



GL5450 Ethernet Extension Manual

Version 4.5.5 | English

Imprint

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1 Introduction

In this chapter you find the following information:

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1.1 About this User Manual

Conventions

In the two following charts you will find the conventions used in the user manual regarding utilized spellings and symbols.

Style	Utilization
bold	Blocks, surface elements, window and dialog names of the software. Accentuation of warnings and advices. [OK] Push buttons in brackets File Save Notation for menus and menu entries
Source Code	File name and source code.
Hyperlink	Hyperlinks and references.
<CTRL>+<S>	Notation for shortcuts.

Symbol	Utilization
	This symbol calls your attention to warnings.
	Here you can obtain supplemental information.
	Here you can find additional information.
	Here is an example that has been prepared for you.
	Step-by-step instructions provide assistance at these points.
	Instructions on editing files are found at these points.
	This symbol warns you not to edit the specified file.

1.1.1 Warranty

Restriction of warranty

We reserve the right to change the contents of the documentation and the software without notice. Vector Informatik GmbH assumes no liability for correct contents or damages which are resulted from the usage of the documentation. We are grateful for references to mistakes or for suggestions for improvement to be able to offer you even more efficient products in the future.

1.1.2 Registered Trademarks

Registered trademarks

All trademarks mentioned in this documentation and if necessary third party registered are absolutely subject to the conditions of each valid label right and the rights of particular registered proprietor. All trademarks, trade names or company names are or can be trademarks or registered trademarks of their particular proprietors. All rights which are not expressly allowed are reserved. If an explicit label of trademarks, which are used in this documentation, fails, should not mean that a name is free of third party rights.

- ▶ Windows, Windows 7, Windows 8.1, Windows 10, Windows 11 are trademarks of the Microsoft Corporation.

1.2 Important Notes

1.2.1 Safety Instructions and Hazard Warnings

**WARNING!**

In order to avoid personal injuries and damage to property, you have to read and understand the following safety instructions and hazard warnings prior to installation and use of the loggers. Keep this documentation (manual) always near the logger.

1.2.1.1 Proper Use and Intended Purpose

**WARNING!**

The loggers are measuring devices which are used in the automotive and commercial vehicles industries. The loggers are designed for gathering and recording data of the bus communication, for analyzing and possibly controlling electronic control units. This includes, inter alia, bus systems like CAN, LIN, MOST, FlexRay and Ethernet.

The loggers may only be operated in a closed state. In particular, printed circuits must not be visible. The loggers may only be operated according to the instructions and descriptions of this manual. Only suitable accessories should be used, such as the original Vector accessories or accessories approved by Vector.

The loggers are exclusively designed for use by skilled personnel as its operation may result in serious personal injuries and damage to property. Therefore, only those persons may operate the loggers who (i) have understood the possible effects of the actions which may be caused by the loggers; (ii) are specifically trained in the handling with the loggers, bus systems and the system intended to be influenced; and (iii) have sufficient experience in using the loggers safely.

The logger specific information can be acquired via the specific manuals as well as from the Vector KnowledgeBase at www.vector.com. Please consult the Vector KnowledgeBase for updated information prior to the operation of the loggers. The knowledge necessary for the bus systems used, can be acquired in workshops and internal or external seminars offered by Vector.

1.2.1.2 Hazards

**WARNING!**

The loggers may control and/or otherwise influence the behavior of electronic control units. Serious hazards for life, body and property may arise, in particular, without limitation, by interventions in safety relevant systems (e.g. by deactivating or otherwise manipulating the engine management, steering, airbag and/or braking system) and/or if the loggers are operated in public areas (e.g. public traffic). Therefore, you must always ensure that the loggers are used in a safe manner. This includes, inter alia, the ability to put the system in which the loggers are used into a safe state at any time (e.g. by „emergency shutdown“), in particular, without limitation, in the event of errors or hazards.

Comply with all safety standards and public regulations which are relevant for the operation of the system. Before you operate the system in public areas, it should be tested on a site which is not accessible to the public and specifically prepared for performing test drives in order to reduce hazards.

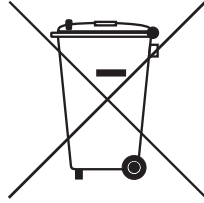
1.2.2 Disclaimer

**WARNING!**

Claims based on defects and liability claims against Vector are excluded to the extent damages or errors are caused by improper use of the loggers or use not according to its intended purpose. The same applies to damages or errors arising from insufficient training or lack of experience of personnel using the loggers.

1.2.3 Disposal of Vector Hardware

Please handle old devices responsibly and observe the environmental laws applicable in your country. Please dispose of the Vector hardware only at the designated places and not with the household waste.



Within the European Community, the Directive on Waste Electrical and Electronic Equipment (WEEE Directive) and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS Directive) apply.

For Germany and other EU countries, we offer free take-back of old Vector hardware.

Please carefully check the Vector hardware to be disposed of before shipping. Please remove all items that are not part of the original scope of delivery, e.g. storage media. The Vector hardware must also be free of licenses and must no longer contain any personal data. Vector does not perform any checks in this regard. Once the hardware has been shipped, it cannot be returned to you. By shipping the hardware to us, you have relinquished your rights to the hardware. Before shipping, please register your old device via:

<https://www.vector.com/int/en/support-downloads/return-registration-for-the-disposal-of-vector-hardware/>

2 GL5450

In this chapter you find the following information:

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2.1 General Information

2.1.1 Scope of delivery

Included

- ▶ 1x GL5450 logger
- ▶ 1x Power supply connector with metal hood and contacts
- ▶ 5x PHY-Board 100BASE-T1 female connectors with contacts (item name: TE 2177588-1)
- ▶ 1x 0.5 m adapter cable AUX+ to AUX+ for connection to GL3400/GL5300
- ▶ 1x AUX(+) terminating resistor for GL3400/GL5300
- ▶ 1x Ethernet cable with a length of 50 cm
- ▶ 2x Hard disk cartridge for exchangeable 2.5" SSD

Please note that the 1000BASE-T1 female connector (Rosenberger E6K101-1BLA5-Z) is not available.

2.1.2 Optional Accessories

Optional hardware

- ▶ 3 m adapter cable AUX+ to AUX+ for connection to GL3400/GL5300
- ▶ SSD

2.2 Overview

Ethernet extension

The GL5450 is an Ethernet extension for the GL3400 and GL5300 family, which is used for recording automotive Ethernet data.

The GL5450 can log data from up to 20x 100BASE-T1 and 6x 1000BASE-T1 interfaces with a high-precision 64 ns timestamp resolution on two SSDs.



