

OPERATING INSTRUCTIONS

MUX400 Multiplexer

Bidirectional data converter from CAN Scanner
Network to serial host interface



Software versions

Software/Tool	Function	Version
MUX 400-0000	Firmware	1.00 0000
CLV Setup	Configuration software (Windows-based)	V 4.0 0077
CLV Setup Help	Online help (HTML)	V 4.0 0077

Copyright

Copyright © 2004
SICK AG Waldkirch
Auto Ident
Reute Facility
Nimburger Strasse 11
79276 Reute
Germany

Trademarks

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

Latest manual version

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

Table of Contents

1	Notes on this document.....	9
1.1	Purpose	9
1.2	Target audience.....	9
1.2.1	Installation, electrical connection, maintenance and replacement.....	9
1.2.2	Startup, operation and configuration.....	9
1.3	Information content.....	9
1.4	Symbols used.....	10
2	Safety information.....	11
2.1	Authorized users	11
2.1.1	Installation and maintenance	11
2.1.2	Electrical connection and replacement	11
2.1.3	Startup, operation and configuration.....	11
2.2	Intended use.....	11
2.3	General safety instructions and protection measures	12
2.4	Quick stop and quick restart.....	12
2.4.1	Switching off the MUX 400	12
2.4.2	Restarting the MUX 400.....	12
2.5	Environmental information.....	12
2.5.1	Power requirements.....	12
2.5.2	Disposal after final decommissioning	12
3	Product description	13
3.1	Design	13
3.1.1	Scope of delivery.....	13
3.1.2	Prerequisites for installation and start-up.....	13
3.1.3	Product features and functions of the MUX 400 (overview)	14
3.1.4	View of the MUX 400	15
3.2	Method of operation.....	16
3.2.1	Function in the network.....	16
3.2.2	Output format of the host interface	17
3.2.3	Diagnosis functions	19
3.3	Indicators and operating elements	19
3.3.1	Operating elements.....	19
3.3.2	Function of the LED indicators.....	20
4	Installation.....	21
4.1	Selecting the installation site.....	21
4.2	Installing the MUX 400	21
4.3	Removing the device.....	21
5	Electrical installation	22
5.1	Overview of the connection sequence	22
5.2	Electrical connections and cables.....	22
5.3	Connector pin and terminal strips assignment.....	23
5.3.1	“CAN“ connection	23
5.3.2	“AUX“ connection.....	23
5.3.3	Terminal strips.....	24
5.4	Planning the electrical installation.....	24
5.4.1	Requirements for the CAN interface	24
5.4.2	Requirements for the host interface	25
5.4.3	Power supply.....	26
5.5	Making electrical connections.....	26
5.5.1	Connecting the power supply.....	26
5.5.2	Connecting the CAN interface to the network	26
5.5.3	Connecting the CAN interface (9-pin D Sub socket)	28
5.5.4	Connecting the host interface	28
5.5.5	Connecting the terminal interface	29
5.5.6	Connecting the digital input “TRIGGER 1“	30
5.5.7	Connecting the outputs	31

6	Operation	34
6.1	Overview of the starting up sequence	34
6.2	Default setting	34
6.3	Operating modes/functions.....	35
6.4	Configuration (parameterizing)	35
6.4.1	Configuring the MUX 400 with the user interface of CLV Setup	36
6.4.2	Function of the tabs in CLV Setup (overview)	38
6.4.3	Parameterization guide.....	39
6.4.4	Configuring the CAN interface of the MUX 400	40
6.4.5	Configuring the host interface of the MUX 400	41
6.4.6	Configuring the data strings of the host interface.....	42
6.4.7	Configuring the network trigger (via MUX 400	43
6.4.8	Configuring the function of the MUX 400 outputs	44
6.4.9	Configuring the function of the MUX 400 terminal interface	44
6.4.10	Downloading the parameter set and restarting the system.....	48
6.5	Further operation steps	49
6.5.1	Displaying and editing operating data	49
6.6	MUX 400 messages	49
6.6.1	Displaying messages	49
6.6.2	System messages.....	49
6.6.3	Error messages	50
6.7	Switching off the MUX 400.....	50
7	Maintenance.....	51
7.1	Cleaning the reading pulse sensor during operation.....	51
7.2	Maintenance	51
7.3	Disposal	51
8	Troubleshooting	52
8.1	Overview of the possible errors and malfunctions	52
8.1.1	Electrical installation errors.....	52
8.1.2	Parameterization errors.....	52
8.1.3	Malfunctions during operation.....	52
8.2	Monitoring error and malfunctions.....	52
8.3	Error messages.....	52
8.4	Troubleshooting	52
8.4.1	General malfunction: MUX 400 not ready	53
8.4.2	Malfunction in Read mode: reading pulse error (Network trigger)	53
8.4.3	Malfunction in Read mode: host interface data output error	54
8.5	Querying error codes with command strings.....	55
8.5.1	Command strings for server diagnosis (group queries)	55
8.5.2	Command strings for network diagnosis (group queries).....	56
8.6	SICK Support.....	57
9	Technical Data	58
9.1	Data sheet MUX 400 Multiplexer	58
9.2	Dimensional drawings.....	59
10	Appendix	60
10.1	Overview	60
10.2	Installation and operation of the PC-based "CLV Setup" program	61
10.2.1	Preparing for installation	61
10.2.2	Performing installation	61
10.2.3	Starting "CLV Setup"	64
10.2.4	CLV Setup graphical user interface	66
10.2.5	Functions	67
10.2.6	Hot keys	67
10.2.7	Opening and closing tabs.....	68
10.2.8	Online help – CLV Setup.....	68
10.2.9	Transferring parameter sets between CLV-Setup and MUX 400.....	68
10.2.10	Dealing with unknown parameters.....	69

10.2.11	Writing a log file in terminal emulator	69
10.2.12	Starting CLV Setup with an INI file as argument	70
10.2.13	CLV Assistant.....	70
10.3	Configuring the MUX 400 with command strings	71
10.4	Replacing a MUX 400 (copying the parameter set).....	72
10.5	Accessories.....	74
10.5.1	Cables and plug-in connections	74
10.5.2	Reading pulse generators.....	74
10.6	Supplementary documentation.....	74
10.7	Code table (Hex – ASCII)	75
10.8	Copy of the EC Declaration of Conformity.....	76
10.9	Index	86

Abbreviations

CAN	C ontrolled A rea N etwork. (standardized field bus system with a messages-oriented data transfer protocol)
CDB	C onnection D evice B asic
CDM	C onnection D evice M odular
CLV	C ode- L eser V -Prinzip (Code reader V principle)
CLX	C ode- L eser X -Prinzip (Code reader X principle, omnidirectional)
HTML	H yper T ext M arkup L anguage
I	I nput
ICR	I mage C ode R eader
LED	L ight E mitting D iode
MUX	M ultiplexer
O	O utput
PLC	P rogrammable L ogic C ontroller

Tables

Table 3-1:	Meaning of the LED indicators.....	20
Table 5-1:	Admissible wire diameters on the terminal strips	22
Table 5-2:	Pin assignment of the 9-pin D Sub socket "CAN"	23
Table 5-3:	Pin assignment of the 9-pin D Sub plug "AUX"	23
Table 5-4:	Jumpers on the MUX 400	24
Table 5-5:	CAN bus: Maximum cable length as a function of the data transfer rate..	25
Table 5-6:	CAN bus: Maximum stub lengths as a function of the data transfer rate .	25
Table 5-7:	CAN bus: Required wire diameter as a function of the data cable length.	25
Table 5-8:	Maximum cable lengths between MUX 400 and host.....	25
Table 5-9:	Host interface: Assignment of the RS 232 signals on the RS 422 interface.....	28
Table 5-10:	Communication parameters of the host interface (default setting)	29
Table 5-11:	Communication parameters of the terminal interface	30
Table 5-12:	Characteristic data of the digital input "TRIGGER 1"	31
Table 5-13:	Characteristic data of the digital outputs "OUTPUT 1" to "OUTPUT 4"	32
Table 5-14:	Characteristic data of the output "RELAIS OUT"	33
Table 6-1:	Default settings of the MUX 400.....	34
Table 6-2:	Monitoring host interface" function.....	47
Table 8-1:	Troubleshooting: restoring operation (network mode).....	53
Table 8-2:	Troubleshooting: network trigger error	53
Table 8-3:	Troubleshooting: errors in the data output to the host.....	54
Table 8-4:	Command strings for server diagnosis.....	55
Table 8-5:	Network diagnosis: three types of status information about the devices in the network.....	56
Table 8-6:	Command strings for network diagnosis	56
Table 9-1:	Technical specifications of MUX 400.....	58
Table 10-1:	Default settings of CLV Setup (extract)	64
Table 10-2:	Accessories: cables and plug-in connections.....	74
Table 10-3:	Supplementary documentation.....	74
Table 10-4:	Code table Hex – ASCII.....	75

Figures

Fig. 3-1:	Design of the MUX 400.....	15
Fig. 3-2:	Multiplexer function: Example of data flow via the multiplexer to the host computer	16
Fig. 3-3:	Structure of block telegram.....	18
Fig. 5-1:	Connections and jumpers of the MUX 400	24
Fig. 5-2:	Principle: Wiring the CAN Scanner Network via CDB connection modules	27
Fig. 5-3:	Connecting the host interface	28
Fig. 5-4:	Connecting the terminal interface	29
Fig. 5-5:	Connecting the digital input "TRIGGER 1"	31
Fig. 5-6:	Connecting the digital output "OUTPUT 1"	32
Fig. 5-7:	Connection diagram of the output "RELAIS OUT"	33
Fig. 6-1:	CLV Setup: "CAN Interface" tab	40
Fig. 6-2:	CLV Setup: "Host Interface" tab	41
Fig. 6-3:	CLV Setup: "Data string" tab	42
Fig. 6-4:	CLV Setup: "Device Configuration" tab	43
Fig. 6-5:	CLV Setup: "Auxiliary interface" tab: Selecting the MUX Diagnosis.....	44
Fig. 6-6:	CLV Setup: Display of the MUX Diagnosis in the Terminal Emulator (Network OK)	45
Fig. 6-7:	CLV Setup: Display of the MUX Diagnosis in the Terminal Emulator (network failure)	45
Fig. 6-8:	CLV Setup: "Auxiliary interface" tab: Selecting the Server Diagnosis	46
Fig. 6-9:	CLV Setup: Display of the Server Diagnosis in the Terminal Emulator	46
Fig. 6-10:	CLV Setup: Display of the data transfer time (MUX Data Timing) in the Terminal Emulator	47
Fig. 6-11:	CLV Setup: Display of the data traffic on the host interface in the Terminal Emulator	48
Fig. 6-12:	CLV Setup: "Operating data" dialog box	49
Fig. 9-1:	Dimensions of the MUX 400	59
Fig. 10-1:	CLV Setup: results of the AutoBaud detect function.....	65
Fig. 10-2:	User interface of the "CLV Setup" software	66
Fig. 10-3:	CLV Setup: entering commands in the terminal emulator	71
Fig. 10-4:	Copy of the Declaration of Conformity (Page 3, scaled down)	76
Fig. 10-5:	Copy of the Declaration of Conformity (Page 2, scaled down)	77

Installation procedure (overview)

CAN Scanner Network:

1. If you have not already done so, install the bar code scanners in the CAN Scanner Network.
To simplify connection and set the default values for communication parameters, mount and connect the CDB/CDM connection modules and CMC 400 cloning modules.
2. Organize the CAN Scanner Network logically (assign unique addresses from 1 to 63 and configure the CMC 400).
3. Switch on the power supply to the bar code scanners.

MUX 400 Multiplexer:

4. Check scope of delivery for completeness.
5. Install the MUX 400 in the control cabinet onto the grounded top-hat rail.
6. Install the reading pulse sensor for reading pulse distribution in the network at an appropriate position.
7. Connect the output of reading pulse sensor to the "TRIGGER 1" input of the MUX 400.
8. Connect the host computer (PLC) to the host interface of MUX 400 (terminal strip).
9. Connect the CAN Scanner Network to the CAN interface of MUX 400 (terminal strip).
10. Connect the power supply 24 V DC +20 %/-10 % to the MUX 400.
11. Switch on the power supply to the MUX 400.
The MUX 400 starts. The "Device Ready" LED lights up after the self-test has been completed successfully. The device is in network mode.
12. Switch on the PC and start Windows™ (at least Windows 98™ required).
13. Install the accompanying "CLV-Setup" configuration software and the online help "CLV Setup Help" from CD ROM ("Manuals & Software") to PC.
14. Connect the PC to the terminal interface of MUX 400. Use a 3-core RS 232 data cable (null modem cable) to connect the PC to the 9-pin connector "AUX".
15. Start "CLV Setup".
CLV Setup contacts the MUX 400 and copies the parameter set of the MUX 400 via an upload. The parameter set is displayed on tabs.
16. Configure the MUX 400 for the application (CAN interface, host interface, input and outputs diagnosis function)
17. To test the data converter carry out readings of the bar code scanners in the network. Display the read results in the Terminal Emulator of CLV Setup.
18. Run a test under realistic conditions.
19. Check and optimize the set parameter values if necessary.
Copy the parameter set to the MUX 400 **permanently** via download.
20. Save the parameter set as a "*.scl" configuration file in CLV Setup.

The MUX 400 is ready for operation with the **application-specific** settings.

1 Notes on this document

1.1 Purpose

This document contains instructions for operating the MUX 400 Multiplexer in the variant:

- MUX 400-0000 (no. 1 026 219)

This document provides information on

- Installation and electrical connection
- Startup
- Operation and configuration (parameterizing)
- Maintenance
- Replacing the device while retaining the parameter set.

The multiplexer will all simply be called "MUX 400" below.

1.2 Target audience

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

1.2.1 Installation, electrical connection, maintenance and replacement

Electricians and service technicians

1.2.2 Startup, operation and configuration

Technicians and engineers

1.3 Information content

This document contains all of the information required to install, make electrical connections and start up the MUX 400 with the **factory default settings**.

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

The MUX 400 is configured for **specific applications** using the Windows-based "CLV Setup" software. Further assistance is also available in the form of the online help system "CLV Setup Help". The procedure for installing and operating the user interface of the software is described in [Chapter 10.2 Installation and operation of the PC-based "CLV Setup" program, Page 61](#).

Installation and configuration of the CAN Scanner Network using bar code scanners and connection modules is proceeded according to the *Operating Instructions "Application of the CAN interface" (Nr. 8 009 180, English edition)*.

For further information on the design and the function of the multiplexer, please contact the Auto Ident division at SICK AG.

Internet address: **www.sick.de/mux400**.

1.4 Symbols used

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



Warning

Warnings are provided to prevent injury to operating personnel or serious damage to the MUX 400.

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

Note Notes indicate special features or characteristics.

Explanation Explanations provide background information on technical correlations.

Recommendation Recommendations help you carry out certain procedures more effectively.

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

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

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



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

"Host receive fault" This font indicates messages output via the terminal interface of the CLV.



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



This symbol refers to additional technical documentation.

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

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

2 Safety information

2.1 Authorized users

For the MUX 400 to function correctly and safely, it must be installed and configured by sufficiently qualified personnel.

The following qualifications are required for the various tasks involved:

2.1.1 Installation and maintenance

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

2.1.2 Electrical connection and replacement

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

2.1.3 Startup, operation and configuration

- Knowledge regarding the operation of the devices in the relevant application (e.g. conveyor belt)
- Knowledge of logical network organization
- Basic understanding of Windows 98™, Windows NT™, Windows 2000™ or Windows XP™
- Basic understanding of an HTML browser (e.g. Internet Explorer™)
- Basic understanding of data transfer methods
- Basic understanding of bar code technology

2.2 Intended use

The MUX 400 Multiplexer is designed to connect a maximum of 32 SICK bar code scanners from the following series:

- CLV 42x to CLV 49x
- CLX 490
- ICR 85x

in the SICK CAN Scanner Network.

Specialized knowledge of networks and bus systems is not required. You can use the CDB/CDM connection modules with the bar code scanners to set up your network (devices can be connected more easily and communication parameters need only be configured once if the CMC 400 cloning modules are used).

As a client, the MUX 400 organizes data conversion between the bar code scanners (servers) in the network and a host computer (PLC). Data communication with the bar code scanners takes place via CAN interfaces. Communication with the host is handled via an RS-422 or RS-232 interface. The MUX 400 is suitable for installation in an industry-type control cabinet on a grounded top-hat rail. If bar code scanners with optional heating are connected, the MUX 400 must be installed outside the cooling area.

For information on installing and configuring the CAN Scanner Network with bar code scanners and connection modules, see *Operating Instructions "Application of the CAN interface"* (no. 8 009 180, English edition).

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

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

2.3 General safety instructions and protection measures

- Carefully read the general safety instructions and observe them at all activities at the MUX 400. This also applies to the warnings provided for the activities described in each chapter of this document.

2.4 Quick stop and quick restart

2.4.1 Switching off the MUX 400

- Switch off the power supply or remove the "24 V IN" terminal strip from MUX 400

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

- the application-specific parameter set, if it was only stored **temporarily** in the MUX 400
- Data that the MUX 400 has just received from the bar code scanners, or data it is sending to the host.

2.4.2 Restarting the MUX 400

- Switch on the supply voltage or reattach the "24 V IN" terminal strip to the MUX 400. The MUX 400 resumes operation with the parameter set that was **last stored permanently**.

2.5 Environmental information

The MUX 400 is designed to cause minimum impact on the environment.

2.5.1 Power requirements

The MUX 400 has a max. power consumption of 5 W.

This value applies to devices with all digital outputs connected and where the bar code scanners have a separate power supply.

2.5.2 Disposal after final decommissioning

Always dispose of unusable or irreparable devices in a manner that is not harmful to the environment and in accordance with the applicable national waste disposal regulations. The MUX 400 can be separated into recyclable secondary raw materials and special-category waste (electronic scrap). See [Chapter 7.3 Disposal, Page 51](#).

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

3 Product description

3.1 Design

3.1.1 Scope of delivery

In the **packaging** the MUX 400 is supplied with the following:

- MUX 400-0000 with 2 snap-in brackets for top-hat rail mounting,
Additional: 2 mounting brackets,
Inserted: 10 terminal strips
- an information sheet (note on device)

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

- CD ROM (no. 2 029 112) with
 - "CLV-Setup" program for Windows™ and the "CLV-Setup Help" online help system (HTML files)
 - "CLV-Connect" PC software (HTML files showing terminal diagrams)
 - MUX 400 Operating Instructions in English and German as PDF edition as well as additional publications (connections module, other SICK bar code scanners)
 - freely available "Acrobat Reader" PC software for reading PDF files

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

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

- MUX 400 Operating Instructions in English and/or German (printed edition)

3.1.2 Prerequisites for installation and start-up

The following components are required to start up and configure the MUX 400 with the CAN Scanner Network:

For the MUX 400:

- Grounded top hat rail in the system cabinet
- 24 V DC supply voltage +20 %/–10 % to IEC 364-4-41 (functional extra-low voltage), power output > 5 W for MUX 400

Note Dimensioning of the power supply = power consumption of MUX 400 + power consumption of the bar code scanners when power supplied via the MUX 400.

- If an external reading pulse is applied to the network via the "Trigger 1" sensor input on the MUX 400: a suitable signal or a reading pulse sensor (e.g. a photoelectric reflex switch) should be installed.
- Connection cables (not included in scope of delivery)
- A higher-level host computer (PLC) with a data interface of type RS 422 or RS 232
- PC with Windows 98™, Windows NT™, Windows 2000™ or Windows XP™ operating system and "CLV-Setup" configuration software from version 4.0 for parameterizing the MUX 400 (on CD ROM)
- To use the online help system CLV Setup Help, an HTML browser is required, e.g. Internet Explorer™ (from Version 5.0)
- A 3-core RS 232 data cable for connecting the PC to the terminal interface of the MUX 400.

