be displayed for text purposes without movement of the object, it is necessary to switch to the "No Tracking" reading mode (Start/Stop mode).

1. Select the DEVICE CONFIGURATION tab.
2. Click the TRACKING PARAMETERS button.
   The TRACKING PARAMETERS dialog box is then displayed.
3. Select the option NO TRACKING ACTIVE, OUTPUT AT END OF READING GATE in the OPERATING MODE group.
4. Close the dialog box with OK.
5. Click the READING PARAMETERS button.
   The READING PARAMETERS dialog box is displayed.
6. Select the option SERIAL INTERFACE from the drop-down list in the READING TRIGGER SOURCE group.
7. Close the dialog box with OK.
8. Perform a download to the OPS400. This is done by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
9. 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.
10. Click in the toolbar.
    The Terminal Emulator dialog box is then displayed.
    The OPS400 is in Reading mode.
11. Click the SW-TRIGGER ON button or press [F7].
    The red scan lines then appear.

12. Present the bar code sample from *Fig. 6-1, Page 6-3*.
13. Click the SW-TRIGGER OFF button or press [F8].
    The OPS400 outputs the reading result in the Terminal Emulator.
    Example: "00123412345".

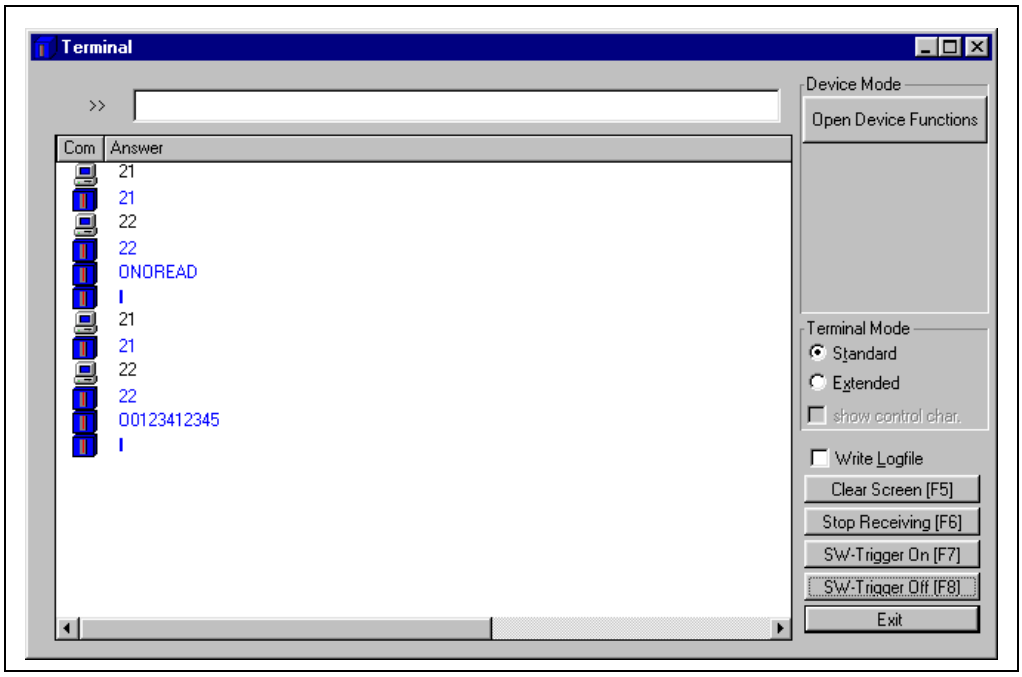


Fig. 6-9: CLV Setup: Reading result of the host interface in the Terminal Emulator

Note Large amounts of data received at high speeds via the host interface and high data transfer rates may cause the flow of host interface traffic to no longer be completely displayed on the auxiliary interface (display "… ").
This is caused by the slower data transfer speed of the auxiliary interface (9,600 bps).

In the default setting, the OPS400 sends the following in the data output string of the host interface:

- On Good Read: Data content of one bar code
- On No Read: Character string "NOREAD"

The "Header", "Code-Info/Separator", "Splitter" und "Terminator" blocks 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 (letters, digits, control characters) and/or reading diagnosis data, can be entered in the "Header", "Code-Info/Separator", "Splitter" und "Terminator" blocks.
- Up to 5 elements, consisting of constants (letters, digits, control characters) can be entered in the "Splitter" blocks.
- The position of the "Code-Info/Separator" block can be choosen before or after the code

1. Select the DATA STRINGS tab.
2. Click the HEADER drop-down list.
   The dialog box 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 "Code-Info/Separator", "Splitter" und "Terminator" blocks.
6. Perform a download to the OPS400. This is done by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
7. Confirm the dialog box by selecting the PERMANENT save option.
   The OPS400 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 **auxiliary interface**. In this mode, the OPS400 accepts a bar code entered at the auxiliary 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 thus be corrected by transmitting missing bar codes subsequently.

Chapter 10.7.1 Auxiliary input via the auxiliary interface, Page 10-25 describes this function and the associated procedure in greater detail.

6.5.9 Code statistics for RDT400

Function of the **auxiliary interface**. The OPS400 outputs a data string with statistic information of the reading situation in this mode. For an exact description of the functions and applications of the Remote Diagnostic Tools RDT400, see the RDT400 operating instructions (no. 8009385).

"Code statistics for RDT400" is activated via the AUXILIARY INTERFACE tab.

1. Select the Code Statistics option for RDT400 on the AUXILIARY INTERFACE tab.
2. Perform a download to the OPS400. This is done by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
3. Confirm the dialog box by selecting the TEMPORARY save option.

The auxiliary interface then operates in "Code statistics for RDT400" mode until the OPS400 is switched off again.

6.5.10 I/O monitor in increment trigger

Function of the **auxiliary interface**. In this mode, CLV Setup displays the conditions of the various switching inputs/outputs of the OPS400 and any data transfer over the host interface. This is done in a dialog box and is time-independent of the increment trigger. Increment signals to the switching input "INC 1" of the OPS400 in the "Tracking" reading mode are required here. The display is continuous; the monitored signals are recorded. After the monitor is called up, the display is started by the next data output from the OPS400.

The display function in CLV Setup can be used for troubleshooting when starting up or when malfunctions occur during operation, as it supplies a convenient overview of the system condition at each moment. The function itself has no effect on the OPS400, apart from the temporary change of the auxiliary interface operating mode.

The inputs, outputs and direction of data transfer which is to be monitored can be selected. The display sequence of the signals in the plot diagram can be changed. Up to 15 signals can be displayed one under the other at the same time. The contents of the data output or data reception of the host interface is displayed separately without protocol characters in two output fields. The effected signal selection/sequence remains until CLV Setup is ended so that the monitor can be called up again without needing to be reconfigured.

Configuring and calling up I/O monitor for display

1. In the menu bar, select TOOLS, DIAGNOSIS, I/O MONITORING.
   The SIGNAL CHOICE dialog box is then displayed (*Fig. 6-10*).
2. Select the desired input, output or data transfer direction for each selection (entry) on the left side in one of the drop-down lists.

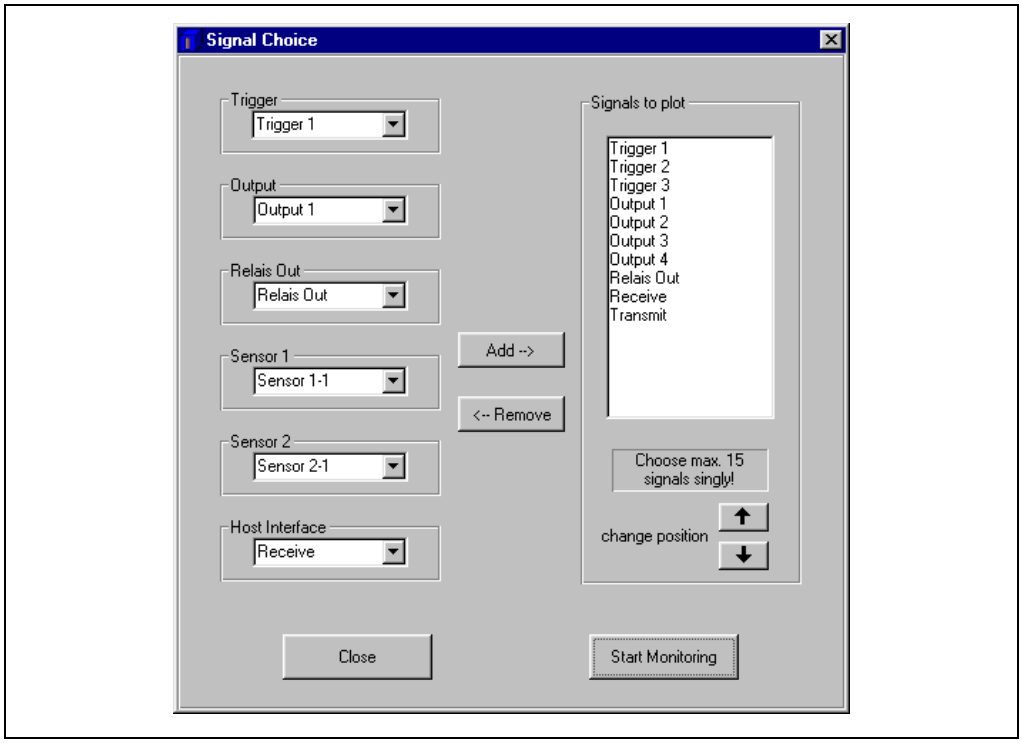


Fig. 6-10: CLV Setup: Selection of the signals to be displayed in I/O Monitoring

3. Click the ADD button.
   The previously selected entry appears at the end of the list in the SIGNALS TO PLOT field to the right.
4. Repeat for other entries. A signal cannot be selected twice.

5. If necessary, delete undesired inputs, outputs or a data transfer direction from the list. Select the relevant entry and click the REMOVE button. Several entries can be chosen selectively by holding down the [CTRL] key and selecting with the left mouse button. A block selection is done by holding down the [SHIFT] key and selecting with the left mouse button.
6. After configuration is complete, click START MONITORING.
   CLV Setup begins with the display of the switching statuses/data output in the I/O MONITORING dialog box as soon as data is output from the OPS400. An example is shown in *Fig. 6-11*.

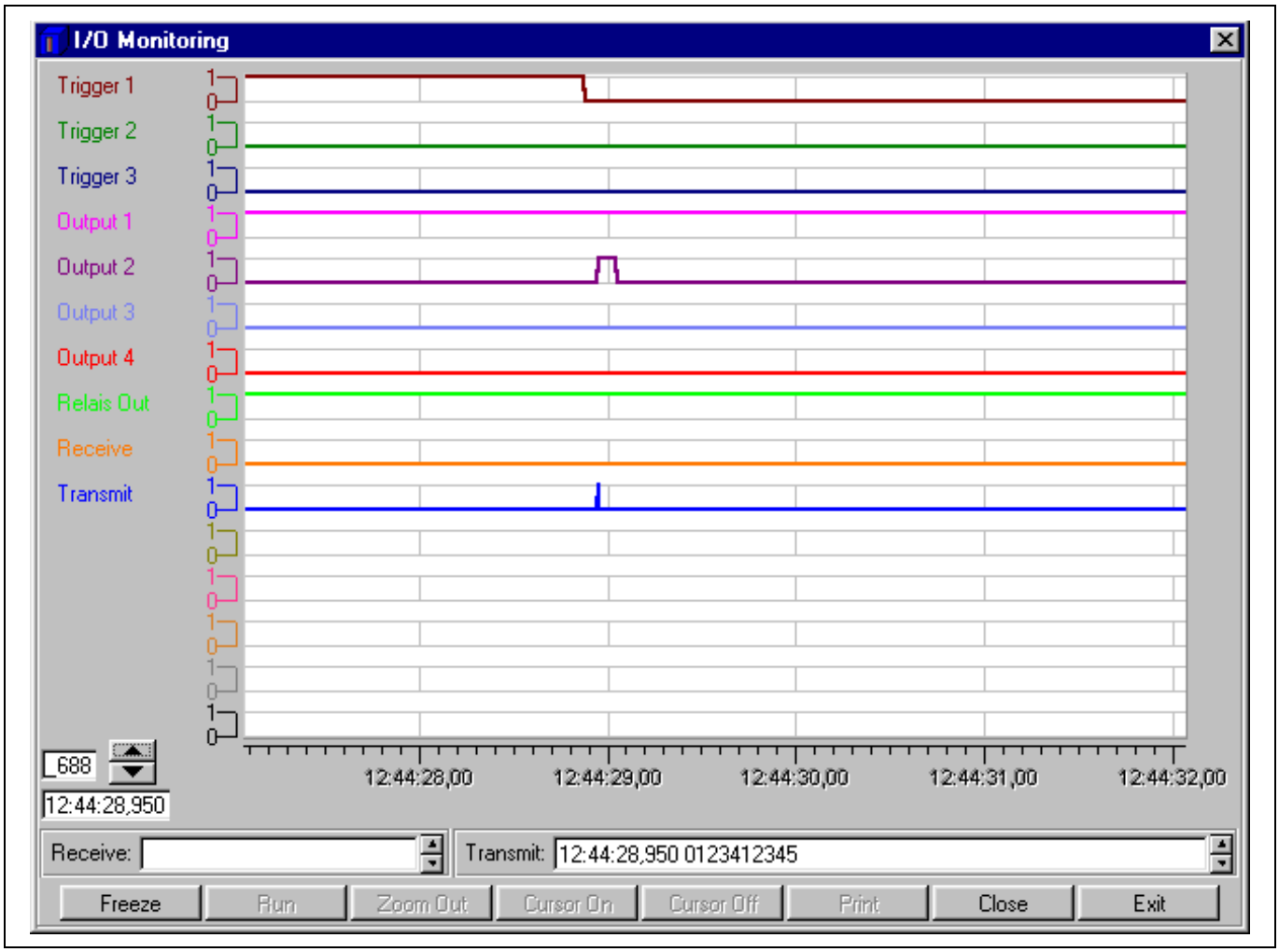


Fig. 6-11: CLV Setup: Example of output in the "I/O Monitoring" dialog box

7. To cancel the display, click CLOSE in the I/O MONITORING dialog box and exit the SIGNAL CHOICE dialog box by clicking CLOSE.

   – or –

   Click EXIT in the I/O MONITORING dialog box.

CLV Setup resets the operating mode of the auxiliary interface to its original function. This also applies when the SIGNAL CHOICE dialog box is exited with CLOSE without having started the I/O Monitor.

a) RUN mode

After opening, the dialog box automatically displays the switching conditions (high, low; relay: ON, OFF), their result-dependent changes and the data communication of the host interface as a marker in the plot diagram. This is done continuously. The selected signals and potentials (1 = high, 0 = low) are listed on the y axis, and the current time down to the 10 ms is listed on the x axis. When the recording reaches the right edge of the window, the screen is scrolled to the right 30 %.

The current increment status is located on the bottom, left-hand side next to the arrow buttons. The time stamp of the last time at which an event occurred is located below this. In the RECEIVE output field, CLV Setup displays the contents of the data string which was last received via the host interface by the OPS400. A time stamp is displayed next to this. The TRANSMIT output field identifies the contents of the data string which was last sent by the OPS400. A time stamp is displayed next to this. Other functions are not possible in this mode of just the display.

b) STOP mode

This mode is used for the selective display and printing of events and measurement.

➢ Click the STOP button.
CLV Setup cancels the continuous display in the plot diagram and the fields, but continues to record in the background.
A small table for displaying measured values appears.

Scrolling through events

A scroll bar will appear to allow scrolling to previous events in the plot diagram which are not visible in the display. The large arrow buttons on the bottom, left-hand side also enable scrolling through the events (down arrow: backward in time, up arrow: forward in time). The arrows next to both output fields control the display of data strings.

Zooming in on area of plot diagram

Using the XY cursor, selected areas of the plot diagram can be enlarged (zoomed in).

1. Click the CURSOR ON button.
The XY cursor appears.
2. Position the XY cursor anywhere in the plot diagram and, holding down the left mouse button, drag the cursor to form a rectangle containing the area to be enlarged.
3. Release the mouse button.
The selected area is enlarged and adjusted to fit the dialog box. In addition, a vertical scroll bar appears on the right side of the dialog box. A section can be enlarged with up to six levels of magnification. The signal names remain unchanged; the colors can be used to differentiate between the conditions in the plot diagram.
4. To reduce the zoom factor to the output level, click the ZOOM OUT button as many times as is needed.
5. Click the CURSOR OFF button to hide the XY cursor.

Calling up a specific event and accompanying data

Clicking the left mouse button in the plot diagram causes CLV Setup to display the event which is closest to the x position of the cursor in all output fields (exception: measured value table). This allows the accompanying data of a data string to be called up selectively to the Receive or Transmit output field. The time and increment status of a rising or falling signal edge can be called up as well.

If the mouse pointer is located directly between two events when clicked, the event which occurred first is displayed.

Measuring increment status and time differential in plot diagram

Using the measured value table which appears, measurements can be made within the visible range of the plot diagram. Two measurement cursors are available for this purpose. They are activated/deactivated with the right mouse button.

1. Place the mouse pointer over the plot diagram and press the right mouse button.
   The first measurement cursor appears.
2. Place the measurement cursor on an edge of one of the signals.
   The corresponding time and the increment status of the first event are displayed in the output fields INCREMENT 1 and TIME 1 of the table.
3. Press the right mouse button again.
   The second measurement cursor appears.
4. Place the measuring cursor to the right of the first measuring cursor on an edge of the same signal or of another angle which you are interested in.
   The corresponding time and the increment status of the second event are displayed in the output fields INCREMENT 2 and TIME 2 of the table.
   In addition, the time differential and the increment differential are displayed in the DELTA INC and DELTA TIME output fields.

Pressing the right mouse button again or scrolling through the display clears both measuring cursors, and the table disappears.

Placing the second measurement cursor to the left (previous point in time) of the first measurement cursor is not permitted. If this is attempted, the first measurement cursor which was set and the table contents are cleared. A cursor cannot be placed outside the visible range of the plot diagram. An event which cannot be seen can appear in the measured value table, however.

Printing contents of window

This function enables the signal conditions which were just displayed in the window to be printed out as a window with the designations of the plot diagram axes. The printout also contains the corresponding values of the increment status, time stamp, measured value table and contents of the data strings of both output fields.

1. Click the PRINT button.
   The dialog box for printing is displayed.
2. Activate the relevant entries and confirm with OK.

Returning to RUN mode

➢ Click the START button.
   CLV Setup returns to the continuous display of the signal conditions. Any enlargements of areas of the plot diagram are undone.

6.5.11 Background Analysis

In this mode, CLV Setup shows how the OPS400 interprets the distance measurement of its visual range. This function provides information on the gradient of the current detected background (current distance profile), the background which was corrected via parameterizing/Background Teach-in and the points in the distance profile focused on by the OPS400. The object distance measurement must be activated for this (default setting).

We recommend that just the background without object be viewed with the function first, and then check whether the OPS400 has correctly focused on the object after it is brought into the foreground.

➢ In the menu bar, select TOOLS, DIAGNOSIS, BACKGROUND ANALYSIS.
The BACKGROUND ANALYSIS dialog box is displayed and shows the values in the plot diagram.

