Kvaser Ethercan HS User's Guide

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https://www.kvaser.com

Printed Wednesday 18th February, 2026

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1 About this manual

This manual is intended for Kvaser Ethercan HS users. This manual contains a description of the hardware properties and general instructions for connecting the device to a computer.

2 Introduction

This section will describe the functions and features of the Kvaser Ethercan HS.

2.1 Welcome to Kvaser Ethercan HS

Figure 1: Kvaser Ethercan HS

The Kvaser Ethercan HS is a powerful real time Ethernet to CAN interface. With a time stamp precision of 25 microseconds, the Kvaser Ethercan HS handles transmission and reception of standard and extended CAN messages on the bus. The Kvaser Ethercan HS is compatible with applications that use Kvaser's CANlib.

This guide is applicable to the Kvaser Ethercan HS devices listed in Table 1.

Device	Product Number
Kvaser Ethercan HS	73-30130-00976-9

Table 1: Kvaser Ethercan HS device and its product number.

2.2 Major features

- Networked CAN interface with Kvaser *t* programmability.
- Supports ISO 11898-1 with both 11-bit and 29-bit CAN identifiers.
- Compatible with applications written for other Kvaser CAN hardware using Kvaser CANlib.
- One high-speed CAN connection (compliant with ISO 11898-2), 40 kbit/s up to 1 Mbit/s.
- Fully compatible with J1939, CANopen, NMEA 2000 and DeviceNet.
- Supports Kvaser REST API.
- Ethernet connection with auto-MDIX using a standard shielded RJ45 socket.
- Built-in Power over Ethernet (PoE), allows the device to receive both data and power over a single Ethernet cable.
- Small and lightweight plastic housing.

2.3 Interface

Kvaser Ethercan HS provides a CAN bus interface through a standard Ethernet connector.

2.4 The t programming language

The Kvaser t programming language is event oriented and modelled after C. It can be used to customize the behavior of the Kvaser Ethercan HS and other Kvaser t capable devices.

A t program is invoked via hooks, which are entry points that are executed at the occurrence of certain events. These events can be, for example, the arrival of specific CAN messages or a timer expiration.

Like any Kvaser CAN interface, the Kvaser Ethercan HS can be used via CANlib on a host computer. The addition of t programs running directly on the Kvaser Ethercan HS makes it possible to react much quicker to CAN bus events (for example to speed up file transfer protocols or to simulate missing hardware).

For more information, see the Kvaser t Programming Language guide that can be downloaded at www.kvaser.com/download.

2.5 Restrictions in t functionality

The Kvaser Ethercan HS is a dedicated CAN interface, and as such does not contain real-time clock (RTC), logger or SD card functionality, neither does the Kvaser Ethercan HS include dedicated I/O pins. This means that the t functionality listed in Table 2 on Page 7 is not available on Kvaser Ethercan HS (the table shows version 3.10 of the t language compiler).

Group	Function name
Hooks	`on IoEvent`
Predefined I/O Functions	`kvIoGetNumberOfPins`
	`kvIoPinGetInfo`
	`kvIoPinSetInfo`
	`kvIoConfirmConfig`
	`kvIoPinSetDigital`
	`kvIoPinGetDigital`
	`kvIoPinGetOutputDigital`
	`kvIoPinSetRelay`
	`kvIoPinGetOutputRelay`
	`kvIoPinSetAnalog`
	`kvIoPinGetAnalog`
	`kvIoPinGetOutputAnalog`
Predefined File I/O Functions	`fileOpen`
	`fileClose`
	`fileGets`
	`fileReadBlock`
	`filePuts`
	`fileWriteBlock`
	`fileSeek`
	`fileDelete`
Predefined XML Functions	`xmlOpen`
	`xmlClose`
	`xmlGet`
Predefined t Program Related Functions	`scriptLoad`
Predefined Logger Related Functions	`filterDropMessage`
	`loggerStatus`
	`loggerStart`
	`loggerStop`
Other Predefined Functions	`timeGetDate`

Table 2: Functionality in the t language (v3.10) that is not supported by Kvaser Ethercan HS.