For connecting to the “AUX” connector, a 3-core RS 232 null modem cable (Rx/D and Tx/D crossed) with 9-pin D Sub socket, e. g. no. 2 014 054

For the CAN Scanner Network:

- Bar code scanners from the CLV 42x to CLV 49x, CLX 490, and ICR 85x series
- Connection cables
- Operating instructions “Application of the CAN Interface” (No. 8 009 180, English edition) for configuring the CAN Scanner Network (on CD ROM)
- Operating instructions for the bar code scanners and CDB/CDM connection modules and for the CMC 400 cloning module, if used (on CD ROM)
- Connection diagrams in the CLV Connect PC program, version 2.0 upwards, for connecting the network devices and the host (on CD ROM)

3.1.3 Product features and functions of the MUX 400 (overview)**High-performance multiplexer:**

- Convenient connection of up to 32 bar code scanners using a CAN bus
- High data transfer rate to the host
- Continuous monitoring of bar code scanner presence on the network and possible system malfunctions

Safety and user-friendly features:

- Specialized knowledge of networks and bus systems is not required
- Robust, compact metal housing, IP 20, CE certificate
- Installation as a module in the system cabinet
- Automatic self-test at system start-up
- Network maintenance requirements indicated by a signal at the switching output or by means of a diagnosis telegram on the terminal interface
- Operating data display
- Future proof thanks to firmware update (flash PROM) via serial data interface
- 24 V DC power supply, low power consumption

Easy operation/configuration:

- With “CLV Setup” software for Windows (online) and help system
- Alternatively with simple command strings that can also be used for adjusting special devices
- 11 LEDs for displaying status and malfunctions
- Optional display for showing network status

Operating modes:

- Network mode
- Parameterization

Reading pulse distribution in the network:

- External reading pulse via MUX 400 (sensor input or serial interface)

Data output (host interface):

- Single or block telegrams

Electrical interfaces:

- CAN interface, data transfer rate, device number and output format parameterizable
- Serial host interface (RS 422 or RS 232) with variable transfer rate, protocol and telegram structure
- Serial terminal interface (RS 232) as auxiliary data interface with special diagnosis functions
- Digital input for reading pulse
- 4 digital outputs + 1 relay output for signaling device and network status information

Connections:

- All interfaces are connected via pluggable screw terminal strips and D Sub connectors

3.1.4 View of the MUX 400

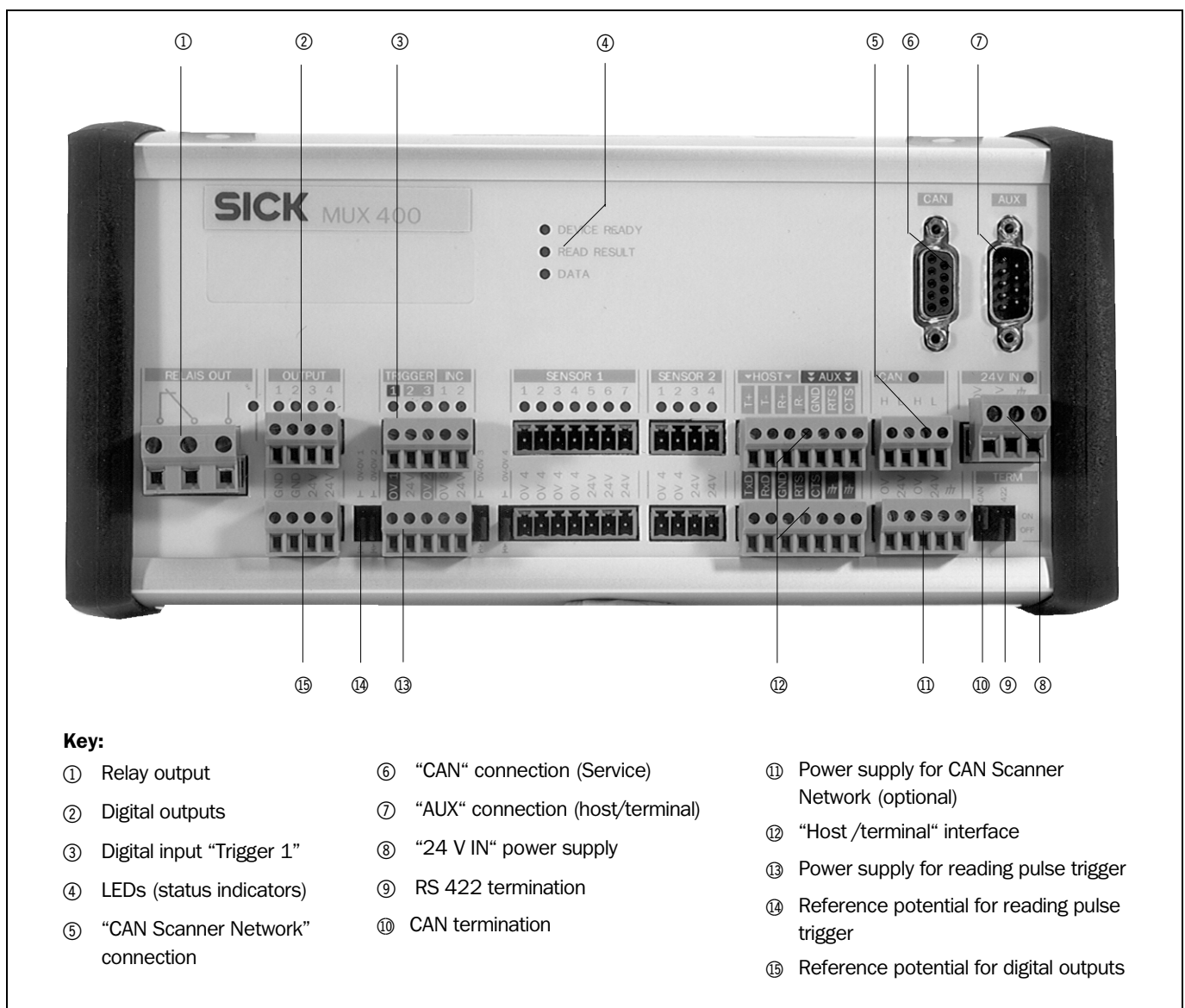


Fig. 3-1: Design of the MUX 400

3.2 Method of operation

3.2.1 Function in the network

The MUX 400 can be used to connect up to 32 bar code scanners with one single data interface to the host computer (PLC) in the CAN Scanner Network. As a client, the multiplexer manages the bar code scanners (servers) with the device numbers 1 to 63 and organizes rapid data conversion between the bar code scanners in the network and the host computer.

To do so, the multiplexer continuously forwards the content of all the read results and data strings it receives from the bar code scanners in the CAN Scanner Network at its CAN interface to the host computer via a serial host interface (Fig. 3-2). The data output format of each individual bar code scanner is freely programmable.

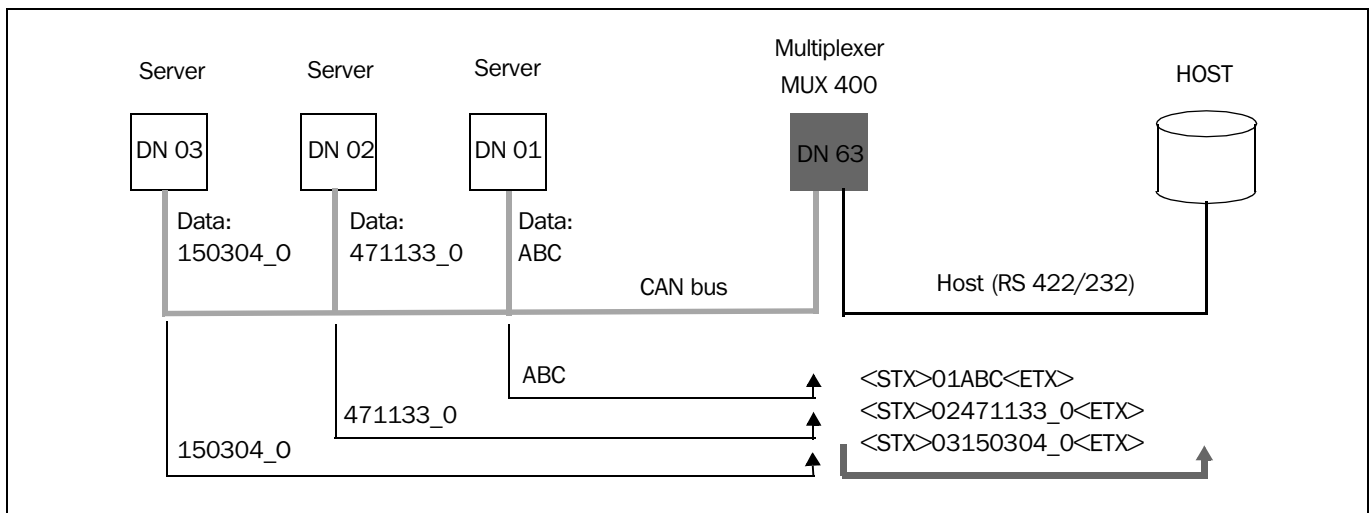


Fig. 3-2: Multiplexer function: Example of data flow via the multiplexer to the host computer

The MUX 400 can send a reading pulse trigger signal via its CAN interface for distribution in the CAN Scanner Network. Bar code scanners that use this signal to trigger their internal read gate must be configured to receive this signal. In the default setting of the MUX 400, an external reading pulse sensor triggers the reading pulse at the "TRIGGER 1" input. A command on the host computer can also be used as an alternative trigger source.

11 LEDs display the current operating status.

The "OUTPUT 1" to "OUTPUT 4" switching outputs as well as the "RELAY OUT" can be assigned status indicator functions for the MUX 400 and network and control external devices such as a PLC.

The MUX 400 derives useful data from the network for diagnosis purposes, which it then outputs via the serial terminal interface. It also outputs operating data that can be queried.

The MUX 400 is operated and configured via the terminal interface (auxiliary data interface) with the CVL Setup program or by command strings on the host interface/terminal interface.

System and error messages can be used for troubleshooting at start-up and during network operation. Special command strings can also be used to query further error codes.

3.2.2 Output format of the host interface

The MUX 400 adds the address of the data source (device number) in the CAN Scanner Network to the serial data strings output on the host interface.

Example:

Bar code scanner 01 sends the following to the MUX 400: <STX>ABC<ETX>

Bar code scanner 02 sends the following to the MUX 400:<STX>471133_0<ETX>

Bar code scanner 03 sends the following to the MUX 400:<STX>15304_0<ETX>

(Data output format 01: read result;

Data output format 02 and 03: read result + separator;

Separator: “_” (underscore) + error status “ST”)

MUX 400 sends the following data strings to the host:

<STX>**01**ABC<ETX>

<STX>**02**471133_0<ETX>

<STX>**03**15304_0<ETX>

The address information “nnx” comprises the two-digit address “nn” (device number) of the bar code scanner and a separator “x”. The host computer can use this address to identify the bar code scanner that sent the information when it queries the data strings.

A read result can also contain the data from several codes, depending on the read.

Separator:

The “x” separator can be used in two ways:

- Not compatible with the prefix for the CLX 200 network controller (default setting):
An ASCII character (default setting: } (7D hex), range: 00 ... 7F hex).
The character can be changed using a command.

Example: <STX>02}471133_0<ETX>

- Compatible with the prefix for the CLX 200 network controller:
The ASCII character is not used (setting: 00 hex).

Example: <STX>02471133_0<ETX>

The host can send command strings with a prefixed address (device number DN) in the same format to the MUX 400, which, in turn, transfers them to the corresponding bar code scanner. So that the MUX 400 does not have to be handled separately by the host, it responds to command strings that contain its own device number in the address, as if it were a bar code scanner in the network.

Single and block telegram:

The MUX 400 outputs the read results received as data strings from the bar code scanners either in the form of single telegrams or in larger block telegrams via the host interface in the protocol timeout frequency.

With block telegrams, the host computer (PLC) can process the data strings from several bar code scanners in one cycle.

The configured maximum block telegram length restricts the output string length of the MUX 400. If several data strings are present in the output memory of the MUX 400 at the time of output, they are added to data blocks to form a single useful data telegram until either the timeout occurs or the maximum telegram length is reached. The MUX 400 buffers the data until the next block telegram if the number of data blocks exceeds the block telegram capacity. The read results are always complete and are never split.

Note A single data string from a bar code scanner is not divided into two block telegrams. The block telegram length must always be larger than the maximum data string length of a bar code scanner.

Structure of the block telegram

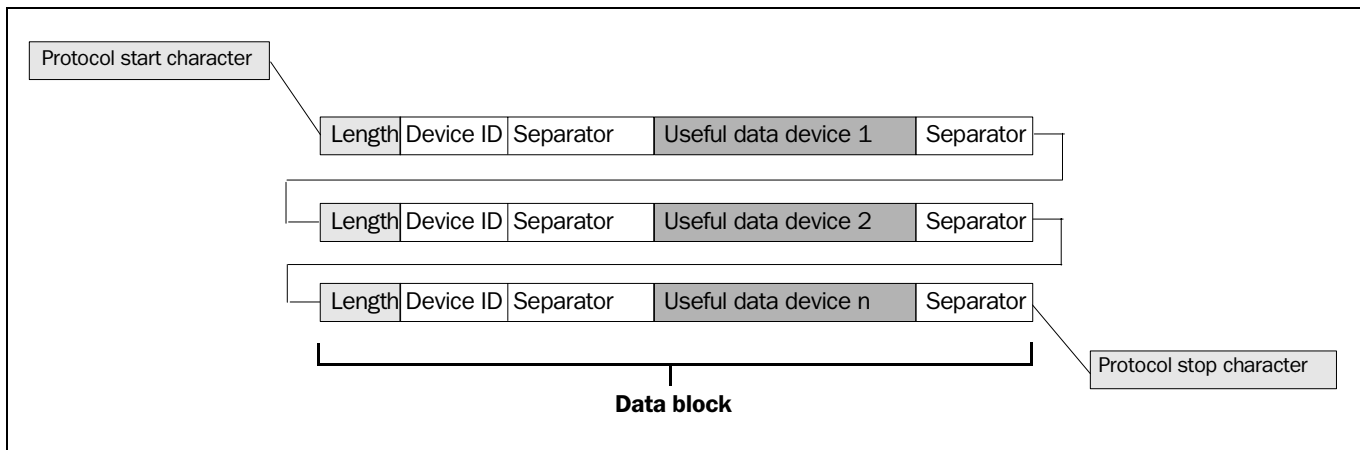


Fig. 3-3: Structure of block telegram

- **Length:**
The length indicates the number of characters in a data block. The host computer calculates the start of the next data block from the number of characters. This is indicated in two ASCII characters (decimal). If a data block is larger than 99 characters, the MUX 400 enters the value 00.
- **Separator:**
The MUX 400 enters the configured separator (max. 5 elements consisting of ASCII characters (letters and numbers) and control characters) as the last character in the data block

Example:

The output memory of the MUX 400 contains 3 data strings from 2 bar code scanners. Max. block telegram length: 20 characters, separator }, separator **S** start character STX, stop character ETX

Output sequence	Data string from bar code scanner	Scanner address
1	12345678	2
2	abc	3
3	XYZ	2

Output strings to the host

STX 14 02 } 12345678 **S** ETX (1st output string, 16 characters in total)

STX 09 03 } abc **S** 09 02 } XYZ **S** ETX (2nd output string, 20 characters in total)

The following combinations are not possible as they would result in a block telegram length of > 20 characters.

STX 14 02 } 12345678 **S** 09 03 } abc **S** ETX

STX 14 02 } 12345678 **S** 09 03 } abc **S** 09 02 } XYZ **S** ETX

3.2.3 Diagnosis functions

The results of all the diagnosis functions for the terminal interface can be displayed with the terminal emulator in CLV Setup.

Network monitoring:

The MUX 400 continuously monitors all bar code scanners that are registered as servers in order to check their presence on the network and detect any system errors (error status ST = 3). Further devices can also be included in the monitoring list, such as slaves in a master/slave cluster. All devices signal their operating status by sending a heartbeat telegram to the MUX 400 at regular intervals.

The MUX 400 registers the failure of a monitored bar code scanner both at start-up and during operation. The MUX 400 outputs a maintenance message if an error occurs by means of a signal at the switching output or a diagnosis telegram on the terminal interface.

Server diagnosis:

This function allows the behavior of an individual bar code scanner in the network to be monitored during read operation. The MUX 400 transmits the data strings from the bar code scanners via the terminal interface for the operating mode selected for the terminal interface on the bar code scanner being monitored. The bar code scanners support this function from the following firmware versions: CLV 42x from V 1.7, CLV 43x ... 45x from V. 3.6, CLV 480, CLV/X 490 higher than V 3.2 and ICR 85x higher than V 1.8.

Output of network data timing:

In order to determine the maximum data transfer time from of a bar code scanner in the network to the host interface, the MUX 400 can scan the network independently and output the measured values via the terminal interface.

Monitoring of the host interface:

In order to analyze data transfer errors between the MUX 400 and host computer, the MUX 400 can also output the data traffic from its host interface on the terminal interface with directional information.

3.3 Indicators and operating elements

3.3.1 Operating elements

The MUX 400 is operated and configured via the terminal interface (auxiliary data interface) using the "CLV Setup" program or using command strings sent via the host interface/terminal interface.

Chapter 10.2 Installation and operation of the PC-based "CLV Setup" program, Page 61, describes the procedure for installing the "CLV Setup" program and how to operate the user interface. Configuration (parameterizing) is explained in *Chapter 6.4 Configuration (parameterizing), Page 35.*

Jumpers on the front panel determine electrical properties.

3.3.2 Function of the LED indicators

A total of 11 LEDs indicate the operating status, digital input and output activity, read result status, and data transfer on the CAN bus and host interface. The LEDs are located on the front panel above the terminal strips in the labeling fields as well as in the upper middle section ([Fig. 3-1, Page 15](#)). [Table 3-1](#) shows the meaning of the LED indicators in the different operating modes/functions.

LED ¹⁾	Number	Color	Meaning
DEVICE READY	1	green	<ul style="list-style-type: none"> Indicates that the MUX 400 is ready in network mode Lights up after the device has been switched on if the automatic self-test was performed successfully and network mode has started Extinguishes when a different operating mode/Function is selected
DATA	1	yellow	Blinks while the MUX 400 is transmitting data to the host on the serial host interface in network mode
OUTPUT	4	yellow	Lights up when the corresponding digital output switches
RELAIS OUT	1	yellow	Lights up when the relay output switches
TRIGGER 1	1	green/ red ²⁾	Lights up when the digital input is energized. TRIGGER 2 and 3 have no function on the MUX 400
24 V IN	1	green	Lights up when the 24 V DC power supply is connected to the MUX 400
CAN	1	green	Blinks while data from the bar code scanners is being received by the MUX 400 via the CAN Scanner Network
1) the LEDs READ RESULT, INC, SENSOR 1 and SENSOR 2 have no function 2) red if interchanged			

Table 3-1: Meaning of the LED indicators

4 Installation

4.1 Selecting the installation site

- The MUX 400 (enclosure rating IP 20) is suitable for installation in an industry-type control cabinet or control box on a top-hat rail. Alternatively it can be installed using the mounting brackets.
- Regard the recommended maximum cable lengths in the CAN Scanner Network ([Table 5-5, Page 25](#))
- Regard the recommended maximum stub length between connection module and bar code scanner ([Table 5-6, Page 25](#))
- Regard the recommended cable length between MUX 400 and host ([Table 5-8, Page 25](#))
- Access to the MUX 400 or to the connection module of a bar code scanner must be possible at all times, as the access for parameterizing/diagnosis of the MUX 400 and the network is carried out via a terminal interface (RS 232).
Max. cable length between MUX 400/bar code scanner and PC: 10 m (32.8 ft)
- If bar code scanners with optional heating are used, the MUX 400 must be installed outside the cooling area due to its limited ambient temperature range of 0 ... +50 °C (+32 to +122 °F)
- For hole and housing dimensions of the MUX 400, see [Chapter 9.2 Dimensional drawings, Page 59](#)

4.2 Installing the MUX 400



Damage to the devices in the control cabinet

Electronic devices in the control cabinet can be damaged by the discharge of static electricity.

- Before opening the control cabinet, discharge your static electricity or wear a discharge wrist strip.

1. Discharge static electricity or put on the a discharge wrist strip.
2. If necessary, switch of power supply for the control cabinet.
3. Ground the control cabinet or the top-hat rail.
4. Remove both mounting brackets on the MUX 400 for mounting the device onto the top-hat rail.
5. Put the MUX 400 onto the top-hat rail in the control cabinet and lock the snap-in brackets.
6. Ground the MUX 400 (e. g. using the grounding contact on the back side).
7. Connect the CAN Scanner Network.

4.3 Removing the device

1. Switch off the power supply of the MUX 400.
2. Remove all connectors and pluggable terminal strips from the MUX 400.
3. Remove the MUX 400 from the top-hat rail respectively unscrew the mounting brackets.

When removing the device from service for the last time, please dispose of it in an environmentally-friendly manner, as described in [Chapter 7.3 Disposal, Page 51](#).

5 Electrical installation

5.1 Overview of the connection sequence

- Install and connect the bar code scanners in the CAN Scanner Network
- Connect the network to the CAN interface of the MUX 400
- Connect the host to the host interface of the MUX 400
- Connect the digital inputs and outputs of the MUX 400 (if required)
- Connect the MUX 400 to the power supply
- Connect the PC to MUX 400 (terminal interface)

5.2 Electrical connections and cables

The electrical connections for the MUX 400 consists of 10 pluggable screw terminal strips and two 9-pin D Sub connectors. They are positioned on the front panel grouped in fields with corresponding signs.

They supply the following interfaces:

Pluggable terminal strips

- one CAN interface, for connecting to the CAN Scanner Network
- one serial host interface (RS 422 or RS 232), for connecting to the host computer
- one serial terminal interface (RS 232), for connecting to the PC (configuration and diagnosis)
- one digital input (external reading pulse), floating
- three digital outputs (for indicating the operating status, for connecting e. g. to PLC)
- one relay output (for indicating the operating status)
- power supply

D Sub connectors

- 9-pin D Sub plug "AUX": host interface/terminal interface as above
- 9-pin D Sub socket "CAN": CAN interface, for testing and diagnosis
- Wire all connections with copper cables with the following wire diameters:
 - to CAN Scanner Network: see [Table 5-7, Page 25](#)
 - host interface, terminal interface, digital input/outputs: at least 0.14 mm² (26 AWG)
 - relay output: at least 1 mm² (18 AWG)
 - power supply: depends on the number of bar code scanners to be supplied
- terminal strips: strip the wires of the cables to be connected approx. 5 mm (0.2 in).

Recommendation Use wire-end ferrules for the wires of flexible cables.

Specification of the terminal strips

Terminal strip	Connection cable	Wire diameter
"CAN", "HOST", "AUX"	fixed/flexible	0.14 to 1.5 mm ² (26 to 16 AWG)
Digital input/outputs "TRIGGER 1" and "OUTPUT"	fixed/flexible	0.14 to 1.5 mm ² (26 to 16 AWG)
Relay output "RELAIS OUT"	fixed/flexible	0.2 ... 2.5 mm ² (24 to 14 AWG)
"24 V IN" power supply	rigid/flexible	0.2 ... 2.5 mm ² (24 to 14 AWG)

Table 5-1: Admissible wire diameters on the terminal strips

5.3 Connector pin and terminal strips assignment

5.3.1 “CAN” connection

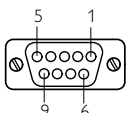
		
Pin	Signal	Function
1	n. c.	–
2	CAN L	CAN bus (low)
3	GND	Ground
4	n. c.	–
5	n. c.	–
6	n. c.	–
7	CAN H	CAN bus (high)
8	n. c.	–
9	n. c.	–

Table 5-2: Pin assignment of the 9-pin D Sub socket “CAN”

5.3.2 “AUX” connection

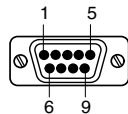
		
Pin	Signal	Function
1	T+ (RS 422)	Host interface (sender+)
2	RxD_T (RS 232)	Terminal interface (receiver)
3	TxD_T (RS 232)	Terminal interface (sender)
4	R+ (RS 422)	Host interface (receiver+)
5	GND	Ground
6	T– (RS 422)/TxD (RS 232)	Host interface (sender–)
7	RTS_T (RS 232)	Terminal interface (control line, Request To Send)
8	CTS_T (RS 232)	Terminal interface (control line, Clear To Send)
9	R– (RS 422)/RxD (RS 232)	Host interface (receiver–)

Table 5-3: Pin assignment of the 9-pin D Sub plug “AUX”

In addition to the 9-pin connectors the individual connections for the host and terminal interfaces are available in two terminal strips ([Fig. 5-1, Page 24](#)).

