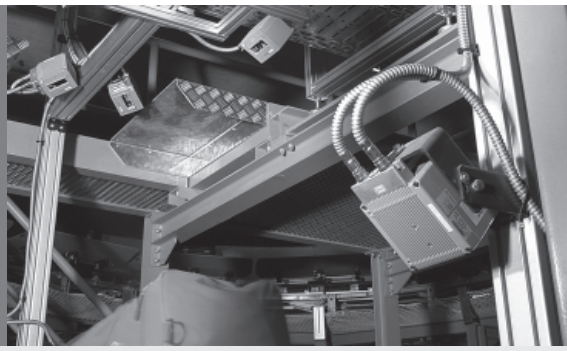
OPERATING INSTRUCTIONS

OTS400
Omni Tracking System



Omni Line

SICK
Sensor Intelligence.

Software version

Software/ tool	Function	Version
OTS400/ OTC400	Firmware	V 1.0 onwards
CLV Setup	Configuration software	V 4.4*) QF16 onwards
CLV Setup Help	Online help (HTML)	V 4.4*) QF16 onwards

***) All versions lower than V4.4 are not longer valid for the OTS400/OTC400. SICK does not deliver any longer the versions lower than V4.4.**

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

Contents

Abbreviations

OTS **O**mni **T**racking **S**ystem
OTC **O**mni **T**racking **C**ontroller
OPS **O**mni **P**ortal **S**ystem
PLC **P**rogrammable **L**ogic **C**ontroller

Tables

Figures

1 Notes on this document

1.1 Purpose

This document provides information on operating the OTS400 Omni Tracking System with the OTC400 Omni Tracking Controller in an OPS Omni Portal System. In the OPS, the bar code scanners are connected to the OTS400/ OTC400 as appropriate.

This document describes

- The basic principles of an OMNIDIRECTIONAL reading operation
- Mounting and electrical installation
- Startup
- Operation and configuration
- Maintenance
- Exchanging the device

In the remainder of the document, the devices will be referred to as "OTS400" or "OTC400".

1.2 Target audience

This document targets people who work in the following areas:

1.21 Mounting, installing, maintaining, and replacing the device

Suitably trained personnel, such as electricians or service technicians.
Only qualified electricians should connect the OTS400 to the voltage supply or connect the relay.

1.22 Startup, operation, and configuration

Suitably trained personnel, such as technicians or engineers.

1.3 Information content

This document contains all information that is required to mount, install, and start up the **OPS with the OTS400/OTC400** and the bar code scanners using **the default settings**. Step-by-step instructions are provided. Details on the bar code scanners are not explained here. This information can be found in the relevant operating instructions. (e.g. CLV490 Operating Instructions, order no. 8 009993, English edition)

Further information on the bar code scanners and on bar code technology can be obtained from SICK AG, Auto Ident division.
Internet address: **www.sick.com**.

1.4 Symbols used

Some of the information in this document is specially marked for quick reference:

WARNING!

A warning protects against physical injury to personnel or extensive damage to the OTS400/OTC400 and the bar code scanners.

➢ Always read warnings carefully and follow them at all times

Note	Indicates special features of the device
Explanation	Provides technical background knowledge
Recommendation	Provides help on setting up/operating the device
TIP	Explains optional settings in the Windows-based "CLV Setup" program
Scan frequency	Refers to an option field in the "CLV Setup" program

2 Safety information

2.1 Authorized personnel

In order to ensure that the OTS400/OTC400 functions correctly and safely in the OPS, it must be mounted and operated by sufficiently qualified personnel. The following qualifications are required to start up the device.

2.1.1 Mounting and maintenance

- Practical training in electrical engineering
- Knowledge of the current guidelines for safety at the workplace

2.1.2 Electrical installation and replacement

- Practical training in electrical engineering
- Knowledge of the current safety standards for electrical engineering
- Knowledge of operating a conveyor belt

2.1.3 Startup, operation, and configuration

- Knowledge of the mechanical and electrical parameters, and characteristics of the conveyor belt
- Knowledge of the software and hardware environment of the conveyor belt
- Knowledge of operating the conveyor belt
- Basic knowledge of Windows 95™/98™, Windows NT™, Windows 2000™ or Windows XP™
- Basic knowledge of an HTML browser (e.g. Internet Explorer™)
- Basic knowledge of data transfer
- Basic knowledge of bar code technology

2.2 Intended use

- The OTS400 Omni Tracking System and the OTC400 Omni Tracking Controller are used in an OPS Omni Portal System in conjunction with the required number of bar code scanners, in order to detect bar codes in different directions and on different sides of an object.
- A total of 24 scanners for reading bar codes on up to 6 planes can be connected to the OPS using the OTS400/OTC400. The bar code scanners are connected to the OTC400 via CAN Bus/ CanOpen. Preformed connection cables are available for connecting the bar code scanners to the OTS400/ OTC400. Incremental encoders and the required trigger signals can also be connected to the OTS400/ OTC400. Other optional inputs are also available.
- RS 232/RS 422/485 interfaces are provided for connecting the host. In addition, various bus interfaces can be integrated directly in the OTS400.
- The OTS400 uses housing with enclosure rating IP 65 with PG conduit threads and mounting brackets. This housing contains the OTC400, a power supply unit, a service socket with a fuse and a mains switch.
- The OTC400 can also be used as a stand-alone device (without OTS400) and is also suitable for installation in industrial control cubicles. The enclosure rating is IP 20.

Note:
Any warranty claims vis-à-vis SICK AG will be rendered invalid if the device is used for any other purpose or if it is modified in any way, even during installation.

2.3 General safety instructions and protection measures

- Please read the general safety instructions carefully and observe them at all times when working with the OTS400/OTC400 and the bar code scanners. This also applies to the warnings accompanying the instructions contained in the individual chapters of this document.
- The voltage supply for operating the OTC400 (24 V +20%/ –10% direct voltage) must be protected by electrical separation.

Shock hazard!

The OTS400 is connected to an operating voltage of 230V AC 50 Hz or 115 V AC 50/60 Hz.

- When working with electrical installations, always observe the current security regulations.

2.3.1 Bar code scanners

When connecting the bar code scanner and applying the operating voltage, remember that the laser beam is in operation:

Laser warning!

The bar code scanner (standard device) operates with a red-light laser. Staring at the laser beam for a long time can damage your eyesight.

- Never look directly at the laser beam (compare to sunlight).
- Never point the laser beam at other persons.
- Observe the laser protection specifications pursuant to EN/IEC 60825-1.

Laser class of the bar code scanners (according to EN/IEC 60825-1):

Device type	Laser class	Max. output power at the reading window
CLV 43x/44x	2	3.5 mW; Pulse duration 149 µs (Germany)
CLV 442	2	1.5 mW; Pulse duration 149 µs (Germany)
CLV 450	2	3.5 mW; Pulse duration 98 µs (Germany)
CLV 480	2	2.8 mW; Pulse duration 111 µs (Germany)
CLV 490	2	2.8 mW; Pulse duration 111 µs (Germany)

Table 2-1: Laser classes of the different bar code scanners

For further information, see the *"Laser protection"* section in the Operating Instructions of the bar code scanners.

2.4 Quick stop and quick restart

2.4.1 Switching off the OTS400

- ➢ Switch off the operating voltage at the mains switch.
- ➢ If the OTC400 is installed without the OTS400, the operating voltage for the OTC400 must be disconnected.

This will result in the loss of (at the most):

- The application-specific parameter block if it was only stored **temporarily** in the OTS400/OTC400 or in the bar code scanners
- The last reading result
- Daily operating hours counter of the individual the bar code scanners and the OTC400 (operating hours counter, number of reading intervals, number of good reads, maximum time of the reading interval, minimum time of the reading interval, average identification quality)

2.4.2 Switching on the OTS400 again

- ➢ Switch on the operating voltage at the mains switch.
- ➢ If the OTC400 is installed without an OTS400, switch on the operating voltage for the OTC400 again.
  The OTS400 and the connected bar code scanners resume operation with the parameter set that was last stored permanently and reset the daily operating data.

2.5 Environmental information

The OTS400/ OTC400 is designed to minimize the impact on the environment. It neither contains nor emits any substances that are harmful to the environment.

2.5.1 Power consumption

The power consumption of the device is low and mainly depends on the number of bar code scanners that are operated in the OPS. The typical power consumption of an OTS400 with one CLV 490 bar code scanner is 30 VA and, with 8 CLV 490 bar code scanners, 130 VA.

2.5.2 Disposal after removal from service

Unusable or irreparable devices should be disposed of in an environmentally-friendly manner in line with the applicable national waste disposal regulations. The OTS400/OTC400 can be separated into reusable secondary raw materials (housing) and problem waste (boards as electronic scrap).
See Section 9.3 Disposal.

At present, SICK AG does not accept any devices that can no longer be used or repaired.

Notes:

3 Product description

3.1 Design

3.1.1 Scope of delivery

The OTS400 Omni Tracking System is supplied with:

- An information sheet (notes on device, yellow)
- A CD-ROM “Manuals & Software Bar Code Scanners“ (no. 2029112) with
  – “CLV-Setup“ programm for Windows™ (version V4.4 or higher) and the “CLV-Setup Help“ online help system (HTML files)
  – “CLV-Connect“ PC software (HTML files showing terminal diagrams)
  – OTS400 Operating Instructions in English and German as PDF edition as well as additional publications (connections modules, other SICK bar code scanners)
  – freely available “Acrobat Reader“ PC software for reading PDF files

***) All versions lower than V4.4 are not longer valid for the OTS400/ OTC400. SICK does not deliver any longer the versions lower than V4.4.**

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

Chapter *12 SICK Accessories* provides an overview of mounting accessories, connection modules, cables, and connector covers.

3.1.2 Variants

The OTS400 Omni Tracking System is currently available in the following variants:

Order no	Type	Description
1017867	OTS400-0000	OTS400 Omni Tracking System with RS 232/ RS 422/485 host interface
*	OTS400-1000	OTS400 Omni Tracking System with bus interface module for Profibus-DP
*	OTS400-2000	OTS400 Omni Tracking System with bus interface module for Interbus-S
*	OTS400-3000	OTS400 Omni Tracking System with bus interface module for Device Net
*	OTS400-x100	OTS400 Omni Tracking System with display
* Available on request		

Table 3-1: OTS400 variants

The OTC400 Omni Tracking Controller is currently available with the following variants:

Order no	Type	Description
1017866	OTC400-0000	OTC400 Omni Tracking Controller without display
*	OTC400-1000	OTC400 Omni Tracking Controller with display
* Available on request		

Table 3-2: OTC400 variants

3.1.3 System requirements

1. Requirements for mounting and starting up the **OTS400** with OTC400:

- An operating voltage of 230 V AC (115 V AC) –15%/ +10% with protective grounding.
  The power consumption depends on the number of bar code scanners connected.
  The typical power consumption with one CLV490 bar code scanner is 30 VA.
  The typical power consumption with 8 CLV490 bar code scanners is 130 VA.

Risk of irreparable damage to the power supply unit

The power supply is equipped with a switch that is set to an operating voltage of 230 V AC at the factory. If set to 115V AC but operated at 230 V AC, the power supply unit may be damaged irreparably.

➢ Never operate the OTS400 at 230 V AC if the power supply unit is set to 115 V AC.

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2. Requirements for mounting and starting up the **OTC400**:

- An operating voltage of 24V DC –10%/ +20% (functional extra-low voltage according to IEC 364-4-41).
  The power consumption depends on the number of bar code scanners connected. The typical power consumption with one CLV490 bar code scanner is 20 W. The typical power consumption with 8 CLV490 bar code scanners is 120 W. The operating voltage supplied must be protected by electrical separation according to IEC 742.

3. Requirements for mounting and starting up the OTS400 with OTC400, or the OTC400:

- A suitable sensor, e.g. a reflection photoelectric switch, to signal the presence of an object with a bar code, if an external reading pulse is supplied via the "Trigger 1“,"Trigger 2“, or "Trigger 3“ terminal
- An external incremental encoder for connecting to the "INC 1" or "INC 2" terminal for internal object assignment. The incremental signal should be resolved every 10 ... 15 mm. A minimum of 4 clock pulses should be transmitted, however, in the smallest possible gap between the objects.
- A connection to the required host interface (RS 232, RS 422/485) for the OTS400-0000 or the OTC400-0000; or a connection to the required bus interface module (OTS400-1000/-2000/-3000).

4. Requirements for accessing the auxiliary interface of the OTC400:

- A PC with the Windows-based "CLV Setup“ program, version 4.4 or higher (can be run on Windows 95™/98 ™ or Windows NT™, Windows 2000™ or Windows XP™) and a serial port (port "COM x“)
- An RS 232 data connection cable with two 9-pole D Sub sockets, e.g. no. 2014054.
  Pin 2 (RxD) and pin 3 (TxD) are crossed in each case.

3.1.4 Design

Fig. 3-1: OTS400 (outside view)

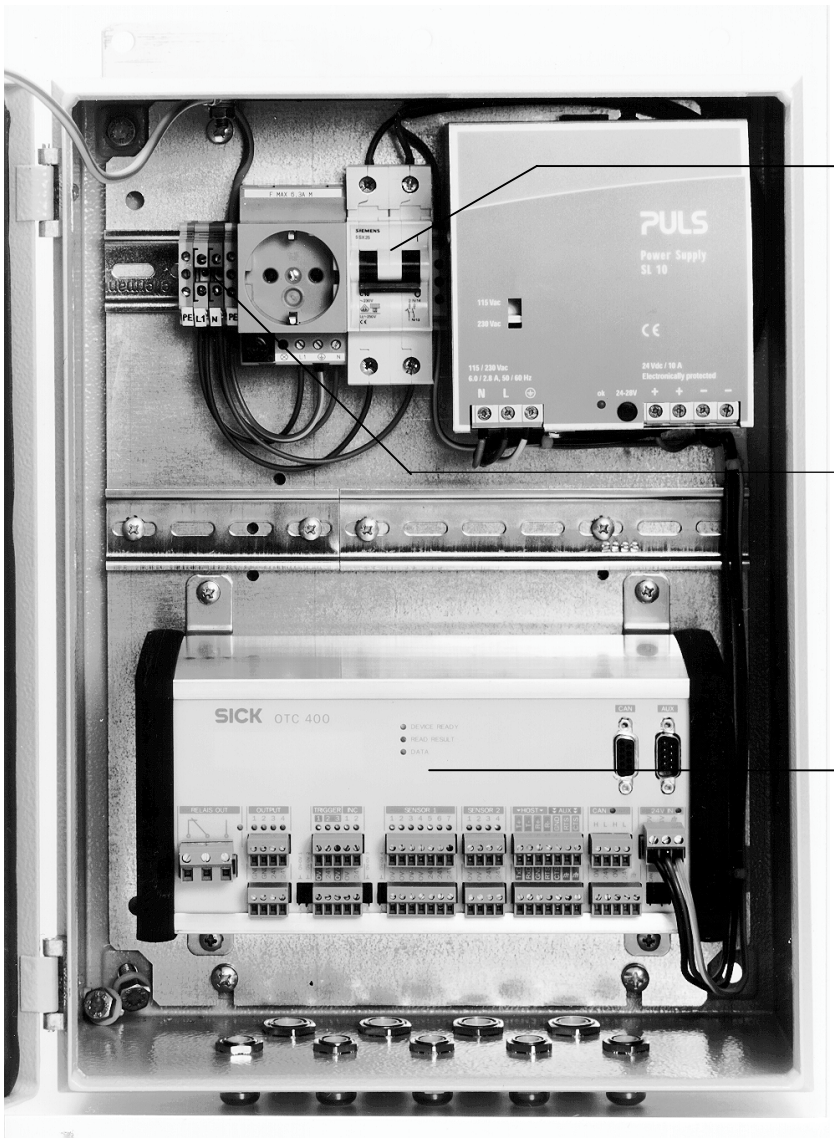

Fig. 3-2: OTS400 (inside view)