2.6 Additional software and documentation

The Kvaser CANlib SDK includes everything you need in order to develop software applications interacting with Kvaser CAN and LIN hardware. The SDK contains full documentation and many sample programs, written in C, C++, C#, Delphi, Python and Visual Basic. Kvaser CAN and LIN hardware is built around the same common software API. Applications developed using one device type will run without modification on other device types.

The latest versions of documentation, software and drivers can be downloaded for free at www.kvaser.com/download.

3 Kvaser Ethercan HS hardware

In this section you can read more about the CAN channels, power supply and LED indicators.

The Kvaser Ethercan HS delivery package contains:

- Kvaser Ethercan HS.
- Ethercan Factory Reset Device.

3.1 Hardware installation

The Kvaser Ethercan HS may be inserted into any free Ethernet socket. If the Ethernet socket does not support Power over Ethernet, power must be supplied on the CAN connector. For the Kvaser Ethercan HS to communicate with the host computer, a compatible version of the Kvaser driver and firmware must be installed. After the driver has been installed on the host computer, the firmware may then be downloaded and installed on the Kvaser Ethercan HS.

The latest version of the driver and firmware can be downloaded from www.kvaser.com/download.

3.2 Network connector

The Kvaser Ethercan HS has a standard shielded RJ45 socket (STP) ethernet connector, see Figure 2. Connect the Kvaser Ethercan HS to your network or directly to your host computer for first time configuration. For more information on how to configure the Kvaser Ethercan HS see Section 4, How to use the Kvaser Ethercan HS, on Page 12.

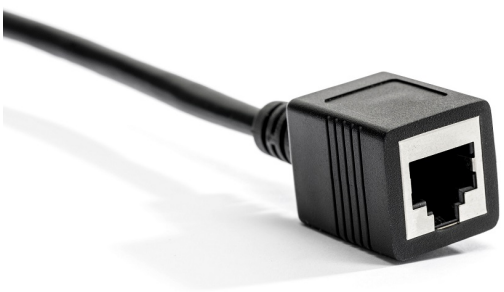

Figure 2: Network (LAN) connector on the Kvaser Ethercan HS.

3.3 Ethercan Factory Reset Device

The Ethercan Factory Reset Device, see Figure 3 on Page 9, is used to reset the Kvaser Ethercan HS configuration. To perform a factory reset see Section 4.4, Reset device to factory settings, on Page 15.

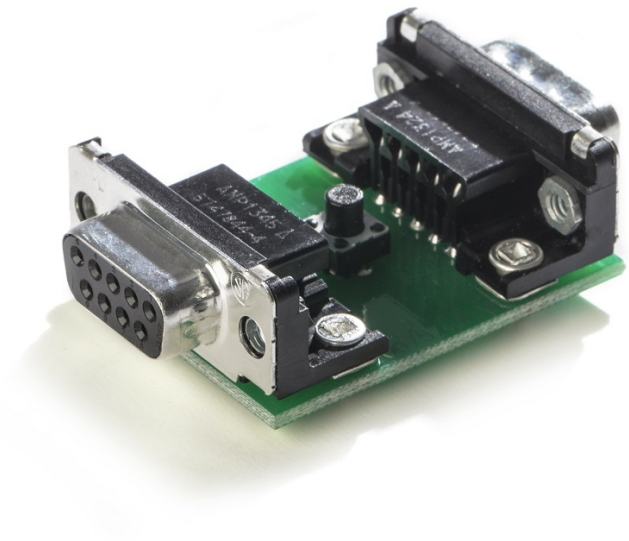

Figure 3: Ethercan Factory Reset Device

3.4 CAN channels

The Kvaser Ethercan HS has one CAN Hi-Speed channel with a 9-pin D-SUB connector. See Section 5.3, CAN connector, on Page 18 for details about the connector.