5.3.3 Terminal strips

The signal assignment to the terminal strips is signed on the front panel.

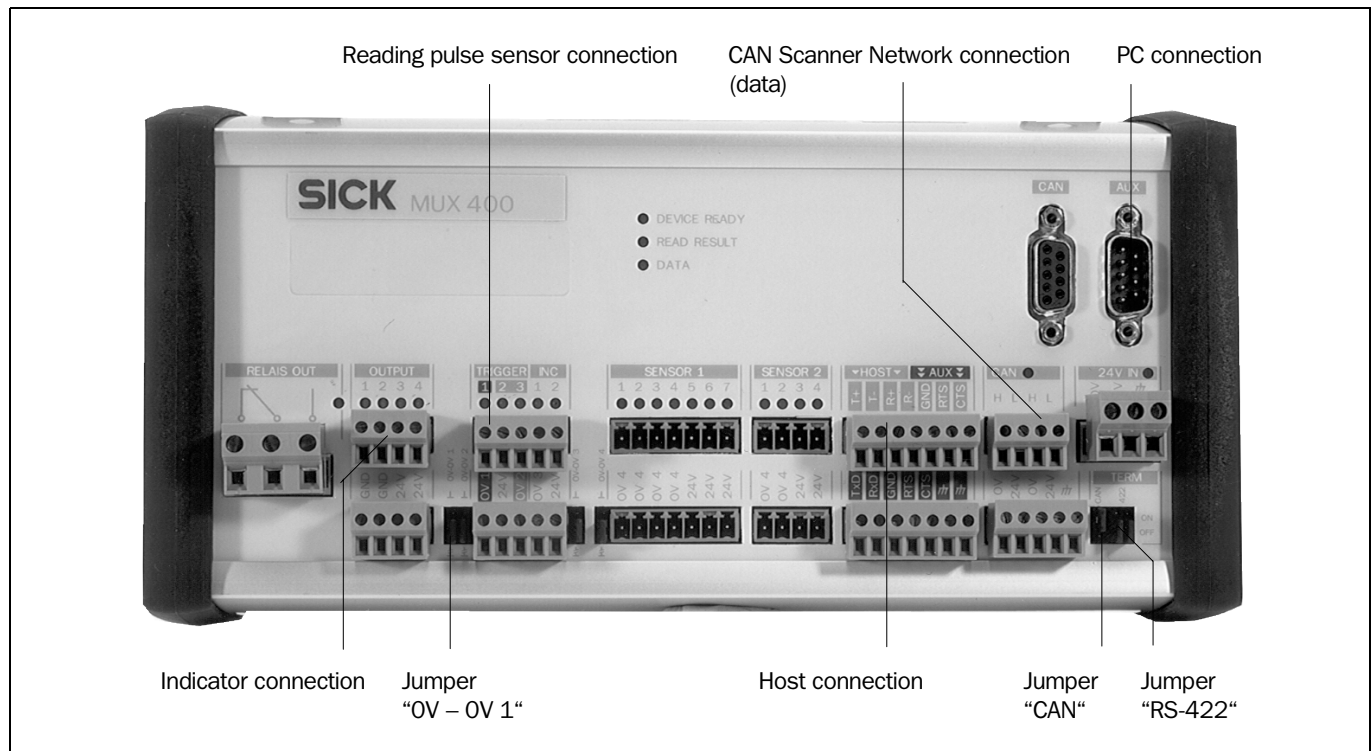


Fig. 5-1: Connections and jumpers of the MUX 400

Jumpers

ON is on the top position, OFF is on the bottom position.

Jumper	Function	Default
OV – OV 1	Reference voltage for GND sensor: ⊥: connected to GND of the MUX 400 OFF: floating	OFF
CAN	Termination of the CAN bus: ON: Resistor 120 Ohm switched on OFF: no termination	ON
RS 422 (2 x)	Termination of the host interface RS 422: ON: Receiver termination switched on OFF: no termination	OFF

Table 5-4: Jumpers on the MUX 400

5.4 Planning the electrical installation

5.4.1 Requirements for the CAN interface

The CAN Scanner Network is based on the CAN bus. The CAN bus is designed as line topology. The admissible maximum cable length of the CAN bus depends on the selected data transfer rate ([Table 5-5](#)). The admissible maximum total amount length of all stubs may not exceed (see [Table 5-6](#)), a single stub may not exceed 6 m (19.7 ft).

The required wire diameter of the data cable depends on the total amount length of the network. [Table 5-7](#) shows the overview according to ISO 11898.

If repeaters are used, the permitted total cable length is shorter because repeaters constitute delay elements in the network..

Data transfer rate	Maximum data cable length
10 kbit/s	5,000 m (16,404 ft)
20 kbit/s	2,500 m (8,202 ft)
50 kbit/s	1,000 m (3,280 ft)
100 kbit/s	600 m (1,968.5 ft)
125 kbit/s	500 m (1,640.4 ft)
250 kbit/s ¹⁾	250 m (820.2 ft)
500 kbit/s	100 m (32.8 ft)
1 Mbit/s	10 m (3.28 ft)
1) default setting of the MUX 400 and the bar code scanners	

Table 5-5: CAN bus: Maximum cable length as a function of the data transfer rate

Data transfer rate	Maximum total amount of all stub lengths
125 kbit/s	156 m (511.8 ft)
250 kbit/s	78 m (255.9 ft)
500 kbit/s	39 m (127.95 ft)

Table 5-6: CAN bus: Maximum stub lengths as a function of the data transfer rate

Cable length	Required wire diameter (data cable)
0 to 40 m (0 to 131.2 ft)	≥ 0.25 mm ² (24 AWG)
40 to 300 m (131.2 to 984.2 ft)	≥ 0.34 mm ² (22 AWG)
300 to 600 m (984.2 to 1,968.5 ft)	≥ 0.5 mm ² (22 AWG)
600 to 1,000 m (1,968.5 to 3,280.8 ft)	≥ 0.75 mm ² (20 AWG)

Table 5-7: CAN bus: Required wire diameter as a function of the data cable length

5.4.2 Requirements for the host interface

The host interface of the MUX 400 can be operated as an RS 422 or an RS 232 interface. [Table 5-8](#) shows the recommended maximum cable lengths as a function of the selected data transfer rate.

Interface type	Transfer rate	Distance from host
RS 422 ^{*)}	max. 38,400 bd max. 57,600 bd	max. 1,000 m (3,280.8 ft) max. 500 m (1,640 ft)
RS 232	up to 19,200 bd 38,400 to 57,600 bd	max. 10 m (32.8 ft) max. 3 m (9.84 ft)
*) with suitable line termination		

Table 5-8: Maximum cable lengths between MUX 400 and host

Recommendation To prevent interference, do not lay the cable between the MUX 400 and the bar code scanners as well as the host parallel with power supply and motor cables over long distances, e.g. in cable ducts.

Connecting the MUX 400 to field bus systems:

For connecting the MUX 400 to the field bus “Profibus-DP” or “DeviceNet” field bus gateways are available for mounting on top-hat-rail. The MUX 400 is connected to the gateway via the RS 232 interface.

5.4.3 Power supply

The MUX 400 requires a power supply of 24 V DC +20 %/–10 % (functional extra-low voltage) in accordance with the standard IEC 364-4-41. The functional extra-low voltage can be generated by using a safety isolating transformer pursuant to IEC 742. The MUX 400 has a power consumption of max. 5 W (when all digital outputs are connected).

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

The core cross-section for the power supply of the MUX 400 should be a minimum of 0.2 mm² (24 AWG). If the bar code scanners are powered via the MUX 400 (power supply through-connected), the core cross-section to the MUX 400 and from the MUX 400 to the bar code scanners is dependent on their power consumption and the cable length in the network and the voltage drop.

5.5 Making electrical connections

5.5.1 Connecting the power supply

- Connect the power supply (24 V DC) to the terminal strip in the field „24 V IN“.
- Only switch on the power supply after connecting all required interfaces.

Note The input for power supply is interchangeable. Note that if the polarity of the supply voltage is reversed, it is also reversed at the reading pulse sensor input, for the power supply of the loads at the switching outputs, and for the power supply to the bar code scanners.

Connecting the power supply to the bar code scanners:



Risk of damage to the MUX 400

Components can be damaged by excessive supply currents at the wrong terminals.

- If the power supply for the bar code scanners is connected through the MUX 400, the supply voltage for the bar code scanners should only be picked up in the CAN field at the “24 V” and “0 V” terminals on the lower terminal strip.
The required wiring diameters for the currents are only provided here.

5.5.2 Connecting the CAN interface to the network

1. For wiring the CAN Scanner Network use only a CAN bus specified cable, e. g. no. 6 027 048 (2 x 2 wires 0.5 mm² (22 AWG), twisted pair, shielded, wave resistor 120 Ω).
2. Terminate the bus cable on both cable ends in the connection module using each a termination resistor of 120 Ω. If the MUX 400 is at the end of the cable, switch on the resistor using the jumper “CAN” (default setting: ON). If the MUX 400 is not at the end, switch off the termination (position: OFF).
3. Connect the data cable of the network to the terminal strip on top of the field “CAN”.
Fig. 5-2 shows the principle of wiring the data cable via the CDB 420 connection modules.

MUX 400 Multiplexer

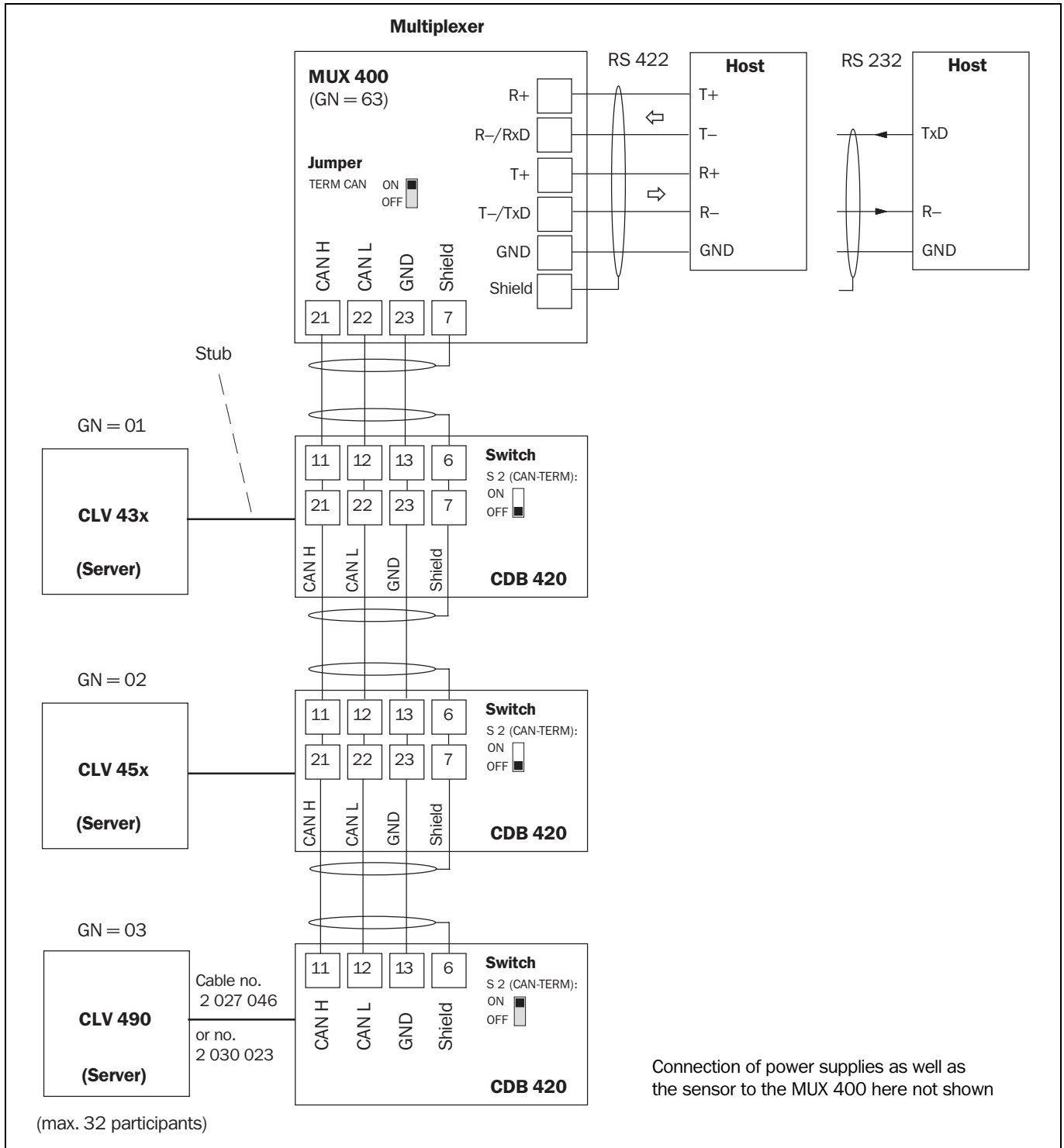


Fig. 5-2: Principle: Wiring the CAN Scanner Network via CDB connection modules

For installing and wiring the network see the *Operating Instructions "Application of the CAN interface"* (Nr. 8 009 180, English edition).

Note Diagrams showing you how to wire the network are available in the "CLV Connect" PC program (from Version 2.0). This software is available on the „Manuals & Software“ CD ROM, which is included in the scope of delivery of the MUX 400. The software can also be downloaded from the SICK home page (www.sick.de). It can be started using a standard HTML browser (e. g. Internet Explorer™, from Version 5.0).

5.5.3 Connecting the CAN interface (9-pin D Sub socket)

This interface is used to connect a PC with CAN interface for testing and diagnosis.
Pin assignment see [Table 5-2, Page 23](#).

5.5.4 Connecting the host interface



ATTENTION

Risk of damage to the interface module

Electronic components in the MUX 400 may be damaged if the host interface is connected incorrectly.

- Connect the host interface as shown in [Fig. 5-3](#).
- Check the connections carefully before you switch on the MUX 400.

1. Connect the host interface on the MUX 400 to the host using shielded cables (EMC requirements). Ensure that the maximum cable lengths are not exceeded ([Table 5-8, Page 25](#)).
2. Connect the host to the terminal strip in the grey field "HOST".

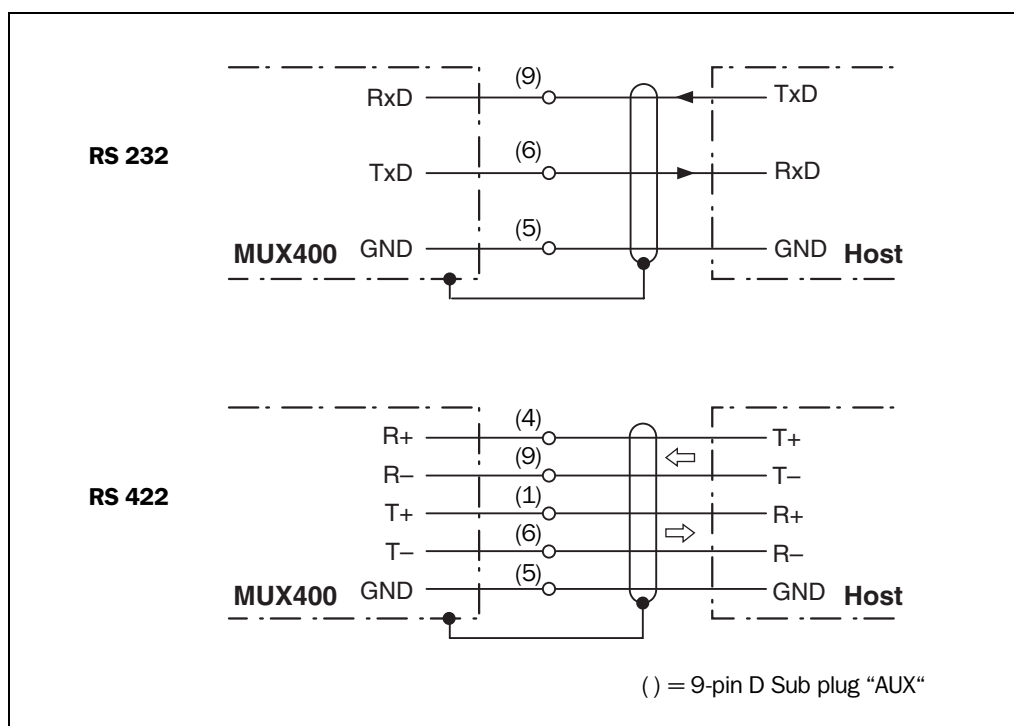


Fig. 5-3: Connecting the host interface

Assignment of terminal signs to RS 232

In the field "Host" only the terminal assignment of the RS 422 interface type is displayed.
The following assignment must be made to connect the RS 232 interface:

RS 422	RS 232
T-	TxD
R-	RxD

Table 5-9: Host interface: Assignment of the RS 232 signals on the RS 422 interface

Termination of the RS 422 interface

To improve the signal-to-noise ratio the receiver of the MUX 400 can be terminated.

- On the front panel, set the two jumpers in the field “TERM” to position “ON” (see also [Table 5-4, Page 24](#)).

In the default setting, the MUX 400 communicates with the host via the host interface using the communication parameter values as shown in [Table 5-10](#).


Parameter	Value
Interface type	RS 422
Data transfer rate	9,600 bd
Data bits	8
Parity	no
Stop bits	1
Protocol	SICK (start character: STX, stop character: ETX, handshake: NAK, Timeout: 50 ms)

Table 5-10: Communication parameters of the host interface (default setting)

Activating the RS 232 interface



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

1. Choose the HOST INTERFACE tab.
2. Choose the "RS 232" option from the HARDWARE drop-down list under DATA FORMAT.
3. Perform a download to the MUX 400. This is done by clicking  in the toolbar. The DOWNLOAD PARAMETER dialog window is displayed.
4. Confirm the dialog window by selecting the PERMANENT save option.

The MUX 400 uses the RS 232 type of the host interface.

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

5.5.5 Connecting the terminal interface

The MUX 400 is configured with the “CLV Setup” program. In order to do so, you must connect the device to the PC via the terminal interface (auxiliary interface). Unlike the host interface, the terminal interface has a permanent data format and a fixed data transfer rate. [Fig. 5-4](#) shows how the terminal interface is connected. The cable length is not to exceed 10 m (32.8 ft).

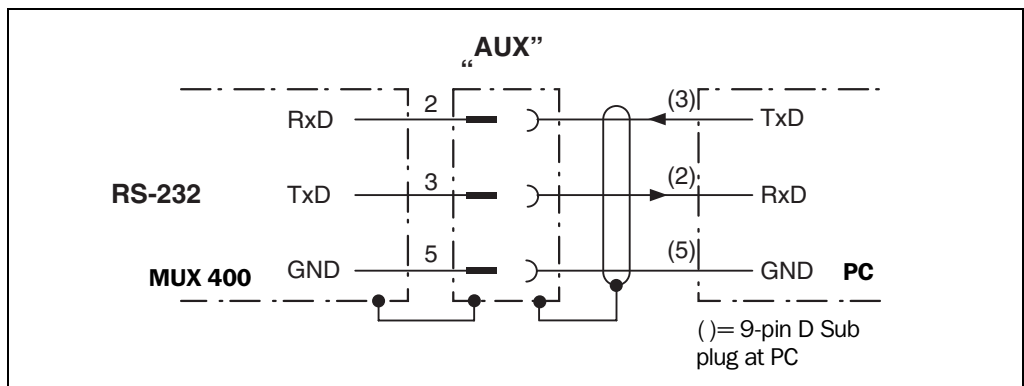


Fig. 5-4: Connecting the terminal interface



Risk of damage to the interface module

Electronic components in the MUX 400 may be damaged if the terminal interface is connected incorrectly.

- Connect the terminal interface as shown in [Fig. 5-4](#).
- Check the connections carefully before you switch on the MUX 400.

1. Switch off the PC.
2. Connect the PC to the 9-pin D Sub plug "AUX".
To do so, use a 3-core RS 232 data cable (null modem cable), RxD and TxD crossed, e. g. no. 2 014 054.
– or –
Connect the PC with an corresponding RS 232 data cable (open end) to the terminal strip in the blue field "AUX".
3. Switch on the PC and start CLV Setup.
4. Set the communication parameters in the PC (see [Chapter 10.2.3 Starting "CLV Setup", Page 64](#)).

In the default setting, the MUX 400 communicates via the terminal interface using the fixed communication parameter values as shown in [Table 5-11](#).

Parameter	Value
Interface type	RS 232
Data transfer rate	9,600 bd
Data bits	8
Parity	no
Stop bits	1
Protocol	Start character: STX, Stop character: ETX

Table 5-11: Communication parameters of the terminal interface



Tip

In the default setting, the terminal interface outputs the read result in "MUX Diagnosis" mode.

Via the AUXILIARY INTERFACE tab in the CLV Setup program you can change the operating mode to "Server Diagnosis" for a selected bar code scanner, to "Monitor Host Interface" (MUX 400), or to "MUX Data Timing" to output the taken maximum data transfer time (from bar code scanner to the host interface).

5.5.6 Connecting the digital input "TRIGGER 1"

If the MUX 400 is to distribute the reading pulse in the network, the external read trigger sensor can be connected to the "TRIGGER 1" digital input. The reading pulse signal will be forwarded by the MUX 400 to the bar code scanners via the CAN bus. This trigger type is selected in the default setting of the MUX 400. [Fig. 5-5](#) shows the connection diagram for the input, which is floating in the default setting (jumper "0V – 0V 1" opened). [Table 5-12](#) contains the characteristic data for this input.