Figure 1: GL5450

Main features

The logger offers the following main features:

- ▶ 5x 100BASE-T1 PHY board slots with 4 ports each
- ▶ 3x 1000BASE-T1 PHY board slots with 2 ports each
- ▶ Supports
 - up to 20 independent 100BASE-T1 (OPEN Alliance BroadR-Reach) Ethernet ports or 10 network TAPs and
 - up to 6 independent 1000BASE-T1 Ethernet ports or 3 network TAPs
- ▶ High time stamp resolution for Ethernet frames (64 ns)
- ▶ System start after max. 250 ms
- ▶ 2 GB RAM for interim buffering of data
- ▶ 2x 1 Gigabit (1000BASE-T) Ethernet connection
- ▶ 1x Mini USB connection
- ▶ 1x AUX+ In for connection to GL3400/GL5300
- ▶ 1x AUX+ Out for connection
- ▶ 3x Status LEDs on the front
- ▶ 128 x 64 pixel OLED display
- ▶ 5x key for navigating display menus
- ▶ Controllable via data logger GL3400/GL5300
- ▶ Time synchronous data recording with data logger data

Status of the functions

- ▶ MAC2MAC
- ▶ PHY2PHY

- ▶ Wake up via terminal 15
- ▶ Filtering of data packets
- ▶ Defining of critical ports (no disruption of route in switched-on state)
- ▶ Sending of Ethernet data via TCP/UDP and Raw-Ethernet from GL3400/GL5300 via GL5450
- ▶ Phy link status (link-up/down, signal quality, receiver status remote/local, TJA1100 only: error counter remote/local)

Not supported functions

The following functions are not supported by the GL5450:

- ▶ Using GL5450 as standalone data logger
- ▶ Sending of 100BASE-T1 or 1000BASE-T1 data
- ▶ Parallel writing on both SSDs
- ▶ Wake up when receiving data via 1000BASE-T1 ports
- ▶ Wake up when receiving data via 100BASE-T1 ports

2.3 Front Side

Device connectors

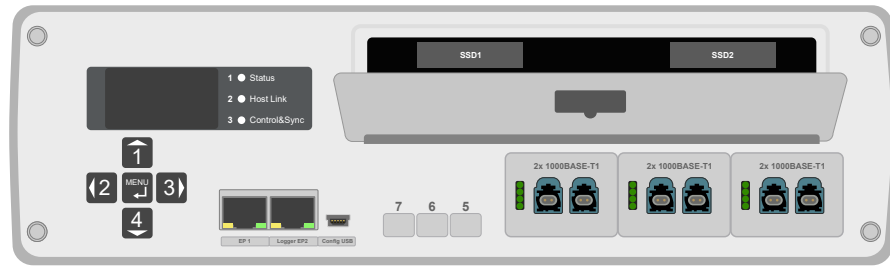


Figure 2: GL5450 front side

► Display

The display is used to show the menu. It also shows different status messages and information concerning ongoing actions as well as general system information (serial number, MAC addresses etc.).

More information can be found in section [Commands](#) on page 41.

► Keypads 1...4

The keypads can be used to navigate through the menu. More information can be found in section [Navigation](#) on page 40.

► Keypad MENU

Use this keypad to open the main menu or to accept (enter) a menu selection. More information can be found in section [Navigation](#) on page 40.

► Ethernet EP1

This interface is used to connect the GL5450 to a computer to update the firmware ≥ 3.00 . This is done using the maintenance program. It is included in the Vector Logger Suite during installation. In the Vector Logger Suite, select the menu item **Tools | GL5450 Maintenance**. The default IP address of the GL5450 (configured as GL5450 with compound ID 1) is 192.168.0.50. To access the device, the computer's IP address must be in the same subnet.

► Logger EP2

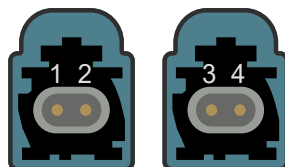
Logger EP2 is a 1 Gbit interface which is used for communication between GL5450 and the data logger GL3400/GL5300.

► Config USB (Mini USB)

This interface is used to connect the GL5450 to a computer to update the firmware < 3.00 . This is done using the maintenance program. It is included in the Vector Logger Suite during installation. In the Vector Logger Suite, select the menu item **Tools | GL5450 Maintenance**. After updating to firmware ≥ 3.00 , this interface has no function.

► 1000BASE-T1 connector (6x)

The GL5450 offers 3 slots for 1000BASE-T1 PHY boards. Each board can be accessed via these two connectors and is equipped with two Ethernet transceivers (see section [Technical Data](#) on page 25).



Pin	Description	Default Mode	TAP
1	1000BASE-T1 Port 0 +	Slave	With Port 1
2	1000BASE-T1 Port 0 -		
3	1000BASE-T1 Port 1 +	Master	With Port 0
4	1000BASE-T1 Port 1 -		

**Note**

Autopolarity is active on the 1000BASE-T1 PHY modules. A change of polarity can cause a delay in the link up.

► **SSD slots (SSD1/SSD2)**

Behind the protective cover you will find the slots SSD1 (left) and SSD2 (right). Further information on the hard disk cartridges can be found in section [Storage Media and Formatting](#) on page 21.

2.4 Back Side

Device connectors

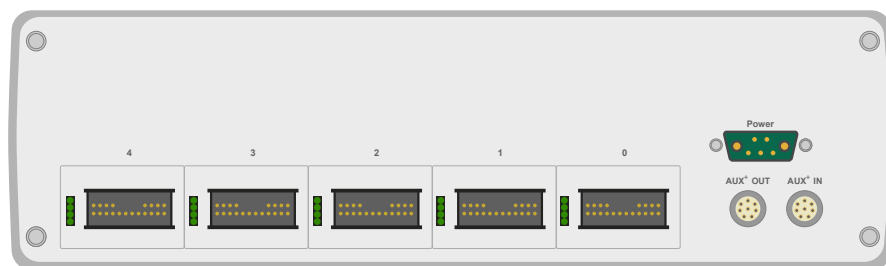
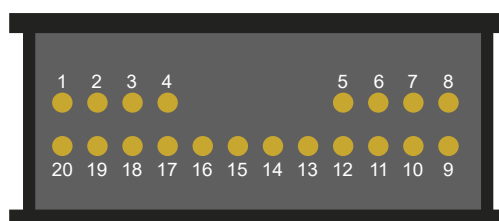


Figure 3: GL5450 back side

► 100BASE-T1 connector (5x 20-pin)

The GL5450 offers five slots for 100BASE-T1 PHY boards. Each board can be accessed via a 20-pin connector and is equipped with four transceivers (see section [Technical Data](#) on page 25).



Pin	Description	Default Mode	TAP
1	100BASE-T1 Port1-	Master	With Port 0
2	100BASE-T1 Port1+		
3	Reserved	-	-
4	Reserved	-	-
5	Reserved	-	-
6	Reserved	-	-
7	100BASE-T1 Port3+	Master	With Port 2
8	100BASE-T1 Port3-		
9	GND	-	-
10	GND	-	-
11	Reserved	-	-
12	100BASE-T1 Port0+	Slave	With Port 1
13	100BASE-T1 Port0-		
14	Reserved	-	-
15	Reserved	-	-
16	100BASE-T1 Port2-	Slave	With Port 3
17	100BASE-T1 Port2+		
19	GND	-	-
20	GND	-	-



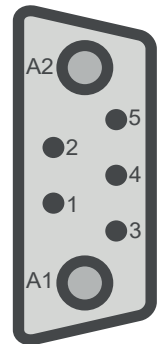
Note

Autopolarity is active on the 100BASE-T1 PHY modules. Changing the polarity can cause a delay in link up.

► **Power**

Power connector for voltage supply and KL15/ignition.

Pin	Name	Description
1	GNDSense	Reference ground for terminal 30 Sense.
2	KL30Sense	Measuring voltage for terminal 30 Sense.
3	KL15	Ignition, wakes the GL5450.
4	-	Reserved.
5	-	Reserved.
A1	KL31 (GND)	Supplies the GL5450, on terminal 31.
A2	KL30 (VCC)	Supplies the GL5450, on terminal 30.