3.5 Power supply

The Kvaser Ethercan HS is powered either from the Ethernet connector using PoE or from the CAN connector. The Kvaser Ethercan HS is compliant with PoE IEEE 802.3af supporting both Mode A (endspan) and Mode B (midspan).

3.6 LED indicators

The Kvaser Ethercan HS has four LEDs as shown in Figure 4 on Page 10.

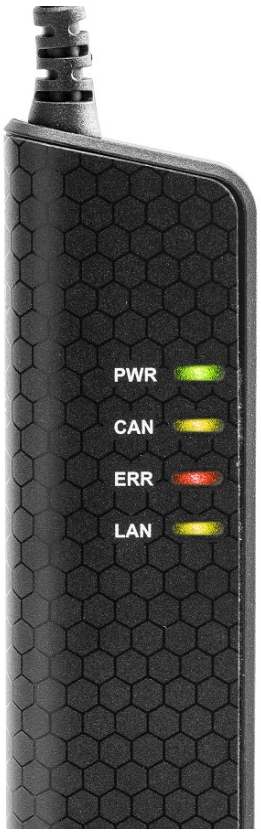

Figure 4: LEDs on the Kvaser Ethercan HS.

LED	General meaning
PWR (Green)	Steady light when unit is powered and working.
CAN (Yellow)	CAN channel status.
ERR (Red)	Indicates different types of errors.
LAN (Yellow)	LAN connection status.
	Fast flashing when waiting for DHCP lease.
	Slow flashing when ready for connection as remote device.
	Steady light when device is connected as a remote device.

Table 3: LEDs on the Kvaser Ethercan HS.

The ERROR LED indicator can give more information about the cause of failure, see Table 4.

ERROR LED Signal	Auxiliary Signal	General Meaning
Blink	CAN LED blinks	CAN channel is in error passive mode
Slower blink	CAN LED blinks	CAN channel is bus off
Short flash	-	Error frame detected

Table 4: ERROR LED Indicator Signals

4 How to use the Kvaser Ethercan HS

4.1 Initial setup on network with DHCP

Connect the Kvaser Ethercan HS to the network and start Kvaser Network Device Selector found in Kvaser Device Guide, see Figure 5.

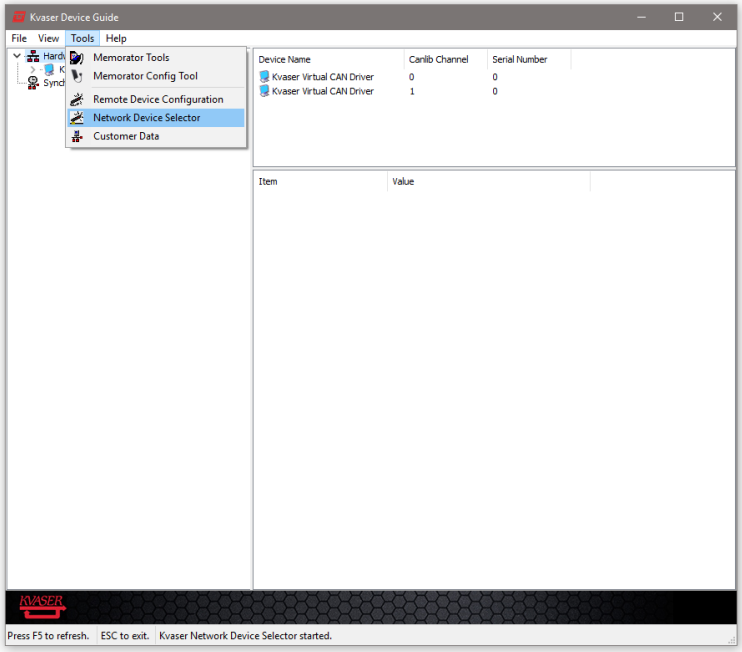

Figure 5: Kvaser Network Device Selector is found in Kvaser Device Guide

The new device will be available in the Kvaser Network Device Selector, see Figure 6 on Page 13.