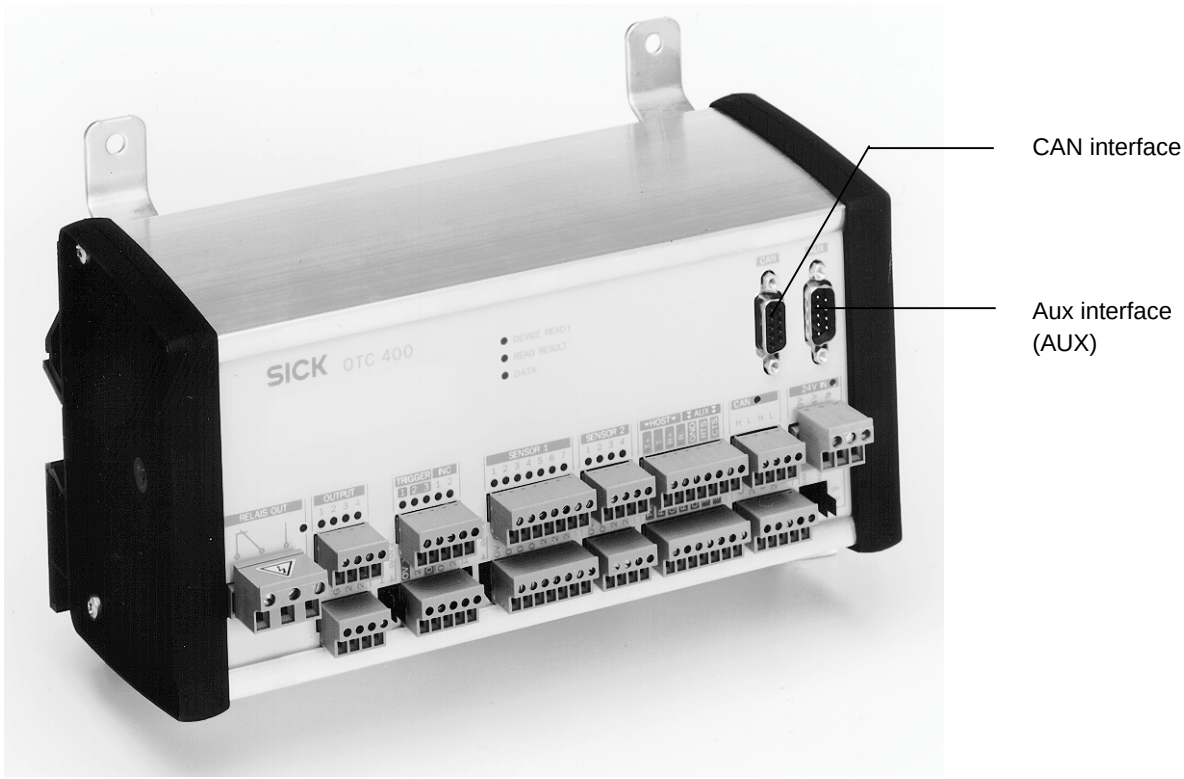

Fig. 3-3: OTC400 (front view)

3.2 Operating principle

The OTS400 Omni Tracking System combines the information supplied by the individual bar code scanners on the code content, and (in the case of line scanners with oscillating mirror) code angle, assignment of the bar code to the object etc., and transfers this bar code information for each object to the host, together with any required additional information.
The OTS400 also powers the bar code scanners and photoelectric switches required in the OPS.

The OTS400 and OTC400 communicate using the CAN Bus/ CAN Open protocol. The OTS400/ OTC400 provides each bar code scanner with the beginning and the end of an object, which is assigned a fixed number.
The current travel increment is continuously communicated to each bar code scanner. If the bar code scanner detects a bar code, it sends this information immediately to the OTS400/ OTC400. The OTS400/ OTC400 then combines the results from the individual bar code scanners and sends these to the host at a defined output point.

The individual bar code scanners are also monitored by the OTC400 for possible system errors. In this way, the OTS400/OTC400 can notify the host, and therefore the plant operator, if maintenance is required.

3.3 Indicators and control elements

The OTS400/ OTC400 operates with a total of 26 LEDs. The device is operated (operating mode selection) and parameterized using the Windows-based "CLV Setup" PC software or alternatively using command strings. See Section 8.3 *Setting parameters with CLV Setup*.

3.3.1 Functions of the LEDs

The LEDs are located on the front of the OTC400 and have the following functions:

Indicator	**Color**	**Function**
Device ready	*green*	Indicates that the OTS400/ OTC400 is ready in **reading mode**: lights up after the device has been switched on if the automatic self-test was performed successfully. Extinguishes when a different operating mode/function is selected.
Read result	*yellow*	In **reading mode**: Lights up after a successful read (good read) Lights up if the match code comparison is activated and the bar code read matches the specified match code(s) Always lights up until the start of the next reading pulse
Data	*yellow*	Blinks while the OTS400/ OTC400 is transmitting data to the host on the serial interface in reading mode
Output (4x)	*yellow*	Lights up when active
Output relay (1x)	*yellow*	Lights up when active
Input trigger (3x)	*green/ red*[*)]	Lights up when active, trigger 1: internal or external ground, Trigger 2 and 3: internal or external ground
Input INC (2x)	*green/ red*[*)]	Lights up when active, internal or external ground
Input Sensor 1 (7x)	*green/ red*[*)]	Lights up when active, internal or external ground
Input Sensor 2 (4x)	*green/ red*[*)]	Lights up when active, internal or external ground
Input 24V (1x)	*green*	Lights up when active
Input CAN (1x)	*green*	Blinks while data is being exchanged between the OTS400/OTC400 and the bar code scanners on the CAN Bus.
*) red if interchanged		

Table 3-3: Functions of the LEDs

3.4 Maximum cable lengths

Due to voltage losses on the cables connecting the bar code scanners, the overall cable length is limited in accordance with the number of scanners connected on each branch line. A maximum of 2 branch lines are allowed for each OTS400/OTC400. The maximum cable lengths are based on the cables provided by SICK AG. See the following tables.

3.4.1 Maximum cable lengths for an OTS400

The power supply unit in the OTS400 is set to 26 V at the factory. The cable lengths are as follows:

Number of scanners per branch line	**Maximum cable length**
2	70 m
3	50 m
4	36 m
5	28 m
6	24 m
7	20 m
8	18 m
9	16 m
10	14 m
11	13 m
12	12 m

Table 3-4: Max. cable length for OTS400

3.4.2 Maximum cable lengths for an OTC400

If the OTC400 is used as a stand-alone device (without OTS400), the maximum cable length depends on the supply voltage. The values in the following table are based on typical supply voltages of 24 V DC and 21.6 V DC (24 V DC minus 10%). Maximum cable lengths for other voltages are available on request.

Number of scanners per branch line	**Maximum cable length for DC 24 V**	**Maximum cable length for DC 21.6 V (DC 24 V minus 10%)**
2	50 m	34 m
3	36 m	22 m
4	28 m	16 m
5	22 m	13 m
6	18 m	11 m
7	15 m	-
8	13 m	-
9	12 m	-
10	11 m	-
11	10 m	-
12	-	-

Table 3-5: Max. cable length for OTC400

3.4.3 Maximum transmission rates

The transmission rate on the data transmission cables between the OTS400/ OTC400 and bar code scanners depends on the cable lengths:

Cable length	**transmission rate**
Up to 40m	1 Mbit/s
> 40m	500 kbit/s

Table 3-6: Max. transmission rate

4 Installation

4.1 Installation sequence

- Mount the frame above the reading location (if not already installed)
- Mount the bar code scanners
- Align and adjust the bar code scanners with the objects and range in which bar codes can appear
- Mount the sensor for generating the reading pulse (if a reading interval signal is not already provided)
- Install OTS400/ OTC400

4.2 Preparations for installation

4.2.1 Required accessories

- Hinged bracket (no. 2018435) or basic mounting bracket (no. 2013824) with the enclosed screws
- 2 screws for fixing each bar code scanner to the frame (if already provided)

4.2.2 Required components to be mounted

- OTS400/ OTC400
- CLV bar code scanners
- Reflection photoelectric switch for external reading interval control
- Connector covers with EEPROM
- Connecting cables
- Terminating resistor
- Hinged bracket or mounting bracket
- Frame (if not already provided)

4.2.3 Required tools

- Tool
- Measuring tape (max. required length 3,000 mm)
- Protractor

4.2.4 Procedure for mounting the bar code scanners

The procedure for mounting bar code scanners is described in detail in Chapter 4 *Installation* in the Operating Instructions of the bar code scanner in question.

4.3 Mounting the OPS

4.3.1 Mounting the OTS400/ OTC400

1 Install the frame and the bar code scanners.

2 Install the OTS400/ OTC400. The OTS400/OTC400 is attached near the CLVs. See Section 3.4 *Maximum cable lengths*.
The OTS400/ OTC400 must be mounted in such a way that the open device can be accessed at any time.

Mounting holes are provided on the OTS400/OTC400 or OTC400 (stand-alone) for securing the devices.
See 11.2 *Dimensional drawings OTS400/ OTC400*.

4.3.2 Mounting the external reading pulse sensor

See Chapter 4 *Installation* in the Operating Instructions of the bar code scanner in question.

4.3.3 Mounting sensors for detecting the object distance

The CLV490 bar code scanner, which is mainly used in the OPS, is equipped with an autofocus function for detecting the object distance automatically. For this reason, sensors for detecting the object distance are usually unnecessary.
If you want to use sensors for detecting the object, nevertheless, proceed as described in Chapter 4 *Installation* for the bar code scanner in question.

4.4 Disassembling the OPS

1. Switch off the operating voltage.
2. Disconnect all cables
3. Remove the bar code scanners and OTS400/ OTC400 from the mounting device
4. Remove the frame if necessary

For information on environmentally-friendly disposal, please refer to Section 9.3 *Disposal*.

5 Electrical installation

5.1 Installation sequence

- Connect the bar code scanners to the OTS400/ OTC400
- Connect the data and function interfaces of the OTS400/ OTC400
- Connect the PC to the OTS400/ OTC400
- Connect the OTS400 or OTC400 to the operating voltage

5.2 Electrical connections and cables

The power supply for the **OTS400** is connected via the screw terminals (top left in the OTS400, see *Fig. 3-2 on page 3-4*). Terminal specifications:

Connection cable	**Cross section**
Rigid	0.2 ... 4 mm^2
Flexible	0.2 ... 4 mm^2

Table 5-1: Power supply connection cable for OTS400

PVC cables are suitable for all connections. Neither heat protection nor halogen-free cables are required. The load carrying capacity of each terminal is 30 A.

The **OTC400** can also be used separately (without an OTS400). In this case, a functional extra-low voltage of 24 V DC +20%/–10% % pursuant to IEC 364-4-41 is required. The functional extra-low voltage can be generated by using a safety transfomer pursuant IEC 742. The is voltage wired directly on the terminal strip on the front panel.

Specification of the connection terminal:

Connection cable	**Cross section**
Rigid	0.2 ... 2.5 mm^2
Flexible	0.2 ... 2.5 mm^2

Table 5-2: Power supply connection cable for OTC400

Furthermore, the following connections can be made using the terminals on the front panel:

- RS 232 or RS 422/485 host interface (connection to the host)
- CAN Bus/CANOpen connection for communication with the bar code scanners
- Power supply for the bar code scanners
- Four switching outputs
- A relay switching output
- Three trigger inputs for external reading pulse triggers
- Two travel increment inputs for external incremental encoders
- Seven sensor inputs (“Sensor 1-1 ... 1-7”) that can be freely defined (e.g. for height photoelectric switches)
- Four sensor inputs (“Sensor 2-1 ... 2-4”) that can be freely defined (e.g. for height photoelectric switches)
- An "AUX" connection (9-pin D Sub HD connector) for test/diagnosis and parameter purposes
- A "CAN" connection (9-pin D Sub HD socket) for test and diagnosis purposes

- All connections, with the exception of the relay switching output must be wired with copper leads with a minimum wire cross-section of 0.125 mm^2!
- Connections for the relay switching output at least 1 mm^2.

5.3 Connector pin assignment

5.3.1 "CAN" connection

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

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

5.3.2 "AUX" connection

Pin	Signal	Function
1	T+ (RS 422/485)	Host interface (RS 422/485)
2	RxD_T	Aux interface (RS 232)
3	TxT_T	Aux 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	Aux interface (RS 232)
8	CTS_T	Aux interface (RS 232)
9	R- (RS 422/485), RxD (RS 232)	Host interface (RS 422/485)

Tab. 5-4: Pin assignment of the 9-pole D Sub "AUX" plug

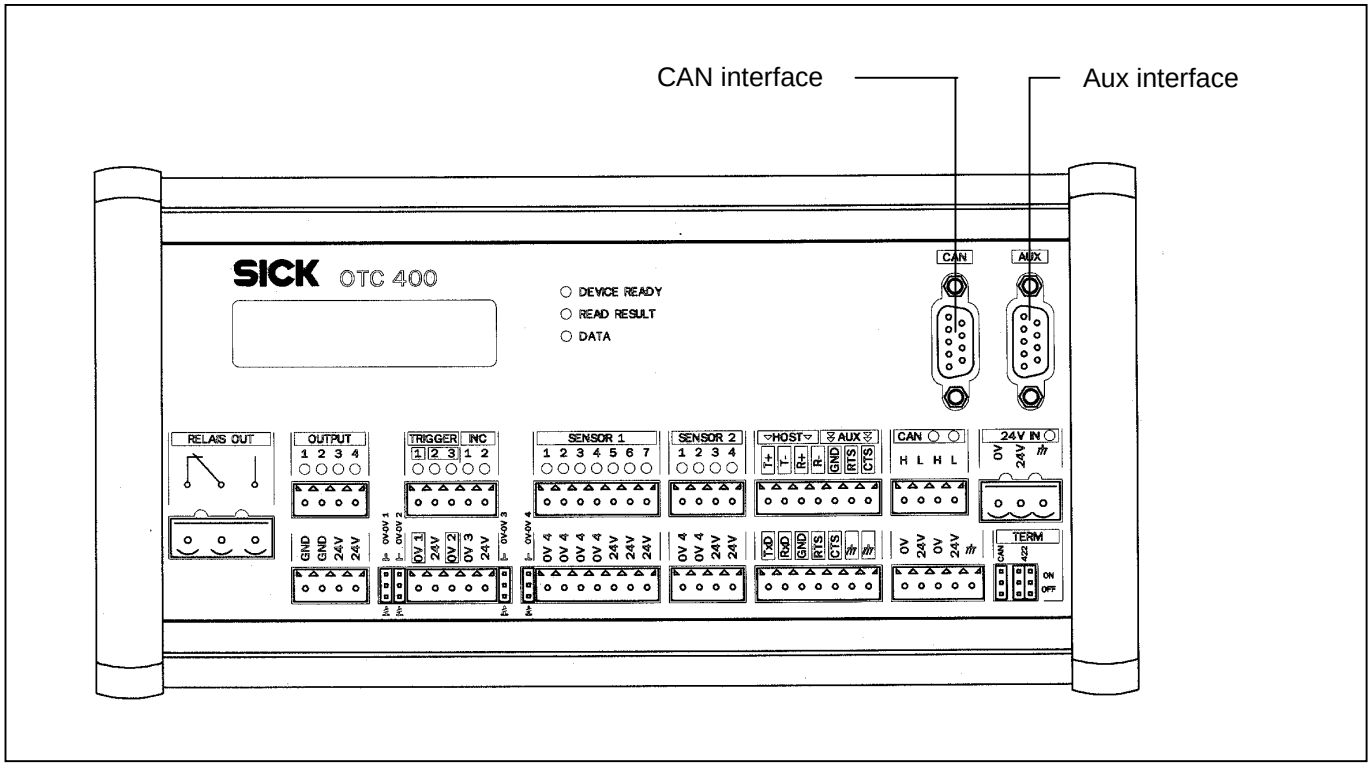

Fig. 5-1: OTC400 - front view

In addition to the 9-pin connectors of the auxiliary interface, the individual connections for the host and auxiliary interface (AUX) are available in two connector strips. *See Fig. 5-1*.