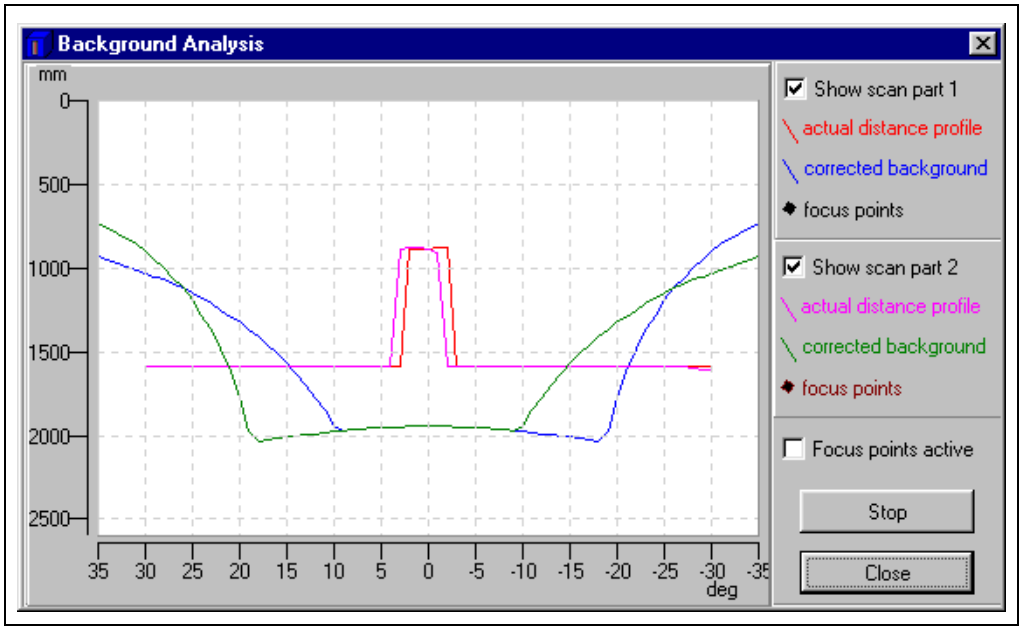


Fig. 6-12: CLV Setup: Example of output in the "Background Analysis" dialog box

Showing/hiding displayed curves

CLV Setup displays two curves (current distance profile/corrected background) in different colors for each of the two scan lines.

➢ For a better view of the curves, hide the curves of one of the scan parts (deactivate the corresponding checkbox).

Starting/Stopping updating

CLV Setup polls the OPS400 once per second for the current distance profile of the scan parts (red and purple) in order to update the display.

1. To "freeze" the curves temporarily for viewing, click the STOP button.
CLV Setup interrupts the updating process.
2. To continue, click the START button.
CLV Setup continues updating.

The curves for the corrected background (blue and green) are static and are only polled once, i.e. when the dialog box is opened.

Showing/hiding focus points

➢ To check the focusing of the OPS400, activate the FOCUS POINTS ACTIVE checkbox.
With the next update, CLV Setup displays the corresponding rhombi for the focus points over the current distance profile.

Zooming in on area of plot diagram

Any area of the plot diagram can be enlarged (zoomed in) by selecting it with the mouse (hold down the left mouse button and drag the cursor to form a rectangle). Pressing the right mouse button returns to the plot diagram at the normal output size.

6.5.12 Performing device functions of OPS400 in dialog box

CLV Setup enables a number of OPS400 functions to be executed interactively in a dialog box. 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:

- Background Teach-in/Reset (to default setting)
- Percentage Evaluation
- Show Reading Angle Limits
- Adjusting mode

➢ In the menu bar, select the desired function from TOOLS, DEVICE FUNCTIONS.
– or –
Press the [F2] key.
The DEVICE FUNCTIONS dialog box is then displayed.
Select the desired function from the EXECUTE menu.
CLV Setup starts the function and, where appropriate, prompts the user to carry out the necessary actions.

Fig. 6-13 shows an example of the dialog box that appears after "Adjusting mode" has been started.

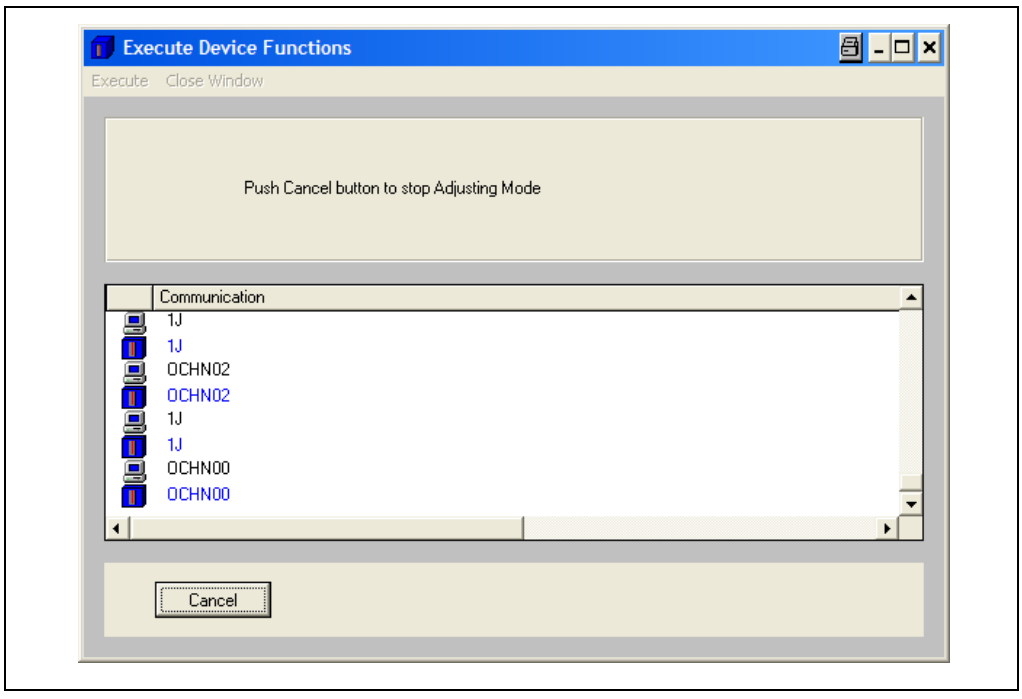


Fig. 6-13: CLV Setup: Dialog box for "Adjusting mode" execution

6.6 Messages of OPS400

The OPS400 outputs encoded system and error messages via the auxiliary interface to report user actions or events in the reading process. When the system is started, the OPS400 also outputs system messages in plain text (English). If configured accordingly, the OPS400 transfers the error status ST in the data output string of the host interface.

6.6.1 Displaying messages

In the 4th field from the left in the status bar at the bottom of the screen, CLV-Setup displays system and error messages that occur at the auxiliary interface of the OPS400. These are recorded in a file, which is continuously updated. The messages have the following format:

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

The additional system messages in plain text can be displayed in the terminal emulator if CLV-Setup and the terminal emulator are started before the OPS400 is connected.

6.6.2 System messages

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

Chapter 10.3 System messages, Page 10-12 explains the contents of the messages.

6.6.3 Error messages

Error messages indicate the following types of error:

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

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

Note To call up the most recent error to occur in the OPS400, enter command "2?SF" in the command line of the terminal emulator.

6.7 Switching off OPS400

1. If the parameter set was modified in CLV-Setup or was only stored temporarily in OPS400 via a download ("Temproray" option or via context menu (right mouse button)), the parameter set must be stored permanently in the OPS400 by choosing the PERMANENT storage option.
2. Save the parameter set as a "*.scl" configuration file in CLV Setup.
3. Switch off the power supply.

The last parameter set stored permanently in the OPS400 remains valid.

Archiving the parameter set:

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

1. Click  in the toolbar.
   The PRINT FILE dialog box is then displayed.
2. Enter a comment in the input field to assign the printout to the OPS400.
   Confirm the dialog box with OK.
   The PRINT dialog box for configuring the printer is then displayed.
3. Edit the dialog box accordingly and confirm.
   CLV Setup prints out the current configuration file in the form of a table.

7 Maintenance

7.1 Maintenance during operation

The OPS400 functions maintenance free. No maintenance required to keep this product in compliance with laser class II.

The OPS400 indicates any faults or malfunctions by outputting coded system and error messages (e. g. "CLV SYS-Failure: 081") via its auxiliary interface. The messages are displayed in the "CLV-Setup" program window in the fourth field from the left on the bottom, in the status line (see also *Chapter 8.3 Error messages, Page 8-2*). CLV-Setup logs the messages in a file.

7.2 Cleaning the OPS400

Recommendation In order to make use of the full optical reading capacity of the OPS400, the reading windows should be checked regularly (e. g. weekly) for soiling. This is especially recommended when operating the device in harsh conditions (dust, abrasion, humidity, finger prints, etc.).

7.2.1 Cleaning the reading windows

Laser beam can cause blindness!

The OPS400 uses two class 2 red-light lasers. Looking directly at the laser beam can seriously damage your eyesight.

- ➢ As with sunlight, never look directly into the laser beam.
- ➢ Switch off the device while it is being cleaned
- ➢ Do not look directly into the reading windows while the device is in operation.

Damage to the reading windows!

The reading windows are made of glass. Scratches and streaks on the windows will reduce the reading performance.

- ➢ Do not use aggressive cleaning agents.
- ➢ Do not use cleaning agents which cause increased abrasion (e. g. powder).
- ➢ Avoid cleaning motions at the reading windows which could cause scratches or abrasion.

Cleaning reading windows

Note Electrostatic charges cause dust particles to stick to the reading windows.
This effect can be combated by using anti-static SICK synthetic cleaner (no. 5600006) in combination with a SICK lens cloth (no. 4003353).

- ➢ Use a clean, soft brush to free the reading windows (*Fig. 7-1, Page 7-2*) from dust.
- ➢ If necessary, additionally clean the reading windows with a clean, damp, lint-free cloth and a mild, anti-static window cleaning fluid.

Fig. 7-1: Cleaning the reading windows

If the reading windows are scratched or damaged (cracked, broken), they must be replaced. Please contact the SICK Service.

7.2.2 Cleaning other optical surfaces

If an external reading pulse generator and/or object-height detection sensors are used (e. g. photoelectric reflex switches), further sensors with optical effective surfaces can be installed. Soiling of these surfaces can cause incorrect switching behaviour.

- In order to prevent incorrect switching behaviour, remove soiling from the optical effective surfaces of the external sensors.

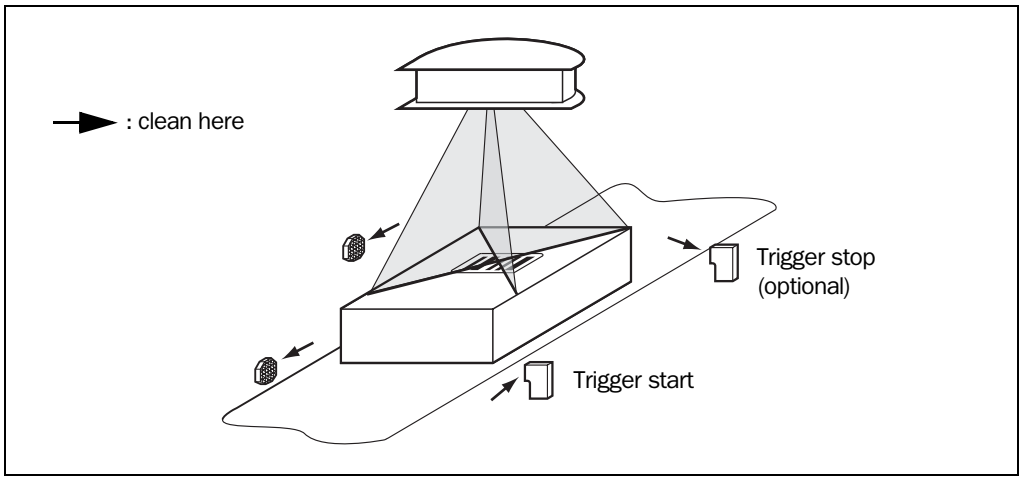


Fig. 7-2: Cleaning the external optical sensors (reading pulse sensors in this case)

7.3 Checking the incremental encoder

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

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

7.4 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 OPS400 housing.
3. Remove electronic modules.
4. Send the bottom and top aluminum sections to be recycled.
5. Send the steel plate to be recycled.
6. Dispose of the electronic modules as special-category waste.
7. Send the cables to be recycled.

At present, SICK AG does not accept any unusable or irreparable devices.

Notes:

8 Troubleshooting

8.1 Overview of errors and malfunctions which could occur

8.1.1 Installation errors

- OPS400 aligned incorrectly with object carrying bar code (e.g. masking)
- Reading pulse sensor(s) positioned incorrectly
- With event-controlled dynamic focus control: sensors for object height detection positioned incorrectly

8.1.2 Electrical connection errors

- Functional interfaces of OPS400 connected incorrectly (incremental sensor or reading pulse sensor(s) wired incorrectly)
- Host interface connected incorrectly

8.1.3 Parameterization errors

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

8.1.4 Malfunctions during operation

- Laser timeout for improperly ended reading pulse elapsed
- Device error (hardware/software)

8.2 Monitoring errors and malfunctions

The OPS400 is self-monitoring:

- While it is in operation, the OPS400 constantly monitors the laser diodes and speed of the polygonal mirror wheels. In addition, a watchdog circuit responds to error statuses. The OPS carries out a reference measurement at regular intervals. For this purpose, it switches the laser diodes on for max. 10 s each time.
- A timer automatically deactivates the laser diodes 10 minutes (default setting) after a continuous reading pulse is initiated in Reading mode with switching input pulse modes "Trigger" and "Serial Interface". The reading pulse must be terminated by resetting the pulse signal. The laser diodes are activated again by the next reading pulse.

8.3 Error messages

The OPS outputs coded error message (number combinations) via the **auxiliary interface** only. *Table 8-1* contains a list of the messages.

Displaying messages:

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

➢ Click  in the toolbar.
The Terminal Emulator is launched.

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

Message	Meaning	Possible cause	Remedy
"OPS SYS-Failure: xxx"	The OPS400 has diagnosed a system error. The "Device Ready" LED does not illuminate, or it extinguises. The OPS400 restarts the system.	Error key: 011 Data error (RAM) 012 Address error (RAM) 013 Insufficient RAM 05 Speed out of tolerance range (mirror wheel) 061 Mirror interval out of tolerance range 071 Error: laser shutter 091 to 095 Error: focus adjustment 101 to 118 Error: external parameter memory 130 Error: intensifier 131 Invalid background profile 132 Center reading angle RA 50 invalid 133 Brightness value exceeded 201 to 215 DSP error	If this system error occurs again after the OPS400 is restarted: Contact the SICK Service department.

Table 8-1: Error messages output on the auxiliary interface

8.4 Error status ST in read result of a bar code

Value	Meaning	Possible cause	Remedy
0	Good Read	–	not applicable
2	No bar code of the enabled code type found according to the evaluation criteria.	• No bar code in the reading field of the OPS400 during the reading pulse • Code type/length in the OPS400 not enabled for decoding • Reading windows obstructed/ dirty	• Synchronize the pulse of the OPS400 with the entry of a bar code into the reading area. • Correct the code configuration parameters. • Check the reading window.
3	Device fault	Device fault	Contact the SICK Service department.
5	Required number of identical multiple reads for the bar code not reached.	• Conveyor speed of the object is too high • Scanning frequency is too low • Print quality too poor	• Check the conveyor speed. • Adjust the scanning frequency. • Check the print quality.
7	The source of the reading result is the auxiliary input via the auxiliary interface.	The bar code was not detected by the reading function of the OPS400, but was entered subsequently with the auxiliary function of the auxiliary interface and sent to the host in a separate data string.	–
9	The OUTPUT FILTER function is also activated for the code comparison. The OPS400 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 OPS400 in Reading mode exceeds that specified under NUMBER OF CODES: MAXIMUM. It outputs the defined error string until the number specified under NUMBER OF CODES: MINIMUM is reached.	In a set of objects with a constant number of bar codes, one object contains more bar codes than defined in the application, for example.	The message indicates an error for such objects (e g. Test for correct sorting: mix with incorrect objects).
D	The CODE 32 evaluation option is activated for Code 39. The OPS400 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 OPS outputs the defined error string instead.	–
F	The CHECK MIN. NUMBER OF CODES function is active. The number of valid codes detected by the OPS400 in Reading mode is less than that specified under NUMBER OF CODES: MINIMUM. Instead of the code contents, it outputs the defined error string in the quantity defined under NUMBER OF CODES: MINIMUM	One object in a set of objects with a constant number of codes, for example, contains fewer codes than defined in the application.	This message is used to indicate errors on the objects (e. g. check whether objects are homogeneous: mix with incorrect objects)

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

8.5 Troubleshooting and rectification

The following are required for error rectification purposes using the tables below:

- These Operating Instructions
- Tools
- Measuring tape (up to 2 m)
- A digital measuring device (ammeter/voltmeter)
- A PC running CLV Setup
- A 3-core RS 232 data cable (null modem cable), pins 2 and 3 crossed, e. g. no. 2014054

8.5.1 General malfunctions: OPS400 not ready for operation

Malfunction	Possible cause	Remedy
The "Device Ready" LED in the connection area does not illuminate. The switching output "Output 1" (default setting: "Controller Ready") does not switch.	After switching on the power supply: • the OPS400 is not supplied with operating voltage During operation: • the OPS400 is not in the "Reading mode" operating mode • The OPS400 has deactivated the laser diode 10 minutes (default setting) after a continuous reading pulse was initiated (Pulse mode: switching input "Trigger"/ Serial Interface)	• Check wiring. • Return to Reading mode using the CLV Setup program. See *Chapter 6.5.1, Page 6-19* • Terminate reading pulse. Check the reading pulse function. Parameterize new pulses or laser timeout duration using the CLV Setup user interface (see *Table 6-7, Page 6-10*).

Table 8-3: Error rectification: Restoring operation readiness

8.5.2 Malfunctions in Reading mode: reading pulse errors

➢ Check whether the "Device Ready" LED in the connection area illuminates.
If the LED does not illuminate, follow *Table 8-3, Page 8-4* .

Malfunction	Possible cause	Remedy
1. Pulse mode: **"Switching input Trig 1"** (external sensor) The reading pulse of the OPS400 cannot be started: – the red scan lines do not appear	• The object does not pass the reading pulse sensor for trigger start with the conveyor running. • If a photoelectric switch is used as the sensor: not aligned with the reflector • Sensor not connected or connected to incorrect switching input • If sensor supplied by OPS400, no ground potential present • Incorrect reading pulse source for trigger start parameterized in OPS400	• Install reading pulse sensor in front of the OPS400 in the conveying direction. See *Chapter 10.2, Page 10-1*. • Align photoelectric switch. Check functioning. • Connect sensor to switching input "Trig 1". Check sensor wiring (*Fig. 5-2, Page 5-5*), Measure output signal of sensor • Set jumper bridge "0V - 0V1". • Check with CLV Setup: DEVICE CONFIGURATION tab, READING TRIGGER PARAMETERS button, READING TRIGGER SOURCE group: **For "Tracking" reading mode:** Is the trigger mode "TRIG 1" selected? (active high: reading pulse starts when power is supplied, active low: reading pulse starts when power is cut off) **The "No Tracking" reading mode (Start/Stop mode):** Is the trigger mode "Begin: rising edge of TRIG 1 End: falling edge of TRIG 2" or "Begin: falling edge of TRIG 1 End: rising edge of TRIG 2" selected?
2. Pulse mode: **“Serial Interface”** The reading pulse of the OPS400 cannot be started: – the red scan lines do not appear	• Incorrect reading pulse source for trigger start parameterized in OPS400 • Incorrect command used	• Check with CLV Setup: DEVICE CONFIGURATION tab, READING TRIGGER PARAMETERS button, READING TRIGGER SOURCE group: Is Serial Interface selected? • Use correct commands: Standard trigger: Start: <START> 21 <STOP> End: <START> 22 <STOP – or – defined single characters (DEVICE CONFIGURATION tab, READING TRIGGER PARAMETERS button, SERIAL INTERFACE group) **For "Tracking" reading mode:** only start command required

Table 8-4: Reading pulse error rectification

Malfunction	Possible cause	Remedy
2 Pulse mode: **“Serial Interface”** The reading pulse of the OPS400 cannot be started: – the red scan lines do not appear – *continued* –	• The OPS400 is not receiving any command strings to start the reading interval via the host interface	• Check data connection to host. • Check with CLV Setup: HOST INTERFACE tab, DATA FORMAT group: Are the correct interface type (hardware) and data format selected? INTERFACE PROTOCOL group: Are the correct start and stop characters selected? • Check the reception of command strings with CLV Setup: TERMINAL INTERFACE tab, select the MONITOR HOST INTERFACE option. See *Chapter 6.5.7, Page 6-28*. Download temporarily to the OPS400.
3. The OPS400 does not terminate the reading pulse or does so too late	• Laser timeout exceeded **For "Tracking" reading mode:** • Incorrect reading mode set in the OPS400 • Resolution of the incremental sensor in the OPS400 parameterized incorrectly • No conveyor motion (OPS400 does not receive incremental signals) • Incremental sensor not connected or connected to incorrect switching input • If incremental sensor powered by OPS400, no ground potential present	• See remedy in *Table 8-3, Page 8-4* • Check with CLV Setup: DEVICE CONFIGURATION tab, TRACKING PARAMETER button, In the OPERATING MODE group: Is "Tracking" selected? • Check with CLV Setup: INCREMENT MODE group: Is the length of the increment vector selected correctly? • Start the conveyor. • Connect incremental sensor to switching input "INC1". Check wiring (*Fig. 5-3, Page 5-6*) Check the output signal of the incremental sensor. • Set jumper bridge "0V - 0V3".