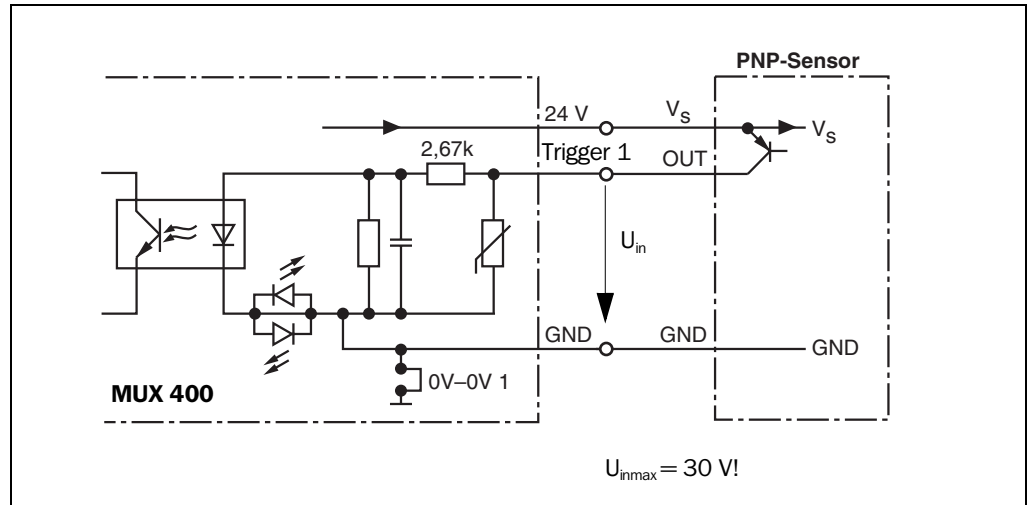


Fig. 5-5: Connecting the digital input "TRIGGER 1"

- Connect the reading pulse sensor to the terminal strip in the blue field "TRIGGER 1" as shown in Fig. 5-5.

The corresponding LED lights up (green) when the input signal (reading pulse signal) is pending. If the input signal is interchanged, the LED lights red to indicate the fault.

The "0V – 0V 1" jumper nearby the field "TRIGGER" is used to connect the ground potential of the reading pulse sensor "TRIGGER 1" with the ground potential of the MUX 400 (top position "1" of the jumper), if the sensor is to be powered via the MUX 400. The power supply voltage (24 V DC) is available on the terminal strips in the field "TRIGGER" (terminals "24 V" and "0 V 1" (blue)). If the sensor is powered by an external power supply, the external potential should be connected to the reading pulse sensor (bottom position of the jumper). See also Table 5-4, Page 24.

Switching mode	Default setting: current at the input starts the reading interval for all bar code scanners in the network (active high, debouncing: 20 ms)
Properties	digital, optodecoupled, non-interchangeable, debouncing 5 to 10,000 ms (can be set) can be connected to PNP output on a sensor
Electrical values (level)	Low: $-10\text{ V} \leq U_{in} \leq +10\text{ V}$; $-3\text{ mA} \leq I_{in} \leq +3\text{ mA}$ High: $-30\text{ V} \leq U_{in} \leq -15\text{ V}$; $-10\text{ mA} \leq I_{in} \leq -5\text{ mA}$ High: $+30\text{ V} \leq U_{in} \leq +15\text{ V}$; $+10\text{ mA} \leq I_{in} \leq +5\text{ mA}$

Table 5-12: Characteristic data of the digital input "TRIGGER 1"

**Tip**

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

- Edit the corresponding options in the NETWORK TRIGGER section.
Download all changes to MUX 400.

5.5.7 Connecting the outputs

The four digital outputs and the relay output (single-break and-make) can be assigned to the status indication "Device Ready" or "System Ready" independently of each other:

- "Device Ready": If the MUX 400 is ready for operation after power-up, the corresponding output becomes live and the relay switches the contact. If there a malfunction occurs in the MUX 400 during operation, the output is deactivated and the relay de-energizes.

- "System Ready": If the entire network is ready for operation, the appropriate output becomes live and the relay switches the contact. If the MUX 400 detects a malfunction during network monitoring (e.g. a registered bar code scanner is not transmitting a signal or outputs the status signal ST = 3), the output is de-energized and the relay drops out.

Digital outputs "OUTPUT 1 to 4"

Fig. 5-6 show an example of how the "OUTPUT 1" output can be connected. Table 5-13 describes the identical characteristic data for the four digital outputs.

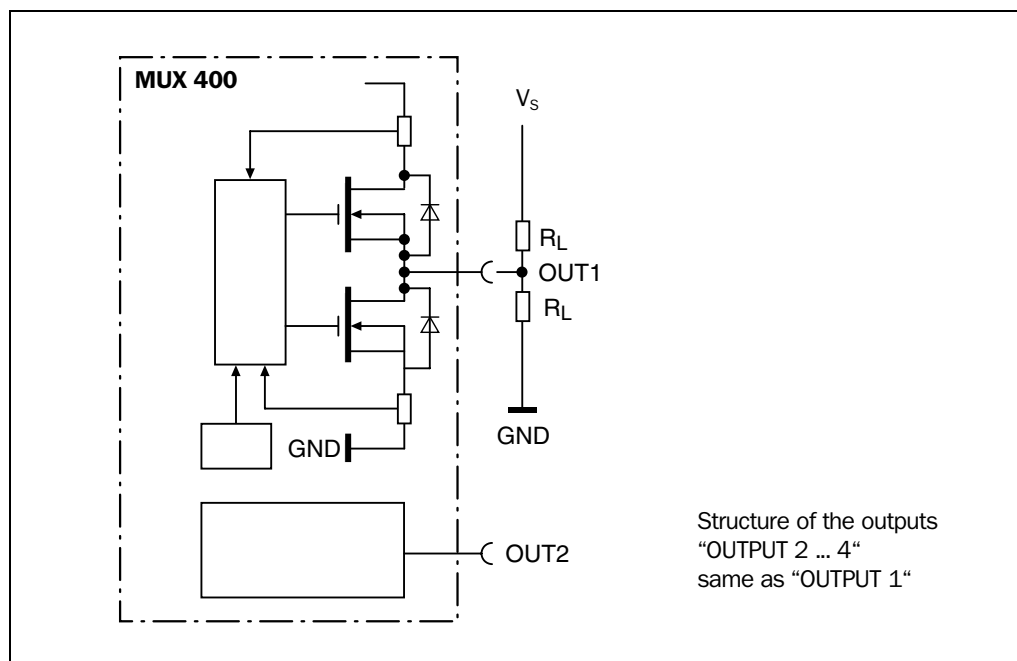


Fig. 5-6: Connecting the digital output "OUTPUT 1"

- Connect the outputs at the terminal strip in the field "OUTPUT", as shown in Fig. 5-6. If an output switches, the corresponding yellow LED lights up.

Switching mode	Switching with respect to the power supply V_s and to ground (push & pull) Pulse duration: static
Properties	digital, short-circuit-proof + temperature-protected not electrically isolated from V_s
Function assignment (default setting)	OUTPUT 1: "Device Ready" (static), polarity: not inverted OUTPUT 2: "Device Ready" (static), polarity: not inverted OUTPUT 3: "System Ready" (static), polarity: not inverted OUTPUT 4: "System Ready" (static), polarity: not inverted
Electrical values	$0\text{ V} \leq U_{\text{out}} \leq V_s$ Guaranteed: $U_{\text{out}} \cdot V_s - 2.5\text{ V}$ at $I_{\text{out}} \leq 100\text{ mA}$ $I_{\text{out}} \leq 100\text{ mA}$

Table 5-13: Characteristic data of the digital outputs "OUTPUT 1" to "OUTPUT 4"



Tip

The output function and polarity of the signals can be changed on the DEVICE CONFIGURATION tab in the CLV Setup program.

- Select the corresponding options in the RESULT OUTPUT FUNCTIONS section.
Download all changes to MUX 400.

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

Relay output “RELAIS OUT“

Fig. 5-7 shows the connection diagram of the output “RELAIS OUT“. Table 5-14 describes the characteristic data of the output.

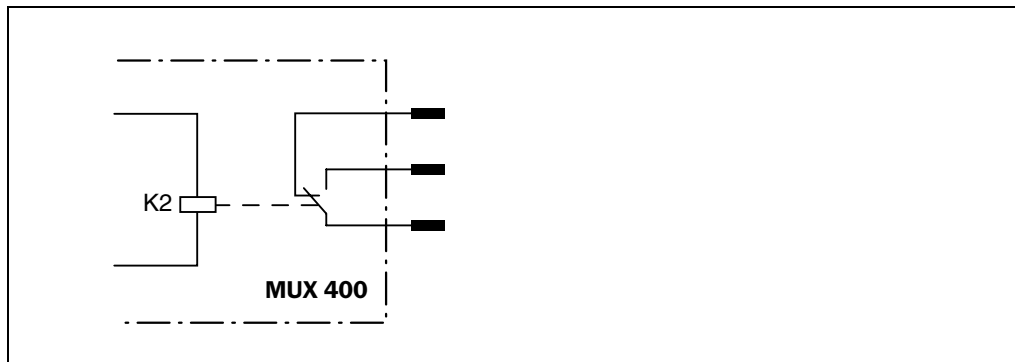


Fig. 5-7: Connection diagram of the output “RELAIS OUT“

- Connect the output on the terminal strip in the field “RELAIS OUT”.
If the relay operates, the corresponding yellow LED lights up.

Switching mode	Relay output, single-break and-make relay, Pulse duration: static
Properties	floating, short-circuit-proof electrically isolated from V_s
Function assignment (default setting)	“System Ready (static)“, polarity: not inverted
Electrical values	Alternating voltage/direct voltage $0 \text{ V} \leq U_{\text{Switch}} \leq 250 \text{ V}$ according to VDE 0110 group C $I_{\text{outmax}} = 1.5 \text{ A}$ at 24 V DC $I_{\text{outmax}} = 0.2 \text{ A}$ at 250 V DC $I_{\text{outmax}} = 1.5 \text{ A}$ at 250 V AC

Table 5-14: Characteristic data of the output “RELAIS OUT“

Note Even high-quality relays suffer from wear and tear on the contacts. For this reason, we recommended the relay output be used only for functions that require many switching cycles. The max. current is 1.5 A.

According to manufacturer’s data:

Typical service life of a relay at a maximum load (220 V AC/8 A): 100 000 switching cycles.
Typical mechanical service life (without load): 30 000 000 switching cycles.

6 Operation

6.1 Overview of the starting up sequence

- Install the SICK CAN Scanner Network and connect the MUX 400
- Configure the bar code scanners for network operating mode
- Start up the MUX 400 with the factory default settings
- Connect the PC to the MUX 400 and configure the MUX 400 as multiplexer for network operating mode

6.2 Default setting



[Table 6-1](#) shows an overview of the factory default settings of the MUX 400.

The default settings of the parameters are stored permanently both in the MUX 400 (ROM) and in the CLV Setup database. They can be loaded into the RAM of the MUX 400 or displayed on the tabs of CLV Setup at any time.



Parameter	Values
CAN interface	
Data transfer rate	250 kbits/s
Device number (GN)	63
Server list (entered devices)	01
Host interface	RS 422
Data transfer rate	9,600 bd
Data format	8 data bits, no parity, 1 stop bit
Protocol	NAK; start character: STX, stop character: ETX; timeout 50 ms
Output format	Single telegram
Prefix compatible to CLX	no
Test string	not active
Terminal interface	RS 232; 9,600 bd; 8 data bits, no parity, 1 stop bit (values cannot be changed)
Function	MUX diagnosis
Reading pulse source for network triggering	Sensor input (TRIGGER 1), active high, debouncing 20 ms, first trigger: edge
Outputs	OUTPUT 1 to 2: "Device Ready" (static), OUTPUT 3 to 4: "System Ready" (static) RELAIS OUT: "System Ready" (static)
Field bus gateway	non

Table 6-1: Default settings of the MUX 400

Restore the default setting in the MUX 400

1. Click  in the toolbar.
CLV Setup loads the default settings from its internal database and displays them on the tabs.
2. Perform a download to the MUX 400. This is done by clicking  in the toolbar.
The DOWNLOAD PARAMETER dialog box is displayed.
3. Confirm the dialog box by selecting the PERMANENT save option.

**Displaying and printing out complete default settings in CLV Setup**

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

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

6.3 Operating modes/functions

Standard operating mode

- Network operating mode

For configuring

- Parameterization

For monitoring purpose/troubleshooting

- MUX diagnosis
- Server diagnosis
- MUX data timing
- Monitoring host interface
- Displaying operating data

6.4 Configuration (parameterizing)

The MUX 400 is configured for network operating mode in accordance with the application in site. The factory default settings or an application-specific parameter set of the MUX 400 are in effect before changes are made.

The MUX 400 supports two configuration methods:

- Configuration via the PC software "CLV Setup"
- Configuration with command strings

See [Chapter 10.3 Configuring the MUX 400 with command strings, Page 71](#).



6.4.1 Configuring the MUX 400 with the user interface of CLV Setup

To be able to use "CLV Setup", a PC has to be connected and the program installed on it. The procedure for connecting the PC to the MUX 400 is described in [Chapter 5.5.5 Connecting the terminal interface, Page 29](#). Installation and startup of "CLV Setup" and operation of the user interface are described in the appendix. See [Chapter 10.2 Installation and operation of the PC-based "CLV Setup" program, Page 61](#).

Transferring the parameter set between CLV Setup and the MUX 400

Upload

When the MUX 400 is being parameterized, CLV Setup runs in the **offline mode**. To be able to modify the current parameter set of the MUX 400, this first has to be loaded to CLV Setup from the MUX 400. This procedure is referred to as an **upload** ("Upload from MUX 400") during which CLV Setup always loads a complete copy of the current MUX 400 parameter set. This parameter set remains unchanged until it is overwritten by CLV Setup. With the help of the **context menu** (right mouse button), only the parameter just edited can be loaded ("Upload parameter") or from version 3.6 all parameters of one tab or one dialog box ("Upload parameters of this view") from the MUX 400's memory (RAM).


Download

Changes made to the current parameter set in CLV Setup do not take effect until the parameter set has been transferred to the MUX 400. CLV Setup always sends a copy of the complete parameter set to the MUX 400, i.e. all of the existing parameter values in the MUX 400 are overwritten. The procedure for transferring and saving the parameter values in the MUX 400 is referred to as a **download** ("Download to MUX 400").

With the help of the **context menu** (right mouse button), only the parameter just edited ("Download parameter") or from version 3.6 all parameters of one tab or one dialog box ("Download parameters of this view") will be **temporarily** loaded into the MUX 400's memory (RAM).


To finish the parametrization done by this way all parameters must be download again to the MUX 400 with the **"Permanent"** option.

Loading complete parameter set from the MUX 400 (upload)

- Click  in the toolbar.
CLV Setup loads the current MUX 400 parameter set from the RAM of the MUX 400 to its database and displays the values on the tabs.
The "Device Ready" LED is extinguished during the upload.

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

Transferring the complete parameter set to the CLV and saving it (download)

1. Click  in the toolbar.
The "Device Ready" LED is extinguished.
CLV Setup copies the parameter set to the RAM of the MUX 400.
The DOWNLOAD PARAMETERS dialog window with the save options is then displayed.
PERMANENT: CLV Setup copies the parameter set to the RAM and to the EEPROM of the MUX 400.

TEMPORARY: CLV Setup copies the parameter set to the RAM only. The changes are lost when the MUX 400 power supply is switched off.

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

The "Device Ready" LED lights up again.

The new parameter set is saved in the MUX 400, permanently or temporarily dependent on the selected option.

Saving the parameter set in CLV Setup

1. To save the modified parameter set as a new configuration file in CLV Setup, or to overwrite an existing file, choose FILE and SAVE AS.

The SAVE AS dialog window is then displayed.

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

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

6.4.2 Function of the tabs in CLV Setup (overview)



Device Configuration

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

- Source of the reading pulse for the network (network trigger)
- Functional assignment of the digital outputs



Host Interface

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

- Active physical interface (RS 422, RS 232)
- Data format and transfer rate
- Data transfer protocol
- Start and stop characters of the interface protocol
- Protocol timeout



Data Strings

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

- Data output format of the host interface (single/block telegram)
- Constants and reading diagnosis data in the Separator
- Test string function
- Prefix compatible with CLX 200 Network Controller



Auxiliary Interface

This tab is used to set the following:

- Operating mode of the terminal interface

CAN Interface

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

- Device number
- Data transfer rate
- Entry of the bar code scanners in the server list
- Bar code scanners to be additionally guarded

Fieldbus Gateway

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

- Data interface of the MUX 400 to be connected to the gateway
- Type of field bus
- Special fieldbus parameters



Extras

This tab is used to edit parameters that were not recognized by CLV Setup after an upload from the MUX 400.

Note The online "CLV Setup Help" contains a detailed description of the functions of the parameters and their valid entries. See [Chapter Online CLV Setup Help, Page 62](#).

6.4.3 Parameterization guide

The MUX 400 can also be configured as a multiplexer via remote access with a bar code scanner in the network. For this purpose, the network communication parameters must be identical (with the exception of the device numbers) and a **project must be created in CLV Setup** to logically organize the network and ensure that the MUX 400 can be addressed via a communication channel.

See *Operating instructions "Application of the CAN interface"* (Nr. 8 009 180, English edition).

Note To following the remaining instructions for configuring the MUX 400, connect the PC directly to the MUX 400.

Prerequisites for parameterization:

- The CAN interfaces of the bar code scanners and MUX 400 are connected via a twisted-pair cable. Both bus ends are terminated with 120 Ω resistors (in the connection module or the MUX 400 itself).
- Each bar code scanner and the MUX 400 must be assigned a unique device number from 1 to 63. With the CMC 400 cloning module, device numbers from 1 to 63 as well as the data transfer rate/CAN operating mode for the bar code scanners can be permanently set in the CDB/CDM connection module.
- The CAN data transfer rate is identical in all bar code scanners and the MUX 400 (default setting: 250 kbit/s, note the maximum CAN data transfer rate, depending on cable length, see [Table 5-5, Page 25](#)).
- The "CAN Scanner Network" operating mode is activated in all bar code scanners.
- The supply voltage for all bar code scanners must be switched on.

Note The CAN interface and the device number of every bar code scanner must be configured separately with CLV Setup if a CMC 400 module is not used. Every bar code scanner must be connected individually to the PC for this purpose.

The CAN interface of the **MUX 400** must first be configured before it can communicate with the other devices in the network.

The procedures for organizing, installing, and configuring the CAN Scanner Network with bar code scanners and connection modules should be carried out as described in the *Operating Instructions "Application of the CAN interface"*.

Preparations for parameterization:

1. Connect the PC to the terminal interface of the MUX 400.
To do so, connect a 3-core RS 232 data cable (null modem cable) to the 9-pin D Sub plug "AUX".
2. Switch on the power supply for the MUX 400.
3. Switch on the PC and install the "CLV Setup" configuration software on the "Manuals & Software" CD ROM if you have not already done this.
4. Start the "CLV Setup" software.
When it successfully establishes communication with the MUX 400, CLV Setup copies the current parameter set and displays the values on the tabs.
5. Configure the MUX 400 as described below.

Overview for the MUX 400:

- Configure the CAN interface and the assignment of the bar code scanners
- Configure the host interface and the format of the data strings
- Configure the network trigger via MUX 400 (if required)
- Configure the function of the outputs (if required)
- Configure the function of the terminal interface (e. g. guarding the network)
- Copy the parameter set to the MUX 400 (download)

6.4.4 Configuring the CAN interface of the MUX 400

- Choose the CAN INTERFACE tab.

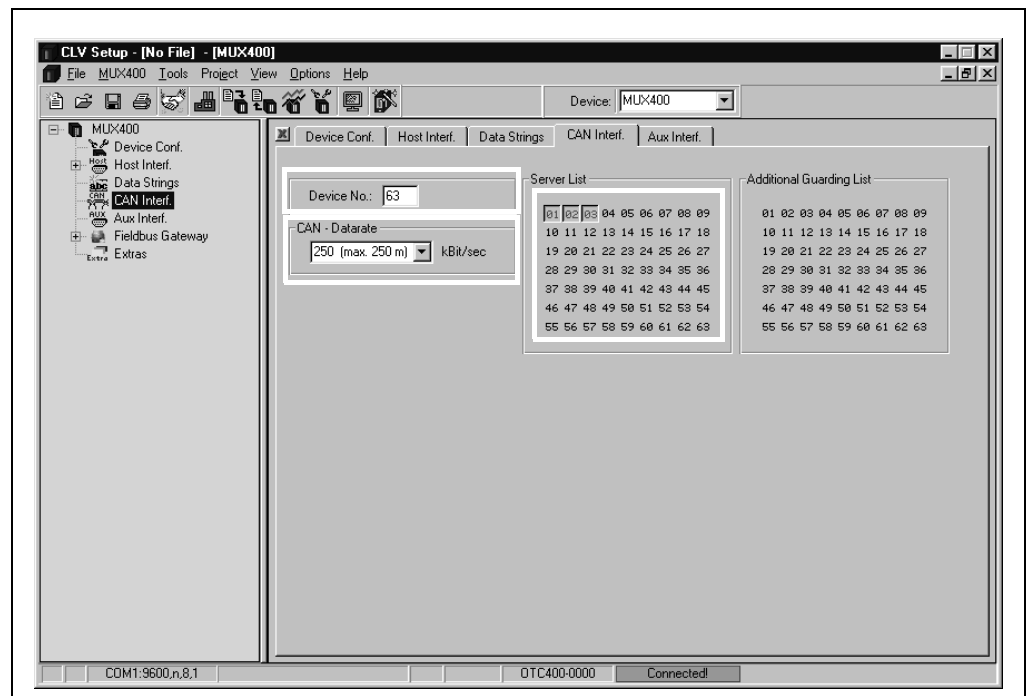


Fig. 6-1: CLV Setup: "CAN Interface" tab

- Set the following values on the tab:

- Device number: 01 to **63** (unique for all devices in the network)
- CAN data rate: 10 to **250** to 1,000 kbit/s (identical to the data rate on the network)
- Server list: **01** to 63.
Click the device numbers of the bar code scanners to be assigned as server to the MUX 400.
The selected devices are automatically included in the network monitoring function by the MUX 400.

Optional:

- Guarding list: Click the numbers of the bar code scanner devices in the list that are also to be monitored by the MUX 400 without exchanging data directly with it (e.g. slaves in a master/slave cluster).

The values in **bold** are the default settings.

6.4.5 Configuring the host interface of the MUX 400

- Choose the HOST INTERFACE tab.