5.4 Preparations for electrical installation

5.4.1 Requirements of the host interface

The host interface of the OTS400/OTC400 can be operated as an RS 422/485 or RS 232 interface. Table 5-3 shows the recommended maximum cable length, in accordance with the data transmission rate.

Interface type	**Transmission rate**	**Distance to host**
RS 232	Up to 19,200 bd	max. 10m
	38,400 bd	max. 3m
RS 422/485[1)]	max. 38,400 bd	max. 1200 m
1) with appropriate line termination		

Table 5-5: Maximum cable length between the OTS400 and host

Alternatively, bus connection modules can be used, see Chapter 3 *Product description*.

5.4.2 Supply voltage

The OTS400 with OTC400 requires an operating voltage of 230 V AC (115 V AC) –15%/+10% with protective grounding.
In stand-alone operation (without the OTS400), the OTC400 requires an operating voltage of 24 V DC –10%/+20% (functional extra-low voltage pursuant to IEC 364-4-41). For connecting the power supply to the OTS400, see *Fig. 3-2*. For connecting the power supply to the OTC400 in stand-alone operation at the 24 V IN connector strip, see *Fig. 5-1*.

5.5 Electrical installation

5.5.1 Connecting the bar code scanners

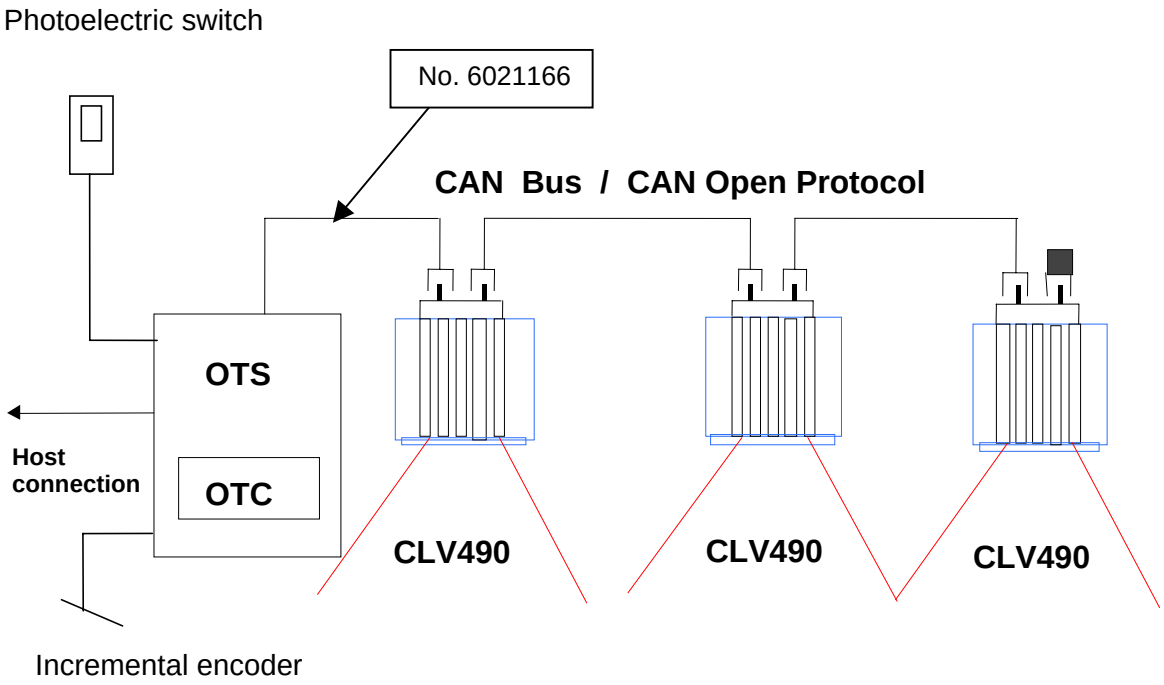

Fig. 5-2: Wiring diagram

Cable no. 6021166 is available for connecting the first bar code scanner to the OTS400/ OTC400. A socket is provided for connection to the bar code scanner; open cable heads are available for the connection to the OTC400.

Recommendation:
the supply cable should be shortened as much as possible, in order to prevent unnecessary transmission losses.

Pin	Signal	Color	Connection OTC400
1	Shield		Shield*)
2	+24 V	Red	+24 V
3	GND	Black	0V
4	CAN_H	White	H
5	CAN_L	Blue	L
*) with the OTS400, apply the shield directly over the conduit thread (housing entry).			

Table 5-6: Pin assignment of the connection cables

For connecting the cables, *see Fig. 5-3*.

Danger of irreparable damage to the OTC400

When operating the OTC400 as a stand-alone device:

- The power supply for the bar code readers may only be supplied at the 24V and 0V terminals in the CAN field. The correct currents are only available at these terminals.

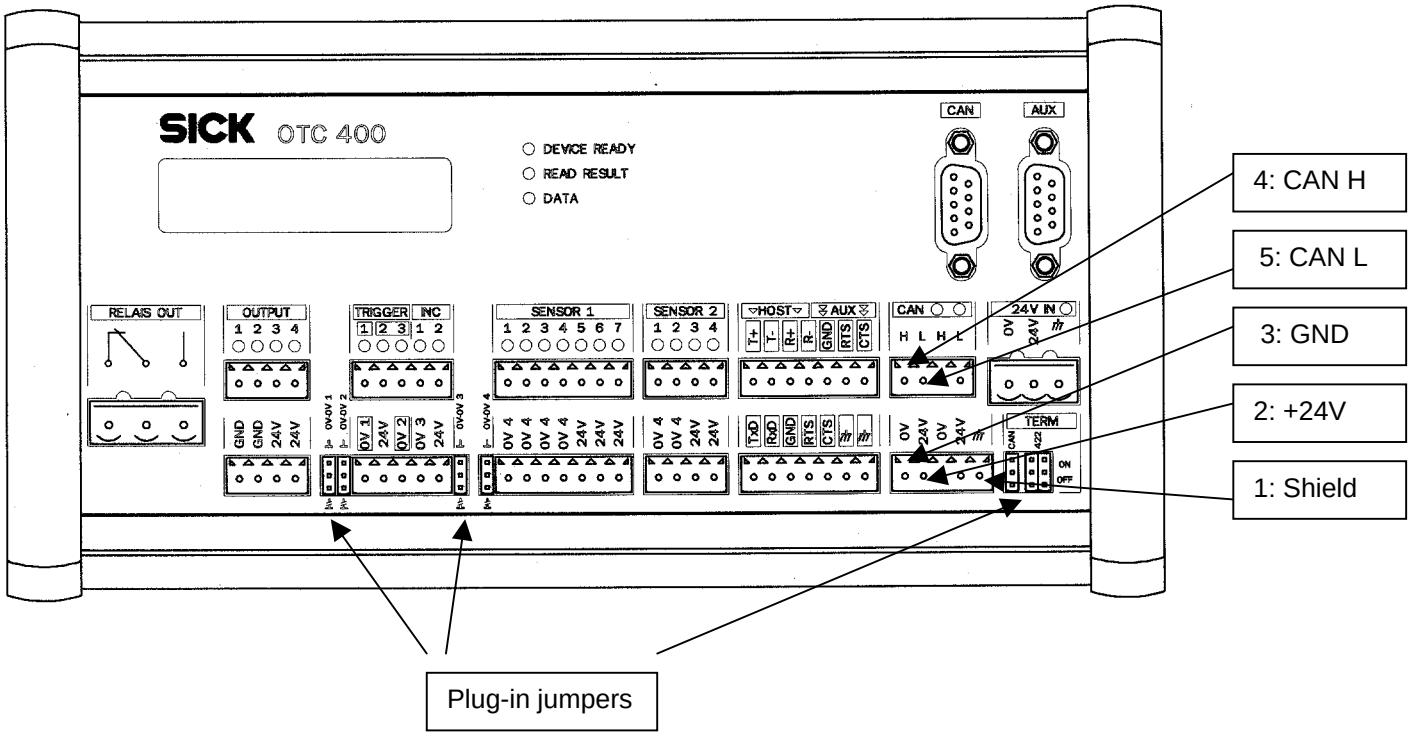

Fig. 5-3: OTC400 - front view

The cables for connecting the individual bar code scanners are available in 3 different lengths:

Order No.	Length	Article
6021166	5 m	Supply cable (1x open end/ 1x socket)
6021175	10 m	Supply cable (1x open end/ 1x socket)
6021164	0.7 m	Cable (1x connector/ 1x socket)
6021165	3 m	Cable (1x connector/ 1x socket)
6021168	5 m	Cable (1x connector/ 1x socket)
6021293	10 m	Return cable (1x connector/ 1x open end)

Table 5-7: Length of cables

The connector cover with EEPROM parameter memory (no. 2021264) should be attached between the connection cables and the bar code scanner. The operating principle of the connector cover is described in detail in the CLV490 Operating Instructions. The basic design is shown in *Fig. 5-4*.
The last bar code scanner is provided with a terminating resistor (no. 6021167). This is also pluggable.
A maximum of 2 branch lines per OTS400/ OTC400 are possible.

Fig. 5-4: CLV490 bar code scanner with connector cover and connection cables

5.5.1 Connecting the incremental encoder

An incremental encoder is to assign the bar codes to the various objects and must be connected directly to the OTC400. The terminal INC 1 is provided for this purpose.
The plug-in jumper "0V – OV 3" is used to connect the frame potential of the incremental encoders with the frame potential of the OTC400 (top position of the plug-in jumper), if the latter is to be powered via the OTC400. The terminal strip below the INC 1 terminal is used to connect the power supply.
Otherwise, the external potential should be assigned to the incremental encoder (bottom position of the plug-in jumper).
A dual-channel incremental encoder can also be connected if necessary. The OTC400 then evaluates the two phase-shifted signals.

Switching behavior:	Provision of an incremental signal at a distance of 10 to 15 mm per increment. Between 4 and 5 increments should be always available for the smallest object gap. See *Fig. 5-5*.
Characteristics:	Opto-decoupled, non-interchangeable
Electrical values:	Low: $-10V \leq V_i \leq +10V$; $-3mA \leq I_i \leq +3mA$ High: $-30V \leq V_i \leq -15V$; $-10mA \leq I_i \leq -5mA$ High: $+30V \leq V_i \leq +15V$; $+10mA \leq I_i \leq +5mA$

Table 5-8: Characteristic data of the "incremental encoder" input

5.5.2 Connecting the reading pulse sensor

The TRIGGER 1 terminal is provided for connecting the reading pulse sensor.
The plug-in jumper "0V – OV 1" is used to connect the ground potential of the reading pulse sensor with the ground potential of the OTC400 (top position of the plug-in jumper), if the latter is to be powered via the OTC400. The terminal strip below the TRIGGER terminal is used to connect the power supply.
Otherwise, the external potential should be assigned to the reading pulse sensor (bottom position of the plug-in jumper).
A 2nd and 3rd reading pulse sensor (TRIGGER 2 or 3) can also be connected, with power supply and assigned ground potential (plug-in jumper "0V – 0V2").

Switching behavior:	Start reading interval when input is live (default: active high, de-bouncing: standard). For connection diagram, *see Fig. 5-5*.
Characteristics:	Opto-decoupled, non-interchangeable
Electrical values:	Low: $-10V \leq V_i \leq +10V$; $-3mA \leq I_i \leq +3mA$ High: $-30V \leq V_i \leq -15V$; $-10mA \leq I_i \leq -5mA$ High: $+30V \leq V_i \leq +15V$; $+10mA \leq I_i \leq +5mA$

Table 5-9: Characteristic data of the "TRIGGER 1, 2, and 3" inputs

5.5.3 Connecting sensors

Additional sensors can be connected if necessary. The SENSOR 1 (1-1 ...1-7) and SENSOR 2 (2-1 ... 2-4) terminal strips are provided for this purpose. A plug-in jumper (0V – 0V4) is also available for SENSOR 1.
At present, the switching function is not defined and can be configured by the customer.

Switching function:	Undefined. *See Fig. 5-5*.
Characteristics:	Opto-decoupled, non-interchangeable
Electrical values:	Low: $-10V \leq V_i \leq +10V$; $-3mA \leq I_i \leq +3mA$ High: $-30V \leq V_i \leq -15V$; $-10mA \leq I_i \leq -5mA$ High: $+30V \leq V_i \leq +15V$; $+10mA \leq I_i \leq +5mA$

Table 5-10: Characteristic data of the "SENSOR" inputs

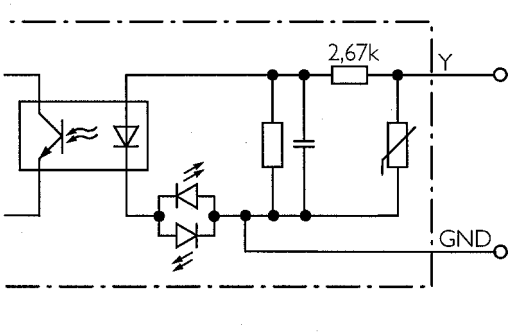

Fig. 5-5: Input circuits

The GND shown in *Fig. 5-5* is the external GND. To connect this to the internal GND, change the jumper setting.

5.5.4 Connecting the outputs

The 4 switching outputs and the relay output can be assigned various result functions, independent of one another. If the associated event occurs during the read operation, the corresponding output becomes live at the end of the reading pulse for the selected pulse duration.

Switching outputs:

The 4 outputs have the same characteristic data.