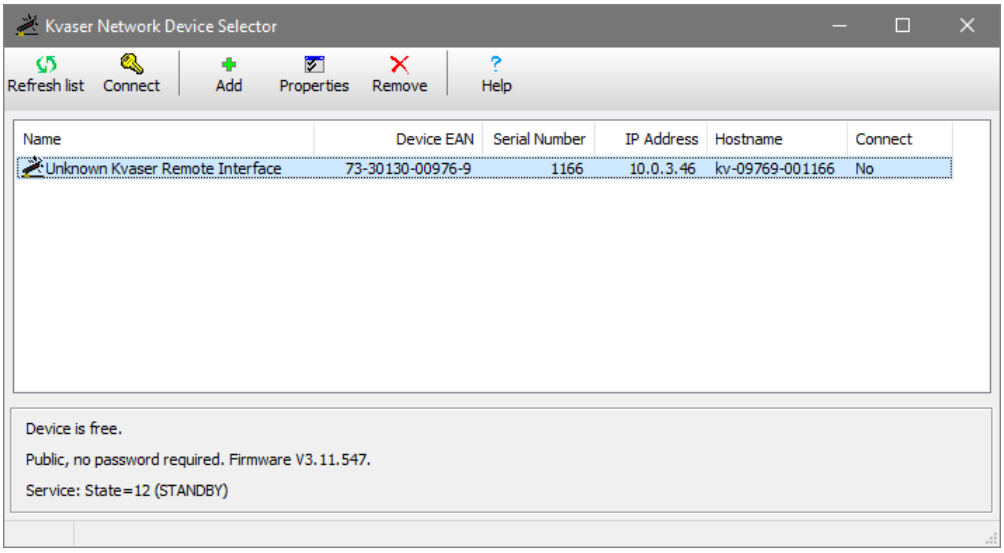

Figure 6: The new device is found in Kvaser Network Device Selector

4.2 Initial setup on network with static IP

The factory setting of the Kvaser Ethercan HS uses Windows APIPA[1]. To configure the Kvaser Ethercan HS for a static IP, first connect the device directly to your computer's network connector and the new device will be available in the Kvaser Network Device Selector (using an IP in the range 169.254.0.1 to 169.254.255.254), in the same way as when an address was acquired via DHCP. Next you may configure the desired static IP address using the Kvaser Remote Device Configuration tool.

4.3 Initial setup on device

When the device is visible in the Kvaser Network Device Selector, connect to the device by clicking the Connect button. The next step is to start the Kvaser Remote Device Configuration (from the context menu, or Tools menu inside Kvaser Device Guide) and select your device, see Figure 7 on Page 14

You will be informed that the parameter area is blank, which is a normal condition for new devices, see Figure 8 on Page 14. The Info tab in the Kvaser Remote Device Configuration tool will then show general information about the device such as MAC address, hostname, and used IP address.

Change the Network Settings to the preferred settings and click OK, see Figure 9 on Page 15.

[1] APIPA (Automatic Private IP Addressing), is a DHCP failover mechanism for local networks. When the DHCP client service fails to obtain an IP address, APIPA allocates IP addresses in the private range 169.254.0.1 to 169.254.255.254.