► **AUX Out/AUX In**

The AUX+ In 8-pin connector is used for connecting to GL3400/GL5300.

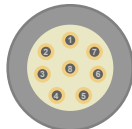
The connectors AUX+ In and AUX+ Out are internally mirrored and linked. AUX+ Out mirrors the output of the connected data logger.

The **+5 V** line of AUX+ is led through a max. 600 mA electronic fuse, this means that the current consumption may be maximum 600 mA in total.

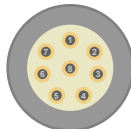
The **Sync** line is used for synchronisation with GL3400/GL5300 and to wake up GL5450 via GL3400/GL5300.

The connector assignment of both connectors is as follows:

AUX⁺ OUT



AUX⁺ IN



2.5 LEDs

2.5.1 Operating Status

► Status

Multicolored LED indicating the main status.

Color	Description
Green	System is OK and ready for recording.
((Green (10)))	Device is configured as GL5450 No. 1 with IP address 192.168.0.50 and compound ID 1.
((Green (20)))	Device is configured as GL5450 No. 2 with IP address 192.168.0.51 and compound ID 2.
((Green (30)))	Device is configured as GL5450 No. 3 with IP address 192.168.0.52 and compound ID 3.
Red	Device is not ready for recording.
((Red))	Data loss.

(()) flashing light with 0.5 Hz

(x) flashing light every x seconds

► Host Link

Multicolored LED indicating the host link status.

Color	Description
Off	Device is off or in sleep mode.
Green	Device is connected to host (GL3400/GL5300).
((Red))	Ethernet interface EP2 connected.
Red	Ethernet interface EP2 not connected.

(()) flashing light with 1 Hz

► Control/Sync

Multicolored LED indicating the control/sync status.

Color	Description
Off	Device is off or in sleep mode.
Green	GL5450 and GL3400/GL5300 are connected.
((Green))	GL5450 received a synchronization time stamp.
((Red))	AUX+ interface is connected.
Red	AUX+ interface is not connected.

(()) flashing light with 0.5 Hz

(()) flashing light with 1 Hz

2.5.2 100BASE-T1 Port Status

► LED1...4

The port status LEDs on the back side indicate the status of the individual 100BASE-T1 ports 0...3. Four green LEDs show the state of the respective PHY boards. From top to bottom:

- LED 1: Port 0
- LED 2: Port 1
- LED 3: Port 2
- LED 4: Port 3

LED State	Description
On	Connection is active.
Off	No connection established.

2.5.3 1000BASE-T1 Port Status

► LED1...4

The port status LEDs on the front side indicate the status of the 1000BASE-T1 ports. Four green LEDs show the state of the respective PHY boards. From top to bottom:

LED	Port	State	Description
1	0	Off	No data.
		On	Receiving data.
2		On	Connection is active.
		Off	No connection established.
3	1	Off	No data.
		On	Receiving data.
4		On	Connection is active.
		Off	No connection established.

2.6 Storage Media and Formatting

2.6.1 General Information

Recorded data is stored on up to two exchangeable 2.5 inch SSDs, each mounted on a cartridge.

The data are written from the GL5450 on to the SSDs in raw format and are only read out by the Readout Utility.

- ▶ The SSDs used for the GL5450 do not need to be formatted before installing.
- ▶ GL5450 creates a 512 kByte Windows partition with the label "GINDISK" on the SSD in order to be detectable by a windows computer, so the data can be read out. Keep this partition unchanged before readout the SSD.
- ▶ If only one SSD is used for recording, this can be used in slot SSD1 or in slot SSD2.
- ▶ If two SSDs are used for recording, the drive in slot SSD1 is written at first.



Note

- ▶ To ensure proper system operation, please use only the storage media which are approved and verified by Vector Informatik GmbH.

Support cases with problems related to non-approved storage media cannot be handled by our support team.

- ▶ Please note the following:
 - Every SSD with unknown data is formatted by the GL5450.
 - SSDs from other GL5450 are formatted.
 - SSDs from a GL3400/GL5300 are formatted.
- ▶ The write rate depends on the used SSD and is limited to 245 MByte/s.

2.6.2 Insertion of the SSD



Step by Step Procedure

Please proceed as follows in order to insert the SSD with hard disk cartridge:

1. Unlock the cover and then open it.
2. Insert the hard disk cartridge carefully and push it in as far as possible.
3. Close the cover again.



Note

- ▶ If the GL5450 is started with opened protective cover, no data is recorded.
- ▶ If the GL5450 is started with opened protective cover and without an SSD, no data is recorded and a signal tone is played.

2.6.3 Removal of the SSD



Step by Step Procedure

Please proceed as follows in order to remove the SSD with hard disk cartridge:

1. Unlock the cover and then open it.
2. Remove the hard disk cartridge when the LED on the cartridge stops flashing red. If the protective cover is opened during recording, writing on the SSD is stopped.
3. Close the cover again.



Note

The SSD may only be replaced when the device is off or in sleep mode.

2.7 Logger Compound

2.7.1 General Information

In a logger compound, the GL5450 is operated time-synchronously to the GL3400/GL5300. This compound is marked with a unique identification number **measurement ID** for measuring. The measurement (compound) is finished when one of the SSDs used for this purpose has been read out.

If all SSDs used at the start of measurement were not previously in a compound or had already been read out, the compound gets a new measurement ID.

If all SSDs used at the start of measurement already have the same ID for this compound (continuation of a measurement from an existing compound), the measurement is continued with the same ID.

Time synchronization is achieved via the adapter cable AUX+ to AUX+, refreshed once per second. Additionally, the following compound information is exchanged and saved on the installed SSDs:

- ▶ Measurement ID
- ▶ Serial numbers of both devices
- ▶ Serial numbers of the used SSDs
- ▶ Firmware version



Note

- ▶ Interchanging of SSDs within the logger compound (also applies to interchanging within a GL5450) is not allowed and leads to an invalid compound.
- ▶ During the entire measurement (in a compound), neither a GL3400/GL5300 nor a GL5450 must be interchanged.
- ▶ SSDs must not be exchanged or removed during an ongoing measurement (in a compound).
- ▶ SSDs with different IDs or IDs from other compounds are not allowed in a logger compound and lead to an invalid compound.
- ▶ Both devices emit a permanent signal tone if the compound is invalid. Additionally, the following information is shown on the respective display: **Measurement ID is wrong. Change all disks.** The status LED at GL5450 lights up red.
- ▶ All GL5450 used in a compound must have the same firmware.
- ▶ Please note the following:
 - Every SSD with unknown data is formatted by the GL5450.
 - SSDs from other GL5450 are formatted.
 - SSDs from a GL3400/GL5300 are formatted.

2.7.2 AUX(+) Terminating Resistor

This terminating resistor is connected to the AUX connector of the GL3400/GL5300 to terminate the AUX CAN. If there are any accessories connected to the GL3400/GL5300, like LOGview, CAS1T3L, CASM2T3L or VoCAN, this bus termination is not needed since the external device are equipped with one.