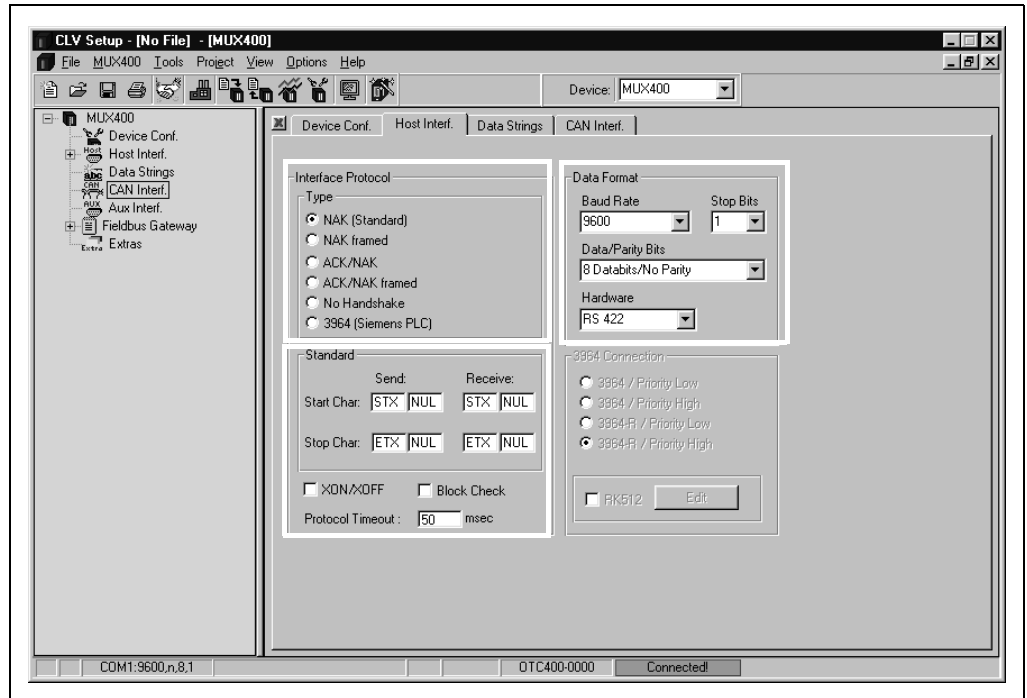


Fig. 6-2: CLV Setup: "Host Interface" tab

- Set the following values on the tab according to the host to be connected:

- Baud rate: 1200 to **9,600** to 57,600 kbd
- Sto pbits: **1** or 2
- Data/parity bits: **8 bit/no parity** to 7 bit/space parity
- Hardware: **RS 422** or RS 232
- Interface protocol type: **NAK (Standard)** to ACK/NAK to No handshake
- Standard start character: Sending: **STX NUL**, Receiving: **ETX NUL**
- Standard stop character: Sending: **STX NUL**, Receiving: **ETX NUL**
- XON/XOFF: active/**not active**
- Block check: active/**not active**
- Protocol timeout: 0 to **50** to 9,999 ms

Optional:

- 3964 connection: 3964/low priority to 3964 (R)/high priority
- RK 512

The values in **bold** are the default settings.

XON/XOFF:

When the XON/XOFF protocol is active, the host can interrupt the data flow from the MUX 400 by sending the control character "XOFF" to the MUX 400. If the MUX 400 then receives the control character "XON", it resumes data transmission.

The MUX 400 only processes the control characters "XON" and "XOFF" at its host interface.

6.4.6 Configuring the data strings of the host interface

- Choose the DATA STRINGS tab.

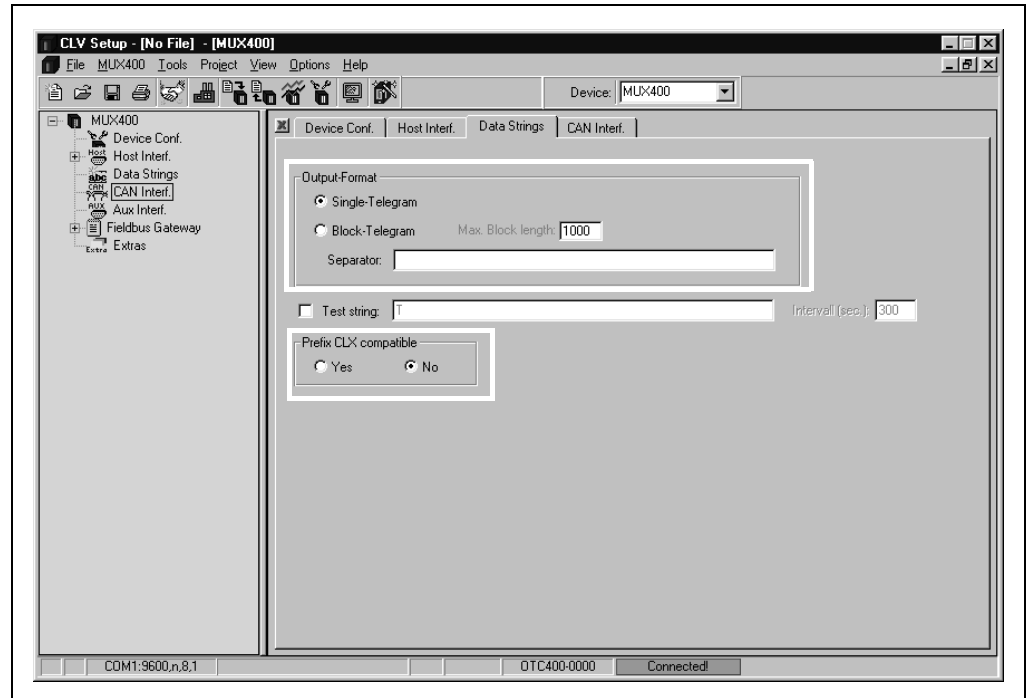


Fig. 6-3: CLV Setup: “Data string” tab

- Set the following values on the tab:

- Output format: **Single Telegram** or Block Telegram.
See also [Chapter 3.2.2 Output format of the host interface, Page 17](#)
- Max. block length: for block telegram: 10 to **1,000** bytes (characters)
- Separator: for block telegram: max. 5 elements. Contain ASCII characters (letters, digits) and control characters. Separates the read results from the individual bar code scanners (blocks) from each other in the data string.
- Prefix CLX compatible: Yes/**no** (compatibility to CLX 200)
Yes: the MUX 400 does not insert a separator between the device number and read result in the data string.
No: the MUX 400 inserts the separator “}” (closing curly bracket, 7D hex, default setting) between the device number and the read result in the data string.
The separator can be changed by using the **CNX hex value** command in the EXTRAS tab.
See [Chapter 10.7 Code table \(Hex – ASCII\), Page 75](#).

Optional:

- Test string: max. 15 elements. Contain ASCII characters (letters, digits) and control characters
- Interval: 1 to **300** to 9,999 s

The values in **bold** are the default settings.

6.4.7 Configuring the network trigger (via MUX 400)

- Choose the DEVICE CONFIGURATION tab.

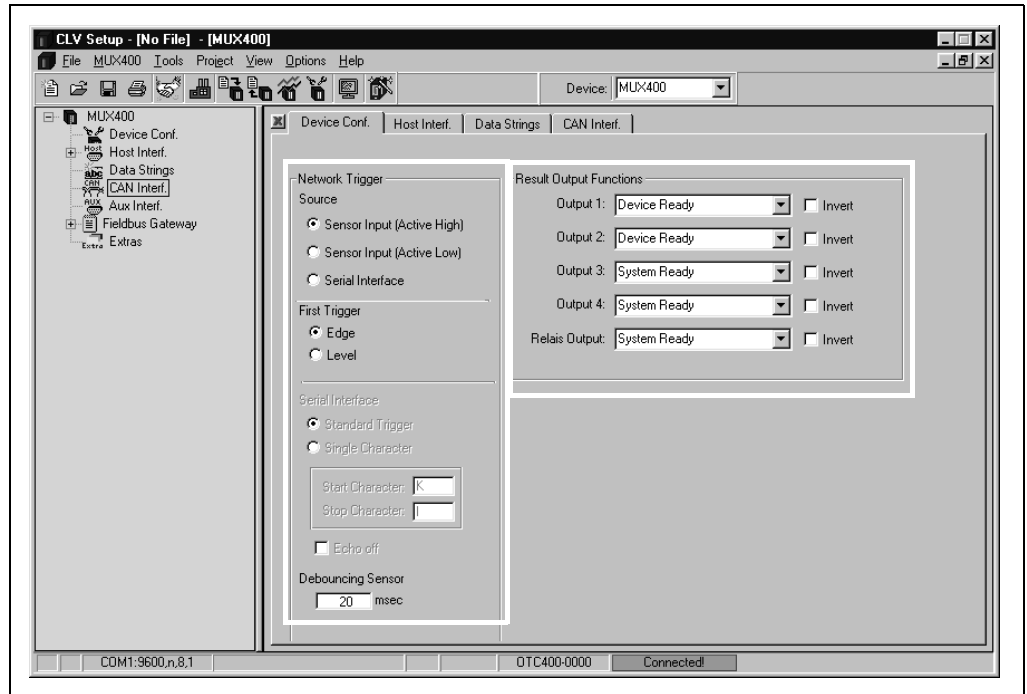


Fig. 6-4: CLV Setup: “Device Configuration” tab

- Set the following values on the tab according to the desired reading pulse type:

- Source: **Sensor Input (active high)** to Serial Interface.
The sensor input is the digital input “TRIGGER 1”.
Active high: the input switches when powered.
Active low: the input switches, when no signal is detected.
See also [Chapter 5.5.6 Connecting the digital input “TRIGGER 1”, Page 30](#).
- First trigger: **Edge** or Level
- Debouncing Sensor: 5 to **20** to 10,000 ms

Optional:

- Serial Interface: **Standard Trigger** or Single Character

Note When the MUX 400 receives a pulse signal via the sensor input or serial interface (host or terminal interface), it distributes this signal in the network. Bar code scanners that use this signal to trigger their internal read gate must be set under the CAN INTERFACE tab in the PULSE DISTRIBUTION section to the “receive read signal” option and the MUX 400 device number. For more details about read pulse distribution in the network, see the *Operating Instructions “Application of the CAN interface”*.

6.4.8 Configuring the function of the MUX 400 outputs

➤ Choose the DEVICE CONFIGURATION tab ([Fig. 6-4, Page 43](#)).

Set the following values on the tab according to the used outputs:

- Output 1 and 2: **Device Ready** (MUX 400) or System Ready (network)
- Output 3 and 4: Device Ready or **System Ready**
- Relay Output: Device Ready or **System Ready**

Optional:

- All outputs: Inverted.
When you choose this option, the appropriate output then transmits a signal when the MUX 400 or the network **are not** operational.

Each of the outputs provide a static signal.

For connecting the outputs see [Chapter 5.5.7 Connecting the outputs, Page 31](#).

6.4.9 Configuring the function of the MUX 400 terminal interface

The terminal interface has four functions for monitoring the network, diagnosing each individual bar code scanner, outputting the data transfer time, and monitoring data traffic on the host interface.

MUX Diagnosis:

In this mode, the terminal interface outputs the results of the continuous network monitoring. These results can be displayed in the terminal emulator.

1. Choose the AUXILIARY INTERFACE tab.
2. Choose the MUX DIAGNOSIS option from the drop-down list.

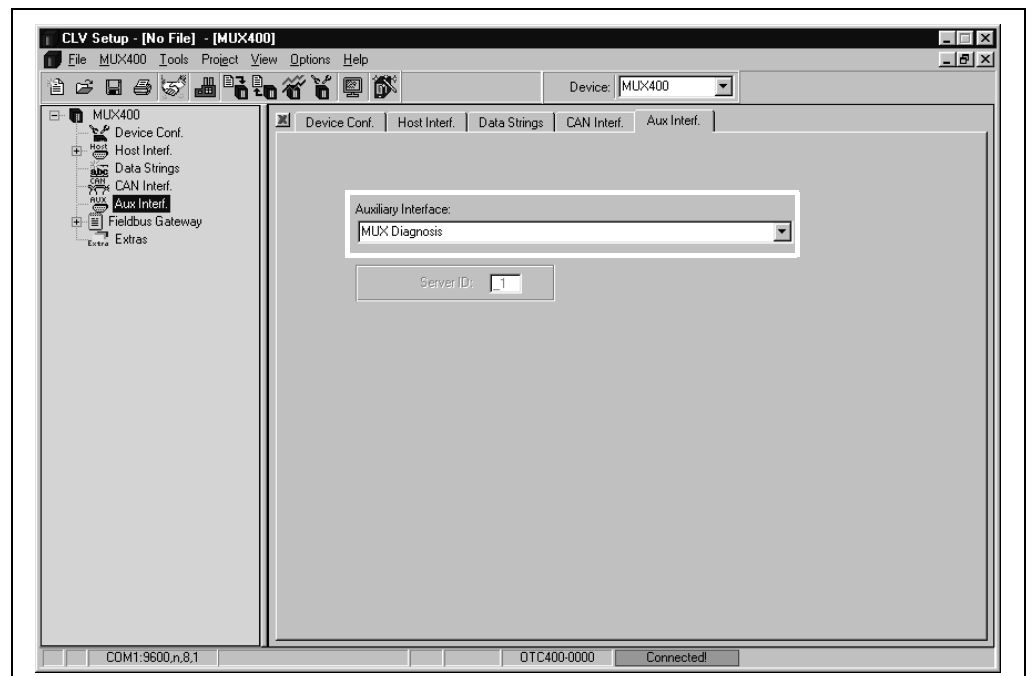


Fig. 6-5: CLV Setup: "Auxiliary interface" tab: Selecting the MUX Diagnosis

3. Perform a download to the MUX 400 (not required in the default setting).
To do so, click the MUX DIAGNOSIS option again with the right mouse button and choose DOWNLOAD PARAMETER in the context menu.

CLV Setup copies the parameter to the MUX 400 **temporarily**.

The MUX Diagnosis has been activated (until the MUX 400 is switched off).

4. Click  in the toolbar.

The TERMINAL EMULATOR dialog box is then displayed.

The MUX 400 is in network operating mode.

Fig. 6-6 shows an example of how the result of network guarding for 3 bar code scanners can be output after successfully starting.

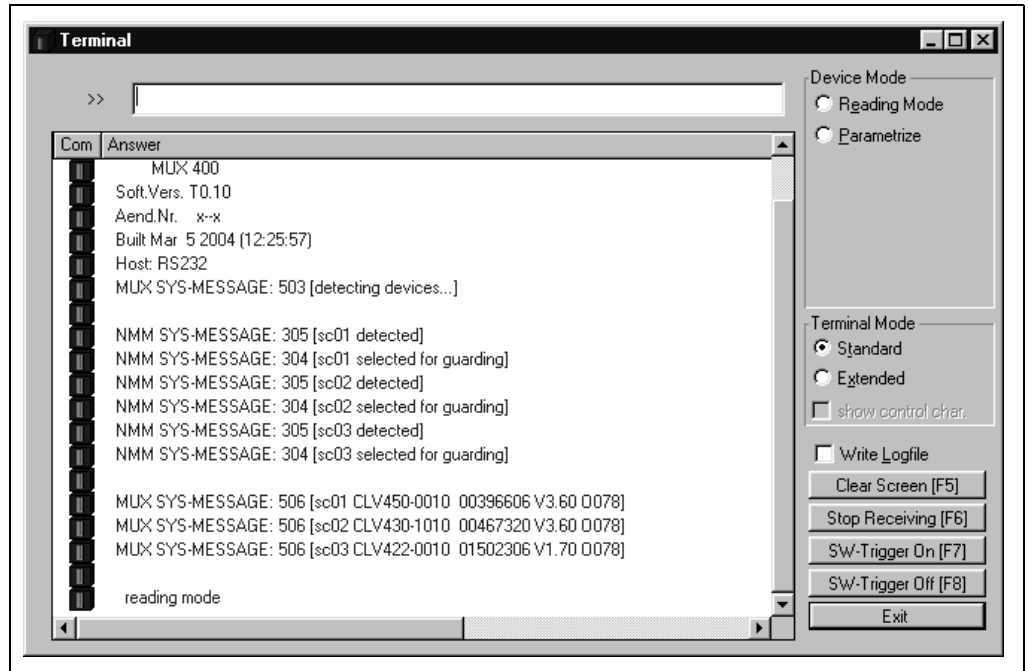


Fig. 6-6: CLV Setup: Display of the MUX Diagnosis in the Terminal Emulator (Network OK)

Explanation The MUX 400 monitors all bar code scanners registered as servers as well as the additional devices entered in the monitoring list. These devices transmit a heartbeat telegram after the first read result in regular 3 second intervals to the MUX 400 to report their presence on the network (even during long periods of inactivity).

The MUX 400 registers a failure of a monitored bar code scanner at start-up and during operation (if the bar code scanner does not send further heartbeat telegrams within 15 seconds of the last read result or transmits an ST=3 error message). If an output is set to “system ready”, it is de-energized (setting: not inverted). Fig. 6-7 shows the relevant message for barcode scanner 2 from the example above.

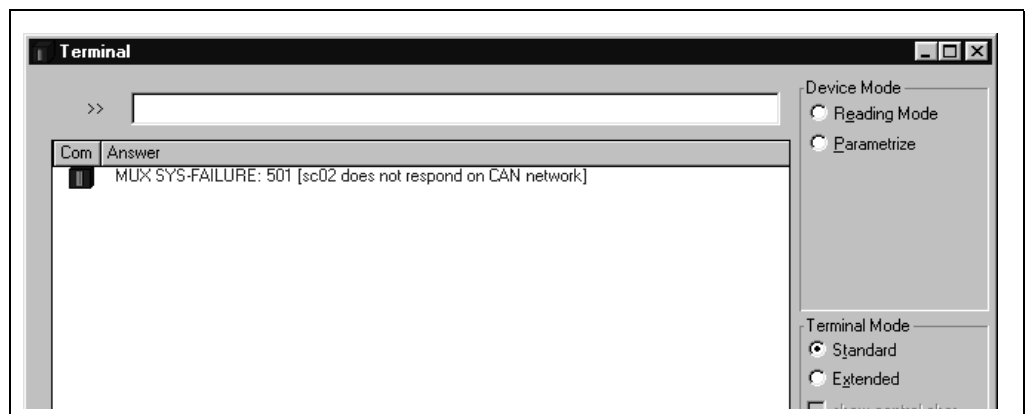


Fig. 6-7: CLV Setup: Display of the MUX Diagnosis in the Terminal Emulator (network failure)

Server Diagnosis:

In this operating mode, the terminal interface of the MUX 400 outputs the data strings from the terminal interface of a selected barcode scanner in the network. These depend on the set operating mode of the terminal interface (e.g. read diagnosis). The data strings can be displayed in the terminal emulator.

1. Choose the AUXILIARY INTERFACE tab.
2. Choose the SERVER DIAGNOSIS option from the drop-down list.
3. In the SERVER-ID field, edit the device number of the bar code scanner to be monitored.

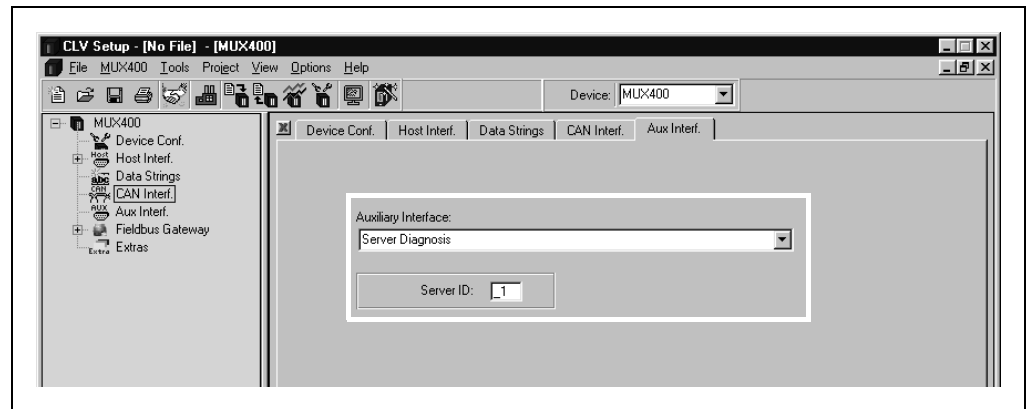


Fig. 6-8: CLV Setup: "Auxiliary interface" tab: Selecting the Server Diagnosis

4. Perform a download to the MUX 400.
To do so, click the tab with the secondary mouse button and select the DOWNLOAD PARAMETERS OF THIS VIEW command from the context menu.
CLV Setup copies the parameters to the MUX 400 **temporarily**.
The Server Diagnosis is has been activated (until the MUX 400 is switched off).

Fig. 6-9 shows an example of how the read result of the bar code scanner no. 2 can be output in the Server Diagnosis.

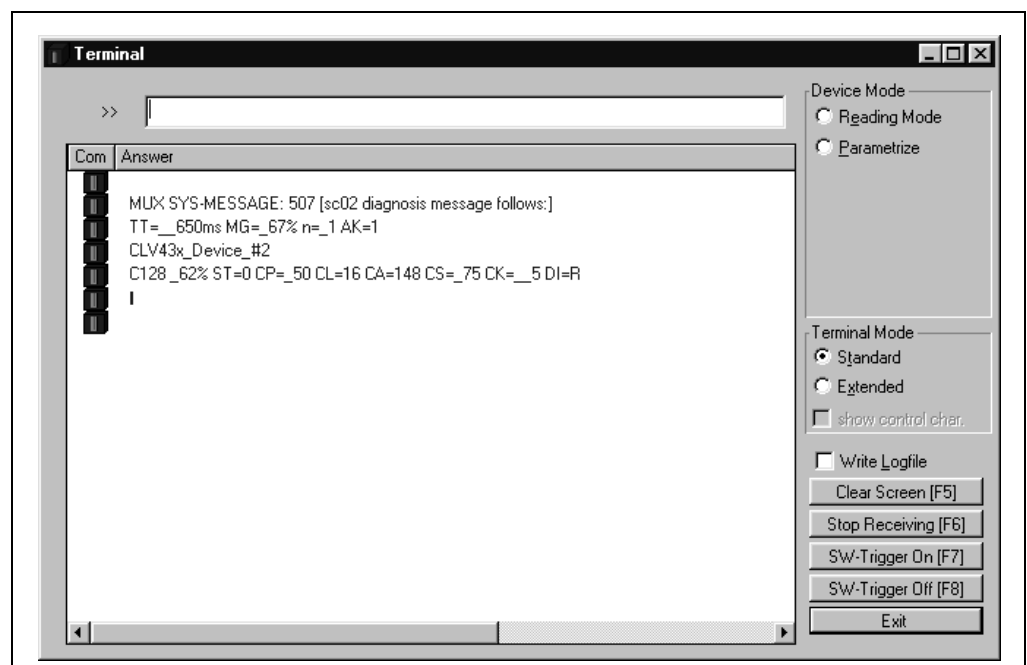


Fig. 6-9: CLV Setup: Display of the Server Diagnosis in the Terminal Emulator

MUX Data Timing:

In this operating mode, the terminal interface of the MUX 400 outputs the required data transfer times for each bar code scanner in the network. These are the times for the transfer of data strings of each signaling barcode scanner to the host interface of the MUX 400. The analyzed times can be displayed in the terminal emulator.