Table 8-4: Reading pulse error rectification (contd.)

Malfunction	Possible cause	Remedy
3. The OPS400 does not terminate the reading pulse or does so too late – *continued* –	**"No Tracking" reading mode (Start/Stop mode):** Pulse mode switching input "TRIG 2": • Incorrect reading mode parameterized in the OPS400	• Check with CLV Setup: DEVICE CONFIGURATION tab, TRACKING PARAMETER button, In the OPERATING MODE group: Is "No Tracking" selected?
	• The object does not pass the reading pulse sensor for trigger stop with the conveyor running.	• Install reading pulse sensor behind the OPS400 in the conveying direction. See *Chapter 10.2, Page 10-1*.
	• If a photoelectric switch is used as the sensor: not aligned with the reflector	• Align photoelectric switch. Check functioning.
	• Sensor not connected or connected to incorrect switching input	• Connect sensor to switching input "TRIG 2". Check sensor wiring (*Fig. 5-2, Page 5-5*). Measure output signal of sensor
	• If sensor powered by OPS400, no ground potential present	• Set jumper bridge "0V - 0V2".
	• Incorrect reading pulse source for trigger stop parameterized in OPS400	• See remedy under 1.
	Pulse mode "Serial Interface": • Incorrect command used	• See remedy under 2.

Table 8-4: Reading pulse error rectification (contd.)

8.5.3 Malfunctions in Reading mode: result output errors

➢ Check whether the "Device Ready" LED in the connection area illuminates.
If the LED does not illuminate, follow *Table 8-3, Page 8-4*.

For the following, the number of bar codes to be read is 1

Malfunction	Possible cause	Remedy
1. The "Read Result" LED (default setting: "Good Read") in the connection area does not illuminate when the reading pulse is ended. – switching output "Output 2" (default setting: "Good Read") is not outputting a pulse	• Reading 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, Page 8-5*
	• Scan lines positioned incorrectly	• Align OPS400. Is the bar code at the center of the scan lines? Check with CLV Setup: read quality. Call up PERCENTAGE EVALUATION for this purpose See *Chapter 6.5.2, Page 6-20*
	• Evaluation range of the scan line was incorrectly limited (Reading angle values)	• Check with CLV Setup: Select the READING CONFIGURATION tab, click the EDIT AUTO FOCUS button respectively the DISTANCE CONFIGURATION button. Are the correct min. and max. reading angle values selected? Check with SHOW READING ANGLE LIMITS. See *Chapter 6.5.5, Page 6-25*
	• Bar code presented at incorrect reading distance	• Check: Is the reading distance of the bar code within the specified reading area?
	• Module width of the presented bar code cannot be resolved by the OPS400 type used	• Present a bar code with the correct module width. See *Chapter 9, Page 9-1*
	• Event-controlled dynamic focus control: Trigger source selected incorrectly	• Check with CLV Setup: READING CONFIGURATION tab, FOCUS CONTROL group: a) Timer mode: Check timeout with respect to the reading process b) Switching inputs: Is the transfer of distance information selected correctly? Is the switching mode parameterized correctly?
	• Event-controlled dynamic focus control: Timer mode: incorrect focus position selected in distance configuration	• Check with CLV Setup: READING CONFIGURATION tab, DISTANCE CONFIGURATION button: Do the focus positions match the distances of the objects?
	• Event-controlled dynamic focus control: Switching inputs: no focus position assigned or incorrect focus position assigned	• Check with CLV Setup: DEVICE CONFIGURATION tab, SENSOR INPUT PARAMETERS button: Are the focus positions assigned?
	• The bar code is tilted excessively with respect to the scan line	• Check with CLV Setup: Select the CODE CONFIGURATION tab, then the DECODER group. Select the SMART decoder. Download to OPS400.

Table 8-5: Error rectification: result output errors

Malfunction	Possible cause	Remedy
1. The "Read Result" LED (default setting: "Good Read") in the connection area does not illuminate when the reading pulse is ended. – *continued* –	• The reading angles at which the bar code appears to the OPS400 are too large	• Check with CLV Setup: Select the CODE CONFIGURATION tab, then the DECODER group. Select Standard decoder. Download temporarily to the OPS400. Start PERCENTAGE EVALUATION, select distance configuration. Monitor reading quality (reading quality >70 %!). If necessary, realign OPS400 and/or reconfigure distance configuration. If ok, select the SMART decoder. Download to OPS400.
	• Bar code in total reflection	• Optimize alignment of OPS400. Scan lines are to strike the bar code at an angle of 15 ; this is already set on the customer side. Install OPS400 so that the bottom plate is parallel with the conveyor level. Check with CLV Setup: read quality. Start Percentage Evaluation (see *Chapter 6.5.2, Page 6-20*).
	• Evaluation criteria for bar code not set correctly	• Check with CLV Setup: Select the CODE CONFIGURATION tab, CODES group. Enable all code types; set code lengths to FREE. Download temporarily to the OPS400. Start PERCENTAGE EVALUATION. Code type and code length are displayed in Reading mode. 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 OPS400.
	• Bar code quality inadequate	• Check with CLV Setup: Are sufficient blank zones present? Is the print contrast adequate? Are the specified print tolerances exceeded? Check with CLV Setup: Select the READING CONFIGURATION tab, SEGMENTATION group. Is "Start/Stop" selected? Perform test read with a reference code in good condition.
2. The OPS400 is not transferring any reading results to the host	• Reading pulse is not functioning correctly	• See *Chapter 8.5.2, Page 8-5*
	• Wiring error in the data connection	• Check wiring with *Fig. 5-4, Page 5-7*.
	• Voltage level incorrect	• Measure voltages.
	• Host interface in OPS400 parameterized incorrectly	• Check with CLV Setup: Select the HOST INTERFACE tab, DATA FORMAT group. Are the correct interface type (hardware) and data format selected? Check settings in INTERFACE PROTOCOL group.

Table 8-5: Error rectification: result output errors (contd.)

Malfunction	Possible cause	Remedy
3. The OPS400 transfers the status ST=3 to the host in the reading result (if enabled for transfer)	• OPS400 has diagnosed a device error during the self-test	• Switch the OPS400 off and on again. If the message occurs again, contact the SICK Service department.
4. The data content of the bar code output by the OPS400 is incorrect or incomplete	• Data format of the host interface in the OPS400 is parameterized incorrectly	• Check with CLV Setup: Select HOST INTERFACE tab, DATA FORMAT group. Do the values match those on the other side?
	• The OPS400 suppresses the last character in the bar code	• Check with CLV Setup: Select the CODE CONFIGURATION tab. Click the EDIT CODES button. Select the tab for the relevant code type. Is Transmit Check Digit activated? Change if necessary. Download to OPS400.

Table 8-5: Error rectification: result output errors (contd.)

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

Check whether the "Device Ready" LED in the connection area illuminates.
If the LED does not illuminate, follow *Table 8-3, Page 8-4* .

Malfunction	Possible cause	Remedy
1. The switching outputs – "Output 1" (default setting: "Controller Ready") – "Output 2" (default setting: "Good Read") – "Output 3" (default setting: "No Read") – "Output 4" (default setting:"Match 1") – "Relay Output" (default setting: "System Ready") are not outputting any signals	• The event of the assigned function for outputting the result status does not occur during the reading process.	• not applicable
	• Incorrect switching mode parameterized in OPS400	• Check with CLV Setup: Select the DEVICE CONFIGURATION tab. Click the RESULT OUTPUT PARAMETER button. Are the outputs inadvertently set to INVERTED? Change if necessary. Download to OPS400.

Table 8-6: Error rectification: errors when outputting the result status

8.6 SICK Support

If a system error occurs repeatedly ("CLVSYS-Failure: xxx", xxx= 000 ... 215)or if you cannot correct an error using the above measures, the OPS may be defective. The OPS400 cannot be repaired by the user, meaning that it is not possible to re-establish functions after a failure. However, the OPS400 can be rapidly replaced by the user. See *Chapter 10.8 Replacing OPS400 (transferring parameter set), Page 10-29*.

➢ Please contact our local SICK office or subsidary if an error occurs which cannot be eliminated:

- The telephone numbers and email addresses are listed on the *back page* of this manual.
  For postal addresses see also **www.sick.com**.

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

Notes:

9 Technical data

9.1 Data sheet for OMNI Portal Scanner OPS400-00/-20/-60

Type	**OPS400-00** (standard density)	**OPS400-20** (high density)	**OPS400-60** (low density)
Laser diodes (wavelength)	red light (λ = 650 nm)		
MTBF of laser diodes	20,000 h		
Laser class of device	Class 2 pursuant to EN/IEC 60825-1 (for publication date, see the warning sign on the device), shutoff of laser diode after 10 min[1)]		
Focus control	Autofocus or event-controlled dynamic focus control		
No. of distance configurations	max. 8		
Focus adjustment time	≤ 20 ms (typical)		
Focus trigger source	Switching inputs "Sensor 1-1 to 1-7"/ Timer		
Useable aperture angle	max. 60 (front reading window)		
Scan/Decoder frequency	600 to 1,200 Hz		
Resolution (typical)	0.25 to 1.0 mm	0.17 to 0.4 mm	0.35 to 1.2 mm
Reading ranges	See *Page 10-2*	See *Page 10-6*	See *Page 10-10*
Bar code print contrast (PCS)	≥ 60 %		
Immunity to ambient light	2,000 lx (on bar code)		
No. of bar codes per scan	1 to 12 (standard decoder), 1 to 5 (SMART decoder)		
No. of bar codes per object	1 to 20		
No. of objects per reading field	1 to 15		
Bar code types (SMART decoder)	Code 39, Code 128, Code 93, Codabar, EAN, EAN 128, UPC, 2/5 Interleaved		
Bar code length	max. 50 characters (max. 600 characters across all bar codes per internal reading interval)		
Print ratio	2:1 to 3:1		
No. of multiple reads	1 to 99		
Visual indicators	26 x LEDs		
Reading pulse	3 switching inputs (Trigger 1, 2 and 3), software trigger (data interface)		
"Host" data interface	RS 232 or RS 422/485, variable data output format		
Data transfer rate	300 to 57,600 bd		
Protocols	SICK Standard		
Physical configurations	Standalone		
"Auxiliary" data interface	RS 232, 9,600 bd, 8 data bits, no parity, 1 stop bit, fixed output format		
Switching inputs	12 digital ("Trigger 1 to 3", "INC 1 to 2", "Sensor 1-1 to 1-7" – the conditions of all inputs are indicated visually by LEDs in the connection area – optodecoupled, $U_{in\ max}$ = +30 V, non-interchangeable		
Switching outputs	– 4 digital ("Output 1 to 4") PNP, $I_{out\ max}$ = 30 mA, short-circuit-proof, variable pulse duration (10 to 990 ms/ 100 to 9,900 ms), selectable result display function – 1 relay ("Relay out"), 24 V DC: max. 1.5 A; 250 V DC: max. 0.2 A; 250 V AC: max. 1.5 A; variable pulse duration (10 to 990 ms/100 to 9,900 ms), Selectable result display function		
Cable connection	4 x PG 9 (for cables ∅ 3.5 to 8 mm), 2 x PG 11 (4 to 10 mm)		
Operating voltage/Power consumption	85 to 264 V AC (100 to 240 V AC +10 %/–15 %, 50 to 60 Hz) /typical 30 W, max. 70 W		
Housing	Steel sheeting with aluminum top and bottom, no silicon on outer surface		
1) Default setting in Reading mode for pulse modes "Switching input Trigger 1/2" and "Serial Interface"			

Table 9-1: OPS400-00/-20/-60 technical specifications

Type	**OPS400-00** (standard density)	**OPS400-20** (high density)	**OPS400-60** (low density)
Protection class	Class 3 (pursuant to VDE 0106/IEC 1010-1)		
Enclosure rating	IP 54/Optics IP 65 (pursuant to DIN 40 050)		
EMC tested	pursuant to EN 61000-6-2 (2001-10), EN 61000-6-4 (2001-10)		
Vibration / shock tested	pursuant to IEC 68-2-6 Test FC/ pursuant to IEC 68-2-27 Test EA		
Weight	approx. 10.7 kg		
Operating/Storage temperature	0 to +40 C/ –20 to +70 C		
Max. rel. humidity	90 %, non condensing		

Table 9-1: OPS400-00/-20/-60 technical specifications (contd.)

9.2 Dimensional drawing of OPS400

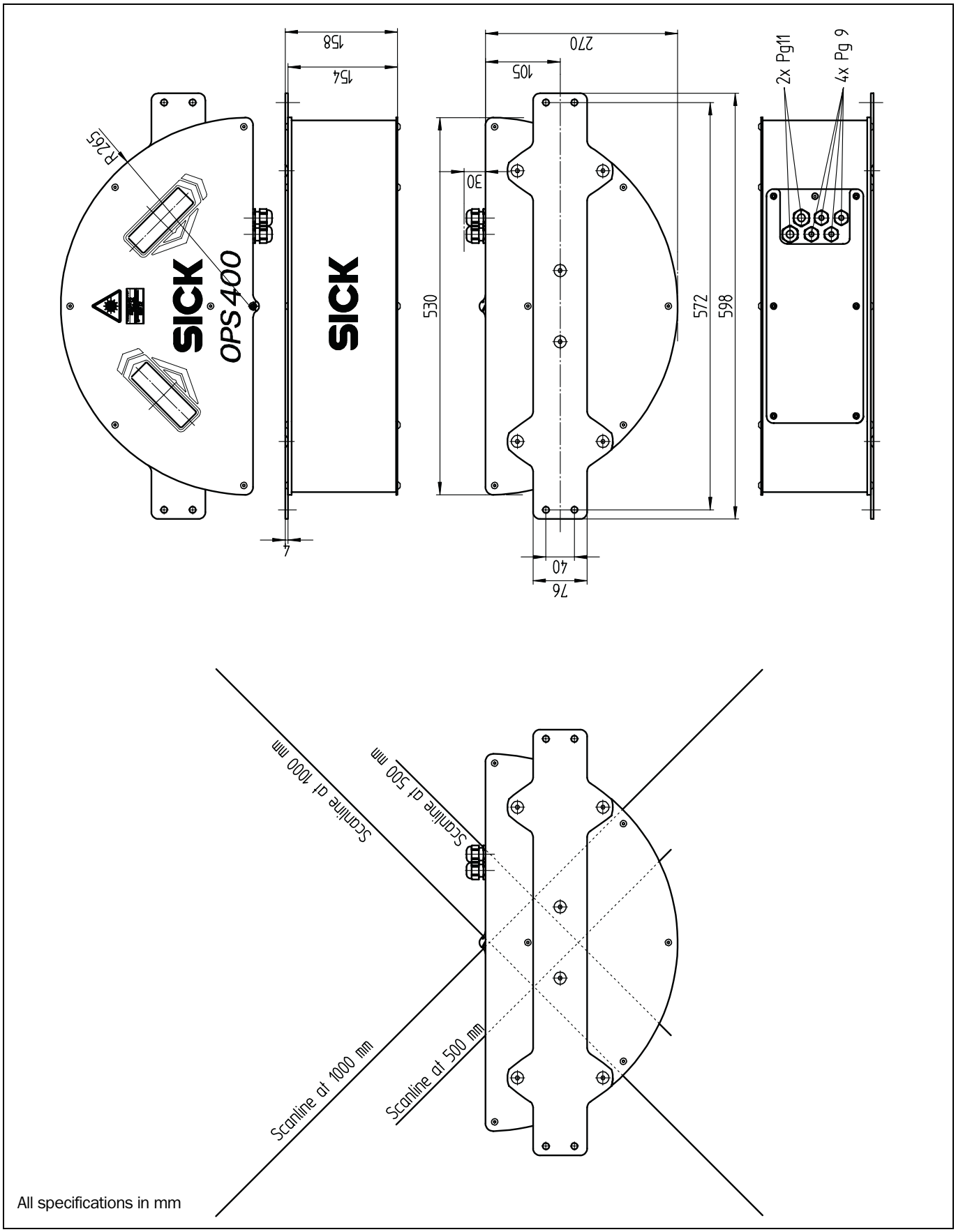


Fig. 9-1: Dimensions of the OPS400

Notes:

10 Appendix

10.1 Overview of appendices

The Appendix contains the following additional information:

- Specification diagrams
- System messages
- Installation and operating instructions for the PC-based CLV Setup program
- Calculation of parameter values for setting the OPS400
- Tables
- Special applications and procedures
- Replacing an OPS400 (transferring the parameter set)
- Ordering information
- Information on additional 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 128
Print contrast	> 90 %
Tilt	omnidirectional
Ambient light	< 2,000 lx
Good read rate	> 75 %

Table 10-1: Reading conditions for specification diagrams

10.2.2 Overview of diagrams

OPS type	Resolution	Diagram	Page
OPS400-00	standard density	Reading field height/Resolution across reading distance	*10-2*
OPS400-00	standard density	Scanning frequency characteristics	*10-2*
OPS400-00	standard density	Reading field and system dimensions: path width: 700 mm, bar width: 0.30 mm	*10-3*
OPS400-00	standard density	Reading field and system dimensions: path width: 800 mm, bar width: 0.35 mm	*10-4*
OPS400-00	standard density	Reading field and system dimensions: path width: 800 mm, bar width: 0.50 mm	*10-5*
OPS400-20	high density	Reading field height/Resolution across reading distance	*10-6*
OPS400-20	high density	Scanning frequency characteristics	*10-6*
OPS400-20	high density	Reading field and system dimensions: path width: 400 mm, bar width: 0.20 mm	*10-7*
OPS400-20	high density	Reading field and system dimensions: path width: 500 mm, bar width: 0.25 mm	*10-8*
OPS400-20	high density	Reading field and system dimensions: path width: 700 mm, bar width: 0.30 mm	*10-9*
OPS400-60	low density	Reading field height/Resolution across reading distance for 0.5 mm	*10-10*
OPS400-60	low density	Scanning frequency characteristics	*10-10*
OPS400-60	low density	Reading field and system dimensions: path width: 800 mm, bar width: 0.50 mm	*10-11*