2.8 Technical Data

Ethernet	20x 100BASE-T1 ports or 10 TAPs (TJA1100 transceiver) 6x 1000BASE-T1 ports or 3 TAPs (88Q2110 transceiver)
Power supply	8 V...55 V
Power consumption (two SSDs)	Typ. 33.6 W (depends on the data rate over individual ports and the used SSDs)
Current consumption	Sleep mode: 2 mA @ 12 V 8 active PHY boards (using 2 SSDs): typ. 2.8 A @ 12 V With inactive PHY boards: typ. 1 A @ 12 V
Start-up time	250 ms
Battery	Lithium primary cell, BR2032 type
Temperature range	-40 °C...+70 °C
Dimensions (LxWxH)	290 mm x 212 mm x 80 mm
Minimum software and hardware requirements	With GL3400: - GL5450: Firmware 3.06 - GL3400: Firmware 2.11 - Vector Logger Suite, Version 4.5 SP2 With GL5300: - GL5450: Firmware 2.06 - GL5300: Firmware 1.45 - Vector Logger Suite, Version 4.1
Operating system requirements	Windows 10 (64 bit) Windows 11 (64 bit)

3 First Steps

In this chapter you find the following information:

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3.1 Switching the GL5450 Compound On/Off

This section describes how to switch on/off the the GL3400/GL5450 or GL5300/GL5450 compound.

3.1.1 Automatic Switching

- Power management** For permanent use in vehicles, the loggers are permanently connected to the vehicle battery. Due to the sleep-/wake functionality, the logger will be switched on and off automatically by bus activity. This implements an effective power management with very quick start times without stressing the vehicle battery in idle times (e. g. during night).
- Sleep mode** The GL3400/GL5300 can be configured to switch to sleep mode automatically if no CAN or LIN message was received within a defined time. This time can be defined in the configuration program (maximum 18,000 s = 5 hours). In sleep mode, LED2 flashes every 2 seconds. The sleep mode has a very low current consumption of less than 2 mA.
- The GL5450 can be configured to switch to sleep mode after GL3400/GL5300 shutdown. Prerequisite is that terminal 15 (KL 15) is not connected and no data is received via the activated ports. A port can keep the GL5450 awake by receiving messages despite a GL3400/GL5300 shutdown if this port is set to critical. This is supposed to maintain vehicle communication via the TAPs, which are interrupted when the GL5450 is turned off. A signal tone will alert you if the protective cover is opened while critical ports are still active.
- Wake-up** The GL3400/GL5300 wakes up from sleep mode:
- ▶ after reception of a CAN message
 - ▶ after reception of a LIN message
 - ▶ positive edge on the wake-up line (clamp 15)
 - ▶ wake-up timer via real-time clock
- After wake-up, messages will be recorded after maximum 40 ms.
- The GL5450 wakes up from sleep mode:
- ▶ through GL3400/GL5300 only

3.1.2 Manual Switching

- ▶ The compound is switched on by applying the supply voltage.
- ▶ The compound is shut down and switched off by opening the protective cover. After opening the front access panel, the display shows **Door opened** and then **Stop Rec**. During the following shutdown of the logger and the writing of the logging files from RAM to SSD, **Shutdown** is displayed. During all these steps a running light from right to left is displayed by the LEDs. If the display is off, the logger is shut down.
- ▶ The SSD can be removed after the red LED is off.
- ▶ Depending on the configuration, bus activity after the shutdown can wake up the logger immediately.

**Note**

The logger must not be switched off by disconnecting the voltage! When the voltage supply is interrupted, the logger performs an emergency shutdown to protect the operating system and the SSD file system. However, any logging data stored in RAM is lost.

3.2 Connection Plan



Step by Step Procedure

Please connect GL5450 to GL3400/GL5300 as follows:

1. Connect the GL5450 (via AUX+ In) to the GL3400/GL5300 (via AUX+1 or AUX+2) with the supplied adapter cable AUX+ to AUX+.
2. Make sure that the delivered AUX(+) terminating resistor is connected to the AUX connector of the GL3400/GL5300 or that any external accessory like LOGview, CAS1T3L, CASM2T3L or VoCAN is connected to the GL3400/GL5300.
3. Connect the GL5450 (via Logger EP2) to the GL3400/GL5300 (via EP1 to EP5) with the supplied Ethernet cable.
4. Supply GL5450 and GL3400/GL5300 via the power connectors.



WARNING!

It is recommended to connect both devices to the same voltage supply (e. g. battery of the vehicle) as the vehicle or test equipment, respectively.

If two different voltage supplies are used for GL3400/GL5300/GL5450 and the test equipment, the ground pins (GND) of the two voltage supplies must be connected.

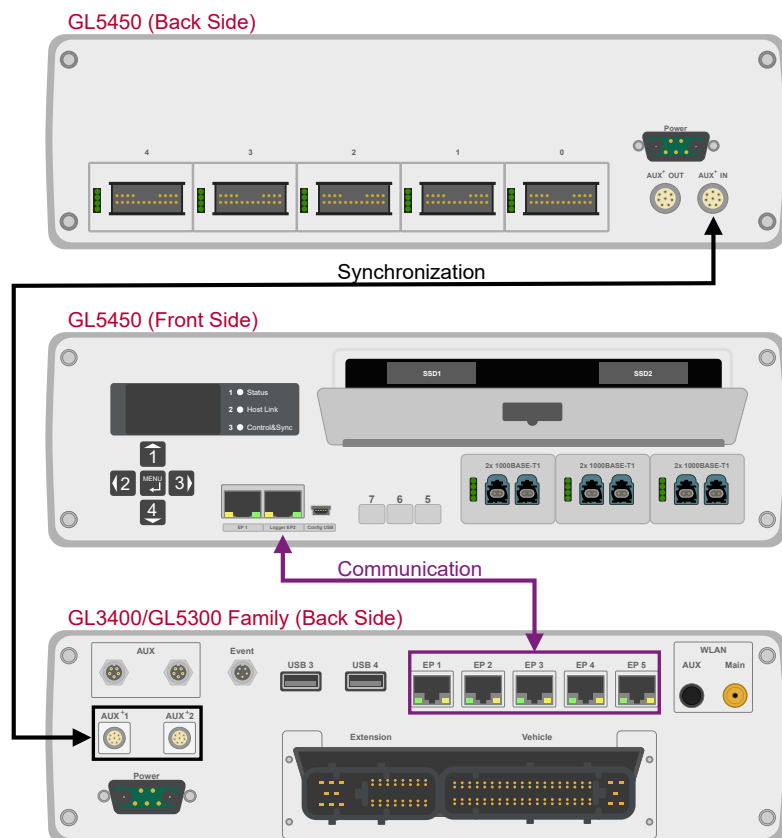


Figure 4: Example with GL5300 (GL3400 similar)