1. Choose the AUXILIARY INTERFACE tab (see [Fig. 6-5, Page 44](#)).
2. Choose the MUX DATA TIMING option from the drop-down list.
3. Perform a download to the MUX 400.

To do so, click the MUX DATA TIMING option again with the right mouse button and choose DOWNLOAD PARAMETER in the context menu.

CLV Setup copies the parameter to the MUX 400 **temporarily**.

The data transfer times are output until the MUX 400 is switched off.

[Fig. 6-10](#) shows an example of how the data transfer time of a network with 3 bar code scanners can be output.

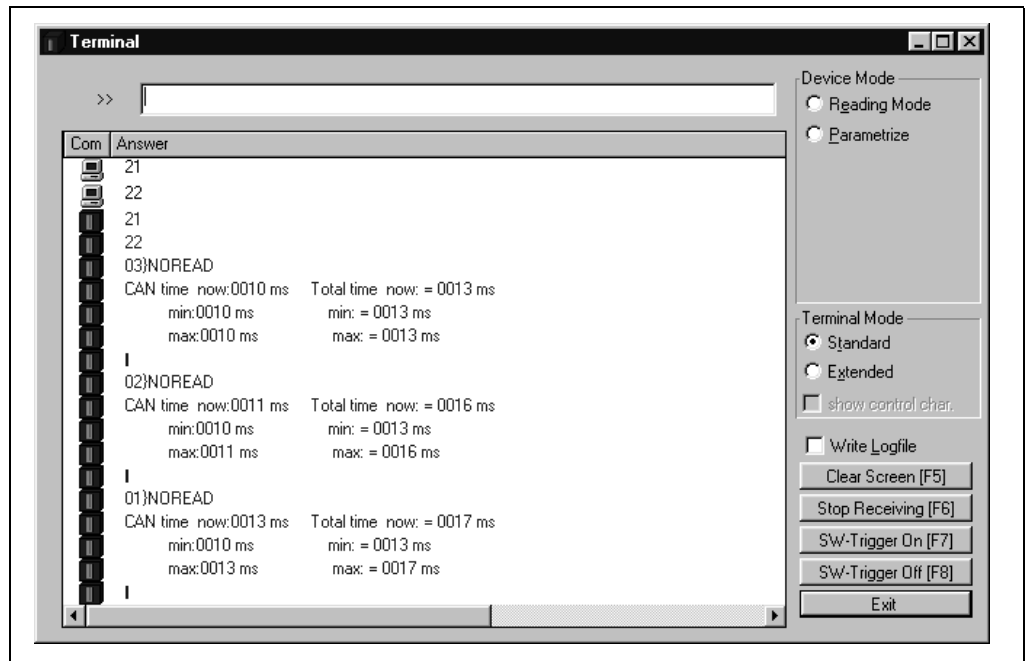


Fig. 6-10: CLV Setup: Display of the data transfer time (MUX Data Timing) in the Terminal Emulator

Monitoring Host Interface:

In this mode, the MUX 400 outputs the data traffic of its host interface via the terminal interface. Protocol driver handshakes and protocol-specific data, such as start and stop characters, are suppressed here ([Table 6-2](#)). Each data string sent to the host by the MUX 400 is displayed on a separate line on the screen with the mark "O" (OUT).

Direction of data	Output format	Representation on screen
MUX 400 receives from host	<STX> I data <CR> <LF> <ETX>	I data
MUX 400 sends to host	<STX> O data <CR> <LF> <ETX>	O data

Table 6-2: Monitoring host interface“ function

1. Choose AUXILIARY INTERFACE tab (see [Fig. 6-5, Page 44](#)).
2. Choose the MONITOR HOST INTERFACE option from the drop-down list.
3. Perform a download to the MUX 400.
To do so, click the MONITOR HOST INTERFACE option again with the right mouse button and choose DOWNLOAD PARAMETER in the context menu.
CLV Setup copies the parameter to the MUX 400 **temporarily**.
The data traffic on the host interface is output until the MUX 400 is switched off.

[Fig. 6-11](#) shows an example of how the data traffic of the host interface can be output.

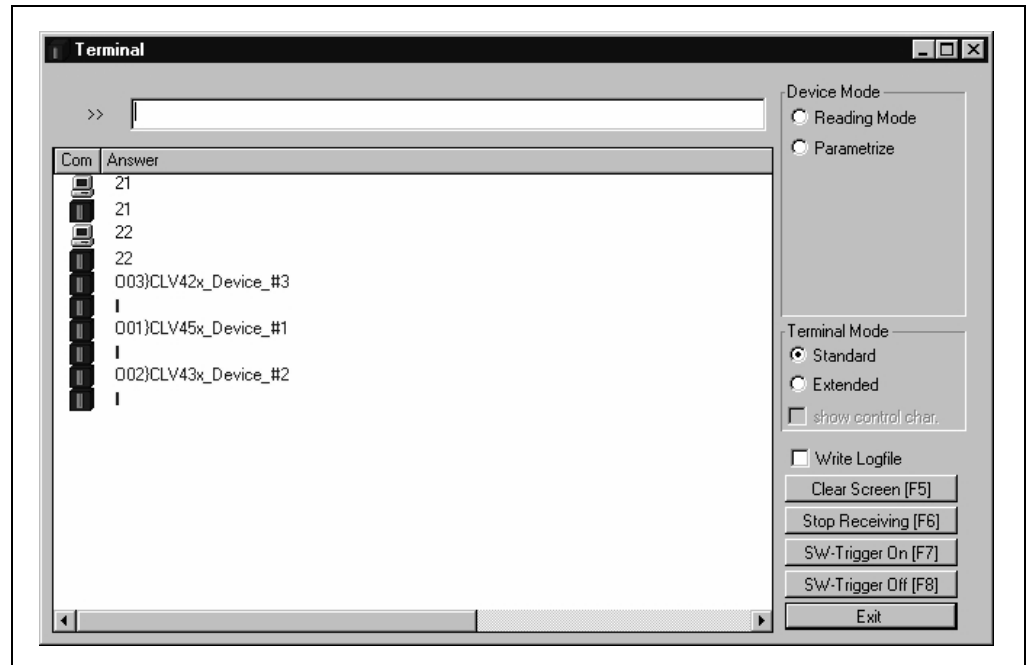



Fig. 6-11: CLV Setup: Display of the data traffic on the host interface in the Terminal Emulator

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

6.4.10 Downloading the parameter set and restarting the system


1. After configuring the MUX 400 via the tabs, copy the created parameter set to the MUX 400 performing a download.
To do so, choose the  icon in the toolbar.
The PARAMETER DOWNLOAD dialog box is displayed.
2. Confirm the dialog box by choosing the **Permanent** storage option.
3. Save the modified parameter set as a new configuration file in CLV Setup.
4. Test the installation.

6.5 Further operation steps

6.5.1 Displaying and editing operating data

This function enables statistical operating data, which the MUX 400 maintains in the form of counters during the network operating mode, to be displayed. A user text for the administration of the MUX 400 can be entered.

The MUX 400 does not output any data via the host interface in this mode.

1. Click  in the toolbar.
The MUX 400 cancels network operating mode. The "Device Ready" LED is extinguished.
The OPERATING DATA dialog box appears (Fig. 6-12).
2. After checking the desired counters, click "OK" to confirm the dialog box.
The MUX 400 returns to network operating mode. The "Device Ready" LED lights up.

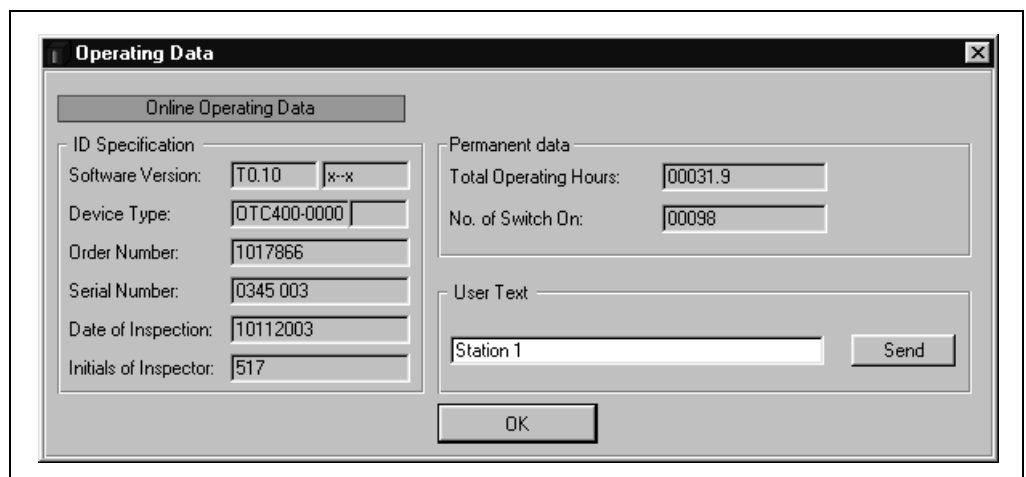



Fig. 6-12: CLV Setup: "Operating data" dialog box

6.6 MUX 400 messages

The MUX 400 outputs system and error messages in English via the terminal interface to confirm user actions. The messages are output in the form of 3-digit codes with a message text in parentheses.

6.6.1 Displaying messages

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

- Click  in the toolbar.
The terminal emulator window is then displayed.

6.6.2 System messages

System messages confirm the successful execution of a task, such as switching on and starting the network. They are initiated by the following identifiers:

- **MUX SYS-Message:** xxx [text] (message of the MUX 400)
- **NMM SYS-Message:** xxx [text] (network management message)

No other actions are required here.

6.6.3 Error messages

Error messages indicate errors on the network with the following identifiers:

- **MUX SYS-Failure:** xxx [text] (MUX 400 error)
- **NMM SYS-Failure:** xxx [text] (network management error)
- **CLV SYS-Failure:** xxx [text] (bar code scanner error)


The error messages indicate the cause of the problem and enable corrective measures to be taken quickly.

6.7 Switching off the MUX 400

1. If the parameter set was modified in CLV Setup or was only stored temporarily in MUX 400 via a download ("Temporary" option or via context menu (right mouse button)), the parameter set must be stored permanently in the MUX 400 by choosing the PERMANENT storage option.
2. Save parameter set as a "*.scl" configuration file in CLV Setup.
3. Switch off the power supply of the MUX 400 or pull the terminal strip "24 V IN" from the MUX 400.

The last parameter set stored permanently in the MUX 400 remains valid.

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

1. Click  in the toolbar.
The PRINT FILE dialog box is then displayed.
2. Enter a comment in the input field in order to assign the printout to the MUX 400.
Confirm the dialog box with "OK".
The PRINT dialog box for configuring the printer is then displayed.
3. Edit the dialog box accordingly and confirm.
CLV Setup prints out the current configuration file in the form of a table.

7 Maintenance

7.1 Cleaning the reading pulse sensor during operation

- If the network is triggered via the MUX 400 using an external reading pulse sensor (e.g. a photoelectric switch), the optical surfaces should be cleaned regularly in accordance with the operating environment. Contamination can cause switching errors.

7.2 Maintenance

The MUX 400 operates maintenance-free. Its self-monitoring function ensures fault-free operation over long periods of time.

When the network is monitored, the MUX 400 shows whether maintenance is necessary if a fault occurs, either by means of a signal to a digital output set with the “system ready” function or by sending a diagnosis telegram to the terminal interface.

The MUX 400 outputs internal errors as well as device errors and malfunctions on the bar code scanners in the form of messages on the terminal interface. These can be displayed on the PC screen in the Terminal Emulator in the CLV Setup program.

7.3 Disposal

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

1. Always observe the applicable national waste disposal regulations.
2. Remove the MUX 400 housing.
3. Remove the electronic modules and the cables.
4. Send the chassis (aluminium) to be recycled.
5. Send the plastics to be recycled.
6. Send the electronic modules and cables for disposal as special waste.

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

8 Troubleshooting

8.1 Overview of the possible errors and malfunctions

8.1.1 Electrical installation errors

- Supply voltage for the bar code scanners or MUX 400 is not connected
- Wiring errors in the CAN Scanner Network
- Interfaces of the MUX 400 connected incorrectly

8.1.2 Parameterization errors

- Wrong device address (doubled) in the network
- Communication parameters in the CAN Scanner Network configured incorrectly
- Communication parameters of the host interface configured incorrectly

8.1.3 Malfunctions during operation

- Device error of a bar code scanner in the CAN Scanner Network
- Device error (hardware/software) of the MUX 400

8.2 Monitoring error and malfunctions

- The MUX 400 is self-monitoring in operation.
After the power supply has been switched on, the MUX 400 automatically carries out a self-test, in which it checks important hardware components, before it is initialized (parameter set loaded and device functions initialized).
- The MUX 400 constantly monitors all bar code scanners registered in the system for their presence on the network and also for any errors that may occur. This takes place when the network is started and during operation.

8.3 Error messages

[Chapter 6.6 MUX 400 messages, Page 49](#) lists the types of error messages.

Further error messages can be queried by using special command strings, e.g. by entering them in the terminal emulator. To do so, see [Chapter 8.5 Querying error codes with command strings, Page 55](#).

For system error messages from the bar code scanners (e. g. error status $ST \neq 0$), see the corresponding operating instructions.

8.4 Troubleshooting

The following are required for troubleshooting purposes of the MUX 400 using the tables below:

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

Note Troubleshooting measures are described in the *Operating Instructions "Application of the CAN interface"*.

8.4.1 General malfunction: MUX 400 not ready

Malfunction	Possible cause	Remedy
After switching on the 24 V DC power supply: The "Device Ready" LED does not light up after a few seconds. The "OUTPUT 1" and "OUTPUT 2" (default setting: „Device Ready“) switching outputs do not switch.	<ul style="list-style-type: none"> The MUX 400 has no power (the LED in the "24 V IN" field does not lit). The MUX 400 detected a device error during the self-test. MUX 400 is in the "Parameterization mode". 	<ul style="list-style-type: none"> Check the connection of the power supply (voltage, pole). Switch the MUX 400 off on again. Does the "Device Ready" LED light up? If not, contact the SICK Service department. Return to the network mode using the CLV Setup program

Table 8-1: Troubleshooting: restoring operation (network mode)

8.4.2 Malfunction in Read mode: reading pulse error (Network trigger)

The "Device Ready" LED lights up. If not, see [Table 8-1](#).

Malfunction	Possible cause	Remedy
<p>1. Pulse mode: Sensor input (external sensor).</p> <p>The MUX 400 does not trigger the reading pulse in the network: – the LED in the "TRIGGER 1" field does not light up when the input is energized.</p>	<ul style="list-style-type: none"> Incorrect reading pulse source parameterized on the MUX 400. Polarity of switching input inverted. Sensor not connected or connected to incorrect switching input. If sensor is supplied by the MUX 400: sensor not connected to the ground potential. Photoelectric switch not aligned with the reflector (photoelectric proximity switch or inductive sensor not dampened). 	<ul style="list-style-type: none"> In the CLV Setup program: Select the DEVICE CONFIGURATION tab, NETWORK TRIGGER section: sensor input (active high) selected? Active high: reading pulse starts when power applied Connect sensor to "Trigger 1" switching input. Check sensor wiring (Fig. 5-5, Page 31) Measure output signal on sensor. Insert "OV – OV1" jumper to position "1". Align sensor. Check functioning.
<p>2. Pulse mode: Serial interface</p> <p>The MUX 400 does not trigger the reading pulse in the network.</p>	<ul style="list-style-type: none"> Incorrect reading pulse source parameterized on the MUX 400 . The MUX 400 is not receiving any command strings via the host interface to start and stop the reading interval. 	<ul style="list-style-type: none"> In the CLV Setup program: Select the DEVICE CONFIGURATION tab, NETWORK TRIGGER section: serial interface selected? SERIAL INTERFACE section: is trigger type correct? Check data connection to host. In the CLV Setup program: Select the HOST INTERFACE tab. In DATA FORMAT section: correct interface type (hardware) and data format selected? INTERFACE PROTOCOL section: are the correct start and stop characters selected? Use the CLV Setup program to check the host command strings: select the TERMINAL INTERFACE tab. Select MONITOR HOST INTERFACE function. See Chapter 6.4.9 Configuring the function of the MUX 400 terminal interface, Page 44 . Download temporarily to the MUX 400

Table 8-2: Troubleshooting: network trigger error

8.4.3 Malfunction in Read mode: host interface data output error

- Check whether the “Device Ready“ LED illuminates.
If the LED does not illuminate, follow [Table 8-1, Page 53](#).

Malfunction	Possible cause	Remedy
The MUX 400 is not transferring any read results to the host.	<ul style="list-style-type: none"> • If the network trigger is used: Reading pulse in the network is not functioning correctly. • Wrong fault in data connection. • Voltage level incorrect. • Host interface in MUX 400 parameterized incorrectly. 	<ul style="list-style-type: none"> • See Chapter 8.4.2 Malfunction in Read mode: reading pulse error (Network trigger), Page 53. • Check wiring as shown in Fig. 5-3, Page 28. • Measure voltages. • In the CLV Setup program: Select the HOST INTERFACE tab, DATA FORMAT section: Are the correct interface type (hardware) and data format selected? Check settings in INTERFACE PROTOCOL section.

Table 8-3: Troubleshooting: errors in the data output to the host

8.5 Querying error codes with command strings

The MUX 400 monitors the system status of the bar code scanners that are listed in the server list and in the monitoring list during network operation. The MUX 400 handles the devices registered in the server list internally in the same way as the devices to be monitored. After the CAN Scanner Network has been switched on, the MUX 400 first collects status information about the devices and then updates this data every 10 seconds. To query bar code scanner error codes or network error codes, enter the appropriate command string in the terminal emulator of CLV Setup.

8.5.1 Command strings for server diagnosis (group queries)

The commands request the system status of all bar code scanners that are listed in the server list, however, not those that are **only** listed in the monitoring list (they cannot send error messages to the MUX 400).

Command	Function	Meaning/Example
2?SF** (SF: System Error)	General group query: Which devices (server list) in the network have output an error message to the MUX 400?	<p><i>Structure of the response string:</i> 2SF[_ addressTens addressUnit] _ = Blank (Blank, 20 hex) addressTens addressUnit= Device address (also MUX 400)</p> <p><i>Example 1 of a response string:</i> 2SF The MUX 400 does not contain any error messages from devices that can communicate with the MUX 400. However, some devices might not be available in the network (e.g. a device has been switched off).</p> <p><i>Example 2 of a response string:</i> 2SF_01_05 The devices with addresses 01 and 05 have output an error code to the MUX 400.</p>

Table 8-4: Command strings for server diagnosis

8.5.2 Command strings for network diagnosis (group queries)

The commands query the network configuration and logical presence of the bar code scanners in the network. After the CAN Scanner Network has been switched on, the MUX 400 first collects the appropriate data that it updates during network operation when a device is connected or disconnected.

The MUX 400 collects the following three types of status information for all devices in the network:

Status information	Description
"detected"	<p>The device with the specified address has been recognized as a server by the MUX 400.</p> <p>Note: This does not indicate whether the device has the correct address. The device, however, is transmitting data to the MUX 400.</p>
"selected"	The device is listed as an expected device in the server list of the MUX 400.
"guarded"	<p>The device is entered in the server list, has been recognized as present on the network by the MUX 400, and is being monitored.</p> <p>Note: Additional devices that are not listed in the server list (e.g. slaves in a master/slave network arrangement) can be added to the monitoring list.</p>

Table 8-5: Network diagnosis: three types of status information about the devices in the network

Command	Function	Meaning/Example
2?NF** (NF:Network Status)	General group query: Which devices listed in the monitoring list has the MUX 400 not recognized on the network?	<p><i>Structure of the response string:</i> 2NF[_ addressTens addressUnit] _ = Blank (Blank, 20 hex) addressTens addressUnit= Device address (also MUX 400)</p> <p><i>Example 1 of a response string:</i> 2NF The MUX 400 has recognized all devices that are listed in the server/monitoring list in the network.</p> <p><i>Example 2 of a response string:</i> 2NF_01_03 The devices with addresses 01 and 03 are listed in the server and monitoring lists (either as servers or only as a device to be monitored) but have not been detected on the network.</p>

Table 8-6: Command strings for network diagnosis

8.6 SICK Support

If you cannot correct an error using the above measures, the MUX 400 may be defective. The MUX 400 contains no user-serviceable parts .