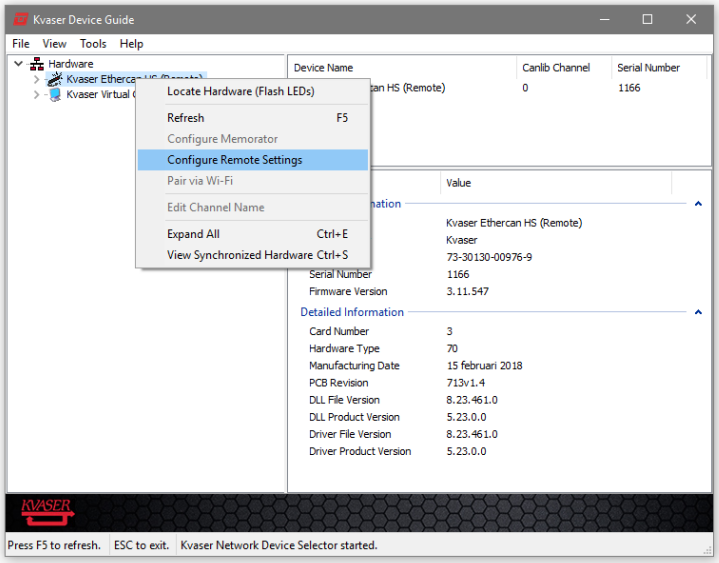

Figure 7: Start Kvaser Remote Device Configuration by right click on the device and select "Configure Remote Settings".

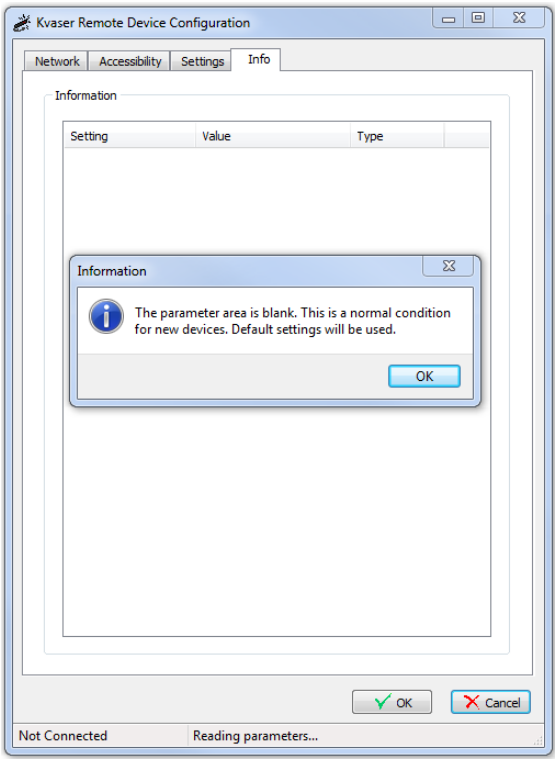

Figure 8: Kvaser Remote Device Configuration starting up

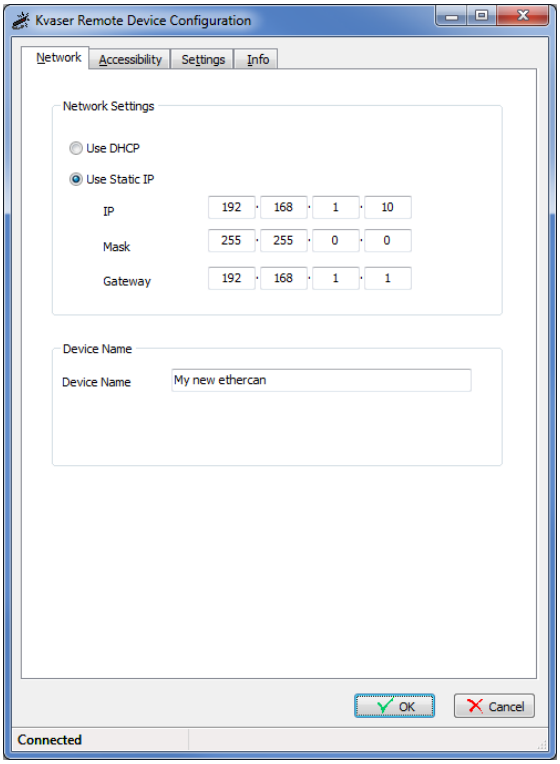

Figure 9: Kvaser Remote Device Configuration network settings

4.4 Reset device to factory settings

To reset the Kvaser Ethercan HS to factory settings, use the included Ethercan Factory Reset Device and follow the steps given in Section 4.4.1, Factory reset procedure, on Page 16.