Table 10-2: Overview of specification diagrams

10.2.3 Standard density: Reading performance data

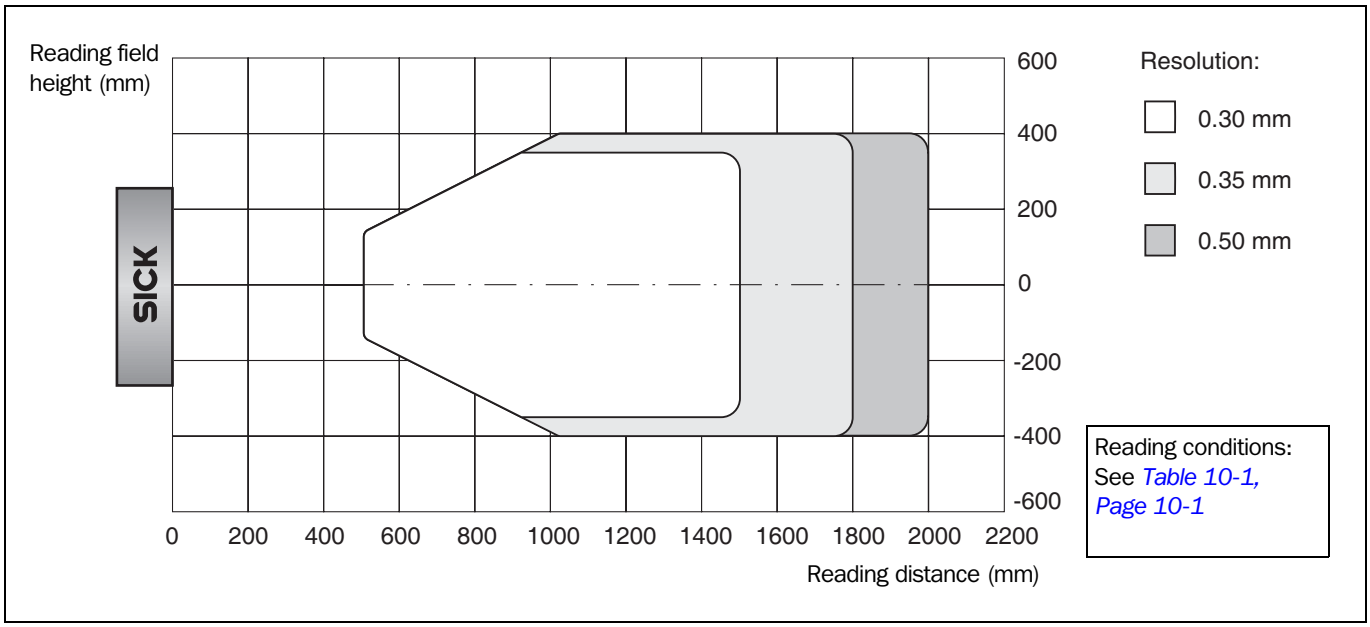


Fig. 10-1: OPS400-00 (standard density): Reading field height

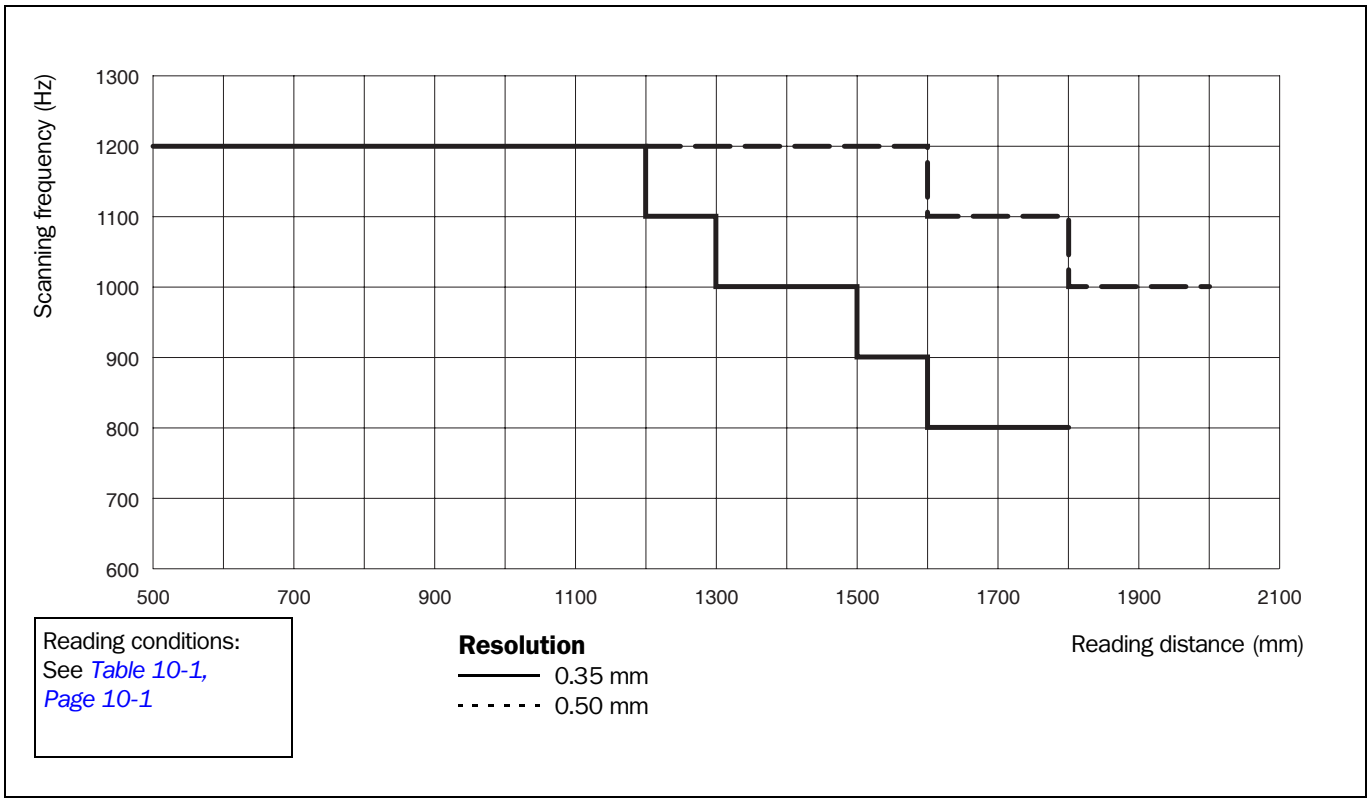


Fig. 10-2: OPS400-00 (standard density): Scanning frequency characteristics

Dimensions reading field and position - OPS400-00

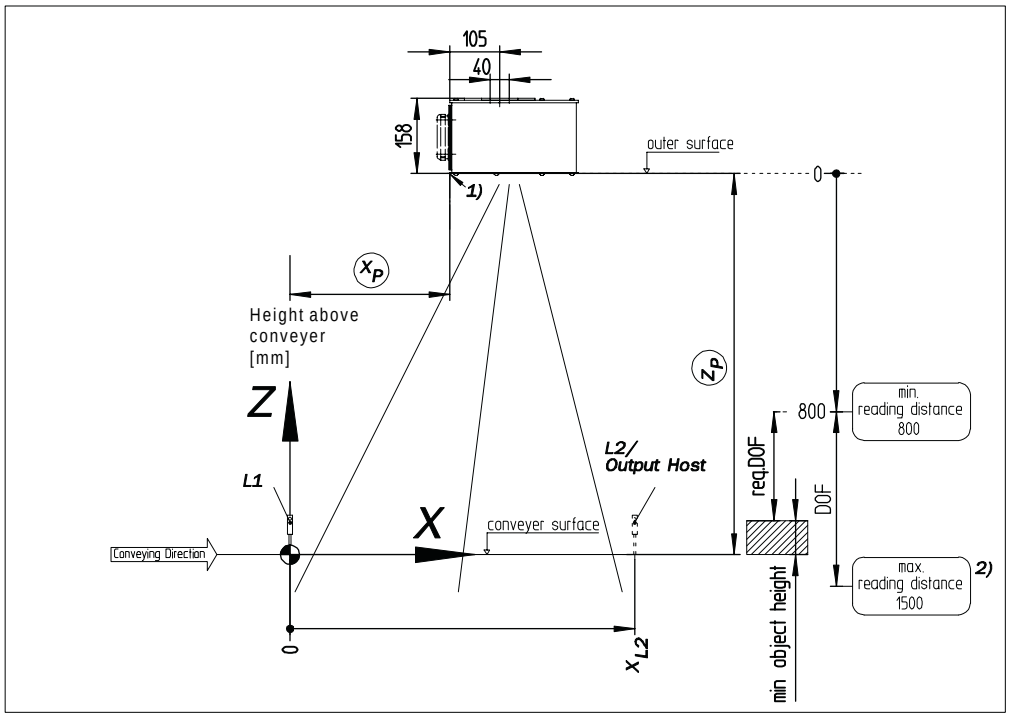
conveyer width **700 mm**

0,30

Parameter 1	Module width	0,30
Parameter 2	Conveyer width	700

min. reading distance 800

Parameter 3	required DOF (Depth Of Field)	100	200	300	400	500	600	700
Results	position light beam switch L2 X_{L2}	890	910	930	940	950	960	970
	coordinates of scanner-reference point (refering to L1) 1) X_P	430	450	460	480	490	500	510
	Y_P	350	350	350	350	350	350	350
	Z_P + min. object height	900	1000	1100	1200	1300	1400	1500



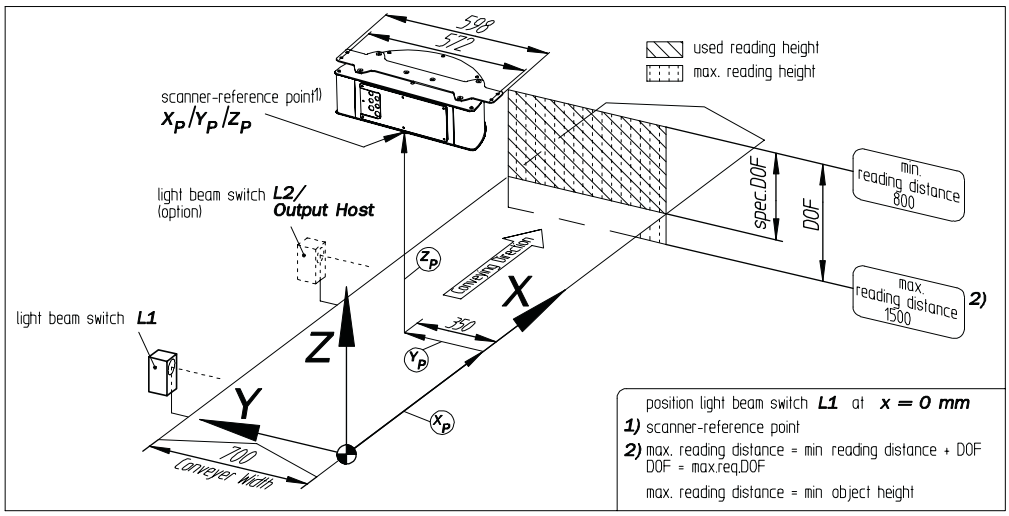


Fig. 10-3: OPS400-00 (standard density): Reading field and system measurements – path width: 700 mm/resolution: 0.30 mm

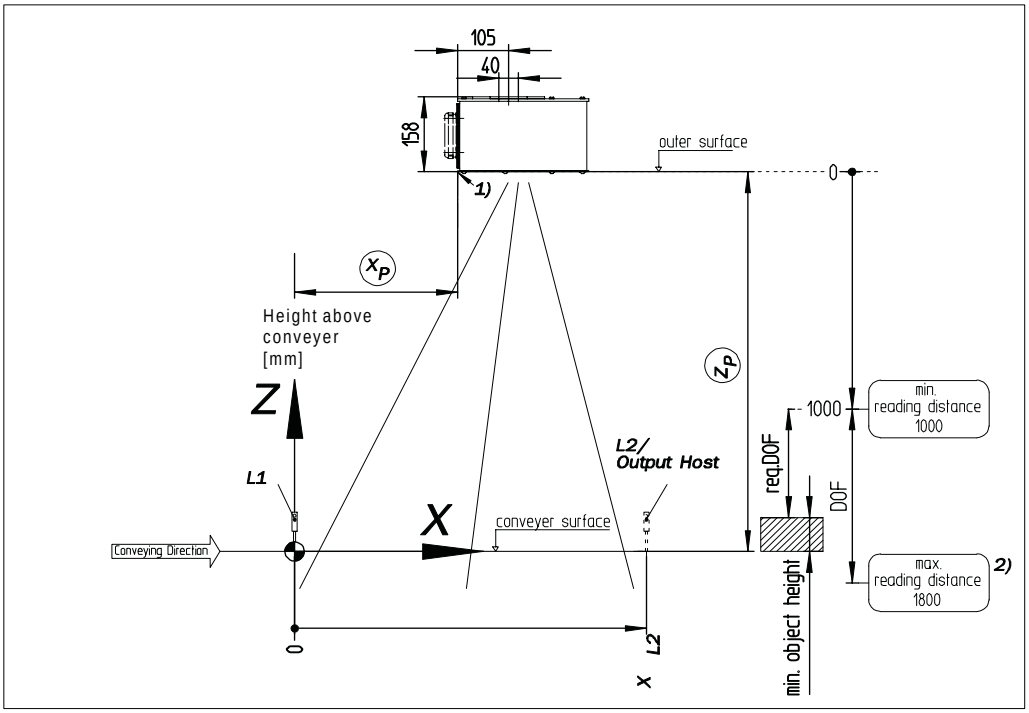
Dimensions reading field and position - OPS400-00

conveyer width ***800 mm***

0,35

Parameter 1	*Module width*	0,35	*min. reading distance* 1000
Parameter 2	*Conveyer width*	800	

Parameter 3	*required DOF (Depth Of Field)*	100	200	300	400	500	600	700	800
Results	*position light beam switch L2*	X_{L2}	1040	1050	1070	1080	1090	1100	1120	1130
	coordinates of scanner-reference point (refering to L1) 1)	X_P	530	550	560	570	580	600	610	620
		Y_P	400	400	400	400	400	400	400	400
		Z_P + min. object height	1100	1200	1300	1400	1500	1600	1700	1800



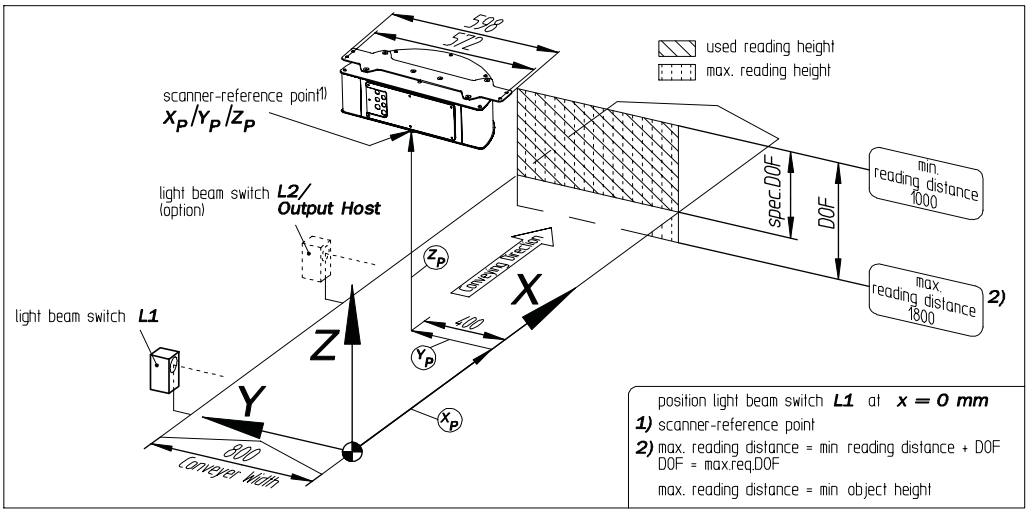


Fig. 10-4: OPS400-00 (standard density): Reading field and system measurements – path width: 800 mm/resolution: 0.35 mm

Dimensions reading field and position - OPS400-00

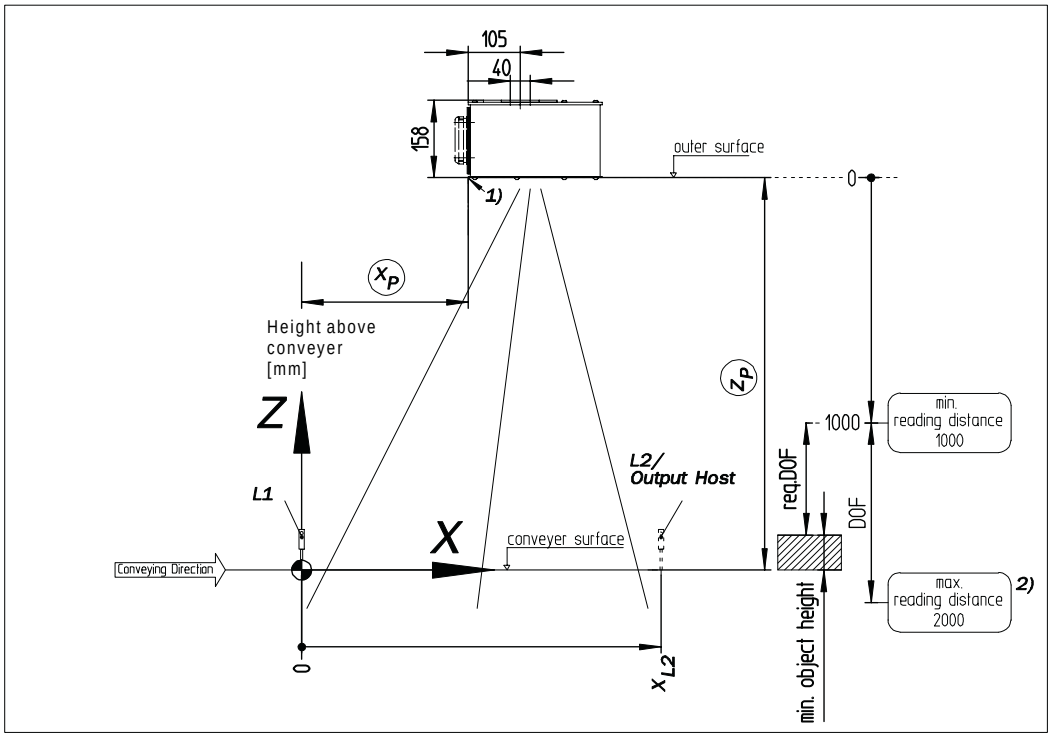
conveyer width **800 mm**

0,50

Parameter 1	Module width	0,50
Parameter 2	Conveyer width	800

min. reading distance 1000

Parameter 3	required DOF (Depth Of Field)	100	200	300	400	500	600	700	800	900	1000
Results	position light beam switch L2 X_{L2}	1030	1050	1070	1080	1090	1100	1120	1130	1140	1150
	coordinates of scanner-reference point (refering to L1) 1) X_P	530	550	560	570	580	600	610	620	630	650
	Y_P	400	400	400	400	400	400	400	400	400	400
	Z_P + min. object height	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000



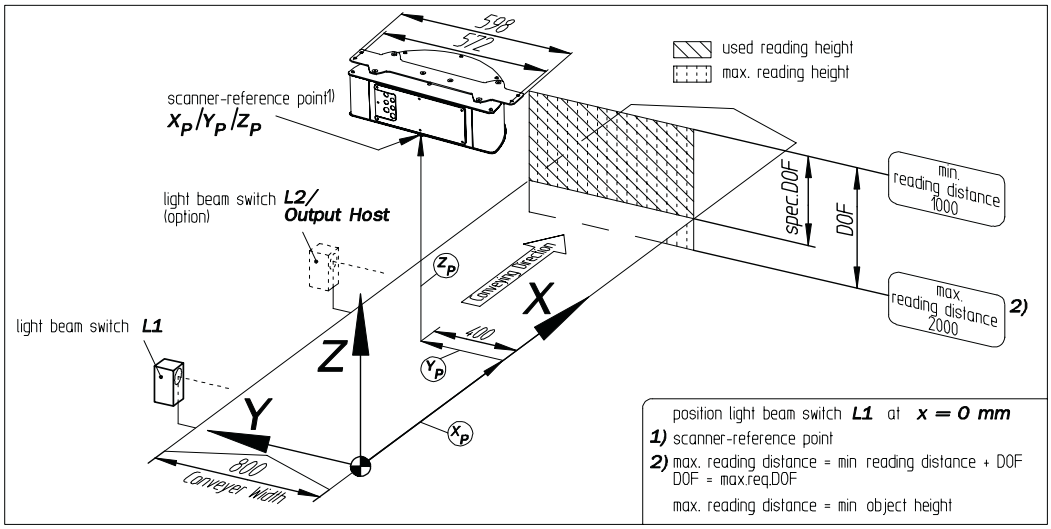


Fig. 10-5: OPS400-00 (standard density): Reading field and system measurements – path width: 800 mm/resolution: 0.50 mm