Please contact our local SICK office or subsidiary:

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

9 Technical Data

9.1 Data sheet MUX 400 Multiplexer

Type	MUX 400-0000
Order no.	1 026 219
Supported bar code scanner	CLV 42x to 49x CLX 490 ICR 85x
CAN Scanner Network	
Number of bar code scanner	max. 32
Data transfer rate	10, 20, 50, 100, 125, 250, 500, 1,000 kbit/s
Device addresses	0 to 63
Read result	max. 300 characters (bytes)
Command/diagnosis string	max. 300 characters (bytes)
Block telegram length	max. 1,000 characters (bytes)
“Host” data interface	RS 422 or RS 232, optional bus connection
Data transfer rate	300 to 57,600 bd
Protocols	SICK Standard, 3946(R)/RK512
“Terminal” data interface	RS 232; 9,600 bd, 8 data bits, no parity, 1 stop bit, fixed output format
Inputs	1 x digital, optodecoupled, $U_{inmax} = 30$ V, non-interchangeable, debouncing 5 to 10,000 ms, 1LED indicates the status of the input
Outputs	<ul style="list-style-type: none"> – 4 x digital, push&pull, $I_{outmax} = 100$ mA, short-circuit-proof + temperature-protected, electrically not isolated from the power supply, pulse duration: static – 1 x relay (single-break-and-make), max. 1.5 A at 24 V DC, pulse duration: static. 5 LEDs indicate the statuses of the outputs
Visual indicators	11 x LED (status and error indication)
Configuration	<ul style="list-style-type: none"> – 4 x jumper – via CLV Setup configuration software (alternative via command strings)
Electrical connections	<ul style="list-style-type: none"> – 1 x 9-pin D-Sub socket “CAN” for CAN interface (service) – 1 x 9-pin D-Sub plug “AUX” for host interface/terminal interface – pluggable screw terminal strips (admissible wire diameter: power supply IN: 0.2 to 2.5 mm² (24 to 14 AWG), relay output: 0.2 ... 2.5 mm² (24 to 14 AWG), all other: 0.14 ... 1.5 mm² (26 to 16 AWG))
Power supply	24 V DC +20 %/–10 % according to IEC 364-4-41
Power consumption	max. 5 W
Housing	Extruded aluminium section/plastic
Enclosure rating	IP 20 (according to DIN 40 050)
Protection class	Class 3 (according to VDE 0106/IEC 0101-1)
Weight	1.3 kg (2.86 lb)
Temperature (operating/storage)	0 °C to +50 °C / –25 °C to +70 °C (+32 °F to +122 °F/–13 °F to +158 °F)
Max. rel. humidity	90 %, non-condensed
Mounting	Snap-in brackets for top-hat rail 35 according to EN 500022 or via 2 mounting brackets (holes dia. 6 mm (0.24 in))

Table 9-1: Technical specifications of MUX 400

10 Appendix

10.1 Overview

- Installation and operating instructions for the PC-based CLV Setup program
- Configuring the MUX 400 with command strings
- Available accessories
- Supplementary documentation
- Code table Hex – ASCII
- Copy of the EC Declaration of Conformity
- Index

10.2 Installation and operation of the PC-based "CLV Setup" program

The scope of delivery of the MUX 400 includes a CD-ROM ("Manuals & Software") containing the "CLV Setup" program.

The following is required to run the program: a PC with Windows 98™, Windows NT™, Windows 2000™ or Windows XP™, 128 MB RAM, CD-ROM drive, serial interface, mouse (recommended).

Approximately 25 MB of hard disk space is required to install CLV Setup and CLV Assistant, approximately 20 MB to install CLV Setup Help.

The latest software versions can be downloaded from **www.sick.de**.

10.2.1 Preparing for installation

1. Make sure that you have the CD-ROM ("Manuals & Software") at hand.
2. Connect the MUX 400 to the power supply (24 V DC +20%/-10%)
(see [Chapter 5.5.1 Connecting the power supply, Page 26](#)).
3. Connect the PC to the terminal interface (port) of the MUX 400 using a 3-core RS 232 data cable (null modem cable). See [Chapter 5.5.5 Connecting the terminal interface, Page 29](#)).
4. Switch on the power supply to the MUX 400.
The MUX 400 starts. The "Device Ready" LED lights up after the self-test has been completed successfully. The device is in Read mode.
5. Switch on your PC and start Windows.

10.2.2 Performing installation

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

Note The following instructions describe how to install the software on Windows 98™. These instructions may differ depending on the operating system you are using (for example, administrator rights are required to install the software on Windows NT4.0).

Initial installation

CLV Setup configuration software

1. Shut down all the applications running in Windows.
2. Insert the CD-ROM into the CD-ROM drive.
3. If the auto run function is enabled, the start page (table of contents) of the CD-ROM is automatically displayed in the your browser.
4. Select the SOFTWARE folder on top left.
5. Select CLV, ICR, OPS SETUP SOFTWARE in the listing.
A table with CLV Setup information is displayed.
6. Select DOWNLOAD under SOFTWARE FILE.
7. In the FILE DOWNLOAD dialog box select the option to install directly from the CD-ROM.
Confirm with OK. The software is automatically saved in the "Programs\CLV" directory on your hard disk.

– or –

Select the option to save the software locally on your local hard disk and confirm with OK.

In the FILE DOWNLOAD dialog box select the desired target directory on your hard disk. The "CLVSetupxx.exe" file is then saved at this location (xx = version number).

Select OPEN in the dialog box to start the file.

8. The installation program starts and guides you through the installation with screen messages. The program asks you for your user name and company name. This information appears as a header in printouts. "CLV Setup" and CLV Assistant are installed. The software will be entered in the Windows start menu under "Programs\CLV Setup".
9. Please read the Readme file, as it contains the latest information and problems regarding CLV Setup.
10. Then confirm the final installation message by clicking "OK".

Online CLV Setup Help

1. Return to the start page of the CD-ROM with the opened folder "Software".
2. Select CLV, CLV HELP SOFTWARE in the listing.
A table with CLV Help information is displayed.
3. Select DOWNLOAD under SOFTWARE FILE.
4. In the FILE DOWNLOAD dialog box select the option to install directly from the CD ROM. Confirm with OK. The software is automatically saved in the "Programs\CLV" directory on your hard disk.

-or-

Select the option to save the software locally on your local hard disk and confirm with OK.

In the FILE DOWNLOAD dialog box select the same target directory as selected for CLV Setup on your hard disk.

The "CLVHelp.exe" file is then saved at this location.

5. After downloading the software, select OPEN in the dialog box to start the software. The software is installed in the sub directory "Help" of the main directory "CLV". CLV Help will also be entered in the Windows start menu under "Programs\CLV Setup".
- Restart the PC.
Some Windows DLL files are possibly updated.

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

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

Updating program

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

- You can install the new version and still keep the old version (parallel installation)

– or –

- You can install the new version over the old version (overwrite)

Installing new version and retaining old version

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

The configuration files "*.scl" of the old version can be used in the new version and contain the MUX 400 parameter sets. In order to do so, copy the configuration files from the "data" directory of the old version to the "data" directory of the new version.

Installing new version over old version

When installing the new version over the old version, the files of the old version must first be deleted (exception: the "*.scl" configuration files). They contain the parameter sets of the MUX 400.

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

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

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

10.2.3 Starting "CLV Setup"

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

Communication	COM 1; 9,600 bd; 8 data bits; 1 stop bit; no parity
Transmit control character	Start: STX, Stop: ETX
Receive control character	Start: STX, Stop: ETX
Unit of measure	metric (depending on the selected installation)
Browser	user dependent
Language	as selected for the installation
Company name	as entered for the installation
User name	as entered for the installation
Establish connection to MUX 400 automatically	at startup: yes on scanner selection: yes when the terminal emulator is started/closed: yes
Initial screen	yes
Storage confirmation prompt	yes
Last type selected	CLV 41x
File storage location	"data" (configuration files for MUX 400)

Table 10-1: Default settings of CLV Setup (extract)


1. Switch on your PC and start Windows.
2. Select CLV SETUP from the Start menu.
The SICK logo is then followed by the initial screen.
3. Confirm the initial screen with "OK".
CLV Setup then checks whether the MUX 400 is connected to the **COM 1** port on the PC and whether the communication parameters on the PC match those on the MUX 400. If this is the case, the "Connected" status is displayed with the MUX 400 specification in the bottom right corner of the screen, in the status bar. The detected CLV type is displayed in the toolbar in the DEVICE drop-down list (in this case: MUX 400).

The software then loads the internal device description of the MUX 400 and the default settings of the parameters/parameter values from its database and displays these on the tabs. The software then copies the current parameter set from the memory (RAM) of the MUX 400. This is displayed on the tabs instead of the default settings.

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

Troubleshooting

If CLV Setup cannot establish communication, it displays "No connection" in the status bar on the bottom, right-hand side. There are two possible causes for this. Either the MUX 400 is not connected or the communication parameters on the MUX 400 do not match those on the PC. In this case, CLV Setup enters the CLV type of the device it last communicated with in the DEVICE drop-down list on the toolbar. The default setting is CLV 41x the first time CLV Setup is started. The software then loads the internal device description for this type and the default settings of the parameters/parameter values from its database and displays these on the tabs.

1. Connect the PC to the terminal interface (port) of the MUX 400 using a 3-core RS 232 data cable (null modem cable).
See [Chapter 5.5.4 Connecting the host interface, Page 28](#).
2. Click  (AutoBaud detect) in the toolbar or choose OPTIONS, AUTOBAUD DETECT. CLV Setup scans the serial interface by varying the communication parameters and sends a telegram to the MUX 400 repeatedly. As soon as a reply from the MUX 400 is detected, CLV Setup conveys the values found for the communication parameters. [Fig. 10-1](#) shows an example of the AUTOBAUD DETECT result display. CLV Setup displays "Connected" in the status bar on the bottom, right-hand side.
3. Confirm the AUTO DETECT dialog window with "OK".
CLV Setup displays the detected CLV type in a separate dialog box and asks you whether you want to upload the current parameter set from the MUX 400.
4. Confirm the dialog box with "Yes".
CLV Setup then uploads the current parameter set from the RAM of the MUX 400 to its database and displays the values on the tabs.

You can edit the current parameter set on the tabs.

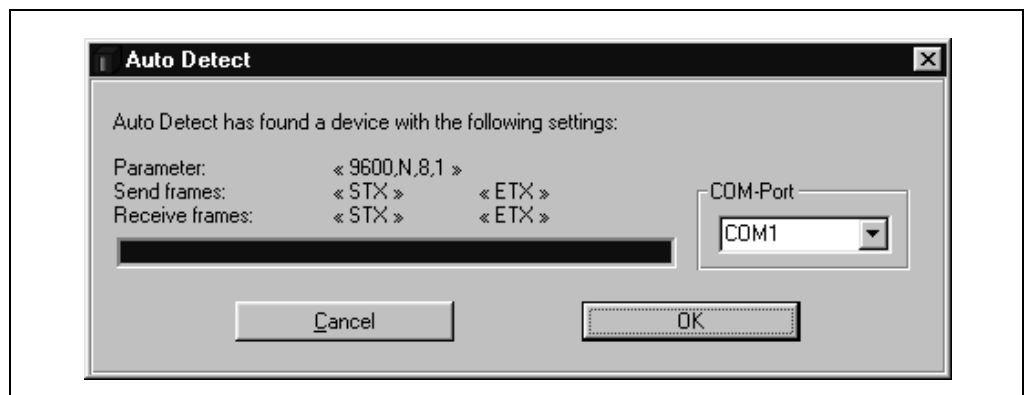



Fig. 10-1: CLV Setup: results of the AutoBaud detect function

– or –

1. Select OPTIONS, then SERIAL INTERFACE from the menu bar.
CLV Setup displays the current communication parameter settings of the PC in the COM PARAMETERS dialog box.
2. Ensure that the communication parameters of the PC and MUX 400 are identical
(connected COM port; 9,600 bd; 8 data bits; 1 stop bit; no parity)
3. Confirm the dialog box with "OK".
CLV Setup attempts to communicate with the MUX 400 again.
If it is successful, CLV Setup displays "Connected " in the status bar on the bottom, right-hand side.
4. Click  in the toolbar.
CLV Setup then copies the current parameter set from the RAM of the MUX 400 to its database and displays the values on the tabs

You can edit the current parameter set on the tabs.

10.2.4 CLV Setup graphical user interface

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

The program window of the GUI comprises the following elements:

- Title page that displays the program name, current configuration file and status (e.g. "No File")
- Menu bar with pull-down menus
- Toolbar with buttons for triggering various functions
- Drop-down list (top right) for selecting the device type
- Left-hand frame with navigation tree for the tabs
- Right-hand frame for the tabs of the MUX 400 (Device Configuration, Host Interface etc.). The number of tabs displayed depends on the number of tabs that have been activated in the navigation tree on the left-hand side. The parameters on the tabs are grouped according to their function. Some of these parameters open further dialog boxes.
- A status bar (at the bottom of the window) with two display fields for the communication activities between CLV Setup and the MUX 400, display of interface parameters of the PC, error display field (system errors) of the MUX 400, device specification field and status display for the connection to the MUX 400

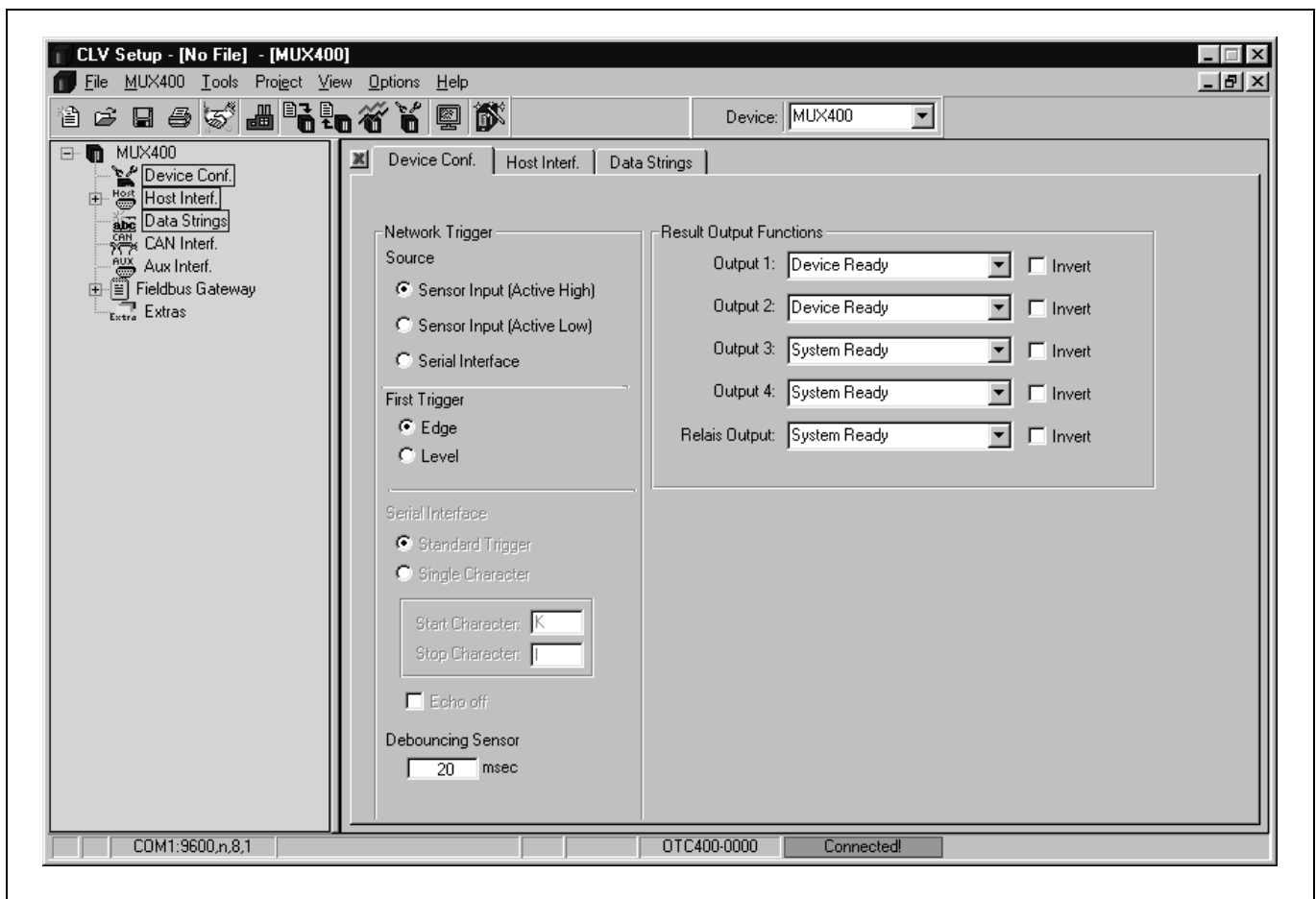


Fig. 10-2: User interface of the "CLV Setup" software

10.2.5 Functions

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

- Loading the default settings of the parameter set from the database
- Automatic communication attempt with the MUX 400 when the program is started
- Automatic software compatibility check in the MUX 400
- Uploading parameter set stored in the MUX 400
- Changing the parameters/parameter values on the tabs
- Downloading the changes to the parameter set in the MUX 400
- CLV Assistant for simplified parameterization (not for MUX 400)
- Saving the changes to the parameter set in the MUX 400 (download)
- Saving the changes to the parameter set as a configuration file "*.scl"
- Printing the configuration files
- Exporting the configuration files in RTF format
- Exporting the command strings contained in the profile bar codes in ASCII format (not for MUX 400)
- Printing the parameter set in the form of profile bar codes (not for MUX 400)
- Direct access to the MUX 400 via a terminal emulator (select operating mode, start operating functions, log file for communication between the MUX 400 and CLV Setup, extended terminal mode, e.g. for displaying messages)
- AutoBaud detect for automatic communication setup with the MUX 400
- Selecting the COM port for adapting the data transfer parameters
- Monitoring the data communication of the MUX 400 host interface
- Selecting the display language
- Selecting the units of measure
- Displaying the last 10 configuration files that were processed
- Saving the CLV type that was selected last
- Automatic storage confirmation prompt when changes are made to the configuration file
- Wizards for individual functions
- Setting switches for starting the program in the "CLVmain.ini" file
- Hot keys [F keys] for essential functions (program operation without a mouse)
- Starting program with SCL file as argument
- Macro player for recording and playing a macro file
- Context-sensitive help via the [F1] key

10.2.6 Hot keys

- [F1] Start "CLV-Setup Help" online
- [F2] Open dialog box to execute device functions
- [F3] Upload complete set of parameters from MUX 400
- [F4] Download complete set of parameters to MUX 400
- [F5] Open configuration file
- [F6] Save configuration file
- [F7] Load default setting of MUX 400 from CLV-Setup database
- [F8] Start AutoBaud Detect

[F9] Load operating data from MUX 400 to be displayed/text to be entered

[F10] Open Terminal Emulator

10.2.7 Opening and closing tabs

After the program has started, CLV Setup shows those tabs in the right-hand frame whose name is surrounded by a frame in the navigation tree. The first tab covers the subsequent tabs. The tab titles are still visible. When you click the buttons in the tabs, further sub-dialogs are displayed (also in the form of tabs). All the tabs then move to the right. You can scroll through the tabs with the scrollbars in the top right-hand corner of the frame.

The tabs can be opened or closed in the following way:

By using the navigation tree:

- Open:
Double-click or place the cursor on the entry and select "show dialog" in the menu with the secondary mouse button.
To display further entries under a branch, click the "+" symbol.
To hide a branch, click "-".
- Close:
Place the cursor on the entry and select "close dialog" in the menu with the secondary mouse button.

In the frame:

- Open:
Click the desired tab or scroll the tab display.
- Close:
Click the red cross in the top left-hand square to close the tab displayed in the foreground.



10.2.8 Online help – CLV Setup

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

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

10.2.9 Transferring parameter sets between CLV-Setup and MUX 400

See [Chapter 6.4 Configuration \(parameterizing\), Page 35](#).

10.2.10 Dealing with unknown parameters





Uploading from the MUX 400

If the CLV Setup program does not recognize parameters or parameter values of the MUX 400 transferred during the upload, it outputs a warning message. Unknown parameters/parameter values can result from the following, for example: The MUX 400 is a special device or the version of CLV Setup is older than the software of the MUX 400. CLV Setup displays the unknown parameters in the window on the EXTRAS tab. The parameters are displayed in the form of command strings and can be edited using the command string conventions. In this way, upward compatibility with the MUX 400 is ensured. When the parameter set is saved as a configuration file in CLV Setup, these parameters/parameter values are also taken into account as with a download to the MUX 400.

Downloading to the MUX 400

If the MUX 400 does not accept individual parameters or parameter values in the parameter set downloaded with CLV Setup, it outputs a separate warning for each parameter in CLV Setup. This is due to the fact that one of the CLV Setup software versions is newer than the software in the MUX 400, and it contains new parameters/parameter values arising from the continued development of this CLV type. The affected MUX 400 contains an older software version which does not recognize these parameters/parameter values, however.

We recommend that you check the effects of warnings in the MUX 400 as follows:

1. Check whether the MUX 400 functions correctly after the parameter set is downloaded.
2. Click  in the toolbar.
CLV Setup loads the default settings from the database.
3. Click  in the toolbar.
CLV Setup copies the problem parameter set from the MUX 400 (upload).
4. Click  in the toolbar.
CLV Setup prints out the problem parameter set when you confirm the dialog box.
5. Open the previous configuration file "*.scl" for the MUX 400.
6. Click  in the toolbar.
CLV Setup prints out the previous parameter set when you confirm the dialog box.
7. Compare the two parameter sets.
To restore the previous status, correct individual parameters in the problem parameter set if necessary and download them to the MUX 400 again.

Opening configuration files "*.scl"

Every time it loads configuration files, CLV Setup checks whether it recognizes all the parameters/values of the MUX 400.


If CLV Setup detects an error, it outputs a warning and enters the problem parameter/parameter value in the window of the EXTRAS tab.

10.2.11 Writing a log file in terminal emulator

The terminal emulator can log the communication between CLV Setup and the MUX 400. CLV Setup stores the data transmitted in both directions with the following identifiers:

MUX 400 -->: MUX 400 sending to CLV Setup

--> MUX 400: MUX 400 receiving from CLV Setup

1. Click  in the toolbar.
The TERMINAL EMULATOR window is then displayed
2. On the right, activate the empty checkbox in front of the WRITE LOGFILE radio button.
The SAVE LOG FILE AS... dialog box is then displayed.
3. Enter a file name with the extension ".log" and exit the window with SAVE.
CLV Setup saves the file in the "data" subdirectory and records communication in the log file.
4. To terminate logging, deactivate the checkbox in front of the WRITE LOGFILE radio button or close the terminal emulator.

10.2.12 Starting CLV Setup with an INI file as argument

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

Example:

```
"CLVmain32.exe\data\Set 1_MUX 400.scl /INI user.ini"
```

CLV Setup is launched with the initialization data contained in the "user.ini" file and loads the configuration file "Set1_MUX 400.scl" from the "data" subdirectory straight away.

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

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

In this way, for example, you can prevent CLV Setup from attempting to establish a connection when a MUX 400 is not connected.

10.2.13 CLV Assistant

The CLV Assistant is not available for the MUX 400.