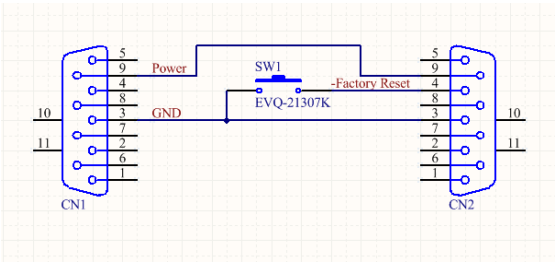

Figure 10: Ethercan Factory Reset Device schematic.

Male D-SUB (CN1)	Function
3	GND
4	Not connected
9	Power supply to the device

Table 5: Ethercan Factory Reset Device pin configuration for Male D-SUB (CN1)

Female D-SUB (CN2)	Function
3	GND
4	Factory Reset. By pushing the button SW1, this pin will be connected to GND.
9	Power supply to the device

Table 6: Ethercan Factory Reset Device pin configuration for Female D-SUB (CN2)

If the Ethercan Factory Reset Device is connected to the Kvaser Ethercan HS it can not be used for normal CAN traffic since CAN high/low are not forwarded within the Ethercan Factory Reset Device.

4.4.1 Factory reset procedure

1. Connect the Ethercan Factory Reset Device directly to the Kvaser Ethercan HS CAN connector. If the Kvaser Ethercan HS is powered through the CAN connector the Ethercan Factory Reset Device should be inserted between the Kvaser Ethercan HS and the power source.
2. Press and hold the button on the Ethercan Factory Reset Device (this will connect the Factory reset pin to ground).
3. Apply power to the Kvaser Ethercan HS.
4. Let the device boot up and the CAN and ERR LEDs will have a steady light.
5. After 5 s the CAN and ERR LEDs start flashing, release the button on the Ethercan Factory Reset Device.
6. The Kvaser Ethercan HS will now reboot with factory default settings.

If the button has not been released after 10 s, the device will continue normal operation without reebooting. The CAN and ERR LEDs will now also stop flashing.

4.5 Troubleshooting

Use "Kvaser Device Guide" in the Control Panel to verify that the computer can communicate with the Kvaser Ethercan HS. If the firmware version shown is all zeros, there are communication problems. If the LEDs are not flashing or do not light up at all, check the power supply.

4.5.1 Check your firewall

The default port number used by the Kvaser Ethercan HS is 11416. This port is used for both UDP and TCP and should be open for both incoming and outgoing traffic (both TCP and UDP) on your firewall. The Kvaser Network Device Selector tool might also need authorization from you. Consult your firewall software documentation for how to do this.

5 Appendices

In this section you will find technical information about Kvaser Ethercan HS and the device's connectors.

5.1 Start and stop of t programs

All events that a t program will react to are specified using various event hooks. In effect, these are functions which are called when the specific events occur. Among other events, the program can react to starting and stopping itself which this section describes. Read the Kvaser t Programming Language guide that can be downloaded at www.kvaser.com/download for more information.

The "on start" event will be triggered in the Kvaser Ethercan HS when any of the following occurs:

- When a t program is started using the CANlib API (`kvScriptStart()`).
- When a t program is started from another t program.

The "on stop" event will be triggered for running t programs during the corresponding cases:

- When a t program is stopped using the CANlib API (`kvScriptStop()`).
- When a t program is stopped from another t program.

5.2 Technical data

In Table 7 on Page 18 below you will find the Kvaser Ethercan HS technical specifications.