10.2.4 High density: Reading performance data

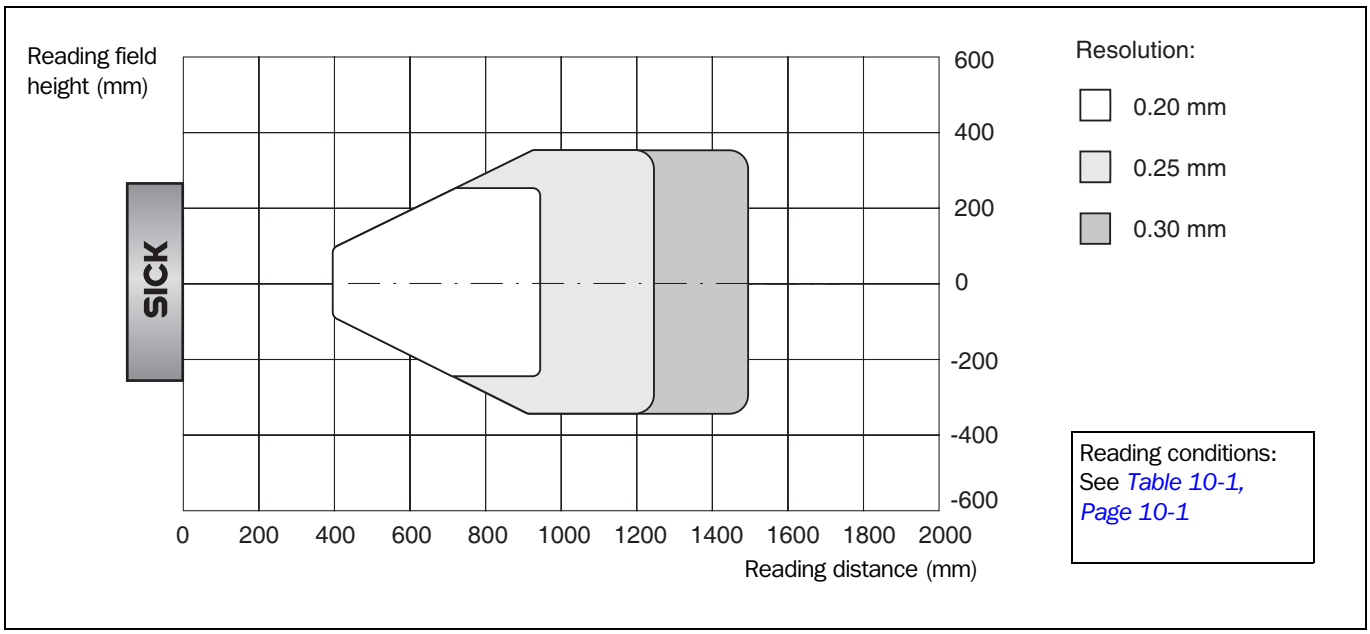


Fig. 10-6: OPS400-20 (high density): Reading field height

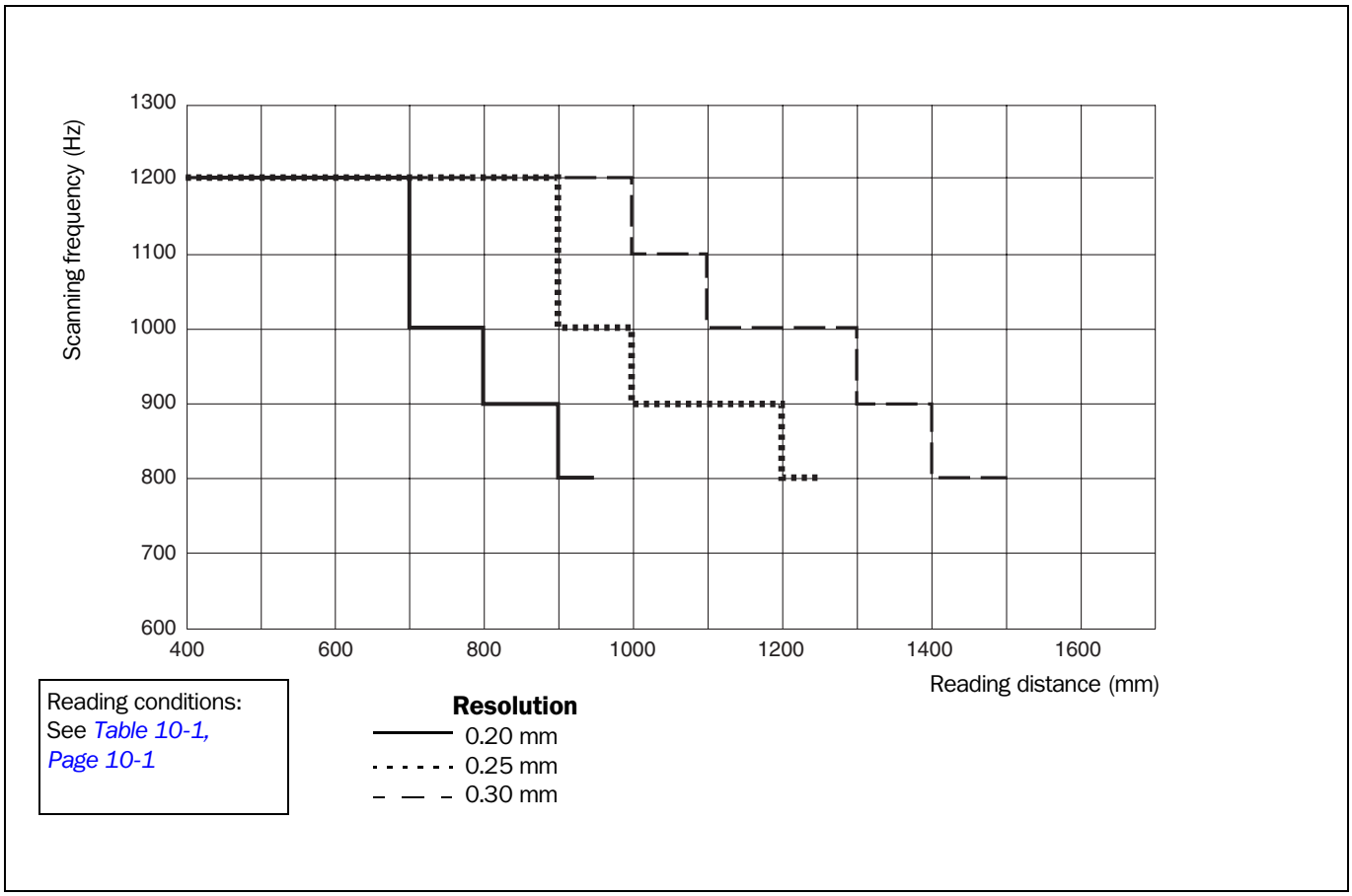


Fig. 10-7: OPS400-20 (high density): Scanning frequency characteristics

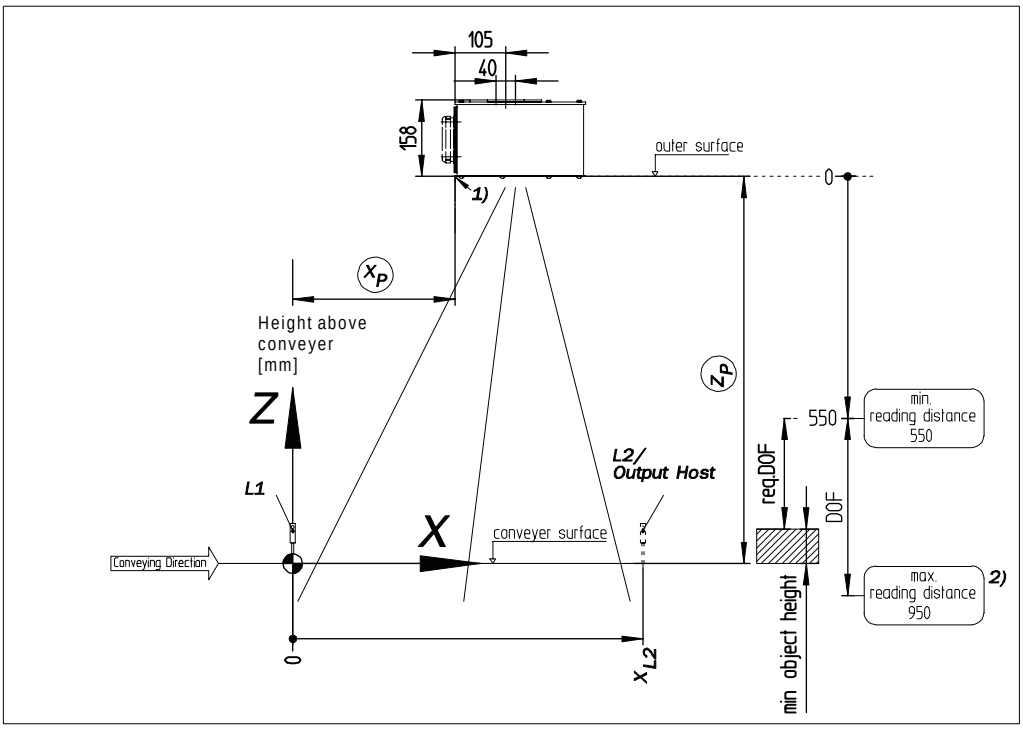
Dimensions reading field and position - OPS400-20

conveyer width ***400 mm***

0,20

Parameter 1	*Module width*	*0,20*	*min. reading distance* 550
Parameter 2	*Conveyer width*	*400*	

Parameter 3	*required DOF (Depth Of Field)*		*100*	*200*	*300*	*400*
Results	*position light beam switch L2*	X_{L2}	710	760	790	830
	coordinates of scanner-reference point (refering to L1) *1)*	X_P	310	340	380	410
		Y_P	200	200	200	200
		Z_P + min. object height	650	750	850	950



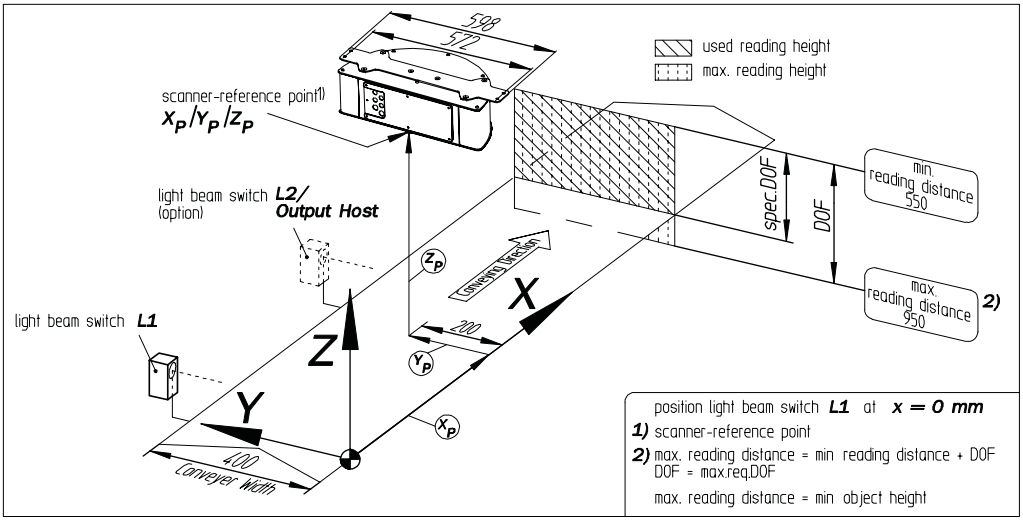


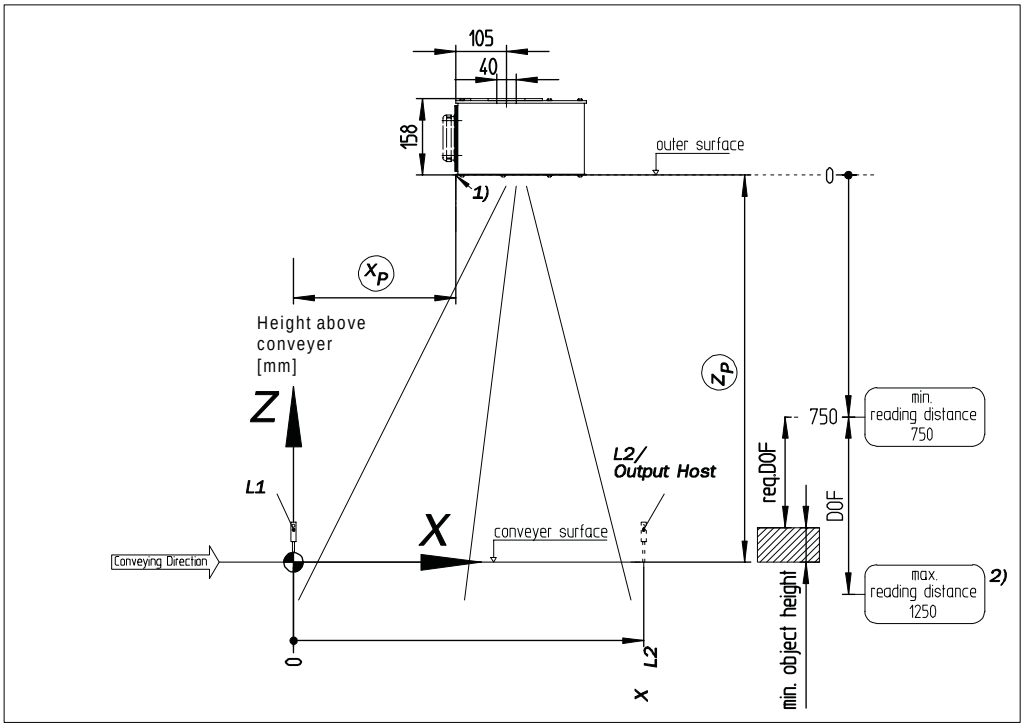
Fig. 10-8: OPS400-20 (high density): Reading field and system measurements – path width: 400 mm/resolution: 0.20 mm

Dimensions reading field and position - OPS400-20

conveyer width **500 mm**

0,25

Parameter 1	Module width	0,25	min. reading distance 750				
Parameter 2	Conveyer width	500					
Parameter 3	required DOF (Depth Of Field)		100	200	300	400	500
Results	position light beam switch L2	X_{L2}	880	910	930	940	950
	coordinates of scanner-reference point (refering to L1) 1)	X_P	410	440	460	470	480
		Y_P	250	250	250	250	250
		Z_P + min. object height	850	950	1050	1150	1250



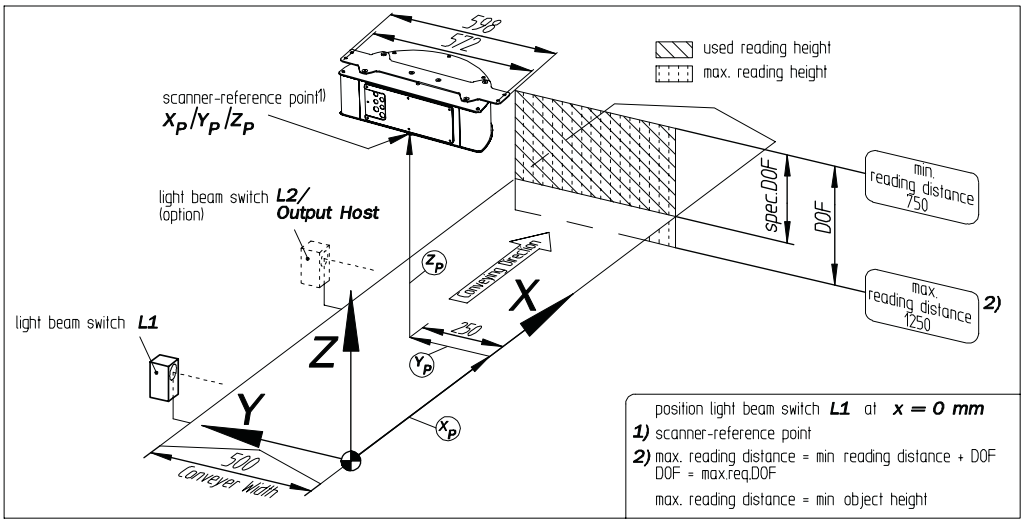


Fig. 10-9: OPS400-20 (high density): Reading field and system measurements – path width: 500 mm/resolution: 0.25 mm

Dimensions reading field and position - OPS400-20

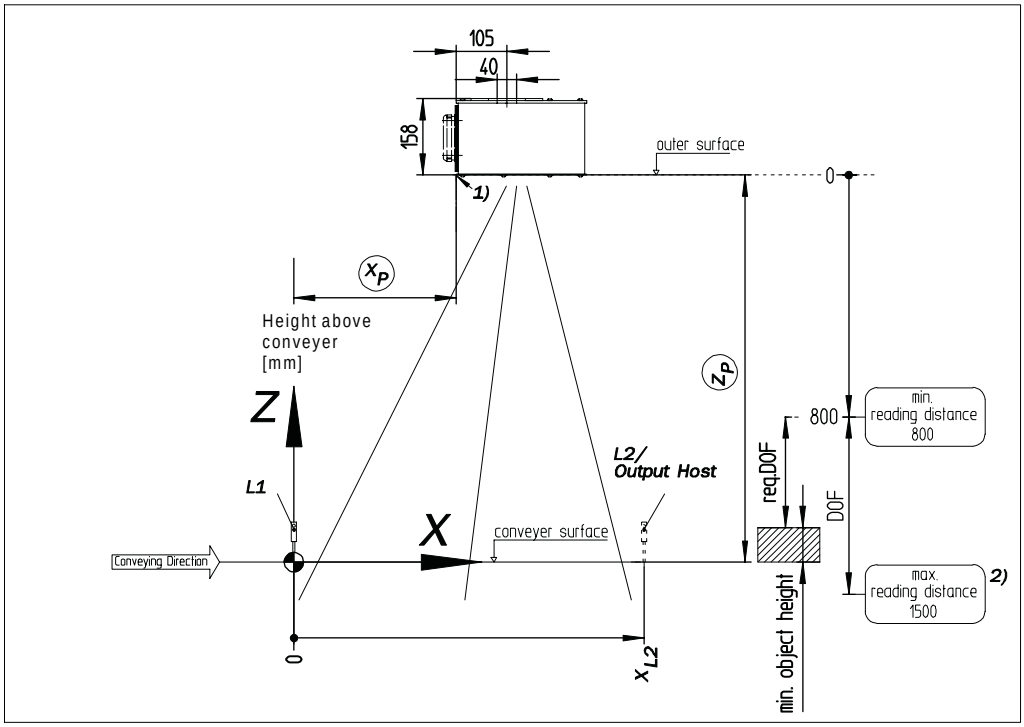
conveyer width **700 mm**

0,30

Parameter 1	Module width	0,30
Parameter 2	Conveyer width	700

min. reading distance 800

Parameter 3	required DOF (Depth Of Field)	100	200	300	400	500	600	700
Results	position light beam switch L2 X_{L2}	890	910	930	940	950	960	970
	coordinates of scanner-reference point (refering to L1) 1) X_P	430	450	460	480	490	500	510
	Y_P	350	350	350	350	350	350	350
	Z_P + min. object height	900	1000	1100	1200	1300	1400	1500



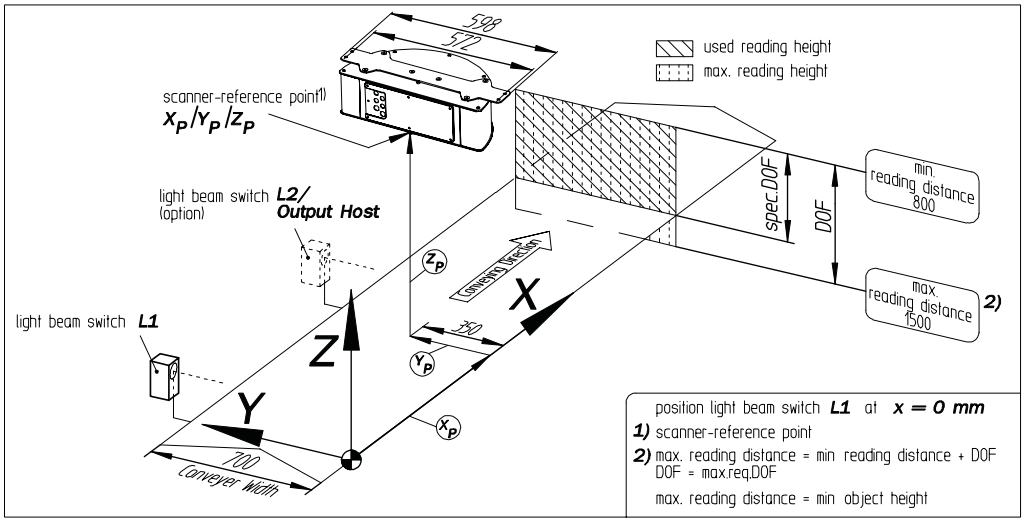


Fig. 10-10: OPS400-20 (high density): Reading field and system measurements – path width: 700 mm/resolution: 0.30 mm