Switching behavior:	Switches with respect to the supply voltage V_S and ground
Characteristics:	Short-circuit-proof, temperature-protected, not electrically isolated from V_s
Function assignment (defaults)	Output 1: "Device ready" (static), output 2: "Good read", output 3: "No read", Output 4: "Data pulse", pulse duration 100ms
Electrical values:	$0V \leq V_o \leq V_S$ Guaranteed: $V_o \geq V_s - 2.5V$ for $I_o \leq 100mA$ $I_o \leq 100mA$

Table 5-11: Characteristic data of the 4 switching outputs

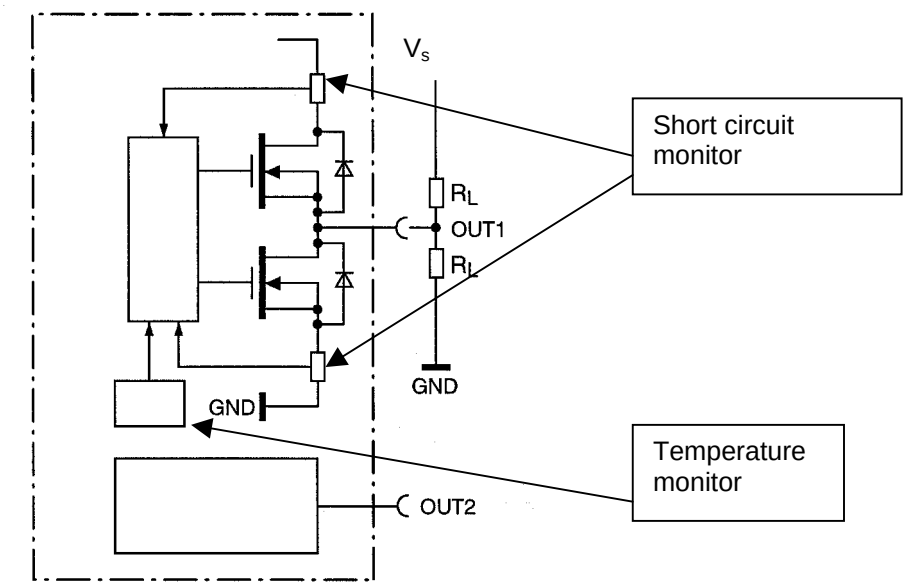

Fig. 5-6: Circuit diagram of the 4 switching outputs (Here: output 1 in detail)

Relay output:

Characteristics:	Not short-circuit-proof, not temperature-protected, electrically isolated, floating
Function setting (defaults)	Relay output: "Device ready" (static)
Electrical values:	Alternating voltage/direct voltage $0V \leq V_{SWITCH} \leq 250V$ according to VDE 0110 group C Max. current 1.5 A for 24 V DC Max. current 0.2 A for 250 V DC Max. current 1.5 A for 250 V AC

Table 5-12: Characteristic data of the relay output

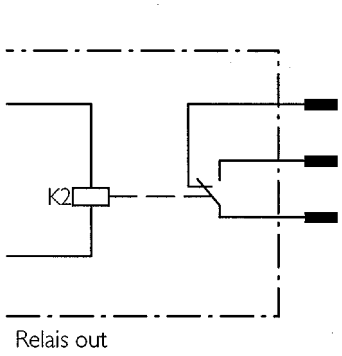

Fig.: 5-7: Circuit diagram of the relay output

Note:

Even high-quality relays suffer from wear and tear on the contacts. For this reason, we recommend the relay output be used only for functions that require many switching cycles (e.g. good read).
Typical service life of a relay at maximum load (220 V AC/ 8 A): 100,000 switching cycles
Typical mechanical service life (without load): 30,000,000 switching cycles

5.5.5 Wiring the host interface

Important:
If the host interface is wired incorrectly, electronic components in the OTC400 may be damaged.

- Wire the host interface correctly
- Check the wiring carefully before switching on the OTC400

---

1. Connect the host interface of the OTC400 to the host using shielded cables, in accordance with EMC guidelines
2. Note the maximum cable lengths, as defined in Section 5.4.1 *Requirements of the host interface*
3. Apply the shield to one side **(recommendation)**
   When using the OTS400, apply the shield directly over the conduit thread (housing entry).

In the default setting, the bar code scanner communicates via the **RS 422/485** interface version with the following values:

Parameter	**Value**
Data transmission rate	9,600 bd
Data bit	8
Parity	None
Stop bit	1
Log	SICK (start characters: STX, stop characters: ETX, handshake: none, timeout: 50 ms)

Table 5-13: Defaults of the communication parameters of the host interface

Terminating the RS 422 interface:

The plug-in jumpers (*see Fig. 5-3*) are used to terminate the host interface:

- To activate the RS 422 version, set both plug-in jumpers to OFF.
- To activate the RS 485 version, set both plug-in jumpers to ON.

Activating the RS-232 version:

The RS 232 interface is activated on the "Host interface" tab of the CLV Setup program.
Only the terminal description for the RS 422 version is displayed under host on the terminal strip. The following assignment must be made to connect the RS 232 interface:

RS 232	**RS 422**
TxD	T-
RxD	R-

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

Downloading to the OTC400:

1. In the toolbar, click the "Page to bar code scanner" button.
   CLV Setup downloads the parameter set to the OTC400.
   The "Download Parameters" dialog box with the storage options appears.
2. Click the desired storage options.
   The dialog box closes automatically.
   The OTC400 now operates the host interface in the RS 232 version.

5.5.6 Wiring the auxiliary interface

The auxiliary interface is the auxiliary data interface with which the user operates and configures the OTC400 with the "CLV Setup" PC software. Unlike the host interface, it has a fixed data format and data transmission rate.

The PC must be connected either to the connector strip of the auxiliary interface directly (*see Fig. 5-1*) or to the terminal interface (*see Fig. 5-1*, 9-pin D Sub connector) via the RS 232 connection cable no. 2 014 054.

The communication parameters for the PC port should be set as follows:

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

Table 5-15: Communication parameters for the auxiliary interface

In the default setting, the auxiliary interface outputs the reading result in "Reading diagnosis" mode. The operating mode can be changed on the "Auxiliary interface" tab in the CLV Setup program. Other available operating modes are described in *Section 7.3*.

5.5.7 Wiring the CAN interface

The procedure for connecting the cable to CAN-H and CAN-L is described in Section 5.5.1 *Connecting the bar code scanners*. The CAN interface must also be terminated.

Terminating the CAN interface:

- The plug-in jumper (*see Fig. 5-3*) is used to terminate the CAN interface.
- To operate the OTS400/ OTC400 with one branch line (*see Fig. 5-2*), set the plug-in jumper to ON.
- To operate the OTS400/ OTC400 with two branch lines, set the plug-in jumper to OFF.

The 9-pin D Sub connector of the CAN interface (*Fig. 5-1*) is used to monitor the CAN bus and is only required for internal analyses at SICK.

Notes:

6 Setup

6.1 Quick start with the factory defaults

Unlike the individual bar code scanner, the OPS does not support the Quick Start procedure, as the position of each individual bar code scanner must be parameterized exactly. See Chapter 8 *Parameterization*. The parameters should be defined using the CLV Setup program.

6.2 Defaults

Table 6-1 shows an overview of the factory defaults for the OTC400, e.g. when it is switched on for the first time. The tried-and-tested default parameters enable the OTC400 to be used in a wide range of applications with only minor changes.
The device-specific default values are stored permanently in the OTC400, the bar code scanner in question, and in the CLV Setup program and can be activated at any time.

Parameter	**Default**
Active code types	Code 39, Code 128, 2/5 Interleaved
Code length	Free (2/5 Interleaved: interval, 4 ... 50 characters)
Multiple reads	3
Min./max. number of codes	1
OTS trigger mode	Active, if TRIG 1 high, end of reading pulse by reading pulse source
Distribution of focus position info	Once per reading pulse
Increment input	INC 1
Switching outputs	Output 1: "Device ready"; Output 2: "Good read"; Output 3: "No read"; Output 4: "Data pulse", Relay output: "Device ready"
Host interface	RS 422/485
Protocol	NAK; start character: STX, stop character: ETX
Transmission rate	9,600 bd
Data format	8 data bits, no parity, 1 stop bit
Output format	Header: blank, separator: blank, terminator: blank; error string: NOREAD + separator
Output point	Reading result: end of reading interval, separator: after code
Test string	Inactive
Auxiliary interface	Reading diagnosis

Table 6-1: Default parameter values of the OTC400

To display and print out the entire default settings, proceed as follows in the CLV Setup program:

1. Saves any changes you made to the current parameter set in a new configuration file "Name.scl" using the menu option "File/Save As".
2. Click the defaults icon ("red factory building") in the toolbar.
   The default settings are loaded and displayed on the tabs.
3. Click the printer icon.
   The Print dialog box appears.
4. Edit and confirm the dialog box.
   CLV Setup prints out the default settings.

7 Operation

7.1 Overview

The OTS400/ OTC400 and the CLV490 bar code scanners connected in the OPS feature the following operating modes/functions:

Standard operating mode:

- Reading mode

Startup:

- Percentage evaluation[1)]
- Adjustment mode and visualization of the reading angle limits[2)]
- Background teach-in[2)]

Parameterization:

- Parameter mode (configuration)

Monitoring/troubleshooting:

- View and edit operating data
- Reading diagnosis
- Monitor host interface
- Auxiliary input
- Self-test
- Standard OTS400 statistics (single read)
- Extended OTS400 statistics (single read)
- Summarized OTS400 statistics (single read)
- Standard OTS400 statistics (single read) with overall statistics after 100 reading pulses
- Summarized OTS400 statistics after 100 reading pulses
- I/O monitor in the increment pulse
- Monitor scanner - reading results

1) These functions are only available for CLV490 bar code scanners and not for the OTS400/OTC400 itself.

2) These functions are only available for CLV490 bar code scanners and not for the OTS400/OTC400 itself. These can be found in the CLV Setup program in the menu "Tools" under "Device Functions".

To call up these functions, choose the "Parameters in the OTS network" option from the OTC400 device selection and enter the ID of the bar code scanner.

7.2 Preparations for operation

1. Connect the PC to the auxiliary interface on the OTS400/ OTC400.
2. Switch on the operating voltage for the OTS400/ OTC400 and connected bar code scanners.
3. Start Windows and CLV Setup configuration software on your PC.
4. Click the "Terminal" icon in the toolbar.
   The Terminal Emulator window appears. The bar code scanner is now in Reading mode.

7.3 Operating modes/functions

7.3.1 Reading mode (standard operating mode)

The OTS400/ OTC400 switches to this mode automatically after it has been started and the self-test has been completed successfully. In the default setting, the OTS400/ OTC400 works with the "TRIGGER 1" switching input (set to "high") as a trigger source for generating the reading pulse. The OTS400/ OTC400 outputs the reading result at the end of the reading field on both the host and auxiliary interface.
An external incremental encoder is required. In the default setting, "INC 1" with a length of 10 mm is active.
If the incremental encoder does not output any signals to the OTS400/ OTC400, e.g. because the conveyor belt is switched off, the end of the reading field is not reached and no reading result is output.
A PC is only required to access the reading result directly.

Displaying the reading result:

1. Connect the incremental encoder and trigger source to the OPS
2. Switch on the the conveyor belt.
3. Place an object with a sample bar code in front of the OPS (position object on the conveyor belt and let it pass through the OPS).
4. Once the object is no longer recognized by the trigger source and the parameterized end of the reading field has been reached, the OTS400/ OTC400 outputs the reading result in the Terminal Emulator.
   The terminal interface is then in "Reading diagnosis" mode (default).

Reading result on the auxiliary interface:

The reading result on the auxiliary interface comprises the data contents of the bar code(s) and the reading diagnosis data. The function of the reading diagnosis data is explained in the CLV490 Operating Instructions, in Chapter 7 *Operation*.

Reading result on the host interface:

In the default setting, the OTS400/ OTC400 sends only the data contents of the bar code(s) as a simple data string on the host interface, without reading diagnosis data. The header, separator, and terminator are empty (blank).
You can define the structure of the data output string on the host interface from the "Data string" tab in the CLV Setup program. The header, separator, and terminator can comprise up to 10 elements, consisting of constants and/or reading diagnosis data.

1. Click "Header" in the drop-down list.
   The "Edit parameters: TFH" dialog box appears.
2. Choose the desired constants or placeholders for reading diagnosis data.
   The selected elements appear in the line at the top of the dialog box.
3. Confirm the dialog box with "OK".
4. Repeat this procedure for the separator and terminator.

Download to the OTS400/ OTC400:

1. Click the "page to bar code scanner" icon in the toolbar
   CLV Setup downloads the parameter set to the OTS400/ OTC400.
   The "Download Parameters" dialog box appears with the storage options.
2. Click the desired storage option.
   The dialog box closes automatically.

The OTS400/ OTC400 now works with the new settings.

Defining an alternative reading pulse in the Terminal Emulator:

For test purposes, the OTS400/OTC400 can also be triggered directly from the Terminal Emulator window without an external reading pulse sensor. This option can also be used if the conveyor belt controller provides a PLC signal for the reading interval.

1. Close the Terminal Emulator.
2. Choose the "Device Configuration" tab.
3. Click the "Edit Reading Trigger" button.
   The "Edit Reading Trigger" dialog box appears.
4. Choose the "Serial Interface" option field.
5. Confirm the dialog box with "OK".

This function requires the incremental signal. The OTS400/ OTC400 outputs the reading result in the main window of the Terminal Emulator.

Download to the OTS400/ OTC400:

1. Click the "page to bar code scanner" icon in the toolbar
   CLV Setup downloads the parameter set to the OTS400/ OTC400.
   The "Download Parameters" dialog box appears with the storage options.
2. Click the desired storage option.
   The dialog box closes automatically.

The OTS400/ OTC400 now works with the new settings.

Triggering the SW trigger:

1. Click the "Terminal" icon.
   The Terminal Emulator screen appears. The OTS400/ OTC400 is in Reading mode.
2. Click the "Start SW Trigger" button.
3. Place the bar code in front of any bar code scanner.
4. Click the "Stop SW Trigger" button.

This function requires the incremental signal. The OTS400/ OTC400 outputs the reading result in the main window of the Terminal Emulator.

As a prerequisite, the OTS400/ OTC400 must be able to assign the read bar code uniquely to one object, i.e. the bar code is located on the object detected by the trigger source of the reading pulse generator.

7.3.2 Percentage evaluation

This operating mode is available for each individual bar code scanner in the OPS and is only accessible via the **auxiliary interface**. It can be used to assess the reading quality for bar codes that are placed statically in the reading field of the OPS or of individual bar code scanners in the OPS (conveyor belt stationary). The bar code scanner evaluates the good read rate statistically for 100 scans in free-running mode and outputs the reading results every 2 seconds. These results can be displayed using the CLV Setup program.

1. Click the "Terminal" icon.
   The Terminal Emulator window appears. The OTS400/ OTC400 is in Reading mode.
2. Click the "Percentage Evaluation" option.
   The OTS400/ OTC400 is in Percentage Evaluation mode.
3. Place bar code statically in front of any bar code scanner and monitor the Terminal Emulator.
   The OTS400/ OTC400 outputs every result. Depending on the reading quality, the "Read result" LED either lights up or blinks. See also Section 3.3.1 *Functions of the LEDs*. The output format of the read result is identical to that in Reading mode.

7.3.3 Setting parameters (configuration)

The parameterization process adapts the OTS400/ OTC400 and the connected bar code scanners manually to the application-specific conditions. The most efficient method is the online method using the tabs and download function of the CLV Setup program. In this mode, the OTS400/ OTC400 does not output any reading results. The procedure is described in Chapter 8 *Configuration*.

Setting parameters with the Terminal Emulator:

The Terminal Emulator can also be used to parameterize the OTS400/ OTC400 and connected bar code scanners directly by entering command strings. This enables special devices to be adjusted and new OTS400/OTC400 parameters to be configured that do not exist in the current version of CLV Setup.
The changes made here are not registered in the program until they have been uploaded from the OTS400/ OTC400 to the PC (provided that they are recognized as parameters) and should be treated with care. The command language accesses the command interpreter of the device directly.