10.3 Configuring the MUX 400 with command strings

The MUX 400 can be parameterized and operated via the terminal interface and the host interface. Parameters that are not recognized by CLV Setup can also be used by following the conventions for command strings. This enables special devices, for example, to be parameterized and new MUX 400 parameters to be configured which may not be recognized by the CLV Setup program if this is older than the software on the MUX 400. The CLV Setup user interface is based on the command language.

The command language accesses the MUX 400 command interpreter directly. It must be used carefully. The commands sent to the MUX 400 are executed immediately. Parameter values that have been changed by commands are initially only active in the current parameter set in the RAM of the MUX 400. Using a special command, the modified parameter set must also be copied to the EEPROM so that it is stored permanently. Otherwise, the changes will be lost when the power supply is switched off.



The ONLINE MODE of the terminal emulator in CLV Setup enables the MUX 400 to be parameterized directly with command strings. Fig. 10-3 contains the initial screen of the terminal emulator with the command field and output window which shows how the PC and MUX 400 communicate with each other.

1. Click  in the toolbar.

The TERMINAL EMULATOR window is then displayed. The MUX 400 is in Read mode.

2. Click PARAMETERIZE under DEVICE MODE.

The MUX 400 cancels Read mode. The "Device Ready" LED is extinguished.

CLV Setup switches the MUX 400 to the PARAMETER mode by issuing an appropriate command.

In the Parameter mode, all commands begin with the number "3".

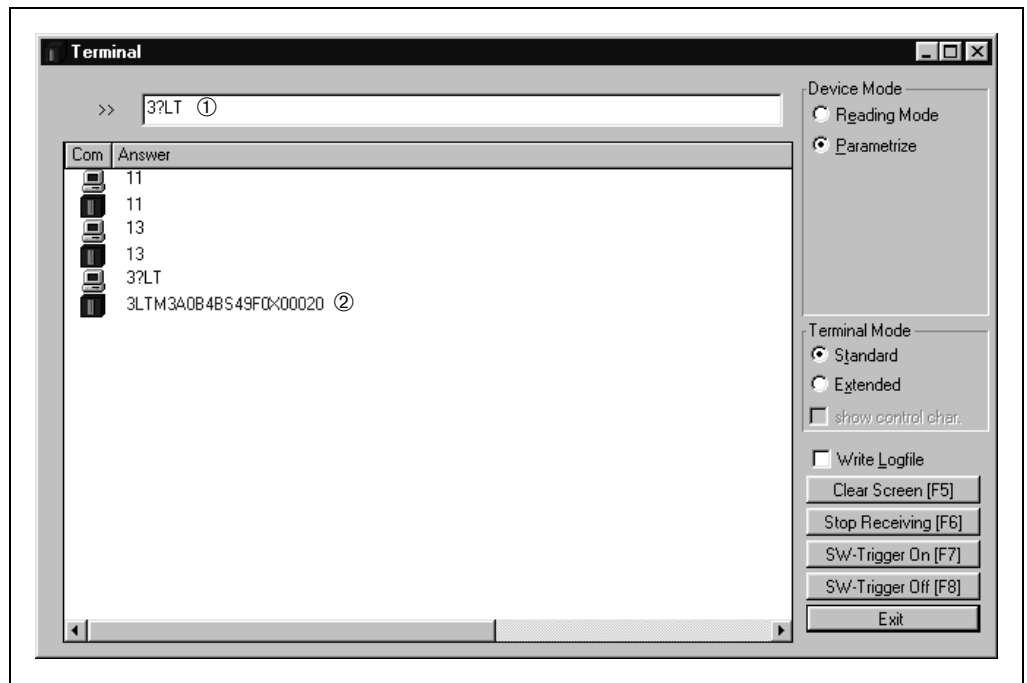


Fig. 10-3: CLV Setup: entering commands in the terminal emulator

3. Enter the desired command in the command field ① and press the [Return] key.
The command is then sent to the MUX 400.
With a few exceptions, the MUX 400 replies to a command with correct syntax with an echo.

Example:

Entering "3?LT" causes the MUX 400 to output the parameter values of the reading pulse in encoded form in the output window ②.

4. Activate the READ MODE radio button to return to the Read mode.

The "Device Ready" LED lights up

Note Changes that are made directly to parameter values in the MUX 400 using command strings are only registered and displayed in CLV Setup after the current parameter set has been uploaded from the MUX 400.



A list of command strings is available on request.

Outputting command strings for all the parameter settings

You can output a list of all the parameter settings configured with CLV Setup in ASCII format. To do so, proceed as follows:

1. In the menu bar, choose EXPORT PARAMETERS under MUX 400.
Starting from the default settings, CLV Setup collects all the command strings required to parameterize the default configuration and customized settings.
The SELECT FILE NAME FOR PARAMETER EXPORT dialog box is displayed.
2. Enter a file name and click the SAVE button.
CLV Setup saves the data as a text file in the directory shown.

You can open this text file using any Windows text editor.

If the commands are sent from the host/PLC to the MUX 400 for configuration, note that "3 EEW" has to be sent as the last command to ensure that they are permanently transferred to the MUX 400 (EEPROM).

10.4 Replacing a MUX 400 (copying the parameter set)

If you need to replace the MUX 400 and transfer the current parameter set to the replacement device, you can download it with CLV Setup..

The parameter set can only be transferred between identical device types (e. g. from one MUX 400 to another MUX 400, etc.).



To download the parameter set, you must connect a PC running the CLV Setup software to the replacement device. The parameter set of the MUX 400 that is to be replaced must be available as a configuration file in CLV Setup, otherwise the device must be configured from scratch.

1. Switch off the power supply of the MUX 400.
2. Remove all cables from the MUX 400.
3. Remove the MUX 400 from the bracket.
4. Install and connect the replacement device.
5. Connect the PC to the terminal interface of the MUX 400 using a 3-core RS 232 data cable (null modem cable).
(see [Chapter 5.5.5 Connecting the terminal interface, Page 29](#)).
6. Switch on the power supply to the MUX 400.
The MUX 400 starts. The "Device Ready" LED lights up after the self-test has been completed successfully. The device is in read mode.
7. Switch on your PC and start Windows.

8. Start "CLV-Setup".
If the communication parameters on the PC and MUX 400 are identical, CLV Setup uploads the parameter set from the MUX 400 and displays the values on the tabs.
9. Open the archived parameter set as a configuration file "*.scl" in CLV Setup and download it to the MUX 400.
10. Confirm the dialog box by choosing the TEMPORARY storage option.
11. Check whether the MUX 400 operates correctly in the network mode.
Correct the parameter settings if necessary.
12. Finally, download the tested parameter set to the MUX 400 and save it with the PERMANENT storage option.
The parameter set is transferred permanently to the replacement device.
13. Save the modified parameter set as a new configuration file in CLV Setup.

Troubleshooting

If the software version on the replacement (new) device is older than the version on the old MUX 400 (e.g. new device is from warehouse stock), the parameter set transferred may contain coded parameters or parameter values that cannot be interpreted by the older software. The new device, however, outputs an error message in CLV Setup for each of these parameters/parameter values when the parameter set is downloaded.

- Check whether all of the parameter settings used are necessary to configure the MUX 400 for the network operation. If necessary, replace the software version in the new device.

If the software version on the new device is more recent than that on the old MUX 400, the default settings in the imported parameter set will include parameters that were not contained in the old version.

- Upload the parameter set from MUX 400 to CLV Setup and check whether the new parameters are relevant for configuring the MUX 400 for the network operation. If necessary, change the parameter values and download the parameter set to the MUX 400 again. Save the new parameter set as a configuration file in CLV Setup.

See also [Chapter 10.2.10 Dealing with unknown parameters, Page 69](#).

10.5 Accessories

10.5.1 Cables and plug-in connections

Oder no.	Description	Wires	Length	Connection
6 027 048	CAN bus cable „LAPP Cable“ for fixed mounting, twisted pair, wave resistor 120 Ω, dia. 9.7 mm (0.38 in), shielded	2 x 2 x 0.5 mm ² (20 AWG)	Cut to size	CAN Scanner Network
2 014 054	RS 232 data cable, dia. 5 mm (0.2 in), shielded, with two 9-pin D Sub sockets. SICK null modem cable (pin2 (RxD) and pin 3 (TxD) crossed).	3 x 0.34 mm ² (22 AWG)	3 m (9.84 ft)	PC to MUX 400
6 009 438	D Sub connector housing (metal) for 9-pin or 15-pin HD inserts			
6 007 335	D Sub connector insert, 9-pin socket connector			
6 007 336	D Sub connector insert, 9-pin plug connector			

Table 10-2: Accessories: cables and plug-in connections

10.5.2 Reading pulse generators



The SICK catalog „SENSICK Industrial Sensors“ (order no. 8 006 530, English edition) contains a large selection of photoelectric switches and photoelectric proximity switches as well as the associated accessories (brackets, connection cables).

10.6 Supplementary documentation

Order no.	Title	Language	Contents
8 009 981	Operating Instructions „CLV 42x Bar Code Scanner“	English	Description for mounting, electrical installing, setting-up, configuring and operating
8 008 568	Operating Instructions „CLV 43x/44x Bar Code Scanner“	English	Description for mounting, electrical installing, setting-up, configuring and operating
8 009 139	Operating Instructions „CLV 45x Bar Code Scanner“	English	Description for mounting, electrical installing, setting-up, configuring and operating
8 009 990	Operating Instructions „ICR 853 2-D Code reader“	English	Description for mounting, electrical installing, setting-up, configuring and operating
8 010 080	Operating Instructions „CLV 480 Bar Code Scanner“	English	Description for mounting, electrical installing, setting-up, configuring and operating
8 008 796	Operating Instructions „CLV 490 Bar Code Scanner“	English	Description for mounting, electrical installing, setting-up, configuring and operating
8 009 237	Operating Instructions „CLX 490 Bar Code Scanner“	English	Description for mounting, electrical installing, setting-up, configuring and operating
8 010 001	Operating Instructions „CDB 420 Connection Module“	German/ English	Description for connecting the bar code scanner to the host/PLC/sensor via the connection module
8 010 004	Operating Instructions „CDM 420 Connection Module“	German/ English	Description for connecting the bar code scanner to the host/PLC/sensor via the connection module
8 010 005	Operating Instructions „CDM 490 Connection Module“	German/ English	Description for connecting the CLV 480, CLV/X 490 bar code scanner to the host/PLC/sensor via the connection module
8 010 002	Operating Instructions „CMC 400 Cloning-Modul“	German/ English	Description for setting up the module in the connection module
8 009 180	Operating Instructions „Application of the CAN interface“	English	Description of building a CAN Scanner Network (electrical connection, configuration of the CLVs, functions) and the integration into a CANopen network

Table 10-3: Supplementary documentation

10.7 Code table (Hex – ASCII)

HEX	ASCII
00	BLANK
01	SOH
02	STX
03	ETX
04	EOT
05	ENQ
06	ACK
07	BEL
08	BS
09	HT
0A	LF
0B	VT
0C	FF
0D	CR
0E	SO
0F	SI

HEX	ASCII
20	SPACE
21	!
22	"
23	#
24	\$
25	%
26	&
27	'
28	(
29)
2A	*
2B	+
2C	,
2D	-
2E	.
2F	/

HEX	ASCII
40	@
41	A
42	B
43	C
44	D
45	E
46	F
47	G
48	H
49	I
4A	J
4B	K
4C	L
4D	M
4E	N
4F	O

HEX	ASCII
60	`
61	a
62	b
63	c
64	d
65	e
66	f
67	g
68	h
69	i
6A	j
6B	k
6C	l
6D	m
6E	n
6F	o

10	DLE
11	DC1
12	DC2
13	DC3
14	DC4
15	NAC
16	SYN
17	ETB
18	CAN
19	EM
1A	SUB
1B	ESC
1C	FS
1D	GS
1E	RS
1F	US

30	0
31	1
32	2
33	3
34	4
35	5
36	6
37	7
38	8
39	9
3A	:
3B	;
3C	<
3D	=
3E	>
3F	?

50	P
51	Q
52	R
53	S
54	T
55	U
56	V
57	W
58	X
59	Y
5A	Z
5B	[
5C	\
5D]
5E	^
5F	_

70	p
71	q
72	r
73	s
74	t
75	u
76	v
77	w
78	x
79	y
7A	z
7B	{
7C	
7D	}
7E	~
7F	▲

Table 10-4: Code table Hex – ASCII

10.8 Copy of the EC Declaration of Conformity

SICK

EC Declaration of Conformity

In Compliance with the EC Directive on Electromagnetic Compatibility 89/336/EEG

We hereby declare that the devices (see page 2)

of the product family OTC400-....
of the product family MUX400-....

comply with the basic requirements of the EC Directive specified under Point 1. If an item of equipment listed overleaf is modified without our approval then this declaration loses its validity for this equipment.

We employ a quality system certified by the DQS (German Quality Assurance Society), No. 462, as per ISO 9001 and have therefore observed the regulations in accordance with module H as well as the following EC directives and EN standards during development and production:

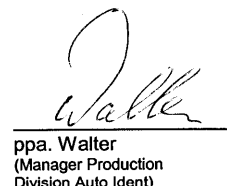
1. EC directives	EC EMC Directive 89/336/EEC as per 92/31/EEC, 93/68/EEC, 93/465/EEC		
2. Harmonized standards used	EN 55011	ISM-Devices	Ed. 98-05
	EN 50082-1	Immunity, residential, commercial and light industry	Ed. 97-08
	EN 61000-6-2	Immunity, industry	Ed. 99-04

Conformance of a type sample belonging to the above-mentioned product family with the regulations from the listed EC directives has been certified by:

Reute,

05-10-2004


 ppa. Pierenkemper
 Manager Development
 Division Auto Ident


 ppa. Walter
 (Manager Production
 Division Auto Ident)

The declaration certifies conformance with the listed directives, but does not guarantee product characteristics. The safety instructions contained in the product documentation must be observed.

Mat. No.: 9 055 298

Page 3

Update no.: see page 2

SICK AG • Nimburger Str. 11 • D-79276 Reute • Telefon 0 76 41- 4 69-0 • Telefax 0 76 41- 4 69-11 49 • www.sick.com
 Aufsichtsrat: Gisela Sick (Ehrenvorsitzende) • Volker Reiche (Vorsitzender)
 Vorstand: Anne-Kathrin Deutrich (Sprecherin) • Dr. Robert Bauer • Jens Höhne
 Sitz: Waldkirch i. Br. • Handelsregister: Emmendingen HRB 355 W

Fig. 10-4: Copy of the Declaration of Conformity (Page 3, scaled down)

SICK

Type	Id.-No.
OTC400-0000	1017866
OTC400-0000S01	1019324
OTC400-0000S02	1019399
OTC400-0000S03	1022185
OTC400-0000S04	1022853
OTC400-0000S05	1022897
OTC400-0000S06	1023875
OTC400-0000S07	1024036
OTC400-0000S08	1025317
OTC400-0000S09	1025397
OTC400-0000S10	1025612
OTC400-0000S11	1025692
OTC400-0000S12	1025776
OTC400-0000S13	1025861
OTC400-0000S16	1026467
MUX400-0000	1026219

- end of list -

Mat. No.: 9 055298

Page 2

Update no.: 0246

SICK AG • Nimburger Str. 11 • D-79276 Reute • Telefon 0 76 41- 4 69-0 • Telefax 0 76 41- 4 69-11 49 • www.sick.com
Aufsichtsrat: Gisela Sick (Ehrenvorsitzende) • Volker Reiche (Vorsitzender)
Vorstand: Anne-Kathrin Deutrich (Sprecherin) • Dr. Robert Bauer • Jens Höhne
Sitz: Waldkirch i. Br. • Handelsregister: Emmendingen HRB 355 W

Fig. 10-5: Copy of the Declaration of Conformity (Page 2, scaled down)

10.9 Index

A		H	
Abbreviations	6	Host interface	
B		- Connecting.....	28
Browser	13	- Default setting.....	29
C		- Function	16
CAN interface		- Hardware selection.....	29
- Connecting.....	26	- Maximum cable lengths.....	25
- Maximum cable lengths.....	24	- Monitoring via the Terminal Emulator.....	47
- Parameterizing.....	40	- Parameterizing.....	41
- Required wire diameters.....	25	I	
CD ROM.....	13	Indicators.....	20
CLV Setup		Installation	
- Dealing with unknown parameters.....	69	- Electrical installation.....	22
- Default settings	64	- Mounting.....	21
- Download.....	36	L	
- Functions (overview)	67	LEDs	
- Hot keys	67	- Function	20
- Ini file	70	- Position.....	20
- Log file serial communication	69	M	
- Start	64	Maintenance	51
- tabs (overview)	38	Malfunctions	
- Upload.....	36	- Analysis and troubleshooting.....	52
- User interface.....	66	- Error messages.....	50
CLV Setup Help	68	Messages (terminal interface)	49
Command strings		Method of operation of the Mux 400.....	16
- Entry in terminal emulator	71	Monitoring host interface	
- Function.....	71	- Activate	48
- Outputting in a file.....	72	- Function	47
Configuration (parameterizing)	35	Mounting bracket.....	59
Connecting the PC.....	29	Mux Data Timing	
Connection diagram	27	- Activate	47
Connector pin and terminal strips assignment.....	23	- Function	47
D		Mux Diagnosis	
Declaration of conformity	76	- Activate	44
Default settings		- Function	44
- CLV Setup.....	64	N	
- MUX 400 print out.....	35	Network trigger	
- Restore in the MUX 400.....	34	- Function	16
Device number.....	16	- Parameterizing.....	43
Dimensional drawings.....	59	O	
Displaying operating data.....	49	Online help.....	68
Disposal	51	Operating modes	35
Documentation (supplementary)	74	Operation	
Download		- Function of the LED indicators.....	20
- Execution	36	- with CLV Setup.....	36
- Function.....	36	- with command strings.....	71
E		P	
Electrical installation	22	Parameter set	
Enclosure rating	58	- Download	36
Error messages		- Function	36
- Displaying in the Terminal Emulator	49	- Upload	36
- Function.....	50		
- Querying with command strings.....	55		
F			
Firmware	2		

MUX 400 Multiplexer

Parameterizing

- Function 35
- Guide..... 39
- Replacing a MUX 400 72
- with CLV Setup 36
- with command strings 71

Power consumption 12

Power supply

- Connection..... 26
- Requirements 26

Product features..... 14

Protection class 58

R

Reading pulse

- Troubleshooting 53

Reading pulse sensor

- Connection at switching input..... 30
- Parameterize pulse source..... 43

Reading result

- Troubleshooting 54

Relay output

- Characteristic data..... 33
- Circuit diagram 33
- Parameterizing..... 44

Removing the device

- Disposal 51
- Procedure..... 21

Repair 57

Replacing a MUX 400 72

S

Safety

- Authorized personnel..... 11
- Enclosure rating/protection class 58
- Features..... 14
- Intended use..... 11
- Notes on device 13
- Power supply..... 26

Scope of delivery 13

Self-test..... 52

Separator 42

Server Diagnosis

- Activate 46
- Function 46

SICK Homepage..... 9

SICK Support 57

Software versions 2

Switching input TRIGGER 1

- Characteristic data..... 31
- Connecting..... 30
- Function 16
- Parameterizing..... 43

Switching off the MUX 400 50

Switching outputs OUTPUT 1 to 4

- Characteristic data..... 32
- Function 16
- Parameterizing..... 44
- Wiring 32

System messages

- Displaying in the Terminal Emulator 49
- Function..... 49

System requirements

- For CAN Scanner Network 14
- For MUX 400..... 13

T

Table of figures..... 7

Table of tables..... 6

Technical data..... 58

Terminal Emulator 45

Terminal interface

- Connecting 29
- Data format..... 64
- Default setting..... 34
- Function..... 16
- Maximum cable length 29
- Operating modes 19
- Parameterizing..... 44

Troubleshooting

- Error messages..... 50
- Troubleshooting..... 52

U

Upload

- Execution 36
- Function..... 36

Use of the MUX 400 11

User interface..... 66

V

View of the device..... 15

W

Warranty..... 12

Windows..... 13

Australia

Phone +61 3 9497 4100
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Belgium/Luxembourg

Phone +32 (0)2 466 55 66
E-Mail info@sick.be

Brasil

Phone +55 11 5091-4900
E-Mail sac@sick.com.br

Ceská Republika

Phone +420 2 57 91 18 50
E-Mail sick@sick.cz

China

Phone +852-2763 6966
E-Mail ghk@sick.com.hk

Danmark

Phone +45 45 82 64 00
E-Mail sick@sick.dk

Deutschland

Phone +49 (0)2 11 53 01-270
E-Mail info@sick.de

España

Phone +34 93 480 31 00
E-Mail info@sick.es

France

Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Great Britain

Phone +44 (0)1727 831121
E-Mail info@sick.co.uk

India

Phone +91-22-2822 7084
E-Mail info@sick-india.com

Italia

Phone +39 02 27 40 93 19
E-Mail info@sick.it

Japan

Phone +81 (0)3 3358 1341
E-Mail info@sick.jp

Nederlands

Phone +31 (0)30 229 25 44
E-Mail info@sick.nl

Norge

Phone +47 67 81 50 00
E-Mail austefjord@sick.no

Österreich

Phone +43 (0)22 36 62 28 8-0
E-Mail office@sick.at

Polska

Phone +48 22 837 40 50
E-Mail info@sick.pl

Republic of Korea

Phone +82-2 786 6321/4
E-Mail kang@sickkorea.net

Republika Slovenija

Phone +386 (0)1-47 69 990
E-Mail office@sick.si

Russia

Phone +7 95 775 05 30
E-Mail info@sick-automation.ru

Schweiz

Phone +41 41 619 29 39
E-Mail contact@sick.ch

Singapore

Phone +65 6744 3732
E-Mail admin@sicksgp.com.sg

Suomi

Phone +358-9-25 15 800
E-Mail sick@sick.fi

Sverige

Phone +46 8 680 64 50
E-Mail info@sick.se

Taiwan

Phone +886 2 2365-6292
E-Mail sickgrc@ms6.hinet.net

Türkiye

Phone +90 216 388 95 90 pbx
E-Mail info@sick.com.tr

USA/Canada/México

Phone +1(952) 941-6780
1 800-325-7425 – tollfree
E-Mail info@sickusa.com

More representatives and agencies
in all major industrial nations at
www.sick.com