3.3 Vector Logger Suite

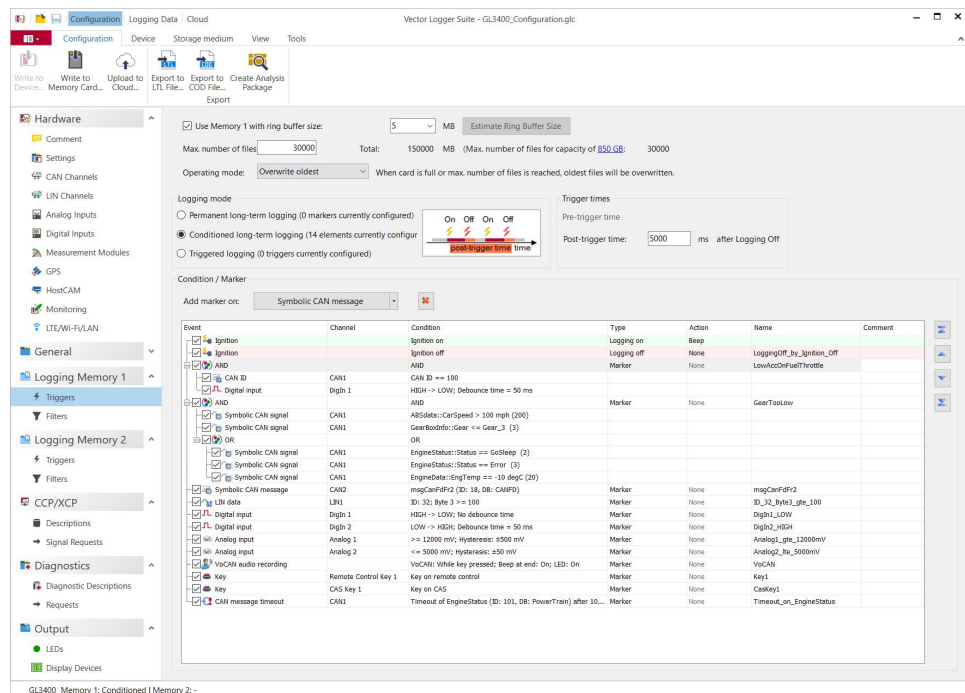
3.3.1 General Information

Overview

Vector Logger Suite enables the configuration of all loggers of the GL Logger family and offers a wide range of settings. You may set baud rates for CAN FD and LIN, configure Ethernet logging, define triggers and filters, set LEDs and manage logging files on the storage media. Furthermore for the CAN bus diagnostics and CCP/XCP can be configured. For CCP/XCP the logger needs an installed license. For Seed & Key CANape is required. Vector Logger Suite also supports trigger and filter by symbolic names defined in CAN and LIN databases.

Main features are:

- ▶ Customizable filters for CAN FD and LIN messages
- ▶ Customizable triggers
- ▶ Support of CAN databases (DBC) and LIN databases (LDF)
- ▶ Support of AUTOSAR description files (ARXML), version 3.0 to 4.4
- ▶ Diagnostic support
- ▶ File management
- ▶ CCP/XCP (optional)



Requirements

The following software requirements must be fulfilled to run the Vector Logger Suite: Windows 10 (64 bit) or Windows 11 (64 bit)

**Reference**

The Vector Logger Suite is described in detail in the user manual of this configuration program. The user manual is available as PDF and can be opened in the Vector Logger Suite via **Backstage | Documentation**.

3.3.2 Quick Start

3.3.2.1 Installation

**Step by Step Procedure**

The Vector Logger Suite can be installed as a 64 bit program as follows:

1. Execute the setup, which is found on the Download Package:
.\VLSuite\Setup_VLSuite_64Bit.exe.
2. Please, follow the instructions in the setup program to complete the installation.
3. After successful installation, the Vector Logger Suite can be found in the start menu (if selected during installation).

3.3.2.2 Configuring the GL3400/GL5300/GL5450

**Step by Step Procedure**

Follow the instructions below to configure the GL3400/GL5300 with GL5450 to record Ethernet data via the Vector Logger Suite and to start long-term logging. This example shows how to record data from an Ethernet connection via TAP. Make sure that two adjacent ports are connected to your Ethernet connection to perform the TAP.

The SSDs for GL5450 are already formatted for use in the device. If you are unsure about the state of your SSD, please follow this preparation:

1. Connect the SSDs for GL5450 to the computer.
2. Start the Vector Readout Utility.
3. In the **Option** dialog, activate the **Expert Mode** in the **Extended** section.
4. Start **Format Data Carrier**, select the according SSD and click on **[Format now]**.
5. After formatting, the SSD is automatically ejected from Windows.
6. Remove the SSD from the computer and insert it in your GL5450.

Configuration:

1. Start the Vector Logger Suite.
2. Create a new GL3400/GL5000 project in the backstage via **New Project....** In the displayed dialog, select the logger type.
3. On the configuration page **Ethernet Logging**, add a port usage **TAP** and select the two ports that you connected to the TAP.
4. Make sure that the slave/master mode in the **Port** settings matches the dir-

ection of the Ethernet connection.

5. Connect the GL3400/GL5300 via USB to your computer, power it up and wait until the display shows **USB Mode**.
6. Load the configuration via **Configuration | Write to Device...** on the connected logger.
7. Open the module **Logging Data** and eject the logger with the  menu from . Disconnect the logger from USB.
8. Connect the compound e. g. to your test system (Ethernet). During the configuration update, the GL3400/GL5300 starts up first and displays approx. 30 s **Record** and afterwards approx. 30 s **Update in progress**. Afterwards, GL3400/GL5300 sends the GL5450 settings to the connected device. The GL5450 is reconfigured and automatically restarted. After a successful update, **Update finished** is displayed for three seconds. As soon as **Record** is displayed again, the new configuration is active.

**Note**

During update, the logger must not be disconnected from the power supply. Please allow up to 5 minutes for extensive firmware updates (e. g. including Linux update).

3.3.2.3 Readout Recorded Data



Step by Step Procedure

Follow the instructions below to read out the SSDs from the GL3400/GL5300 and GL5450 compound compound via Vector Readout Utility, which is installed with the Vector Logger Suite.

1. Start the Vector Readout Utility.
2. At the first startup, select a destination folder for the read logging data.
3. Remove all SSDs from the GL3400/GL5300 and GL5450 compound compound.
4. Connect these SSDs to your computer e. g. via the Disc Reader.
5. The Vector Readout Utility asks whether you want to start the readout. Confirm with **[Yes]**. You can also start the readout via the  button.
6. Successful readout is indicated via  **Finished**.
7. Remove the SSD via the  button. Make sure that **Format data carrier** is selected in the subsequent dialog and click on **[Format & Eject]**.
8. Repeat this for all SSDs of the compound. In view **Compounds**, you can check the status of the entire compounds.

3.3.2.4 Conversion of Recorded Data



Step by Step Procedure

Follow the instructions below to convert logging data to the desired destination format.

1. Open the GL3400/GL5000 project in Vector Logger Suite.
2. Open the **Export** module.
3. Click on **Backstage** , then on **Open Source Directory | Uncompressed** and select the destination folder which was created by the Readout utility for this compound. All data from this compound is displayed afterwards.
4. Make sure that **GJF Ethernet Logging** is selected via the button **Extended**.
5. Click on **Destination Format** and select the file format (e. g. BLF logging file).
6. In **Advanced Settings | GJF Ethernet Logging Data**, select **Mix GJF data into ring buffer data** and **Overlap**.
7. Click on **File Storage** and select the target directory and optionally further settings.
8. Click on **Export** to initiate the readout of the logging data and the automatic conversion to the selected file format. The files will be stored in a new subfolder (Destination Subdirectory) of the target directory.