Configuring the OTS400/ OTC400 or bar code scanner with command strings:

1. Click the "Terminal" icon in the toolbar.
   The Terminal Emulator window appears. The OTS400/ OTC400 is in Reading mode.
2. Click the "Parameterise" option field.
   CLV Setup issues a command that switches the OTS400/ OTC400 to Parameter mode (all commands begin with "3").
3. Enter the desired command in the command line and send it to the OTS400/OTC400 by pressing the Return key.
   The OTS400/ OTC400 responds to a command with the correct syntax by issuing an echo.
   Example:
   The entry "3?HS" instructs the OTS400/ OTC400 to output the communication parameters of the host interface.
4. To return to Reading mode, click the "Reading mode" option.

7.3.4 Viewing and editing operating data

This function allows you to interrogate and reset statistical operating data that the OTS400/OTC400 logs in the form of counters during the reading operation. The OTS400/ OTC400 does **not** output reading results in this mode.

1. Click the "operating data" icon (“jagged line”) in the toolbar.
   The Operating Data dialog box appears. The OTS400/ OTC400 interrupts Reading mode.
2. After reading/resetting the desired counters, confirm the dialog box with "OK".
   The OTS400/ OTC400 resumes Reading mode.

7.3.5 Displaying Adjusting mode and reading angle limits

These two functions are not directly available in the OTS400/ OTC400 but in the bar code scanners connected to the OPS. A detailed description is provided in Chapter 6 *Operation* of the CLV490 Operating Instructions.

7.3.6 Background teach-in

This function is not directly available in the OTS400/ OTC400 but in the bar code scanners connected to the OPS. A detailed description is provided in Chapter 6 *Operation* of the CLV490 Operating Instructions.

7.3.7 Reading diagnosis

Function of the **auxiliary interface** (default). In this mode, the OTS400/ OTC400 outputs the data contents of all read bar codes with the associated reading diagnosis data, including the data recorded incorrectly according to the selection criteria (errored). The number of bar codes output, therefore, may be greater than the number of bar codes that are sent in the reading result on the host interface.
In the default setting, the OTS400/ OTC400 does not output any reading diagnosis data on the host interface.

The reading diagnosis can be activated on the "Auxiliary Interface" tab in the CLV Setup program as follows:

➢ Choose the "Read Diagnostics" option in the "Auxiliary Interface" list box.

Download to the OTS400/ OTC400:

1. Click the "page to bar code scanner" icon in the toolbar.
   The CLV Setup downloads the parameter set to the OTS400/ OTC400.
   The "Download Parameters" dialog box appears with the storage options.
2. Click the desired storage option.
   The dialog box closes automatically.

The terminal interface of the OTS400/ OTC400 is now working in "Reading diagnosis" mode.

7.3.8 Monitoring the host interface

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 outputs the data traffic on its host interface via the auxiliary interface. Repetition requests from the protocol driver and protocol-specific data, such as start and stop characters, are suppressed. Each data string is represented on a separate line.

Identification of the data direction:

O data string ... = OTS400/ OTC400 sending to the host (**O** = Output)
I data string ... = OTS400/ OTC400 receiving from the host (**I** = Input)

The function for monitoring the host interface can be activated on the "Auxiliary Interface" tab in the CLV Setup program as follows:

➢ Choose the "Monitor Host Interface" option from the "Auxiliary Interface" drop-down list.

Download to the OTS400/ OTC400:

1. Click the "page to bar code scanner" icon in the toolbar.
   The CLV Setup downloads the parameter set to the OTS400/ OTC400.
   The "Download Parameters" dialog box appears with the storage options.
2. Click the desired storage option.
   The dialog box closes automatically.

The auxiliary interface of the OTS400/ OTC400 is now working in "Monitor Host Interface" mode.

Displaying data in the Terminal Emulator (for test purposes):

1. Choose the serial interface as a trigger source for the reading pulse. See Section 7.3.1 *Reading mode*.
2. Click the "Terminal" icon in the toolbar.
   The Terminal Emulator window appears. The bar code scanner is in Reading mode.
3. Click the "Start SW Trigger" button.
4. Place the bar code in front of any bar code scanner.
5. Click the "Stop SW Trigger button.
   The OTS400/ OTC400 outputs the result of the host interface in the main Terminal Emulator window. In the default setting, the result does not contain any reading diagnosis data.

This function requires the incremental signal. The OTS400/ OTC400 outputs the reading result in the main window of the Terminal Emulator.
As a prerequisite, the OTS400/ OTC400 must be able to assign the read bar code uniquely to one object, i.e. the bar code is located on the object detected by the trigger source of the reading pulse generator.

If the data traffic on the host interface is very fast or very high, it may not be displayed correctly. This is due to the slower transmission speed of the auxiliary interface, with the result that missing information appears as ".....".

7.3.9 Auxiliary input

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 accepts a bar code entered manually on the auxiliary interface (via keyboard or handheld scanner with decoder). It sends the bar code to the host in a separate data string on the host interface. This function can be used to correct no reads, for example, by transferring missing bar codes subsequently.

7.3.10 Self-test

During the self-test, the OTS400/OTC400 checks whether its hardware components are functioning properly and verifies the number and error status of the connected bar code scanners. A concluding message output on the auxiliary interface provides information on the test result. Each time it is switched on, the device runs a self-test before it is initialized with the valid parameter set. The test can be called up explicitly at any time. The CLV **does not** output any **reading results** during the test routine.

1. Click the "Terminal" icon in the toolbar.
   The Terminal Emulator window appears. The OTS400/ OTC400 is in Reading mode.
2. Click the "Self-Test" option field.
   The OTS400/ OTC400 terminates Reading mode and starts the test routine. After a few seconds, the OTS400/ OTC400 outputs the test result in the form of a code number.
3. To return to Reading mode, click the "Reading mode" option or close the Terminal Emulator.
   The OTS400/ OTC400 resumes Reading mode.

The code number "15**000"** means that the test has been concluded successfully and no errors were diagnosed. Section 10.2 *Error messages* contains a list of error codes and associated remedies.

7.3.11 Standard OTS400 statistics (single read)

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 outputs an overview of the information collected for each reading pulse via the auxiliary interface. The reading interval lengths and durations, as well as velocity are output. Furthermore, the code type, length, and contents, reading rate, and code reliability are output for each code read.

The standard OTS400 statistics (single read) can be activated on the "Auxiliary Interface" tab in the CLV Setup program as follows:

- Choose the "Standard OTS Statistics (single read)" option from the "Auxiliary Interface" drop-down list.

Download to the OTS400/ OTC400:

1. Click the "page to bar code scanner" icon in the toolbar.
   The CLV Setup downloads the parameter set to the OTS400/ OTC400.
   The "Download Parameters" dialog box appears with the storage options.
2. Click the desired storage option.
   The dialog box closes automatically.

The terminal interface of the OTS400/ OTC400 is now working in the "Standard OTS statistics (single read)" mode.

The procedure for activating the described function for 7.3.11 to 7.3.16 is always the same and only described in Section 7.3.11.

7.3.12 Extended OTS400 statistics (single read)

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 outputs an overview of the information collected for each reading pulse via the auxiliary interface. In addition to Section 7.3.11 *Standard OTS statistics (single read*), the reading results of the various bar code scanners are also transferred in detail here.

7.3.13 Summarized OTS400 statistics (single read)

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 outputs a summarized overview on the information collected for each reading pulse via the auxiliary interface. Only the most important items of data are summarized in one line. This compressed form is particularly useful for evaluating the results in detail (e.g. with a spreadsheet program).

7.3.14 Standard OTS400 statistics (single read) with overall statistics after 100 reading pulses

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 outputs an overview of the information collected for every 100th reading pulse via the auxiliary interface. No data is output between the cycles, with the exception of error messages. The information output here is the same as that described in Section 7.3.11 *Standard OTS statistics (single read)*.

7.3.15 Summarized OTS400 statistics (single read) with overall statistics after 100 reading pulses

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 outputs a summarized overview of the information collected for every 100th reading pulse via the auxiliary interface. No data is output between the cycles, with the exception of error messages. Only the most important items of data are summarized in one line. This compressed form is particularly useful for evaluating the results in detail (e.g. with a spreadsheet program).

7.3.16 I/O monitor in the incremental pulse

Function of the **auxiliary interface**. In this mode, the OTS400/ OTC400 outputs a status line referring to the time and increment on the auxiliary interface for every status change of an input or output. One position in the status line is available for this purpose for each of the 4 outputs, the relay, and 14 inputs (without increment inputs). Depending on the status of the input or output, the position contains either a "." or a "1".

7.4 Switching off the device

Any changes made to the parameter set of the OTS400/ OTC400 or the bar code scanner with the CLV Setup program do not take effect until they have been transferred to the OTS400/ OTC400 or bar code scanner.

Current parameter set unchanged:

1. If **no changes** have been made or if these are to be rejected, choose "File" and "Exit" in the menu bar.
   CLV Setup closes.
2. Switch off the supply voltage to the OTS400/ OTC400 and the bar code scanners connected to the OPS.
   The parameter set that was last stored permanently in the OTS400/ OTC400 or bar code scanner remains valid.

Current parameter set has been modified in CLV Setup:

1. Download the modified parameter set **to the OTS400/OTC400**:
   Click the "page to bar code scanner" icon in the toolbar.
   CLV Stup transfers the parameter set to the OTS400/ OTC400 and asks you to specify the desired storage option.
2. Confirm the "Permanent" storage option with "OK".
   The OTS400/ OTC400 is now working with the modified parameter set.
3. Store the modified parameter set as a **new configuration file in CLV Setup on the PC** or overwrite the existing file: choose "File", a "Save As" from the menu bar.
4. Enter and confirm the path and file name in the dialog box.
   CLV Setup stores the configuration file.
5. Choose "File" and the "End" menu option in the menu bar.
   CLV Setup closes.
6. Switch off the supply voltage to the OTS400/ OTC400 and bar code scanners connected in the OPS.

8 Parameterization

8.1 Overview

The parameter settings are used to adapt the reading, evaluation, and output properties of the bar code scanner to the application. The default settings defined at the factory or a parameter set that has already been modified is used as a starting point.

The parameter settings for the bar code scanner can be defined as follows:

- Using the Windows-based CLV Setup program (via a serial interface)
- With command strings (via a serial interface)

8.2 Quick start

8.2.1 Setting parameters with the CLV Setup program

The CLV Setup program provides a convenient means of configuring the OTS400/OTC400 via a serial interface:

1. Connect the PC to the auxiliary interface on the OTS400/ OTC400
2. Switch on the power supply to the OTS400/OTC400 and bar code scanners in the OPS.
3. Start Windows and the CLV Setup program.
4. Upload the parameter settings from the OTS400/OTC400 by clicking the ‘Bar code scanner to page’ icon in the toolbar. CLV Setup then transfers the values from the current parameter set from the OTS400/OTC400 to the PC (this is carried out automatically when the program starts, provided that the PC is connected).
5. Change the required values on the tabs. You can display an explanation of the parameters and their functions by pressing the <F1> key.
6. Download the parameters to the OTS400/ OTC400 by clicking the ‘Page to bar code scanner’ icon in the toolbar. CLV Setup then transfers the modified parameter set to the OTS400/OTC400. The ‘Download Parameters’ dialog box is then displayed with the storage options.
7. Confirm the ‘Permanent’ storage options by clicking ‘OK’.
   The dialog box is then closed automatically.
8. Save the modified parameter set as a configuration file ‘*.scl*’ in CLV Setup.

The OTS400/OTC400 is now ready to use the new parameter settings.

The individual bar code scanners used in the OPS can also be parametrized via the auxiliary interface on the OTS400/OTC400. To do so, choose the ID of the relevant bar code scanner in the menu ‘Option’ under ‘Parameter in OTS network’.

8.2.2 Setting parameters with command strings

➢ Program the host/PC in such a way that it sends the command strings to the OTS400/OTC400.

8.3 Setting parameters with CLV Setup

The Windows-based CLV Setup program is used to set the OTS400/OTC400 and bar code scanner parameters manually and to operate the device in general (choose functions and operating modes). The program supports the OTS400/OTC400 and all standard SICK bar code scanner types.
CLV Setup communicates with the OTS400/OTC400 and bar code scanners by uploading and downloading the parameter values via the serial port on the PC (online mode).
The default settings defined at the factory or a parameter set that has already been modified are used as a starting point. All of the parameter sets can be stored in configuration files in CLV Setup.
You can display the context-sensitive help, which contains a description of all the OTS400/OTC400 and bar code scanner parameters, e.g. with the ‘Intrenet Explorer‘. A terminal emulator provides direct (online) access to the OTS400/OTC400 and the bar code scanner. You can display and edit the operating data on the screen in English or German.

8.3.1 Installing the CLV Setup software

Preparations:

1. Make sure you have the CD-ROM “Manuals & Software Bar Code Scanners” (no. 2029112) containing CLV Setup at hand.
2. Connect the PC to the auxiliary interface of the OTS400/ OTC400.
3. Connect the power supply to the OTS400/ OTC400.
4. Switch on your PC and start Windows.

Installing the software:

You can run the software on a PC with Windows 95™/ 98™, Windows NT™, Windows 2000™ or Windows XP™. The installation program creates a main directory with a series of subdirectories and generates the necessary links. Approximately 30 MB of hard disk space is required to install CLV Setup. You can also remove the program from your PC at any time by running the uninstaller.

1. Initial installation

1. Close all Windows applications!
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 that contains the latest information on CLV Setup.
10. Then confirm the installation message by clicking OK.

The CLV Setup program and CLV Setup Help are installed and ready.

2. Updating the program

a) Installing the new version over the old one:

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" – using the uninstaller program.

There are two ways of removing CLV Setup:

- Automatic, full deinstallation (default setting):
  All of the files in the main directory and subdirectory, with the exception of the configuration files in the 'data' directory (which contain the application-specific parameter sets of the OTS400/OTC400 and bar code scanner), are deleted.
- Custom deinstallation:
  The uninstaller uses the log file from the installation routine to list all of the files, with the exception of the configuration files '*.scl' in the 'data' directory. The configuration files '*.scl' only remain if you do not allow the main directory to be deleted. We recommend that you move these files to a different directory and copy them back to the "data" directory later.

Starting the uninstaller:

1. Choose the uninstaller for CLV Setup under Programs in the Start menu.
   The uninstaller is then started and guides you step by step through the deinstallation process.
2. Choose the deinstallation method.
3. Install the new version of CLV Setup as described in Point *1. Initial installation*, making sure to choose the same directory.

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

b) Installing the new version in parallel with the old one:

1. Start the installation program for the **new CLV Setup** version as described under *1. Initial installation*.
2. When the program asks you for the target directory, you must specify a **new directory**.

The new version of CLV Setup is then installed. We recommend that you do not run both versions simultaneously. You can also use your old configuration files with the new CLV Setup version.

8.3.2 Starting CLV Setup

1. Switch on your PC and start Windows.
2. Choose CLV Setup from the Start menu.
   The SICK logo is then followed by the initial screen.
3. Confirm the initial screen.
   CLV Setup then checks whether a bar code scanner is connected to the COM 1 port on the PC (default setting in CLV Setup) and whether the OTS400/OTC400 communication parameters match those in CLV Setup.
4. Once the program has successfully established communication, it enters the OTS400/OTC400 type in the 'Scanner' drop-down list in the tool bar and changes the status field to 'Connected'.

The program then loads the internal OTS400/OTC400 or scanner description as well as the default parameter values and displays them in the tab. Finally, CLV Setup uploads the parameter set that was last stored permanently in the OTS400/OTC400 and displays the values in the tabs.