10.2.5 Low density: Reading performance data

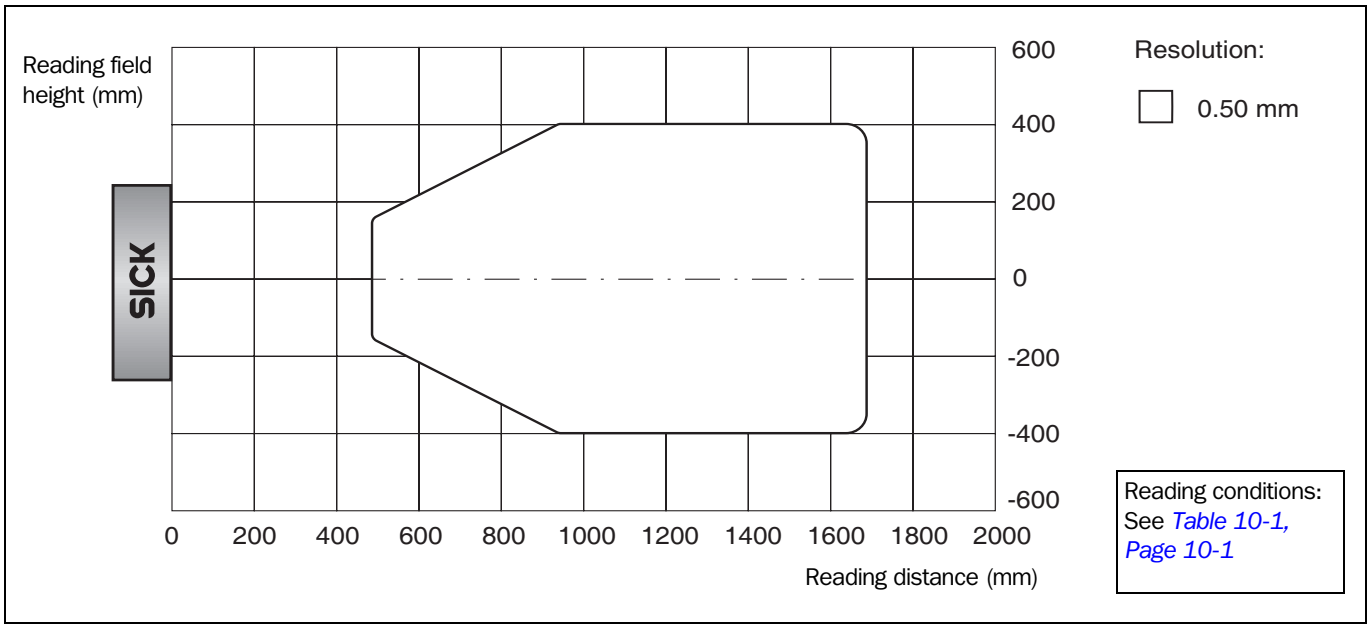


Fig. 10-11: OPS400-60 (low density): Reading field height

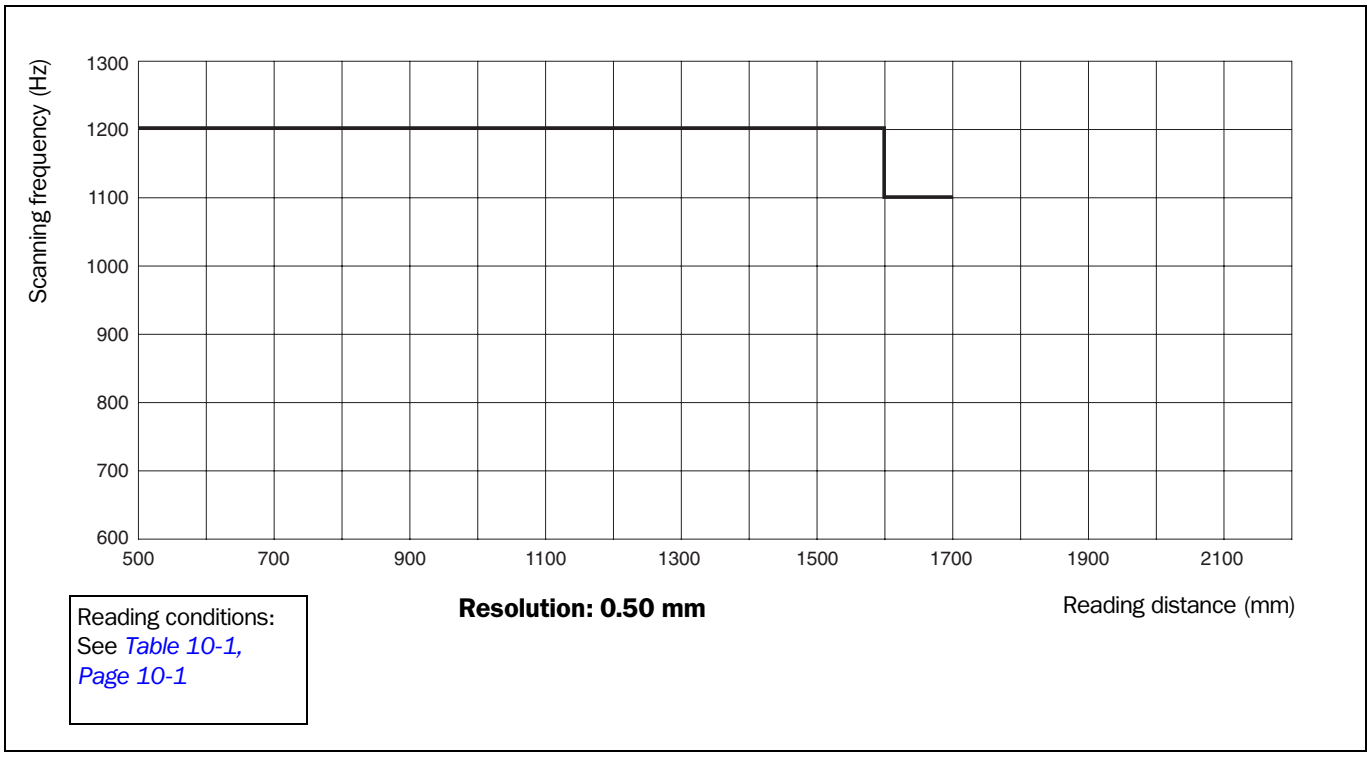


Fig. 10-12: OPS400-60 (low density): Scanning frequency characteristics

Dimensions reading field and position - OPS400-60

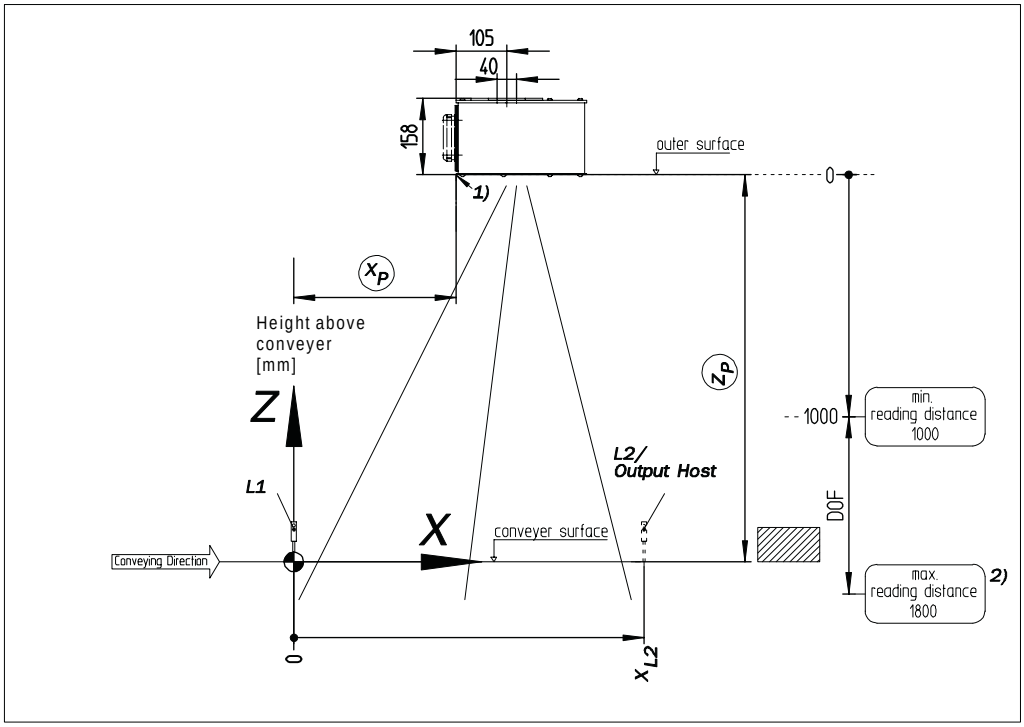
conveyer width **800 mm**

0,50

Parameter 1	Module width	0,50
Parameter 2	Conveyer width	800

min. reading distance 1000

Parameter 3	required DOF (Depth Of Field)		100	200	300	400	500	600	700	800
Results	position light beam switch L2	X_{L2}	1030	1050	1070	1080	1090	1100	1120	1130
	coordinates of scanner-reference point (refering to L1) 1)	X_P	530	550	560	570	580	600	610	620
		Y_P	400	400	400	400	400	400	400	400
		Z_P + min. object height	1100	1200	1300	1400	1500	1600	1700	1800



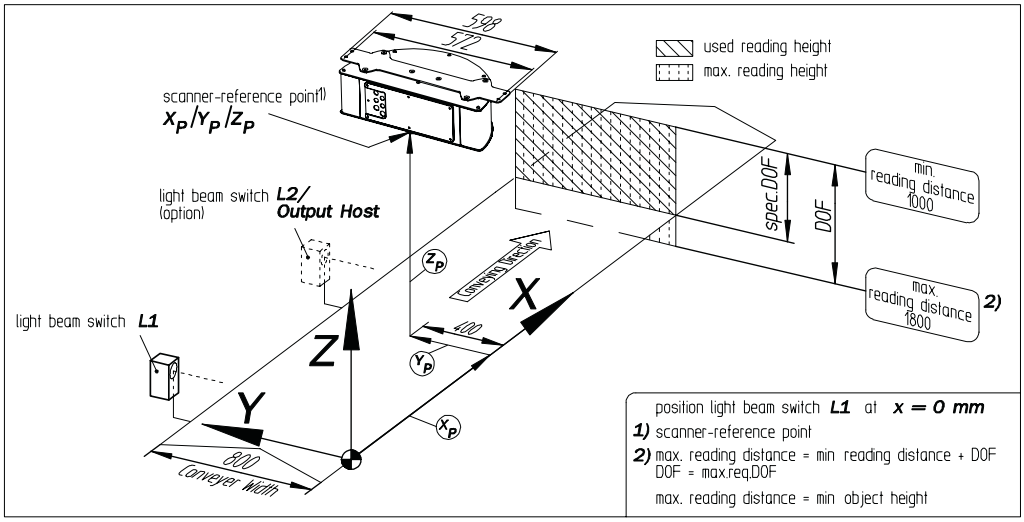


Fig. 10-13: OPS400-60 (low density): Reading field and system measurements – path width: 800 mm/resolution: 0.50 mm

10.3 System messages

The OPS outputs all system messages in plain text on the auxiliary interface. The messages are in English and can be displayed in the Terminal Emulator in the "CLV-Setup" program.

See *Chapter 6.6.1 Displaying messages, Page 6-37*.

Message	Meaning
"OTC 400 start up..... OTC 400 Soft.Vers. V2.04 Aend. Nr. L472 Built Jun 19 2001 (09:31:02) Host: RS 422/485 OTC 400"	The software version and revision are displayed when the power supply is switched on.
"internal parameters loaded"	When starting up the OPS400: the OPS400 loads the parameter set which was last saved (permanently) to its internal EEPROM to memory (RAM).
"laser safety timeout"	The OPS400 has deactivated the laser diode 10 minutes (default setting) after a continuous reading pulse was initiated. The reading pulse is still active, even though the OPS400 is no longer reading. The reading pulse interval is to be terminated by resetting the pulse signal. The laser diode is activated again with the next reading pulse.
"no code!"	In Reading/Parameter Evaluation mode, the OPS400 indicates that no bar codes matching the parameterized evaluation conditions were detected during the reading interval. (error status ST=2 output via the host interface, if enabled)

Table 10-3: OPS400 system messages

10.4 Installing and operating CLV Setup

The scope of delivery of the OPS400 includes a CD-ROM ("Manuals & Software") containing the "CLV-Setup" program. The software can be installed on a PC with the following minimum configuration: Pentium II processor, 350 MHz, and 64 MB RAM, CD drive, serial interface and mouse (recommended) as well as an operating system Windows 95™ /98™, Windows NT™, Windows 2000™ or Windows XP™.
Approximately 25 MB of hard disk space is required to install CLV-Setup (V 4.10) and CLV Assistant, approximately 20 MB to install CLV-Setup Help (V 4.10).

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

10.4.1 Preparations for installation

1. Make sure you have the CD-ROM ("Manuals & Software") at hand.
2. Connect the PC to the auxiliary interface on the OPS400 using a 3-core RS 232 data cable (null modem cable).
   See *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
3. Switch on the power supply to the OPS400.
   The OPS400 starts up. The "Device Ready" LED in the connection area illuminates.
4. Switch on your PC and start Windows.

10.4.2 Installing software

The "CLV-Setup" installation program creates a directory "CLV", a series of subdirectories, and the necessary links. A deinstaller is also installed automatically so that you can remove the program from the PC at any time. As of version V 2.6, CLV-Setup will only be available and further developed as a 32-bit application.

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

Initial installation

1. Shut down all the applications running in Windows.
2. Insert the CD-ROM into the CD-ROM drive.
3. If the auto run function is enabled, the start page (table of contents) of the CD-ROM is automatically displayed in the your browser.
4. Select the SOFTWARE folder on top left.
5. Select CLV, ICR, OPS SETUP SOFTWARE in the listing.
   A table with CLV-Setup information is displayed.
6. Select DOWNLOAD under SOFTWARE FILE.
7. In the FILE DOWNLOAD dialog box select the option to install directly from the CD-ROM. Confirm with OK. The software is automatically saved in the “Programs\CLV“ directory on your hard disk.
   – or –
   Select the option to save the software locally on your local hard disk and confirm with OK.
   In the FILE DOWNLOAD dialog box select the desired target directory on your hard disk. The “CLVSetupxx.exe“ file is then saved at this location (xx = version number).
   Select OPEN in the dialog box to start the file.
8. The installation program starts and guides you through the installation with screen

messages. The program asks you for your user name and company name. This information appears as a header in printouts. “CLV-Setup“ and CLV Assistant are installed. The software will be entried in the Windows start menu under “Programs\CLV-Setup“.

9. Please read the Readme file, as it contains the latest information and problems regarding CLV-Setup.
10. Then confirm the final installation message by clicking “OK.

CLV-Setup Help (Online):

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

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

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

Updating program

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

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

Installing new version and retaining old version

If you want to install the new version and still keep the old version of CLV-Setup, follow the procedure described under *Initial installation.* When the program asks you for the target directory, you must specify a **new directory.** Both versions of the software are then available but must not be started simultaneously.
The configuration files "*.scl " (scanner configuration), "*.npj" (network project), "*.opj" (OTS project) or "*.rpj" (redundant OTS project) of the old version can be used in the new version and contain the OPS400 parameter sets as well as project data if serveal scanners had been organized logically by projects. In order to do so, copy the configuration files from the "data" directory of the old version to the "data" directory of the new version.

Installing new version over old version

Before you can install the new version of the software, you must remove the files of the old version – with the exception of the configuration files "*.scl " (scanner configuration), "*.npj" (network project), "*.opj" (OTS project) or "*.rpj" (redundant OTS project). They contain the OPS400 parameter sets as well as project data if serveal scanners had been organized logically by projects.

The uninstaller of the old version removes the program files. 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, select PROGRAMS and the uninstaller for CLV Setup. The uninstaller starts and guides you step by step through the uninstall procedure.
2. Select the uninstall method (complete or custom).
3. Install the new version of CLV Setup as described under *Initial installation.* Select the same directory.

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

10.4.3 Starting CLV Setup

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

Communication	COM 1, 9,600 bd, 8 data bits, 1 stop bit, no parity
Transmit control character	Start: STX, Stop: ETX
Receive control character	Start: STX, Stop: ETX
Unit of measure	metric (depending on the selected installation)
Browser	I-ViewPro™ (if installed) or 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 OPS400 automatically	at startup: yes upon scanner selection: yes when the Terminal Emulator is started/closed: yes
Initial screen	yes
Storage confirmation prompt	yes
Last type selected	CLV41x
File storage location	"data" (configuration files for OPS400)

Table 10-4: Default settings in CLV Setup

1. Switch on your PC and start Windows.
2. Select CLV SETUP from the Start menu.
   The SICK logo is then followed by the initial screen.
3. Confirm the initial screen with "OK".
   CLV Setup then checks whether an OPS400 is connected to the **COM 1** port on the PC and whether the communication parameters of the PC match those of the OPS400. If this is the case, the CONNECTED status is displayed with the OPS400 specification on the bottom, right-hand side in the status bar. The detected device type (in this case, the OPS400) is displayed on the top, right-hand side in the toolbar in the DEVICE drop-down list.

The software then loads the internal device description of the OPS400 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 OPS400. This is displayed on the tabs instead of the default settings.

You can edit the current parameter set on the tabs. At initial startup, the values correspond to the default settings of the OPS400 in CLV Setup.

Troubleshooting

If CLV Setup cannot establish communication, it displays NO CONNECTION in the status field on the bottom, right-hand side. There are two possible causes for this. The OPS400 is not connected or the communication parameters of the OPS400 do not match those of the PC. In this case, CLV Setup enters the scanner type of the device it last communicated with in the DEVICE drop-down list in the toolbar. The default setting is CLV41x the first time CLV Setup is started. The software then loads the internal device description for this type and the default settings of the parameter values from its database and displays these on the tabs.

1. Connect the PC to the auxiliary interface (port) of the OPS400 using a 3-core RS 232 data cable (null modem cable). See *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
2. Click (AutoBaud detect) in the toolbar – or – select OPTIONS and AUTOBAUD DETECT or press [F8].
   CLV Setup scans the serial interface by varying the communication parameters and sends a telegram to the OPS400 repeatedly. As soon as a reply from the OPS400 is detected, CLV Setup conveys the values found for the communication parameters. *Fig. 10-14* 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 OPS400 type in a separate dialog box and asks you whether you want to upload the current parameter set from the OPS400.
4. Confirm the dialog box with "Yes".
   CLV Setup then uploads the current parameter set from the memory (RAM) of the OPS400 to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

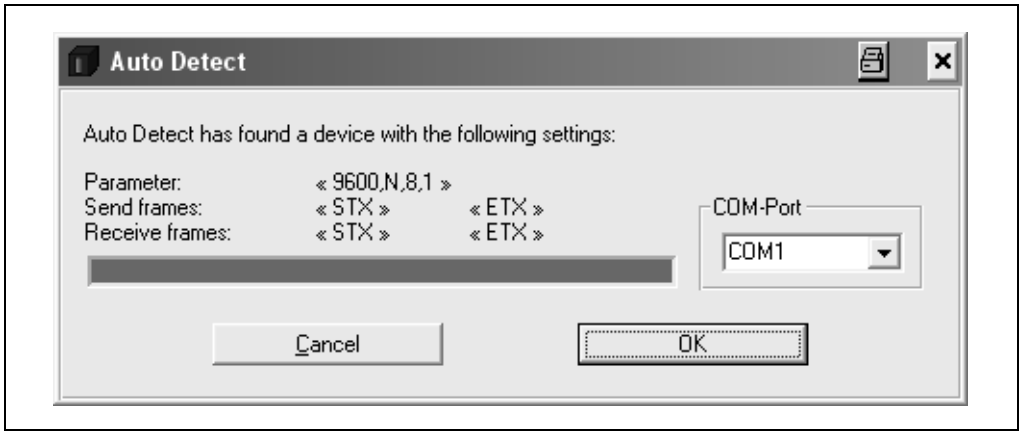


Fig. 10-14: CLV Setup: Results of the AutoBaud detect function

– or –

1. Connect the PC to the auxiliary interface (port) of the OPS400 using a 3-core RS 232 data cable (null modem cable). See *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
2. Select OPTIONS, then SERIAL INTERFACE from the menu bar.
   CLV Setup displays the current communication parameter settings of the PC in the COM PARAMETERS dialog box.
3. Ensure that the communication parameters of the PC and OPS400 are identical **(connected COM port, 9,600 bd, 8 data bits, 1 stop bit, no parity).**
4. Confirm the dialog box with "OK".
   CLV Setup attempts to communicate with the OPS400 again.
   If it is successful, it displays CONNECTED in the status bar on the bottom, right-hand side.
5. Click in the toolbar.
   CLV Setup then uploads the current parameter set from the memory (RAM) of the OPS400 to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

10.4.4 User interface

The graphical user interface (GUI) of the CLV-Setup is largely self explanatory. The online CLV-Setup Help function provides a description of how to use the program under HELP TO CLV-SETUP in the help navigation tree. The GUI is shown in *Fig. 10-15*.