3.4 Examples of Usage

3.4.1 PHY2PHY

GL5450 supports the use case of PHY2PHY. This allows recording of 100BASE-T1/1000BASE-T1 Ethernet packets with a minimum impact. A symmetric and constant delay of around 1.52 μ s for 100BASE-T1 and 4.9 μ s for 1000BASE-T1 is created between the two TAP ports.

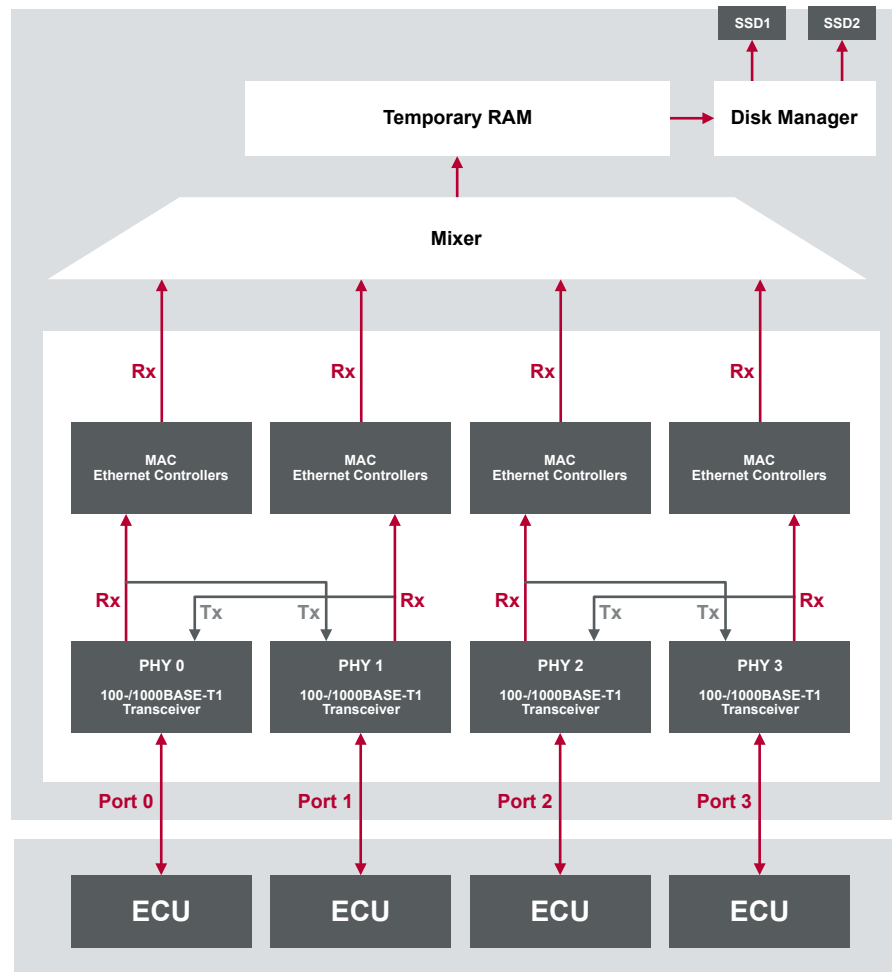


Figure 5: PHY2PHY example



Note

For a network TAP you need to cut the connection between the control units and loop-in the GL5450 between them. The network connection between the control units is interrupted in case of failure or when the GL5450 is switched off. This can lead to malfunctioning of the vehicle.

3.4.2 MAC2MAC

GL5450 supports the application of MAC2MAC. In addition to monitoring the Ethernet packets, you also can add your own packets to the data flow. The throughput times can be dynamic in this application.

The MAC bypassing latency (approx. 5 μ s for 100BASE-T1 and approx. 5.27 μ s for 1000BASE-T1) is independent from the frame length as long as there are no bypassing conflicts such as additional frames sent by the application.

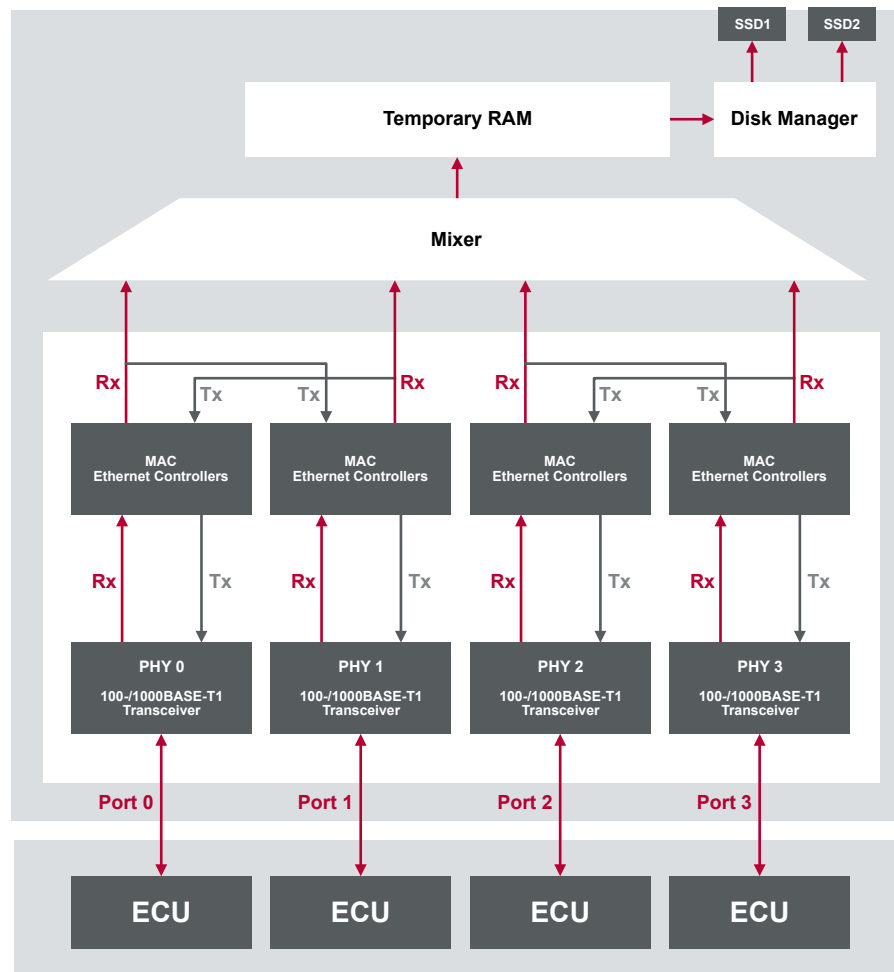


Figure 6: MAC2MAC example



Note

For a network TAP you need to cut the connection between the control units and loop-in the GL5450 between them. The network connection between the control units is interrupted in case of failure or when the GL5450 is switched off. This can lead to malfunctioning of the vehicle.

4 Appendix

In this chapter you find the following information:

4.1 Updating Device Firmware	37
4.2 Miscellaneous Features	39
4.3 Menu Navigation and Commands	40
4.4 System Messages	44

4.1 Updating Device Firmware

Checking firmware

You can update the GL5450 firmware with the GL5450 maintenance program, which is located under **Tools | GL5450 Maintenance**.

A greater firmware update is required from version 2.xx to 3.xx. For more information, see the `GL5450_Firmware_3.xx_Update.pdf` file. This file is installed with the Vector Logger Suite and can be found in the Backstage menu under **Documentation**.