Troubleshooting

If the program cannot establish communication, it outputs a timeout warning and displays ‘No connection’ in the status field. CLV Setup then enters the OTS400/OTC400 or scanner type that it last communicated with in the ‘Scanner’ drop-down list (CLV410 the first time the program is started).

The program then loads the internal description of the scanner type and displays the default parameter values on the tabs.

1. OTS400/ OTC400 or bar code scanner connected but the communication parameters differ

1. Choose the connected OTS400/OTC400 or CLV type from the ‘Scanner’ drop-down list in the toolbar.
   CLV Setup then attempts to connect to the device. Depending on whether it was successful, it displays either ‘Connected’ or ‘No connection’ in the status field.
   The program then loads the internal scanner description and displays the default parameter values on the tabs.
2. If ‘No connection’ is displayed, choose ‘Options’, ‘Serial interface’.
   CLV Setup then displays the current communication parameter settings in the ‘COM parameters’ dialog box.
   If you choose the **‘Option‘, ‘Auto Baud Detect’**, CLV Setup attempts to detect and set the communication parameters automatically.
3. Make sure that the communication parameters defined in CLV Setup are identical to those of the bar code scanner (9,600 bd, 8 data bits, 1 stop bit, no parity) and confirm the dialog box.
   CLV Setup attempts to communicate with the OTS400/OTC400 again. If it succeeds, it displays ‘Connected’ in the status window.

You can then change the current parameter values on the tabs.

2. No OTS400/OTC400 or bar code scanner connected when CLV Setup is started

1. Connect the PC to the auxiliary interface on the OTS400/OTC400.
2. Choose the connected OTS400/OTC400 or CLV type from the ‘Scanner’ drop-down list in the toolbar.
   CLV Setup then attempts to connect to the device. If it was successful, it displays either ‘Connected’ in the status field.
   The program then loads the internal scanner description and displays the default parameter values on the tabs.
3. Click the ‘bar code scanner to page’ icon in the toolbar.
   CLV Setup uploads the parameter set that was last stored permanently in the OTS400/OTC400 and displays the values in the tabs.

You can then change the current parameter values on the tabs.

8.3.3 Functions

The graphical user interface (GUI) is largely self explanatory and comprises the following elements:

- Title bar and status display for the configuration files
- Menu bar with pull-down menus
- Toolbar with scanner selection field for connecting to the OTS400/OTC400 or bar code scanner
- Max. 9 tabs containing parameters that are grouped according to their functions. Some of these parameters open further dialog boxes.

The following functions are provided in CLV Setup:

- Upload the default parameter set from the database
- Automatic communication attempt with the OTS400/OTC400 and bar code scanner when the program is started
- Automatic storage of last OTS400/OTC400 or bar code scanner type selected
- The Terminal Emulator window provides direct access to the OTS400/OTC400 and can be used to select operating modes and functions. For further information, see Chapter 7 *Operation*.
- A communication window for selecting the communication port on the PC and for setting the data transfer parameters
- An “auto baud detect” function that attempts to detect the communication parameters automatically
- A menu for selecting the units of measure
- A menu for selecting the GUI language
- A function for printing the parameter sets as profile bar codes (not for OTS400/ OTC400 and CLV490)
- A function for displaying the last 10 configuration files
- Context-sensitive help in HTML format (<F1> Help)

The online ‘CLV Setup Help’ function provides a description of how to use the program under ‘Program information’.

Default settings of CLV Setup

Parameter	**Value**
Communication	COM 1, 9,600 bd, 8 data bits, 1 stop bit, no parity
Units of measure	Metric
Browser	Not assigned
Language	German
Last type selected	CLV410
File repository	‘data’ (bar code scanner configuration files)

Table 8-1: CLV Setup – default settings

8.3.4 Transferring parameter sets between CLV Setup and the OTS400/OTC400 or CLV

Uploading from the OTS400/OTC400 or CLV (displaying the current parameter set in CLV Setup):

Each time you select the OTS400/OTC400 or scanner type, CLV Setup loads the internal scanner description and displays the **default parameter sets** on the tabs, irrespective of whether it can communicate with the connected device.

To be able to edit the current OTS400/OTC400 or CLV parameter set, you must first transfer it from the device to the CLV Setup program.

- Click the 'bar code scanner to page' icon in the toolbar.
  CLV Setup uploads the parameter set that was last stored permanently in the OTS400/OTC400 and displays the values in the tabs.
  - or -
  Open the correct configuration file '*.scl' (if it exists) in CLV Setup.

Download the parameter set to the OTS400/OTC400 or CLV (transfer a new parameter set to the OTS400/OTC400 or CLV):

The parameter values displayed on the tabs only affect how the data is stored in CLV Setup. **Any changes to these values do not take effect until they have been transferred to the OTS400/OTC400.** CLV Setup always transfers the entire parameter set, i.e. all of the parameter values are overwritten in the OTS400/OTC400.

1. Click the 'page to bar code scanner' icon in the toolbar.
   CLV Setup transfers the parameter set to the RAM of the OTC400/OTS400 or CLV. The 'Download Parameters' dialog box is displayed with the following storage options.

   'PERMANENT': CLV Setup transfers the parameters to the RAM and to the non-volatile parameter store (EEprom) of the OTS400/OTC400 or bar code scanner.
   'TEMPORARY': CLV Setup transfers the parameters to the RAM. The changes are lost when the OTS400/OTC400 or bar code scanner is switched off.
2. Click the required storage option.
   The dialog box is closed automatically.

The new parameter set is now stored in the OTS400/OTC400 or bar code scanner (either temporarily or permanently).

3. **Recommendation**:
   Save the changes to the parameter set as a **new configuration file in CLV Setup on the PC** or overwrite the existing file: choose 'File' -> 'Save as' from the menu bar.
4. Enter the path and file name in the dialog box and confirm your entries.
   CLV Setup then saves your configuration file.

The new parameter set is then saved in CLV Setup.

Unknown OTS400/OTC400 or CLV parameters in CLV Setup

If CLV Setup detects unknown parameters when it uploads the parameter set to the OTS400/OTC400 or bar code scanner (CLV Setup has not been updated for handling new parameters or the OTS400/OTC400 or bar code scanner is a special model), it outputs a warning and displays the unknown parameters in the window on the 'Extras' tab. The parameters are displayed in the form of command strings and can be edited using the command

string conventions. When the parameter set is saved as a configuration file in CLV Setup, these parameters are also included and are also downloaded to the OTS400/OTC400 and bar code scanner.

8.3.5 CLV Setup – online help

The procedure for setting the bar code scanner 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 and permissible values.

Displaying the help function:

- Press the <F1> key.
  The browser is launched automatically and displays the help topic.
  If the program cannot find a browser, it asks you to specify the storage location on the hard disk.
- Enter the storage location and link CLV Setup with the browser.
  Confirm the dialog box.
  The link is then stored and the browser window opens.

Using the help function:

To display information on a tab, click the tab in the top, horizontal frame. The vertical frame on the left-hand side of the screen then displays a list of parameters, which you can click for a detailed explanation. To display an overview of the help function, choose ‘Help’ -> ‘Contents’ on the menu bar.

Recommendation

Use the **<ALT>+<TAB>** keys to switch between the ‘CLV Setup’ and ‘CLV Setup Help’ applications and prevent several browser windows from being opened.

8.3.6 Tabs (overview)

This section only describes the tabs for the OTS400/OTC400. For a description of the CLVs connected in the OPS, please refer to the Operating Instructions for the relevant bar code scanner. The OTS400/OTC400 does not have a separate ‘Reading configuration’ tab. The settings required in the OPS, therefore, must be made on the respective bar code scanner.

Device configuration

You can use this tab to define:

- The device number
- How odette filters are processed
- How the information on the focus position is distributed
- The configuration (master / slave / standalone)
- The function assignment of the switching outputs (outputs 1...4 and relay output)
- How the reading pulse is processed
- How the incremental input(s) is/are processed
- How the switching inputs are processed (sensors 1-1 ... 1-7, 2-1 ... 2-4)
- How the match code is processed

Code configuration

You can use this tab to define:

- The individual codes that are activated for evaluation
- The number of identical reads
- The min. and max. number of bar codes to be read/output

Recommendation

To enhance the reading reliability, we recommend that you only activate those code types and code lengths that are relevant.

Host interface

You can use this tab to define:

- The active interface version (RS 422/485 or RS 232)
- The protocol for data transfer
- The start and stop characters
- The data format and transfer rate

Data string

You can use this tab to define:

- The data output format on the host interface
- The constants and reading diagnosis data in the header, separator, and terminator
- The position of the separator in the data string
- The output format for no reads and the contents of the error string
- The test string function
- The output sequence and sort criteria if more than one bar code is read during each reading interval
- The activation criteria and structure of the format mask
- Special features (S2000, Cancel/Bell...)

Auxiliary interface

You can use this tab to define:

- The operating mode of the auxiliary interface

Slave configurations

You can use this tab to define:

- The CAN data rate[1)]
- The end of the reading field
- The list of salves in the network

1) it is important that the same CAN data rate be set in the OTS400/OTC400 and on the connected bar code scanner.

Extras

These tabs can be used to edit unknown parameters after they have been uploaded to CLV Setup from the OTS400/OTC400 or the bar code scanner.

8.3.7 Parameterization guide

Change the following parameter settings in the default parameter set:

1a. Read: 1 bar code per reading pulse

- Code types ⇒ 'Code configuration'
- Decoder ⇒ 'Code configuration'
- Scanning frequency ⇒ under 'Reading configuration' in connected CLVs
- Assignment table ⇒ under 'Reading configuration' in connected CLVs
- Trigger source for dynamic focus control ⇒ under 'Reading configuration' in connected CLVs
- Autofocus function ⇒ under 'Reading configuration' in connected CLVs
- Focus positions (DC) ⇒ under 'Reading configuration' in connected CLVs
- Edit area parameters ⇒ under 'Reading configuration' in connected CLVs
- Trigger source for the reading pulse ⇒ 'Device configuration'

1b. Read: several bar codes per reading pulse

in addition to a:

- Minimum and maximum number of codes ⇒ 'Code configuration'

1c. Read: identical code type with identical data contents

in addition to b:

- Capture range ⇒ 'Device configuration'
- Code comparison ⇒ 'Device configuration'

1d. Restrict evaluation range of the scan line (per distance configuration)

in addition to a and b:

- Minimum and maximum reading angle ⇒ under 'Reading configuration' in connected CLVs

2. Host interface

- Type ⇒ 'Host interface'
- Communication parameters ⇒ 'Host interface'
- Protocol (if necessary) ⇒ 'Host interface'

3. Data output string on the host interface

- Contents of the header, separator, terminator ⇒ 'Data string'
- No read format ⇒ 'Data string'
- Test string (if required) ⇒ 'Data string'
- Output string (if required) ⇒ 'Data string'

8.3.8 Completing parameterization

Current parameter set unchanged:

1. If you **have not made any changes**, or if you want to reject these changes, choose ‘File’ -> ‘Exit’.
   CLV Setup then closes.
2. Switch off the power supply to the OTS400/OTC400 and bar code scanners in the OPS.
   The parameter set that was last saved permanently remains valid.

Current parameter set was changed:

1. **Download the modified parameter set to the OTS400/OTC400 or bar code scanner**: Click the ‘page to bar code scanner’ icon in the toolbar.
   CLV Setup transfers the parameter set to the OTS400/OTC400 or bar code scanner and asks you to select the storage option.
2. Choose the ‘Permanent’ option.
   The OTS400/OTC400 or bar code scanner then uses the new parameter set.
3. Save the changes **as a new configuration file in CLV Setup on the PC** or overwrite the existing file: from the ‘File’ menu, choose ‘Save as’.
4. Enter the path and file name in the dialog box and confirm your entries.
   CLV Setup saves your configuration file.
5. From the ‘File’ menu, choose ‘Exit’.
   CLV Setup closes.
6. Switch off the power supply to the OTS400/OTC400 and bar code scanners in the OPS.

8.4 Backup concept for parameter sets

You can use the following methods to activate the current parameter set:

OTS400/OTC400 and bar code scanner:

1. Download it from CLV Setup to the OTS400/OTC400 or bar code scanner and save it permanently. See also Section 8.3.4 *Transferring parameter sets between CLV Setup and the OTS400/OTC400 or CLV*.

CLV Setup

2. Save the configuration file ‘*.scl’ in CLV Setup. See also Section 8.3.8 *Completing parameterization*.

8.5 Editing area parameters

You must enter each individual bar code scanner in the OPS in a coordinate system.

➢ To do so, enter the relevant data for all of the connected bar code scanner in the corresponding window under ‘Code configuration’. *Fig. 8.2* shows the angles and coordinates.

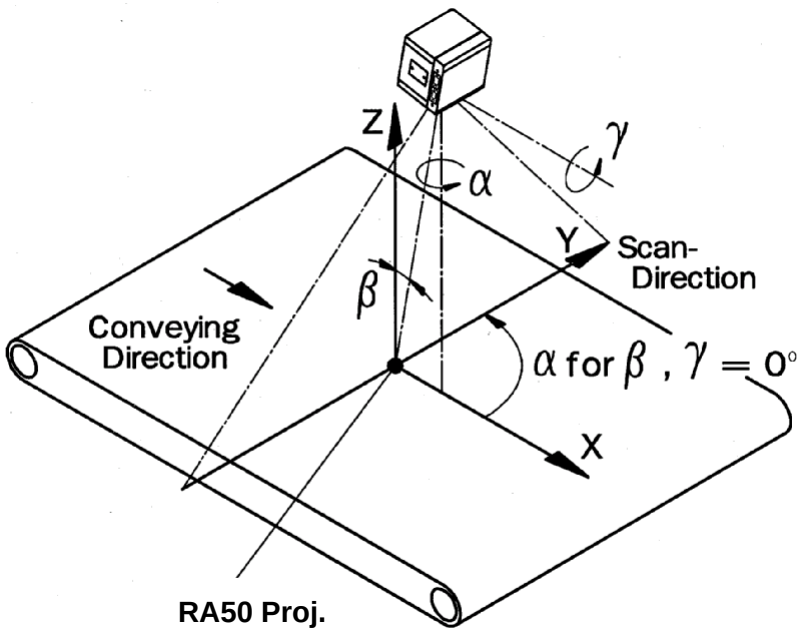

Fig. 8-1: The OPS coordinate system

Area parameters:

Coordinate	**X**	**y**	**z**
Orientation	Transport direction	Perpendicular to TD	Vertical on belt
Zero point	Trigger – Photo electric switch PS (second PS if 2 PS)	Belt edge right, in transport direction	Top edge of belt

Table 8-2: Coordinates

Each bar code scanner must be provided with 3 angles for positions in the area (counterclockwise):

- *alpha* : angle of rotation of the scanning direction from the conveyor direction
- *beta* : skew angle of scanner (for oscillating mirror: direction of oscillation), rotation about an axis through the scanner that is parallel to the scanning direction, after alpha has been applied.

  Negative

  angle values are not allowed in CLV Setup. An angle of –10°, therefore, corresponds to 350°.
- *gamma* : angle of rotation of the scanner about an axis that is parallel to the conveyor direction; value 0 : vertically downwards, after alpha and beta have been applied

Parameter	**Description**	**Resolution, unit**	**Min. value**	**Max. value**
x coordinate	Distance: OPS – frame pos. to scanner (center light emission front panel)	1 mm	-9999	+9999
x Offset	Distance: start – PS to OPS frame pos. (start) (identical for all bar code scanners)	1 mm	-3000	+3000
y coordinate	Scanner position perpendicular to conveyor direction	1 mm	-3000	+3000
z coordinate	Scanner height above belt	1 mm	-2000	+2000
Alpha	Angle of rotation of scanning direction from conveyor direction	1 degree	0	360
Beta	Skew (scanner)	1 degree	0	360
Gamma	Angle of rotation of scanner perpendicular to conveyor direction	1 degree	0	360
INC Scale	Travel increment scale	0.01 mm	0 (no increment)	100 mm

Table 8-3: Area parameters

In the case of scanners with oscillating mirrors, the geometry parameters apply in a similar manner to the zero position of the oscillating mirror (CW 50).