The program window of the GUI comprises the following elements:

- Title bar that displays the program name, current configuration file, and its status (e. g. "No File")
- Menu bar with pull-down menus
- Toolbar with buttons for triggering various functions
- Drop-down list (top right) for selecting the device type
- Frame for displaying the navigation tree of the tabs (on left-hand side)
- Frame for displaying the tabs for OPS400 (Reading Configuration, Device Configuration, etc.) (on right-hand side). The numbers of displayed tabs depends on the selected items in the navigation tree on the left side. The parameters on the tabs are grouped according to their function. Some of these parameters open further dialog boxes

Status bar (bottom) with two display fields for the communication between CLV-Setup and the OPS, the PC's interface parameter display, error display field (system errors), device specification field and status display for the connection to the OPS400.

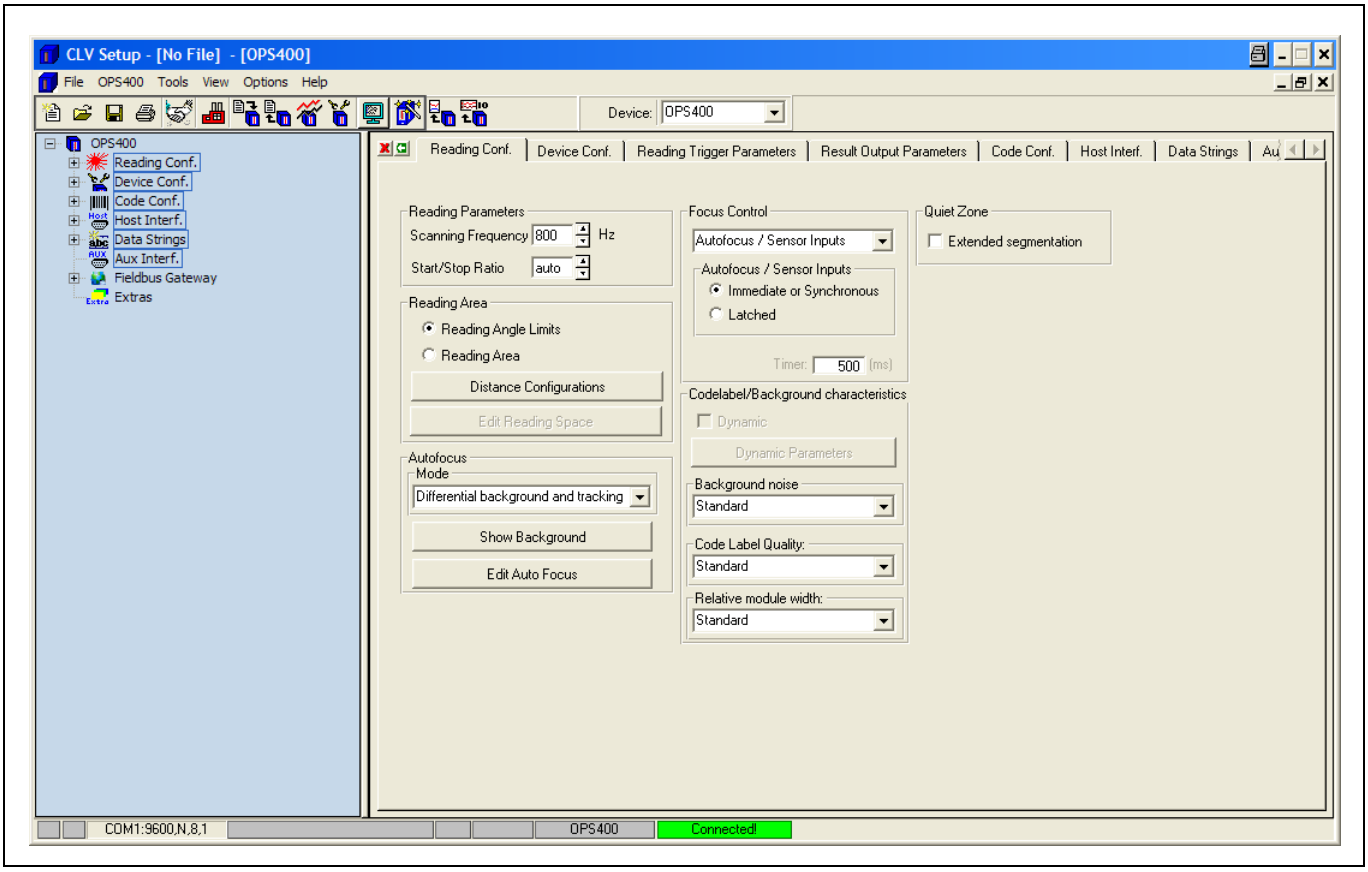


Fig. 10-15: User interface of the CLV Setup software

10.4.5 Functions

The "CLV-Setup" program (from version V 4.0) features the following functions to carry out:

- Uploading the default parameter set from the database of CLV-Setup
- Automatic communication attempt with the OPS400 when the program is started
- Automatic software compatibility check in the OPS400
- Uploading and displaying parameter set stored in the OPS400
- Changing the parameter/parameter values on the tabs
- Downloading the changes to the parameter set in the OPS400
- Saving the changes to the parameter set as a configuration file "*.scl"
- CLV Assistant for simplified parameterization (not for OPS400)
- Printing the configuration files
- Exporting the configuration files in RTF format
- Exporting the command strings contained in the profile bar codes in ASCII format
- Printing the parameter set in the form of profile bar codes (not for OPS400)
- Online access to the OPS400 via a Terminal Emulator (select operating mode, start operating functions, log file for communication between the OPS400 and CLV-Setup, extended Terminal mode, e. g. for displaying OPS400 messages)
- AutoBaud Detect for automatic communication setup with the OPS400
- Selecting the COM port of the PC for adapting the data transfer parameters
- Monitoring the data communication of the CLV host interface
- Selecting language setting
- Selecting units of measure
- Displaying the last 10 configuration files that were processed
- Saving the device type that was selected last
- Automatic storage confirmation prompt when changes are made to the configuration file
- Wizards for individual functions
- OPS400 only: Background analysis
- OPS400 only: I/O monitoring
- Setting switches for starting the program (in the "CLVmain.ini" file)
- Hot keys [F keys] for important functions (using the program without a mouse)
- Starting program with SCL file as argument
- Macro player for recording and playing a macro file
- Context-sensitive help via the [F1] key

10.4.6 Hot keys

[F1] Start "CLV-Setup Help“ online

[F2] Open dialog box to execute device functions

[F3] Upload complete set of parameters from OPS400

[F4] Download complete set of parameters to OPS400

[F5] Open configuration file

[F6] Save configuration file

[F7] Load default setting of OPS400 from CLV-Setup database

[F8] Start AutoBaud Detect

[F9] Load operating data from OPS400 to be displayed and reset

[F10] Open Terminal Emulator

10.4.7 Opening and closing tabs

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

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

In the navigation tree:

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

In the frame for displaying tabs:

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

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

10.4.8 Online help program CLV Setup Help

The procedure for setting the OPS400 parameters is supported by the online help function, which is displayed in an HTML browser, such as Internet Explorer™. You can call up context-sensitive help on each parameter as well as a description of its function.

1. Press the [F1] key.
   The browser is launched automatically and displays the help topic.
2. If the program cannot find a browser, it asks you to specify the storage location on the hard disk.
   Enter the name of the executable file and the path in the dialog box.
3. Use the [ALT]+[TAB] keys to switch between the CLV-Setup and CLV-Setup Help applications and prevent several browser windows from being opened.
4. To display an overview of the Help function, Choose HELP, CONTENTS from the CLV-Setup menu bar.
5. In the left-hand frame click on the desired entry in the navigation tree.
   CLV-Setup Help then displays the associated help text in the right-hand frame and jumps to the parameter heading.

10.4.9 Transferring parameter sets between CLV Setup and OPS400

See *Chapter 6.4.1 Configuring OPS400 with user interface of CLV Setup, Page 6-4*.

10.4.10 Unknown parameters

Uploading from OPS400

If the CLV Setup program does not recognize the parameters or parameter values of the OPS400 transferred during the upload, it outputs a warning message. Unknown parameters/values can result from the following, for example: The OPS400 is a special device or the version of CLV Setup is older than the software of the OPS400. CLV Setup displays the unknown parameters in the window on the EXTRAS tab. They are displayed as command strings. 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 OPS400.

Downloading to OPS400

If the OPS400 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 OPS400, and it contains new parameters/values arising from the continued development of this OPS400 type. The effected OPS400 contains an older software version which does not recognize these parameters/values, however.

We recommend that you check the effects of warnings in the OPS400 as follows:

1. Check whether the OPS400 functions correctly after the parameter set is downloaded.
2. Click  in the toolbar.
   CLV Setup loads the default settings from the database.
3. Click  in the toolbar.
   CLV Setup uploads the problem parameter set from the OPS400.
4. Click  in the toolbar.
   CLV Setup prints out the parameter set used up to now when you confirm the dialog box.
5. Open the previous configuration file "*.scl" for the OPS400.
6. Click  in the toolbar.
   CLV Setup prints out the parameter set used up to now 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 OPS400 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.

10.4.11 Recording log file in Terminal Emulator

The Terminal Emulator can log the communication between CLV Setup and the OPS400. CLV Setup stores the data transmitted in both directions with the following identifiers:

--> PC: OPS400 transmitting to CLV Setup

PC -->: OPS400 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 radio button to 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 thecheckbox in front of the WRITE LOGFILE radio button again or close the Terminal Emulator.

10.4.12 Starting CLV Setup with an INI file as an argument

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

Example:

"CLVmain32.exe**data**\Satz 1_OPS400.scl /INIuser.ini"

CLV Setup is launched with the initialization data contained in the "user.ini" file and immediately loads the configuration file "Satz1_OPS400.scl" from the "data" directory. The "user.ini" file must be stored in the same directory as "CLVmain32.exe".

You can use this method to link CLV Setup to several different configurations on your Windows desktop.
In this way, for example, you can prevent CLV Setup from attempting to establish a connection when an OPS400 is not connected.

10.4.13 CLV Assistant

CLV Assistant is not suitable for OPS400 parameterization.

10.5 Calculating parameter values for setting the OPS400

10.5.1 Calculating the necessary capture area for the bar code if several bar codes are read on each 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: 7 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

$$d_{scan} = \frac{V}{f} \qquad d_{scan} = \frac{2{,}000 \text{ mm/s}}{800 /\text{s}} = 2.5$$

dy = 7 x 2.5 mm = 17.5 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 CAPTURE RANGE between bar codes (DEVICE CONFIGURATION tab, TRACKING PARAMETERS button)
2. The reading angle comparison must be activated (CODE CONFIGURATION tab, CODE SUMMARIZATION section)

Bar code lines in the conveyor direction:
If the scan line records bar codes with the same name at the same reading angle, an external incremental sensor or an internal INC timer for path information is required for the separation of bar codes.

Rule of thumb: Area around bar code should be blank!

Fig. 10-16: Required distances between the bar codes on an object

10.6 Tables

10.6.1 Calculating code length of a bar code

The code length of a bar code is the number of used characters in the printed code including the check digit (if present). This code length must be specified in CLV Setup.

If the code type of a bar code is known, the code length can be calculated by counting the bars and gaps. The following table contains the respective formulas for calculation.

1. Count the bars and gaps as specified in *Table 10-5*.
   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	$l_{code} = \frac{\text{Number} - 10}{5}$	Calculated code length
2/5 Interleaved	Number of wide elements (bars and gaps)	$l_{code} = \frac{\text{Number} - 1}{2}$	Calculated code length
EAN	not applicable	13 characters (normal version) 8 characters (short version)	Activate 13-digit Activate 8-digit
UPC	not applicable	12 characters (UPC A, normal version) 6 characters (UPC E, short version)	Activate version A Activate version E
Codabar	Number of bars	$l_{code} = \frac{\text{Number} - 8}{4}$	Calculated code length
Code 128 (character set A)	Number of bars	$l_{code} = \frac{\text{Number} - 10}{3}$	Calculated code length
Code 93	Number of bars plus separator bar after stop character	$l_{code} = \frac{\text{Number} - 13}{3}$	Calculated code length
EAN 128	Number of bars	$l_{code} = \frac{\text{Number} - 10}{3}$	Calculated 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 OPS400 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 OPS400 can be larger than the number of characters in the printed code, as it comprises several character sets.

Table 10-5: Formulas for calculating the code length of a bar code

10.7 Special applications and procedures

10.7.1 Auxiliary input via the auxiliary interface

If the OPS400 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 auxiliary interface of the OPS400 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 OPS400 via an internal or external decoder of the device.

Fig. 10-17 shows the flow of auxiliary input.

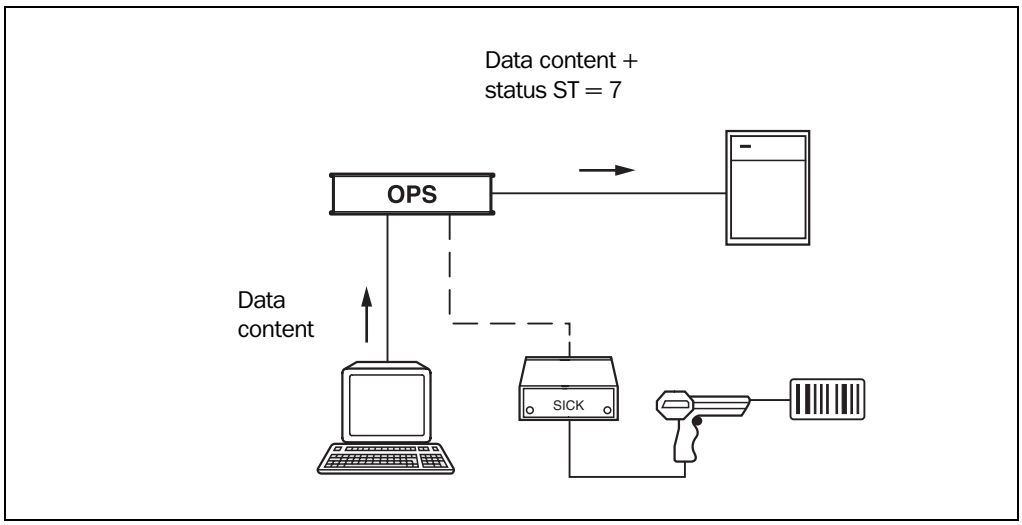


Fig. 10-17: Auxiliary input via the auxiliary interface of the OPS400

The OPS400 transmits the data content of the bar code which it receives via the auxiliary interface to the host in the same format as the other reading results. Each string can contain the data content from a bar code with a maximum length of 50 characters. The OPS400 automatically enters the status ST = 7 if the error status has been enabled for transmission. The values of the other reading diagnosis data in the data string are of no significance.

To enable the OPS400 to receive the data content of the bar code via the auxiliary interface, you must switch the operating mode on the interface to "Auxiliary input".

1. Connect the PC to the **auxiliary interface** (port) of the OPS400 using a 3-core RS 232 data cable (null modem cable).
   See *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
2. Start CLV Setup on your PC.
   See *Chapter 10.4.3 Starting CLV Setup, Page 10-16*.
3. Select the AUXILIARY INTERFACE tab.
4. Select the AUXILIARY INPUT option from the drop-down list.
5. Perform a download to the OPS400. This is done by clicking in the toolbar.
   The DOWNLOAD PARAMETERS dialog box is displayed.
6. Confirm the dialog box by selecting the TEMPORARY save option.

The auxiliary interface then operates temporarily in "Auxiliary input" mode.

Entering bar code using Terminal Emulator of CLV Setup

1. Click in the toolbar.
   The Terminal Emulator window is then displayed.
   The OPS400 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. 10-18 shows the Terminal Emulator window in extended mode.
3. Use the drop-down lists to set the start and stop characters to NUL.
4. Enter the data content of the 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 OPS400 then interprets all additional characters as a new data string.
   CLV Setup transmits the character string to the OPS400 and deletes the entry in the text field.
   The OPS400 does not return an echo.
6. Once the active reading pulse has ended, the OPS400 transmits the data received from the PC to the host via the host interface.

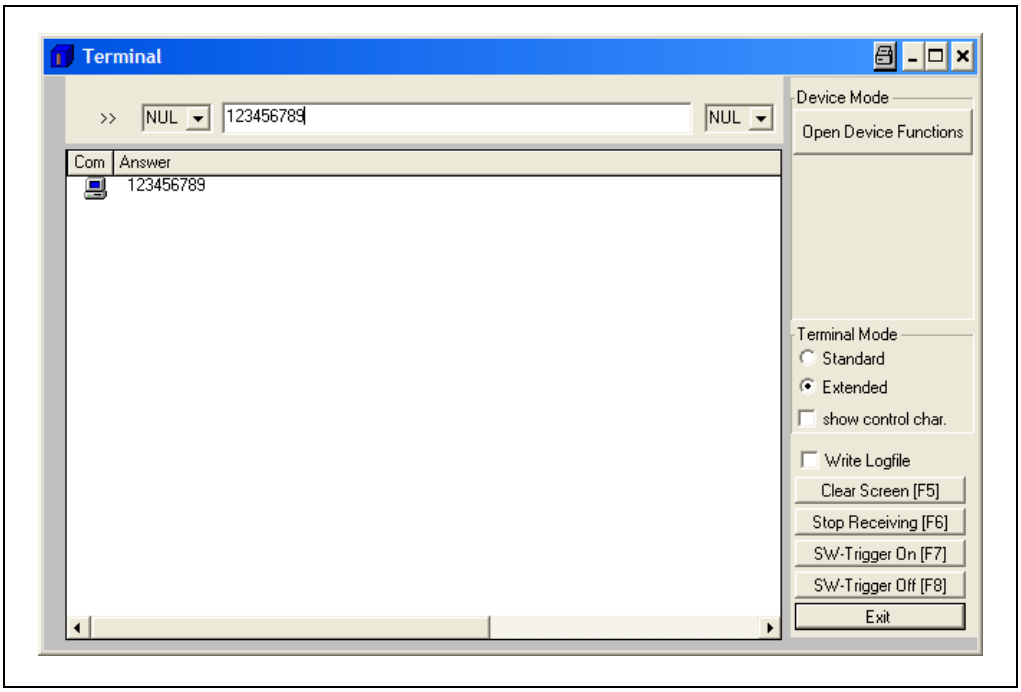


Fig. 10-18: CLV Setup: Auxiliary input via the Terminal Emulator

Entering bar code using a terminal/PC keyboard

1. Connect a terminal or PC with terminal emulation to the auxiliary interface of the OPS400. For the pin assignment, see *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
2. Set the communication parameters and data output format as shown in *Table 10-6*.

Parameter	Value
Data transfer rate	9,600 bd
Data bits	8
Parity	none
Stop bits	1
Data output format	Data Terminator *e.g. 1234* *CR*

Table 10-6: Communication parameters of the terminal/PC for the auxiliary input

3. Enter the data content of the bar code via the keyboard.
   The terminal transmits the individual characters to the OPS400 immediately.
   Use the backspace key to correct input errors.
4. Terminate the data content with the control character <CR>.
   The OPS400 then interprets all additional characters as a new data string.
   The OPS400 ignores other control characters. The data content itself may not contain control characters.
5. Once the active reading pulse has ended, the OPS400 transmits the data received from the PC to the host via the host interface.

Entering bar code using a handheld scanner with decoder

1. Connect a handheld scanner with decoder to the auxiliary interface of the OPS400. For the pin assignment, see *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
2. Set the data format and communication parameters of the handheld scanner as shown in *Table 10-6*.
3. Read the bar code with the handheld scanner.
   Once the active reading pulse has ended, the OPS400 sends the data received from the PC to the host via the host interface.

If you connect a SICK Hand-held Scanner from the IT 38xx/46xx/48xx/58xx series, set the communication parameters and data output (data + terminator) as shown in *Table 10-7*.