You can check the firmware version installed on your device by accessing the front panel menu. Access the menu by pressing and holding the **[MENU]** key, then pressing **[3 ►]**. In the menu, use the arrow keys to navigate to **Device** (in older versions, **Device Info**) | **Firmware** | **COD**. Alternatively, you can look up the firmware version when opening a raw logging data folder in the **Exporter** module at **Device Information**.

You can check for the latest available firmware with the GL5450 maintenance dialog. In the Vector Logger Suite's **Configuration** module, select **GL5450 Maintenance** from the **Tools** menu. Then, in the version selector dialog, choose ≥ 3.00 . The GL5450 maintenance dialog will now show the latest available version at **Firmware** (see the screenshots below). The version can be derived from the file name. For example, a file name such as `GL5450_303.COD` contains firmware version 3.03.

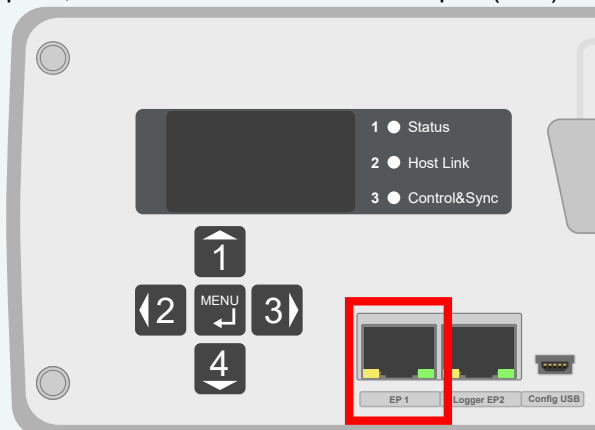
Installing firmware

If you have firmware version 3.xx installed and want to update it, follow these steps:



Step by Step Procedure

1. Connect the GL5450 to your computer using an Ethernet cable. For this purpose, be sure to use the left Ethernet port (EP1) on the front of the GL5450.

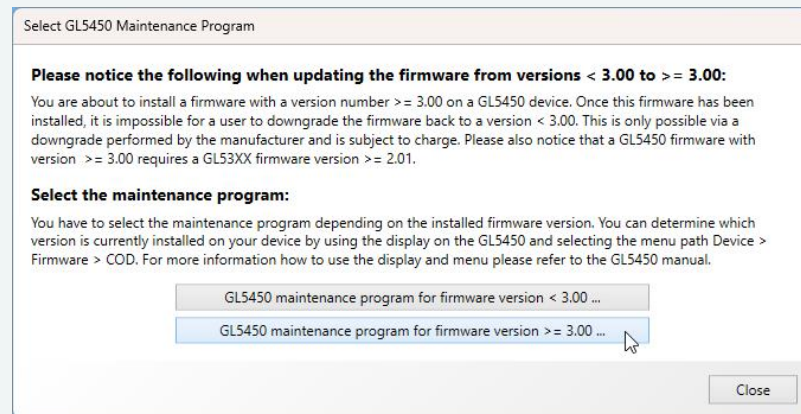


Use a direct connection between the GL5450 and the computer. Do not use a switch or network between them.

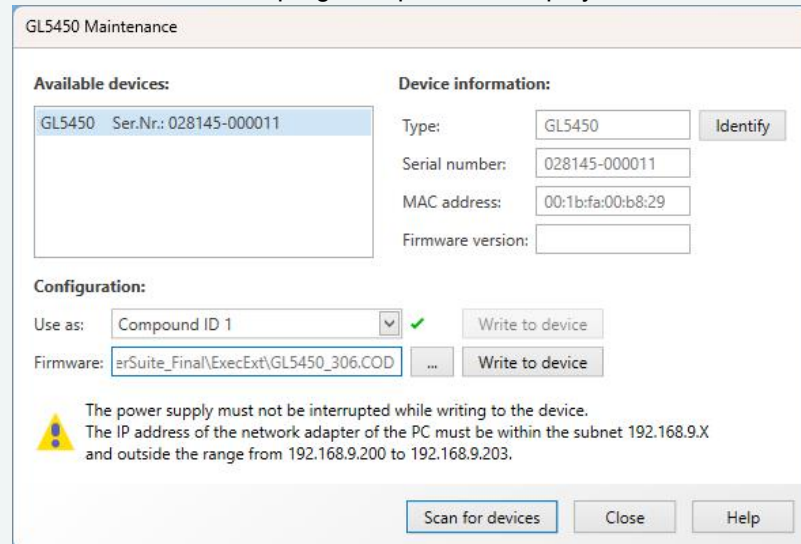
2. Set the IP address of your Ethernet adapter to be in the same subnet as the GL5450 (192.168.9.xx).
3. Choose an IP address that does not conflict with 192.168.9.200 ... 192.168.9.203. For example, set your computer to 192.168.9.100.
4. Ensure that the Ethernet connection between the GL5450 and the computer is not blocked by a firewall. Using a USB-to-Ethernet adapter for a second Ethernet interface often proves helpful, as you will not have to disconnect your computer from the company network. If you are unsure, ask your IT

department for assistance.

5. The GL5450 does not need to be connected to a GL3400 or GL5300 during the update. Make sure the GL5450 stays awake, for example by connecting the wake line (clamp 15).
6. Insert at least one SSD into the GL5450 to avoid warnings about missing SSDs. Also, format the SSD before inserting it to avoid **Measurement-ID** warnings.
7. Ensure that the GL5450 is powered. Also, keep it awake by connecting the wake line (clamp 15), for example.
8. In the Vector Logger Suite, select the **Configuration | Tools | GL5450 Maintenance**.
9. From the list of maintenance programs that now appears, select the one for firmware version **>= 3.00**.



10. The new maintenance program opens and displays the connected GL5450.



11. If the GL5450 is not displayed, check the network connection and IP settings of your Ethernet adapter. Click the **[Scan for devices]** button to search for connected devices again. If necessary, close and reopen the dialog.
12. Install the latest firmware on the GL5450. The latest available firmware for the Vector Logger Suite is preselected at **Firmware**.
13. Click **[Write to device]**. Depending on the amount of changes, the update process may take a few minutes. Monitor the progress on the GL5450 display.

4.2 Miscellaneous Features

4.2.1 Real-Time Clock and Battery

- General information** The GL5450 has an internal real-time clock, which is battery supplied, and thus continues running even if the logger is disconnected from power supply. The real-time clock inside the logger is required to store the date and time together with the logged data.
- Primary cell** The GL5450 is equipped with one Lithium primary cell (type designation: BR2032). This battery has a typical durability of approximately 5 to 10 years under the following conditions:
- T = +40 °C ... +80 °C for at most 40 hours per week
 - T = -40 °C ... +40 °C in the rest of the time
- Replacing battery** The battery may only be replaced by Vector Informatik GmbH. For more information, please contact the Vector Support.

4.2.2 Beep

- Speaker** The GL5450 has a speaker that acoustically alerts the user e.g. in case of an error.

4.3 Menu Navigation and Commands

4.3.1 Navigation

The following table describes the keypad functions.