9 Maintenance

9.1 Maintenance during operation

Information on maintaining and repairing the bar code scanners is provided in the relevant Operating Instructions.

The optical surfaces in the OPS must be cleaned at regular intervals.

- Clean the optical surfaces on external reading pulse generators and/or object-height detection systems using sensors (e.g. photoelectric reflex switches) with a mild, water-soluble, non-scouring detergent and a soft, lint-free cloth. Dirt on these surfaces may affect the switching behavior.

The OTS400/OTC400, for example, does not require further maintenance.

9.2 Maintenance

The OPS does not require maintenance. Its self-monitoring functions ensure fault-free operation over a long period of time. Any device or malfunctions on the OTS400/OTC400 or bar code scanner are output via the terminal interface (see Chapter 10 *Error messages*).

9.3 Disposal

Defective devices that have been removed from service should always be disposed of in an environmentally friendly manner. Further information for the bar code scanners used in the OPS are provided in the respective Operating Instructions.

In the case of the OTS400/OTC400, please note the following:

1. Always observe the national waste disposal guidelines.
2. Disassemble the housing of the OTS400 and OTC400 and submit it for recycling.
3. Disassemble electronic modules and connecting cables and dispose of them as special treatment waste.
4. Remove the reading window from the OTS400 and submit it for plastic recycling (PC).

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

Notes:

10 Troubleshooting

10.1 Overview of errors and malfunctions

10.1.1 Mounting errors

- Bar code scanners are not aligned correctly with the object
- Reading pulse sensor is positioned incorrectly
- Sensor for object-height detection is positioned incorrectly

10.1.2 Electrical installation errors

- Ports on the OTS400/ OTC400 are connected incorrectly (wiring error)

10.1.3 Parameterization errors

- Functions are not adapted to the local conditions, e.g. communication parameters on the host interface are incorrect
- The technical limits of the bar code scanners have not been taken into account, e.g. the relationship between the available scanning frequency and the reading distance
- The coordinates of the bar code scanner in the OPS are incorrect

10.1.4 Malfunctions

- Safety timer for incomplete reading interval has expired
- Device error (hardware/software)

10.2 Error messages

The OPS outputs error messages on the auxiliary interface of the OTC400.

These messages are structured as follows: *type SYS-FAILURE: xxx*

Device	Error message	Range
CLV bar code scanner	*typ = CLV-FAILURE: xxx*	xxx= 000 ... 299
OTS400/ OTC400	*typ = OTC-FAILURE: xxx*	xxx= 500 ... 599
CANOpen protocol	*typ = COP-FAILURE: xxx*	xxx= 300 ... 399
network management	*typ = NMM-FAILURE: xxx*	xxx= 400 ... 499

Table 10-1: Types of error messages

In addition to error messages (*FAILURE)*, the OPS also outputs general messages (*MESSAGE*) that contain information only.

10.2.1 Overview of the error messages for the CLV490 bar code scanner

The following table contains a general overview of the error messages for the bar code scanner. For a more detailed description, please refer to the relevant Operating Instructions.

1. To display the error messages in CLV Setup, select the bar code scanner (under *Options*, *Parameters in the OTS network*)
2. Select the *extended* terminal mode.

Message	Meaning	Remedy
“CLV SYS- Failure: xxx” (CLV system error) xxx = 000 ... 299 Error code: 011 data error (external RAM) 012 address error (external RAM) 013 insufficient RAM (external RAM) 051 speed out of tolerance (mirror wheel) 061 Mirror interval out of tolerance 071 Laser shutter failure 091 ... 095 focus adjustment error 101 ... 118 parameter memory error 130 amplifier setting 131 invalid background profile 132 center reading angle RA-50 not plausible 133 brightness value overrun 201 ... 215 DSP failure	The bar code scanner has diagnosed a system error. The “Device Ready” LED does not light up or extinguishes. The system is restarted.	If the error occurs again after the bar code scanner has restarted, contact the SICK Service department.

Table 10.2: SYS failures – CLV490 bar code scanner (excerpt)

10.2.2 Overview of the error messages for the OTS400/ OTC400

The OTS400/OTC400 displays an error message for each bar code scanner if it does not respond in the CAN network. Error messages 502 to 525 are used for this purpose (502 for CLV 1, 503 for CLV 2.... 525 for CLV 24). Internal bar code scanner errors are in the range from 527 to 550 (527 for CLV 1, 528 for CLV 2... 550 for CLV 24). To determine the exact error, see *Table 10.2*.

➢ If the error occurs again after the CLV has restarted, contact the SICK Service department.
This also applies to error messages between 300 and 499.

10.3 Troubleshooting table

Table 10.3 contains a list of further malfunctions that can occur as a result of incorrect parameter settings or errors during operation. It is assumed in each case that only one bar code is read with each reading pulse. By connecting a terminal/PC to the auxiliary interface of the OTC400, you can display error messages and monitor data traffic on the host interface.

Malfunction	**Possible cause**	**Remedy**
The OTS400/OTC400 is not ready. The “Device Ready” LED is not lit. The “Dev Rdy” switching output (default setting of output 1) is blocked.	- The power supply to the OTS400/ OTC400 has not been switched on	- Check the power supply. Check the bar code scanner (listen to the housing): can you hear the polygon mirror wheel running?
	- The OTS400/ OTC400 is not in “Reading mode”	- Exit the control menu
	- The OTS400/ OTC400 has diagnosed a device error during the self-test	- Analyze the error messages using *Section 10.2.2*. Switch the device off and on again
The connected bar code scanners cannot be clocked via the “Sensor” switching input. The “Sensor” LED on the individual LEDs does not light up. The scan line is not visible.	- Sensor not connected correctly	- Check the electrical connection and functioning of the sensor
	- Incorrect trigger source set	- Check the setting under the “trigger source” menu option
	- OTS400 mode not activated in bar code scanner	
	- CAN baud rate in the OTS400/ OTC400 and bar code scanner do not match	
The “Read Result” LED does not light up when the event occurs that triggers the parameterized function. The “Good Read” switching output does not supply a pulse.	- Incorrect function parameterized	- Check the setting under the “Good Read - Output” menu option
The OTS400/OTC400 does not transmit a reading result to the host. The “Data” LED is not lit.	- The OTS400/OTC400 is not in “Reading mode”	- Switch to “Reading mode”
	- No reading pulse present (e.g. sensor signal or command string missing)	- Check reading pulse supply
	- No incremental signal present	
The OTS400/ OTC400 only transfers the error status ST=3 in the reading result to the host	- The OTS400/ OTC400 has diagnosed as device error during the self-test	- Analyze the error messages using *Section 10.2.2*.

Table 10-3: Troubleshooting table

Malfunction	Possible cause	Remedy
The OTS400/OTC400 repeatedly transmits the error status ST=2 in the reading result to the host (message on terminal interface: “No code!”)	- There is no bar code in the reading field during the reading pulse - The evaluation criteria, e.g. code type and code length, are incorrectly set - If the autofocus function is not used: the focus position has not been adapted to the reading situation (code outside reading range) - The bar code quality is too poor	- Synchronize the pulse supply to the bar code scanners with the appearance of the bar code in the reading field - Check the individual menu options of the enabled code types (code configuration) - Check the corresponding parameters - Check the reading function using a standard reference code
Control characters contained in the code, header, separator, or terminator appear as “@” in the data output string (Code 39, Code 128, Code 93, and EAN 128)	- When the data is output in ASCII format, the OTS400/OTC400 replaces each control character in the protocol frame with the character “@” in order to avoid transmission errors - The format mask refers to characters that are not contained in the code	- Set the “Output Hex-ASCII” menu option to “yes” (The OTS400/ OTC400 then outputs the code contents in Hex format) - Correct or delete the format mask
In “immediate” output mode, the bar code scanner outputs the reading result as a no read at the end of the reading pulse	- The parameterized minimum number of bar codes to be read is greater than the actual number that occurred in the reading pulse - The evaluation criteria, e.g. bar code type, bar code length, have been defined incorrectly	- Check the “Min. number of codes” menu option - Check the individual menu options for the enabled code type(s) (code configuration)
The bar code scanner suppresses the last character of the code in the data output string	- The output of the last character (check digit) may have been disabled	- Check the “Transfer check digit menu option

Table 10-3: Troubleshooting table (continued)

10.4 Error status ST in the reading result of a code

Value	Meaning	Possible cause	Remedy
0	Good read	-	-
1	Check digit error	• The check digit calculated by the CLV during the read operation does not match the value printed in the bar code field	• Check whether the check digit calculated in the bar code field during the printing operation is correct • If the check digit of the bar codes used are sometimes incorrect, deactivate the check digit function
2	No code found that matches the evaluation criteria	• No code present in the reading field of the CLV during the reading pulse • Code type/length not enabled for decoding in the CLV • Reading window covered/dirty	• Synchronize the pulse supply to the CLV with the appearance of the bar code in the reading range • Correct the code configuration parameters • Check the reading window
3	Device error	• Device defective	Start self-test. If result ≠ 000: inform SICK Service department
5	Required number of identical multiple reads for the code not reached	• Conveyor speed of object too high • Scanning frequency too low • With ladder-type arrangement of the bar code relative to the conveyor direction: code height (bar length) too small • Print quality too poor	• Check conveyor speed • Adjust scanning frequency • Check code height • Check print quality
7	The source of the reading result is the auxiliary input on the terminal interface	• The code was not read by the OTS400/OTC400, but entered subsequently via the auxiliary function of the terminal interface and transferred to the host in a separate data string.	-
9	The “Filter for output” function is also active during the code comparison. The OTS400/OTC400 has detected valid codes. However, these do not match the active match code(s)	• The scanned object is not carrying a code that matches the specified match code	-

Table 10.4: Error status ST

Value	Meaning	Possible cause	Remedy
A	The “Check max. number of codes” function is activated. The CLV has detected more codes in the reading pulse than was specified under “Max. number of codes”. Instead of the codes, it outputs the error string repeatedly until the “Max. number of codes” is reached.	• One object in a set of objects with a constant number of codes, for example, contains more codes than is allowed	• This message indicates an error on the object (e.g. check whether they have been sorted correctly or if one of the objects is incorrect)
D	The Code 32 evaluation option is activated for 39. The CLV is attempting to interpret 6-character C39 codes as C32 codes (⇨ output of 9-digit decimal values)	• The read 6-character code is not a C32 code. The CLV outputs the error string instead	-

Table 10.4: Error status ST (continued)

10.5 SICK Support department

If you cannot correct the error using the above measures, the device may be defective. The bar code scanners/the OPS does not contain any components that can be repaired by the user.

➢ Please contact your 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.

11 Technical data

11.1 OTS400/OTC400 data sheet

Type	OTS400	OTC400
No. of bar codes per object	Max. 10 (with max. 4 scanners)	
No. of objects per reading field	Max. 20 (autodiscriminating)	
Bar code types	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 reading interval)	
Print ratio	2:1 ... 3:1	
No. of multiple reads	1 ... 99	
Optical indicators	26 x LED (status and function indicators)	
Reading pulse	3 switching inputs (“Trigger 1, 2, and 3”) /software triggers	
“Host” data interface	RS 232 or RS 422/485, variable data output format, optional bus connection	
Data transfer rate	300 ... 38,400 bd	
Protocols	SICK Standard, 3964(R)/ RK 512/ Crisplant S2000	
Physical configurations	Stand-alone	
“Terminal” data interface	RS 232, 9,600 bd, 8 data bits, no parity, 1 stop bit, fixed output format	
Functional switching inputs	16 (“Trigger 1..3”, “Travel increment 1..2”, “Sensor 1-1..1-7”, “Sensor 2-1..2-4”) - all inputs are assigned LEDs - optodecoupled, $V_{i\,max}$= +30V, non-interchangeable	
Functional switching outputs	- 4 (“Output 1 ... 4”) PNP, $I_{o\,max}$ = 30 mA, short-circuit proof, variable pulse duration (10 ... 990 ms/ 100 ... 9.900 ms), variable result indicator function - 1 (relay output), 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 ... 990 ms/ 100 ... 9.900 ms), variable result indicator function	
Electrical connections	Terminal strips 1 x 9-pin D Sub HD connector “AUX” (diagnosis) 1 x 9-pin D Sub HD socket “CAN” (SICK diagnosis)	
Operating voltage	230 V AC –15%/ +10% 50 Hz	24 V DC +20%/ –10%
Housing	Sheet steel, lacquered, PC reading window	extruded aluminum section
Electrical safety	To EN 61010-1 (2001-03)	
Protection class	III, to EN 61140 (2002-03)	
Enclosure rating	IP 65, to EN 60529 (1991-10); A1 (2002-02)	IP 20
EMC tested	To EN 61000-6-1 (2001-10), EN 61000-6-2 (2001-10), EN 55011 (1998-05), EN 55011/A1 (1999-08), EN 55011/A2 (2002-10)	
Vibration/shock tested	To IEC 68-2-6 Test FC/ to IEC 68-2-27 Test EA	
Weight	Approx. 10.3 kg (incl. power pack/automatic circuit-breaker)	approx. 1.3 kg
Operating/storage temperature	0 ... +50 °C/ –25 ... +70 °C	
Max. relative humidity	90%, non-condensing	