Parameter	Value
Data transmission rate	9,600 bd
Data bits	8
Parity	No
Stop bits	1
Data interface	RS 232
Prefix (Header)	Clear all Prefixes
Suffix (Terminator)	CR

Table 10-7: Communication parameter settings for the SICK Hand-held Scanner from the IT 38xx/46xx/48xx/58xx series

10.7.2 Connection to Profibus DP

See operating instructions "*BMV/BMH10 for Profibus DP*" (order no. 8008825, English version).

10.7.3 Connection to DeviceNet

See operating instructions "*BMV/BMH10 for DeviceNet*" (order no. 8008972, English version).

10.7.4 Connection to Interbus S

See technical information "*BMS 0/20 for Interbus S*" (order no. 8007546, English version).

10.8 Replacing OPS400 (transferring parameter set)

If the OPS400 is replaced and its current parameter set is to be transferred to the replacement device, a download is to be performed in CLV Setup.

To download the parameter set, you must connect a PC running the CLV Setup software to the replacement device. The parameter set of the OPS400 which is to be replaced must be available as a configuration file in CLV Setup, otherwise the device must be parameterized from scratch.

1. Switch off the power supply to the OPS400.
2. Open the cover of the connection area.
3. Disconnect all wires (from cables lead in from outside) from the terminals.
4. Loosen PG threaded joints and unplug the cables from the OPS400.
5. Unscrew the OPS400 from the holder.
   Before doing so, mark the position and alignment on the holder.
6. Install, align, and connect the replacement device.
7. Connect the PC to the auxliary interface (port) of the OPS400 using a 3-core RS 232 data cable (null modem cable). See *Chapter 5.5.9 Connecting auxiliary interface (connecting PC), Page 5-11*.
8. Switch on the power supply to the OPS400.
9. The OPS400 starts up. The "Device Ready" LED in the connection area illuminates.
10. Switch on your PC and start Windows.
11. Start CLV Setup.
    If the communication parameters of the PC and OPS400 are identical, CLV Setup uploads the parameter set from the OPS400 and displays the values on the tabs.
12. Open the archived parameter set as a configuration file "*.scl" in CLV Setup and download it to the OPS400.
13. Confirm the dialog box by choosing the TEMPORARY storage option.
14. Check whether the OPS400 reads the bar codes correctly.
    Correct the parameter settings if necessary.
15. Finally, download the tested parameter set to the OPS400 and save it with the PERMANENT save option.
    The parameter set is transferred permanently to the replacement device.
16. Save the modified parameter set as a new configuration file in CLV Setup.

Troubleshooting

If the software version on the replacement device is older than the version on the old OPS400 (e.g. new device is from warehouse stock), the parameter set transferred may contain 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 parameters used are necessary to configure the OPS400 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 OPS400, the default settings 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 OPS400 for the current reading application. If necessary, change the parameter values and download the parameter set to the OPS400 again. Save the new parameter set as a configuration file in CLV Setup.
See also *Chapter 10.4.10 Unknown parameters, Page 10-21*.

10.9 Ordering Information

10.9.1 OPS400 OMNI Portal Scanner

Order no.	Type	Module width	Resolution
1019692	OPS400-20	high density	from 0.2 mm
1019691	OPS400-00	standard density	from 0.3 mm
1019693	OPS400-60	low density	from 0.4 mm

10.9.2 Accessories: Bus connection modules

Order no.	Type	Description
6020896	BMV10-0111	Bus connection module for the connection of an OPS400 to a Profibus DP; for the OPS400, with a pair of 15-pin D Sub HD device sockets/plugs, bus plug, terminal strips (signal distributors) for wiring the RS 232 and the functional interfaces, internal 9-pin D Sub plug "Service", cable grips, pressed aluminum housing, protection type IP 54 (protection type max. IP 65 with a plug cover), operating voltage 20 to 30 V DC
6020893	BMH10-0111	Bus module for Profibus DP, with terminal screws, bus plug, no housing, for top-hat rail installation, protection type IP 20, operating voltage 10 to 30 V DC
6021190	BMV10-0311	Bus connection module for connection of an OPS400 to the DeviceNet, for specifications see BMV10-0111
6021 88	BMH10-0311	Bus module for DeviceNet, for specifications see BMH10-0111
1012683	BMS20-0113	Bus connection module for the connection of an OPS400 to an Interbus S; for the OPS400, with a pair of 15-pin D Sub HD device sockets/plugs, bus plug, terminal strips (signal distributors) for wiring the data and functional interfaces, internal 9-pin D Sub plug "Service", integrated power supply 230 V AC 50 Hz/24 V DC, cable grips, protection type IP 30 (max. IP 54)
1012684	BMS20-0112	As with BMS20-0113, but with integrated power supply 115 V AC 50/60 Hz/24 V DC

Table 10-8: Accessories: Connection modules

10.9.3 Accessories: Cables

Order no.	Description	Wires	Length	Connection
2020319	Data connection cable, shielded, with 9-pin D Sub socket and open end (wire ends stripped)	3 x 0.34 mm^2	3 m	OPS400 to BMV/BMS
2014054	RS 232 data cable (null modem cable), ∅ 5 mm, shielded, with two 9-pin D Sub cable sockets (pin 2 (RxD) and pin 3 (TxD) crossed)	3	3 m	PC to OPS400
6010088	Data cable, ∅ 6.6 mm, shielded, for connection cables up to 3 m	15 x 0.09 mm^2	Yard ware	free
6007655	Power cable with 3-pin power plug and open end	3	2 m	OPS400/BMV/BMS to power supply

Table 10-9: Accessories: OPS400 cables

Note Information on other cable lengths/cables for the OPS400 available on request.

10.9.4 Accessories: Connectors

Order no.	Description
6009438	D-Sub connector housing (metal) for 9-pin or 15-pin HD inserts
6007335	D-Sub connector insert, 9-pin socket connector
6010019	D-Sub connector insert, 15-pin HD socket connector
6010020	D-Sub connector insert, 15-pin HD pin connector

Table 10-10: Accessories: Connectors

10.9.5 Accessories: Reading pulse generation

The SICK catalog "SENSICK Industrial Sensors" (order no. 8006530, English version) contains a large selection of photoelectric switches and photoelectric proximity switches as well as the associated accessories (brackets, connection cables).

A photoelectric switch WL18-3, reflector and bracket are all contained in assembly no. 2034693.

Order no.	Description
2034693	Photoelectric switch with installation hardware, consisting of: – 1 x photoelectric switch WL18-3P430 – 1 x mounting angle bracket – 1 x cable (10 m) with socket for WL18-3P430 and one open end (no. 6027559) – 1 x reflector PL50A – Mounting hardware

Table 10-11: Accessories: Photoelectric switch with installation hardware

10.9.6 Accessories: Incremental encoder

Order no.	Description
2022714	Incremental encoder with friction wheel, resolution 10 mm per pulse, max. 100 KHz, operating voltage 18 to 28 V DC, operating temperature 0 to +70 °C. With mounting bracket and accessories, connection cable 10 m with M12 socket and open end

Table 10-12: Accessories: Incremental encoder

10.10 Supplementary documentation

Order no.	Title	Contents
8008825	Operating instructions "BMV/BMH10 for Profibus DP"	Description of the connection of the OPS400 to the Profibus/the PLC/the sensor via the bus connection module BMV/BMH10
8008972	Operating instructions "BMV/BMH10 for DeviceNet"	Description of the connection of the OPS400 to the DeviceNet/the PLC/the sensor via the bus connection module BMV/BMH10
8007546	Technical information "BMS10/20 for Interbus S"	Description of the connection of the OPS400 to the Interbus/the SPS/the sensor via the bus connection module BMS20

Table 10-13: Supplementary documentation

10.11 Glossary

For additional terms, see also *Online help – CLV Setup Help.*

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 code heights.

Autofocus function

Ability of the OPS400 to detect the distance of objects without external sensors and automatically adjust the focus position to the object distance.

Auxiliary input

Special function of the ⇨ auxiliary interface. Used to enter bar code data subsequently in order to complete reading results sent to the host.

Auxiliary interface

Auxiliary interface (RS 232) of the OPS400 with fixed data output format. Access to the OPS400 is always available using this interface and the CLV Setup program. Also used to output system and error messages. Can be assigned various functions.

Capture range

Zone around a moving bar code created by the OPS400 using the increment management and reading angle comparison functions. Enables bar codes with identical content and code type to be separated.

CLV Setup

PC program that runs on Windows 95™ /98™, Windows NT4.0™, Windows 2000™, Windows XP™ and is used to parameterize the OPS400 offline (adjust the device to the local conditions) and operate it online. The parameter set is exchanged with the OPS400 by ⇨ uploading and ⇨ downloading it..

CLV Setup Help

Online help function that provides support for using the "CLV-Setup" program. The help function explains the OPS400 parameters and their permissible values and can be launched directly from CLV-Setup in an HTML browser, such as Internet Explorer™.

Code geometry

Length and height dimensions of the bar code.

Code Info/Separator

Data block in the reading result on the ⇨ host interface. Used to provide additional information about the bar codes. Can be attached to the bar code as a prefix or suffix. Contains up to 10 elements, consisting of reading diagnosis data and/or constants (control characters, letters, digits), depending on the configuration. The "Code-Info/Separator" block is empty in the default setting of the OPS400.

Command strings, commands

Alternative user interface to the OPS400. Used instead of the CLV Setup program. Presents a basic, yet clearly structured command language for modification of the OPS400

parameter set online. Accesses the OPS400 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 OPS400. Can be printed out in the form of a table.

Data forwarding

Option of forwarding data transmitted by the host transparently to a terminal via the OPS400 using an identifier. Data can also be forwarded in the opposite direction. Furthermore, this function allows data received via one of the serial interfaces to be output again immediately via one of the same interfaces (echo).

Data output string

Structured data telegram in the ⇨ reading result output by the OPS400 via 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 ⇨ auxiliary interface, on the other hand, cannot be changed.

Decoder, decoding

Code type-specific evaluation routine for reconstructing the read bar code in electronic form in order to decode its data content.

Distance configuration

Data record in the OPS400 for defining a ⇨ focus position for the laser beam for event-controlled dynamic focus control. The corresponding values are to be entered under DISTANCE CONFIGURATION on the READING CONFIGURATION tab of the CLV Setup user interface.

Download

Method of transferring the ⇨ parameter set that was modified with the ⇨ CLV-Setup program offline from the PC to the OPS400. CLV-Setup either always transfers a complete copy to the memory (RAM) of the OPS400 (DOWNLOAD TO CLV) or just the parameter previously processed using the context menu of the right mouse button (DOWNLOAD PARAMETER) or all parameters of the displayed tab (DOWNLOAD PARAMETERS OF THIS VIEW). You can overwrite the existing parameter set in EEPROM of the OPS400 by choosing the "Permanent" save option.

Dynamic focus control

Function in the OPS400 for shifting the focal point of the laser beam across a wide range on the reading plane. The dynamic focus control function is either event controlled (e. g. by the distance detector) or dynamic (with the ⇨ Autofocus function).

Error messages

Messages in ⇨ plain text or coded (3-digit) that are used to identify a malfunction on the OPS400 in Reading mode. The messages are output on the auxiliary interface only. Exception: ST = 3 (device error), which is also output on the host interface. The error messages can be displayed in the Terminal emulator in the "CLV-Setup" program.

Error status

Identifier output with the reading result by the OPS400 for errors that were diagnosed while the bar code was being read. The entry for the host interface is made in the "Code-Info/ Separator" block of the ⇨ data output string and must be enabled using the parameters (for the OPS400 disabled by default).

Focus position

Distance of the focal point of the emitted laser beam in front of the reading window. Can be adjusted using the optical components in the OPS400. Creates a distance-specific depth of field (DOF) in which the bar code can be recorded.

Functional interfaces

Digital switching inputs and outputs and the relay outout of the OPS400.

Good Read

The OPS400 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 on the ⇨ host interface. Used as a header in the ⇨ data output string for the subsequent data content of the bar codes. Contains up to 10 elements, consisting of reading diagnosis data and/or constants (control characters, letters, digits), depending on the configuration. The "Header" block is empty in the default setting of the OPS400.

Host interface

Main data interface on the OPS400 with configurable data output format. Used to output the ⇨ reading result in telegram form to the host/PLC. Used as gateway in the CAN Scanner Network. Can be physically switched to RS 232 or RS 422/485. It supports various transmission protocols.

Increment management

Used in the "Tracking" reading mode in the OPS400 to clearly separate bar codes with identical content which are moving during reading.

Multiple read

Variable number of reading operations which must provide identical reading results (data content) of the same bar code before the OPS400 outputs the result.

No Read

The OPS400 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 Read. Comprises a variable combination of the error string and the ⇨ "Code-Info/Separator" block.

OMNI Portal Scanner

Scanner with two scan lines which form a cross. This scan line arrangement enables omnidirectional reading of barcodes.

Parameter set

Data record used to initialize and activate the functions implemented in the OPS400. With ⇨ downloading and ⇨ uploading, the parameter set is transferred from CLV Setup to the OPS400 or from the OPS400 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 OPS400 carries out 100 scans and evaluates the reading quality. It then outputs the reading results via the ⇨ auxiliary interface every 2 s together with the ⇨ reading diagnosis data.

Plain text

Legible form of an OPS400 message. The OPS400 outputs special messages in coded form.

Reading angle (RA value)

Position of the first dark bar in a detected bar code along the ⇨ scan line. Calculated by the OPS400 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 reading angle value for the application.

Reading diagnosis data

Data directly derived from the reading procedure by the OPS400. This data enables the quality of the read to be assessed. The data is always output on the ⇨ auxiliary interface together with the reading result. Only output on the host interface if enabled on the DATA STRING tab in the "CLV-Setup" program (for the OPS400 disabled by default).

Reading field

Area under the OPS400 within which the objects with bar codes are scanned by the OPS400 during the reading pulse. The width extent is specified by the path width to be covered, the length extent in the conveying direction depending on the path width (ratio 1:1) and the required depth of field of the OPS400 (including angle offset).

Reading field height

Length of the ⇨ scan line which is available for recording the bar code on the reading level. Due to the V-principle of beam generation, the reading field height is dependent on the reading distance.

Reading interval

Timeslot in which the OPS400 activates the laser diode and attempts to detect valid bar codes from the information read. The reading interval may be shorter than the external reading pulse, depending on the selected output mode for the reading result.

Reading pulse

Clock pulse applied externally to the OPS400 to trigger the internal ⇨ reading interval. Can be supplied by a photoelectric reflex switch or a command from the host via the serial interface.

Reading range (DOF)

Depth of field around the focal point of the laser beam on two sides. The extent of the reading area depends on the resolution and reading distance.

Reading result

Electronic representation of the data content of the read bar codes together with ⇨ the reading diagnosis data in one ⇨ data output string that is generated after the reading pulse has elapsed. The reading result of the auxiliary interface has a fixed format (content and output format); the reading result of 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 four switching outputs "Output 1 to Output 4" and the relay output 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 "Read Result" LED is linked to the "Output 2" for indication.

Scan line

See OMNI Portal Scanner.

Sending point

Point at which the reading result is output with respect to the start of the ⇨ reading pulse and the internal ⇨ reading interval.

SMART decoder

Specially developed ⇨ decoder used for reading bar codes with an extremely small code height and a code print which is dirty or of poor quality.

Specification diagrams

Diagrams for reading the resolution-specific depth of field (DOF) for specific focus positions.

Splitter

Data block in the reading result of the ⇨ host interface. Used to separate the data content of the bar codes. Contains up to 5 elements, consisting of constants (control characters, letters, digits), depending on the configuration. The "Splitter" block is empty in the default setting of the OPS400

Standard decoder

Tried-and-tested ⇨ decoder from the OPS400 product family. Recommended for applications with an adequate code height and high-quality code prints.

Storage in OPS400

The application-specific ⇨ parameter set can be stored temporarily or permanently in the OPS400. If it is stored temporarily in the RAM, it is lost when switched off. Parameter sets that are stored permanently are transferred to the EEPROM in the OPS400 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 read-only memory (ROM).

Switching sequence

Function of timer-controlled dynamic focus control. 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 OPS400. The messages are output via the auxiliary interface only. The messages can be displayed in Terminal Emulator of the CLV Setup program.

Teach-in

Method of programming the information required to adjust the OPS400 to the reading application in Parameter mode. Example: Teaching in the background for the Autofocus function; referred to as a ⇨ distance profile.

Terminator

Data block in the reading result on the ⇨ host interface. Used to terminate the data content of the bar code. Contains up to 10 elements, consisting of reading diagnosis data and/or constants (control characters, letters, digits), depending on the configuration. The "Terminator" block is empty in the default setting of the OPS400.

Upload

Method of transferring the ⇨ parameter set from the OPS400 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 OPS400 (UPLOAD TO CLV) or just the parameter previously processed using the context menu of the right mouse button (UPLOAD PARAMETER) or all parameters of the displayed tab (UPLOAD PARAMETERS OF THIS VIEW). Displays the current parameter values on the tabs. Prerequisite for modifying the current parameter set.

User interface

Windows-based input interface of the CLV Setup program used for operating and configuring the OPS400.

10.12 EC Declaration of Conformity

Fig. 10-19 shows the scaled down copy of the EC Declaration of Conformity (page 1).

➢ The complete EC Declaration of Conformity with the listing of the device versions and the fullfilled standards can be requested from SICK AG.

SICK

EC Declaration of conformity

Ident-No. : 9062268 O639

The undersigned, representing the following manufacturer

SICK AG
Nimburger Straße 11
79276 Reute
Deutschland

herewith declares that the product

OPS400

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

(place),..Reute..... (date),..2004-07-21

ppa. Pierenkemper
(Manager Development
Division Auto Ident)

ppa. Walter
(Manager Production
Division Auto Ident)

Fig. 10-19: Copy of the EC Declaration of Conformity (Page 1, scaled down)

10.13 Index

Notes:

10.14 Bar code samples

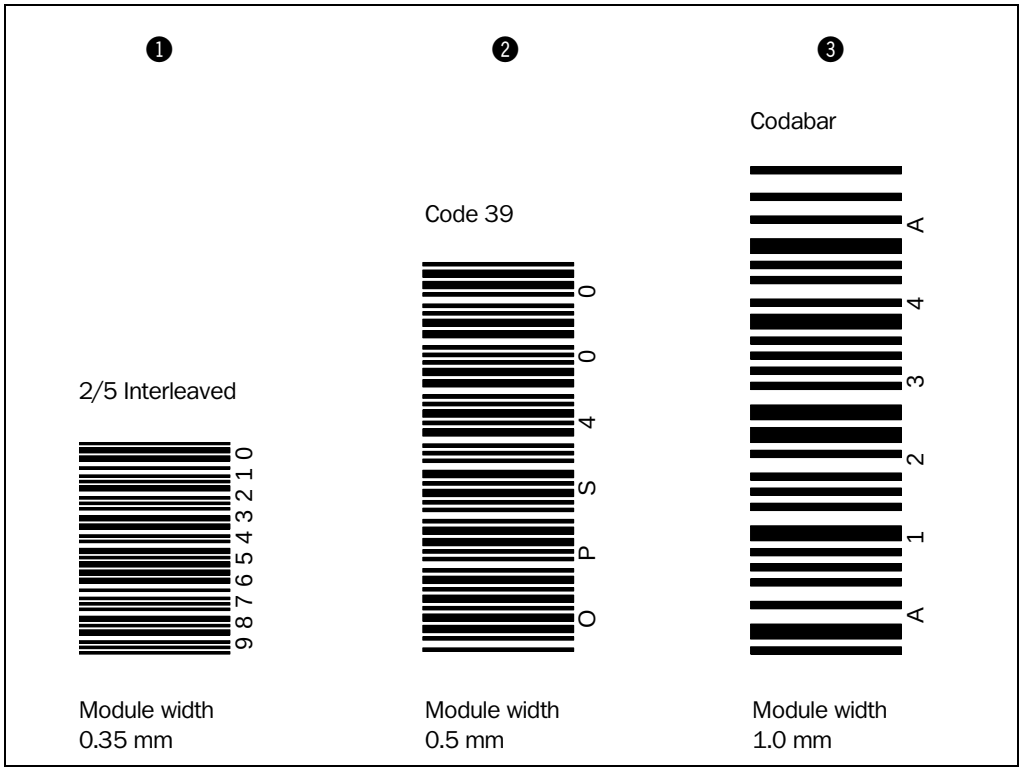


Fig. 10-20: Scannable bar codes with various module widths (print ratio 2:1)

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