Keypad	Description
 	The [menu] key, in combination with key [3] , opens the main menu. Keep the [menu] key pressed and then press key [3] within 3 seconds.
	This key is used to accept a menu selection.
   	Navigation keys, allow navigating the menus.
 	Key [1] and [4] allow navigating up- or downwards in the menu tree. The keys have a "repeat function"; this means that a longer key press activates the key multiple times, as long as it is pressed.
 	Key [2] and [3] allow navigating horizontally through the menu.
	Forward key: one step forwards in the menu (one layer deeper in the menu structure).
	Back key, one step backwards in the menu. One long key press exits the menu. If no key is pressed for 20 seconds, the menu will be exited automatically.

4.3.2 Commands

In order to support navigation in the menu, the following characters are shown (at the beginning or end of a line):

Character	Description
▲▼	Additional menu item above/below
T┐	Topmost/lowermost menu item
▶	Submenu (one layer deeper)
└	Enter key needed to initiate action (e. g. shutdown logger)
▶◀	Menu selection in editing mode

Slots

Menu Item	Description
Configuration	
Slot #s - Enable	Displays whether the ports of slot s are enabled.
Slot #s- Logging	Displays whether the ports of slot s are logging.
Slot #s- Mode	Displays in which mode the ports of this slot are operating.
Slot #s- Speed	Displays at which speed the ports of slot s are operating (T for 10Mbps, H for 100Mbps, G for 1Gbps, A for auto-mode, – otherwise).
Slot #s- Coupling	Displays whether the ports of slot s are enabled (phy for PHY-coupling, mac for MAC-coupling, — otherwise).
Slot #s- Critical	Displays whether the ports of the slot s are activated as critical.
Slot #s- KeepAwake	Displays whether the ports of slot s can keep the GL3400/GL5300 awake and thus the GL5450 also by message reception.
Slot #s- Quality	Displays the signal quality.
Slot #s- Legacy	Displays whether the ports of slot s connection (1000BASE-T1 only) should be used in Legacy "√" or Compliance "x" mode.
Slot #s- Forward	Displays whether the ports of slot s are activated as bidirectional connection to the host.
Slot #s- Filter	Displays whether the filter function of the ports of slot s is activated.
Slot #s- Link Up	Displays the link status.
Status	
Slot #s- Link Up	Displays the link status.
Slot #s- Role	Displays in which mode the ports of slot s are operating (S for slave mode, M for master mode).
Slot #s- Mode	Displays in which mode the ports of this slot are operating.
Slot #s- Quality	Displays the signal quality: ▶ 0: ErrorOccuring

Slots

Menu Item	Description
	▶ 1: NoMargin ▶ 2: Marginal ▶ 3: Acceptable ▶ 4: Good ▶ 5: Excellent ▶ 6: Not available
Hardware	
Slot #s - Name	Displays the name of the PHY. For slot 5 to 6 the revision of the PHYs is also displayed (e. g. A2).
Slot #s - Prod. No.	Displays the production number of the PHYs.
Slot #s - Ports	Displays the number of the ports on the PHY.
Slot #s - Port Revs	Displays for slot 5 to 6 the revision of the PHYs (e. g. A2).

Disks

Menu Item	Description
Compound	
Disk #s - Measurement ID	Displays the measurement ID for the compound.
Disk #s - Master Serial No.	Displays the GL3400/GL5300 serial number.
Disk #s - Master Disk Serial No.	Displays the serial number of the SSD inserted in GL3400/GL5300.
Disk #s - Master Device Type	Displays the GL3400/GL5300 type.
Disk #s - Vehicle ID Number	Displays the car ID.
Disk #s - Disk Count	Displays the number of SSDs used in the compound.
Device	
Disk #s - Disk Index	Displays the SSD index number (0 for SSD1 and 1 for SSD2).
Disk #s - Serial No.	Displays the device's serial number.
Disk #s - Disk 0 Serial No.	Displays the SSD1 serial number.
Disk #s - Disk 1 Serial No.	Displays the SSD2 serial number.
Disk #s - Device Type	Displays the device's type number.
Disk #s - Mainboard Prod. No.	Displays the motherboard production number.
Compound ID	Displays the compound number assigned to the device.
Hardware	
Disk #s - Name	Displays the SSD name.
Disk #s - Serial No.	Displays the SSD serial number.
Disk #s - Size	Displays the SSD memory size.
Disk #s - Usage	Displays the memory used on the SSD in %.
Versions	
Disk #s - COD	Displays the installed COD version.
Disk #s - CPU Firmware	Displays the installed CPU version.
Disk #s - Bootloader	Displays the installed boot loader version.
Disk #s - FPGA1	Displays the installed FPGA1 version.
Disk #s - FPGA2	Displays the installed FPGA2 version.
Format	

Disks

Menu Item	Description
Format	Deletes the entire content of all the SSDs inserted in the device (including measurement ID and recorded data). A pin is required to confirm the process. The pin is "1234".

Device

Menu Item	Description
Compound ID	Assign a device number to the GL5450 (default is ID = 1).
Hardware	
Device Type	Shows the GL5450 type, its serial and production number and its production date.
Serial No.	
Production Date	
Firmware	
COD	Displays the installed version and the creation date of the following packets: COD, application, updater, boot loader, FPGA1 and FPGA2.
Application	
Updater	
Bootloader	
FPGA1	
FPGA2	
Fault Record	Displays a list of persistent error entries.

**Note**

Please note that all the menu functions are not usable during a data logger update process.

4.4 System Messages

Status and errors

System Message	Description
Fatal Error Please contact support	Error occurred which affects the main functions of the system. The error message indicates a hardware fault or a corrupt bootloader.
Critical error in <task name>	Critical error, ongoing operation of the device without restart is not recommended.
Debug Mode active	Debug mode is active (due to a key press during boot up), which means extended log messages and the usage of the USB interface for logging. Please note that this also prevents updates via USB.
Executable verification failed	The boot loader verification process failed when the required application version was launched.
Received configuration from Host	Received the logging configuration from GL3400/GL5300 .
Compound ID changed to <new compound id>	Compound ID changed.
No user input for 20 seconds	No user input via keys was registered for the last 20 seconds. The system returns to default screen.
LTL configuration missing	There is no (interpretable) LTL configuration stored in the device.
Logger lost frames	Login buffer overflow which leads to missing frames.
Logger failed to start	Device start failed.
Watchdog triggered reset	The watchdog was triggered because the system did not report any activity for the last 30 seconds.
No disks inserted	No SSD inserted.
Door must be closed	The device door was open during transmitting of the format task.
Disks rejected	Access to the disk was rejected. This message appears because SSDs from another GL5450 have been inserted.
Disks mount timeout	Mounting process of the SSD exceeded time limit.
Disks faulty	Mounting process of the SSD failed.
Marker #<number> of type <type> received	Marker # of the described type was received.
Wrong PIN	Wrong PIN entered.
Disks formatted	One or more SSDs were formatted.
Check/exchange SSDs	Shows that ▶ one of the SSDs in the compound has errors ▶ one of the SSDs in the compound has a wrong measurement ID (new or existing compound)

Status and errors

System Message	Description
	▶ the number of SSDs in the compound is wrong
Error while updating. Please restart update.	The update process could not be completed without errors and must be run again. This message is also shown when restarting after a failed update. Here are some probable causes: ▶ The COD could not be received without errors (such as connection loss). ▶ COD does not fit or is corrupted. ▶ HW problems (such as flash access). ▶ Power supply was interrupted during the update process.



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