Table 11-1: Technical specifications of the OTS400/ OTC400

11. 2 Dimensioned drawing OTC400

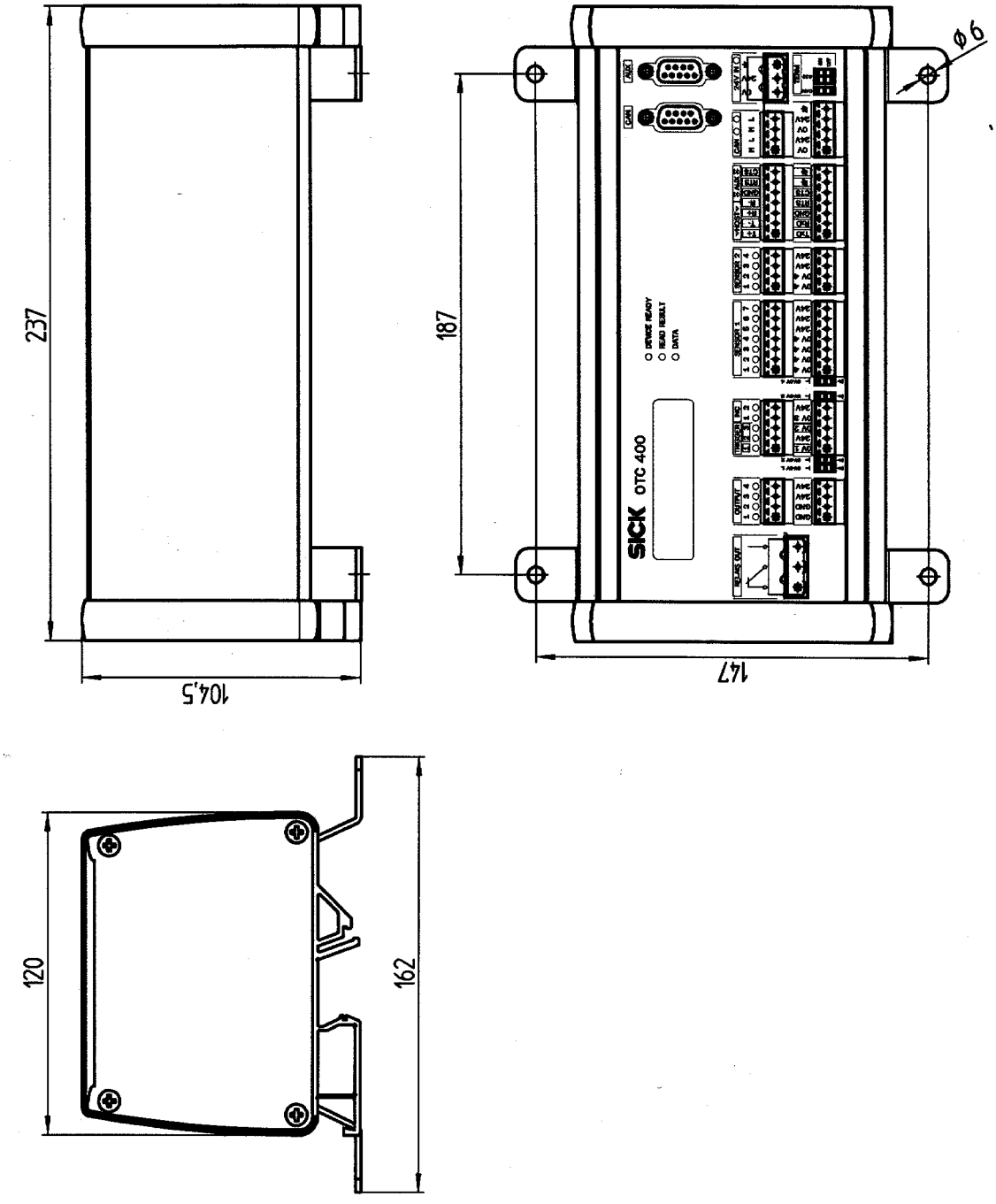

Fig. 11-1: Dimensioned drawing – OTC400

11. 3 Dimensioned drawing OTS400

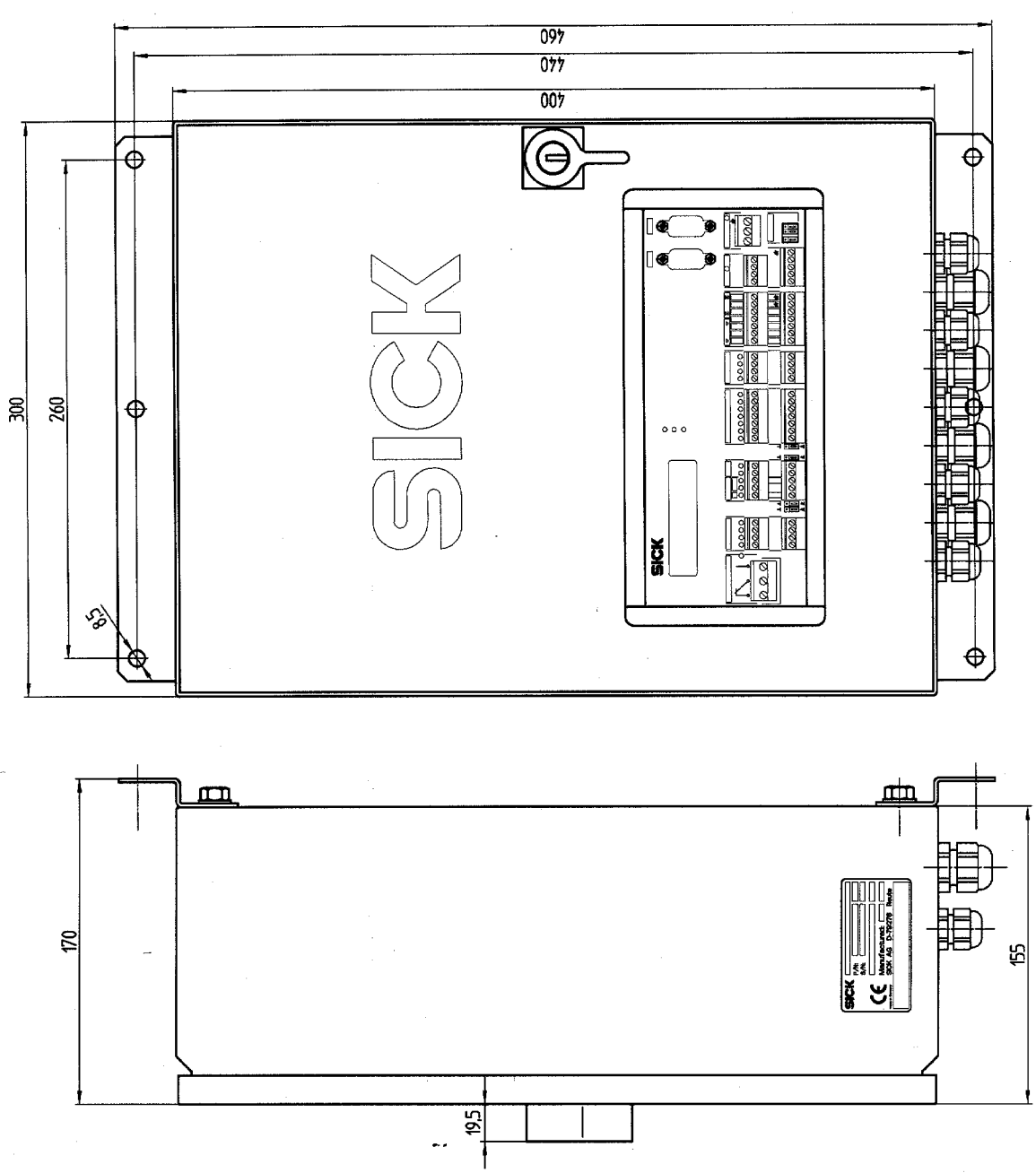

Fig. 11-2: Dimensioned drawing – OTS400

Notes:

12 Appendix

12.1 Fundamental principles of omni directional reading and system technology

12.1.1 Why is it necessary to use Omni Portal Systems?

In many cases, one bar code scanner is not sufficient to perform the task at hand. This is the case, for example, if the bar code is oriented randomly on one side of the object, or if several bar codes are located on more than one side. For this reason, several bar code scanners are used. The individual reading results are then combined in the OTS400/OTC400 and forwarded to the host as one reading result per object.

12.1.2 What are the basic parameters?

- Path width/ required object width coverage
- Required depth of field (with readings from above: max. height differences per object)
- Code type
- Module width
- Bar length (height)
- Velocity used in the application

12.1.3 Basic principles

- Specified reading ranges apply to skew and pitch angles ≤ ± 15°. Applications involving larger pitch and skew angles should be examined carefully.
- Objects containing a bar code covered by a film can reduce the reading rate of the system. These objects should be examined carefully.
- Code quality, e.g. EN 1635 3 or EN 1635 4. Closer examination is required if the code quality is poorer.

12.1.4 Configurations

a) OPS 290

2 line scanner 45° with respect to the conveyor direction

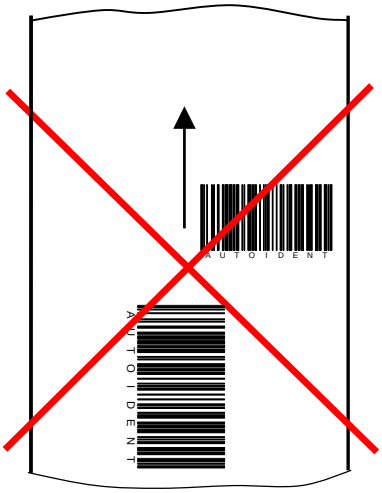

Fig. 12-1: Typical scan line field of an OPS290

- Scanning rate up to 1,200 Hz per scan line
- Coverage for module width 0.35 ... 0.5 mm for reads from above:
  Path width/required object width coverage: 800 mm
  Object height, max. object height differences: 800 mm
- Required minimum bar length (bar code height) for 2 typical code types:

Velocity	**Bar length for Code 128**	**Bar length for Interleaved 2/5 (PR 2:1 ... 3:1)**
≤ 1 m/s	≥ 18 mm	≥ 17 ... 20 mm
≤ 2 m/s	≥ 20 mm	≥ 22 ... 25 mm

b) OPS 490

4 Line scanners 45° with respect to conveyor direction

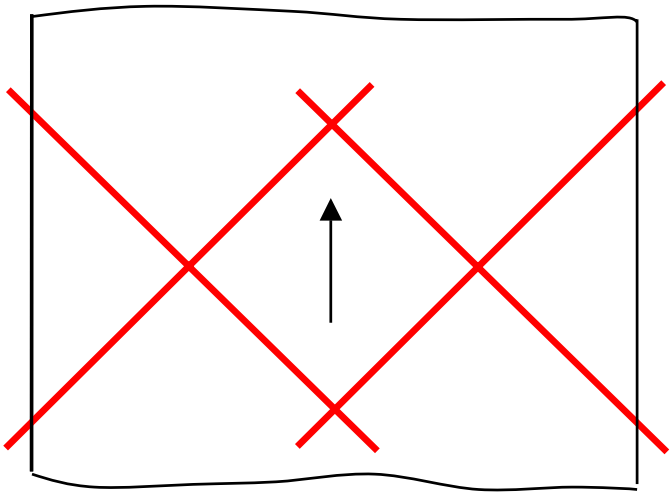

Fig. 12-2: Typical scan line field of an OPS490

- Scanning rate up to 1,200 Hz per scan line

- Coverage for module width 0.35 ... 0.5 mm for reads from above:
  Path width/required object width coverage: typically 1,500 mm
  Object height, max. object height differences: 800 mm
- Maximum required bar length (bar code height) for 2 typical code types:

Velocity	**Bar length for Code 128**	**Bar length for Interleaved 2/5 (PR 2:1 ... 3:1)**
≤ 1 m/s	≥ 18 mm	≥ 17 ... 20 mm
≤ 2 m/s	≥ 20 mm	≥ 22 ... 25 mm

c) OPS 360

2 Line scanners 30° with respect to the conveyor direction
1 Line scanners 90° with respect to the conveyor direction

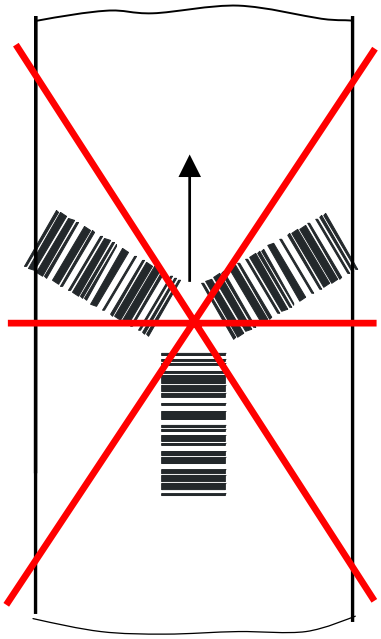

Fig. 12-3: Typical scan line field of an OPS360

- Scanning rate up to 1,200 Hz per scan line
- Coverage for module width 0.35 ... 0.5 mm for reads from above:
  Path width/required object width coverage: 600 mm
  Object height, max. object height differences: 800 mm
- Minimum required bar length (bar code height) for 2 typical code types:

Velocity	**Bar length for Code 128**	**Bar length for Interleaved 2/5 (PR 2:1 ... 3:1)**
≤ 1 m/s	≥ 12 mm	≥ 13 ... 15 mm
≤ 2 m/s	≥ 17 mm	≥ 19 ... 21 mm

d) OPS 560

4 Line scanners 30° with respect to the conveyor direction
1 Line scanners 90° with respect to the conveyor direction

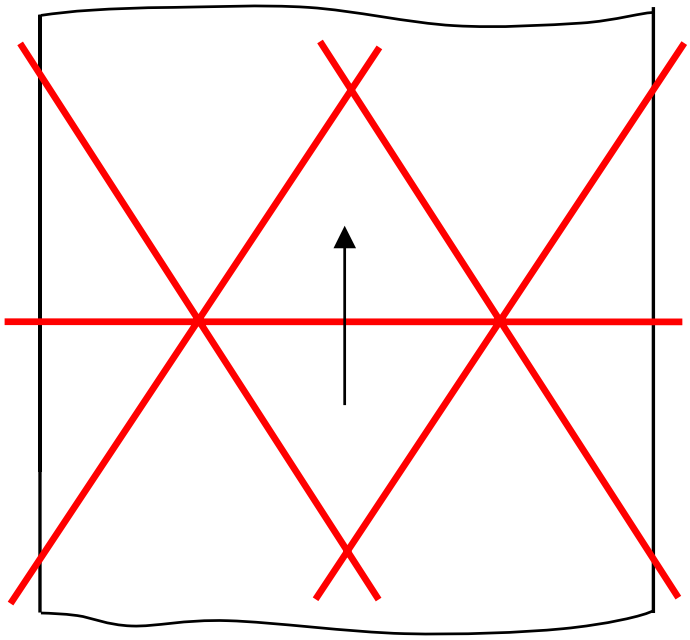

Fig. 12-4: Typical scan line field of an OPS560

- Scanning rate up to 1,200 Hz per scan line
- Coverage for module width 0,35 ... 0,5 mm for reads from above:
  Path width/required object width coverage: typically 1,100 mm
  Object height, max. object height differences: 800 mm
- Minimum required bar length (bar code height) for 2 typical code types:

Velocity	**Bar length for Code 128**	**Bar length for Interleaved 2/5 (PR 2:1 ... 3:1)**
≤ 1 m/s	≥ 12 mm	≥ 13 ... 15 mm
≤ 2 m/s	≥ 17 mm	≥ 19 ... 21 mm

The typical OPS systems for standard applications are shown here. A set of precise criteria for determining the optimum solution, from both a technical and economical perspective, for your application will be drawn up by the trained product specialists at SICK using the necessary resources.

12.2 Accessories

12.2.1 Mounting accessories

Order No.	Article
2016110	Quick-change clamping device, with securing material
2013824	Angle bracket, simple, with two bolts M 6 x 10, self-locking
2018435	Articulated bracket (2 x 2013824), with two bolts M 6 x 10, self-locking

Table 12-1: Mounting accessories

12.2.2 Cables, connector covers, and terminating resistor

Order No.	Length	Article
6021166	5 m	Supply cable (1x open end/ 1x CAN bus socket)
6021175	10 m	Supply cable (1x open end/ 1x CAN bus socket)
6021164	0.7 m	Cable (1x CAN bus connector/ 1x CAN bus socket)
6021165	3 m	Cable (1x CAN bus connector/ 1x CAN bus socket)
6021168	5 m	Cable (1x CAN bus connector/ 1x CAN bus socket)
6021293	10 m	Return cable (1x CAN bus connector/ 1x open end)
2021164	-	Connector cover with EEPROM parameter memory
6021167	-	Terminating resistor
2014054	3 m	RS 232 data cable for connecting the PC to the terminal interface on the OTC400 (2 x Sub D socket, 9-pin)

Table 12-2: Cables, connector covers, and terminating resistor

Temperature range of cables 6021xxx: stationary: –40°C ... +70°C
moving: –20°C ... +70°C

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