CAN Channels	1
CAN Transceiver	TJA1051T (Compliant with ISO 11898-2)
CAN Bit Rate	40 kbit/s up to 1 Mbit/s
Time stamp resolution	25 µs
Error Frame Detection	Yes
Error Frame Generation	No
Silent mode	No
Kvaser t programming	Yes
Kvaser CANtegrity	No
Host interface	Ethernet
Host OS	Windows (7 or later)[1].
Ethernet interface	Ethernet IEEE 802.3u 100BASE-TX
Ethernet connector	Shielded RJ45 socket STP
Galvanic isolation	Yes
Power Supply	PoE (Power over Ethernet) IEEE 802.3af or CAN +9 V to +35 V DC
Power consumption	Typical 1.2 W
Hardware configuration	Done by software.
Dimensions	35 x 165 x 17 mm for body incl. strain relief
Weight	120 g including cables and connectors.
Operating temperature	−20 °C to +70 °C
Storage temperature	−40 °C to +85 °C
Relative Humidity	0 % to 85 % (non-condensing.)

Table 7: Technical specifications.

5.3 CAN connector

Kvaser Ethercan HS devices that use the 9-pin D-SUB connector (see Figure 11 on Page 19) have the pinning described in Table 8 on Page 19.

[1] For other operating systems, contact Kvaser support.

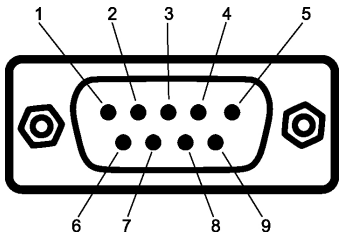

Figure 11: The D-SUB 9 connector pin numbers

D-SUB pin number	Function
1	Not connected
2	CAN_L
3	GND
4	Factory Reset
5	Shield
6	Not connected
7	CAN_H
8	Not connected
9	Power supply to the device

Table 8: Configuration of the 9-pin D-SUB

The Factory Reset input is only used to reset the device to factory settings, see Section 4.4, Reset device to factory settings, on Page 15.

5.4 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser Ethercan HS does not contain any CAN bus termination, because their inclusion could cause severe disturbance in a system which is already correctly terminated.

For laboratory or testing use, the exact value of the termination resistors is not always critical. Sometimes a single terminator is sufficient. For production, proper termination is essential. If you see error frames on the bus, you should check the termination.

To save yourself a lot of trouble, always terminate the CAN bus properly.

6 Safety Instructions

6.1 Intended Use

Kvaser interfaces are used to connect computer systems to CAN buses. The Kvaser Ethercan HS is intended for connection to a computer via an available Ethernet socket.

6.2 Usage Warning

WARNING FOR ALL USERS

WARNING! - YOUR USE OF THIS DEVICE MUST BE DONE WITH CAUTION AND A FULL UNDERSTANDING OF THE RISKS!
THIS WARNING IS PRESENTED TO INFORM YOU THAT THE OPERATION OF THIS DEVICE MAY BE DANGEROUS. YOUR ACTIONS CAN INFLUENCE THE BEHAVIOR OF A CAN-BASED DISTRIBUTED EMBEDDED SYSTEM, AND DEPENDING ON THE APPLICATION, THE CONSEQUENCES OF YOUR IMPROPER ACTIONS COULD CAUSE SERIOUS OPERATIONAL MALFUNCTION, LOSS OF INFORMATION, DAMAGE TO EQUIPMENT, AND PHYSICAL INJURY TO YOURSELF AND OTHERS. A POTENTIALLY HAZARDOUS OPERATING CONDITION IS PRESENT WHEN THE FOLLOWING TWO CONDITIONS ARE CONCURRENTLY TRUE: THE PRODUCT IS PHYSICALLY INTERCONNECTED TO A REAL DISTRIBUTED EMBEDDED SYSTEM; AND THE FUNCTIONS AND OPERATIONS OF THE REAL DISTRIBUTED EMBEDDED SYSTEM ARE CONTROLLABLE OR INFLUENCED BY THE USE OF THE CAN NETWORK. A POTENTIALLY HAZARDOUS OPERATING CONDITION MAY RESULT FROM THE ACTIVITY OR NON-ACTIVITY OF SOME DISTRIBUTED EMBEDDED SYSTEM FUNCTIONS AND OPERATIONS, WHICH MAY RESULT IN SERIOUS PHYSICAL HARM OR DEATH OR CAUSE DAMAGE TO EQUIPMENT, DEVICES, OR THE SURROUNDING ENVIRONMENT.
WITH THIS DEVICE, YOU MAY POTENTIALLY:

- CAUSE A CHANGE IN THE OPERATION OF THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT.
- TURN ON OR ACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- TURN OFF OR DEACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- INHIBIT, TURN OFF, OR DEACTIVATE NORMAL OPERATION.
- MODIFY THE BEHAVIOR OF A DISTRIBUTED PRODUCT.
- ACTIVATE AN UNINTENDED OPERATION.
- PLACE THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT INTO AN UNINTENDED MODE.

ONLY THOSE PERSONS WHO:
(A) ARE PROPERLY TRAINED AND QUALIFIED WITH RESPECT TO THE USE OF THE DEVICE,
(B) UNDERSTAND THE WARNINGS ABOVE, AND
(C) UNDERSTAND HOW THIS DEVICE INTERACTS WITH AND IMPACTS THE FUNCTION AND SAFETY OF OTHER PRODUCTS IN A DISTRIBUTED SYSTEM AND THE APPLICATION FOR WHICH THIS DEVICE WILL BE APPLIED, MAY USE THE DEVICE.
PLEASE NOTE THAT YOU CAN INTEGRATE THIS PRODUCT AS A SUBSYSTEM INTO HIGHER-LEVEL SYSTEMS. IN CASE YOU DO SO, KVASER AB HEREBY DECLARES THAT KVASER AB'S WARRANTY SHALL BE LIMITED TO THE CORRECTION OF DEFECTS, AND KVASER AB HEREBY EXPRESSLY DISCLAIMS ANY LIABILITY OVER AND ABOVE THE REFUNDING OF THE PRICE PAID FOR THIS DEVICE, SINCE KVASER AB DOES NOT HAVE ANY INFLUENCE ON THE IMPLEMENTATIONS OF THE HIGHER-LEVEL SYSTEM, WHICH MAY BE DEFECTIVE.

7 Disposal and Recycling Information

When this product reaches its end of life, please dispose of it according to your local environmental laws and guidelines.

For information about Kvaser's recycling programs, visit:
https://www.kvaser.com/en/kvaser/recycling-policy.html

8 Legal acknowledgements

8.1 EU Regulatory Compliance

KVASER **EU Declaration of Conformity (DoC)**

We

Company Name:	Kvaser AB	City:	Mölndal
Postal address:	Aminogatan 25	Telephone number:	+46 31 886344
Postcode:	431 53	E-mail address:	sales@kvaser.com

declare that the DoC is issued under our sole responsibility and belongs to the following product:

Product: Kvaser Ethercan HS

Object of the declaration (identification of apparatus allowing traceability):
Product: Kvaser Ethercan HS
Type: 73-30130-00976-9

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
Electromagnetic Compatibility (EMC) Directive 2014/30/EU (Art. 6)

RoHS recast Directive 2011/65/EU (Art. 4.1)

The following harmonised standards and technical specifications have been applied
(title, date of standard/specification):

EN 55032 (2015 + A11:2020) EN 55035 (2017 + A11:2020)

EN IEC 63000 (2018)

Signed for and on behalf of:

Mölndal	2025-01-10	
Place of issue	Date of issue	Kent Lennartsson, Research Manager

8.2 FCC Regulatory Compliance

KVASER

Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:
Product: Kvaser Ethercan HS
Type: 73-30130-00976-9

APPLICABLE COMPLIANCE STATEMENTS:
CFR Title 47 Part 15 §15.107, §15.109
This device complies with part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received,
including interference that may cause undesired operation.

RESPONSIBLE PARTY (IN USA) NAME:
Kvaser Inc.
23881 Via Fabricante, Suite 503
Mission Viejo, CA 92691

Internet contact: support@kvaser.com

8.3 Patents, copyrights and trademarks

All trademarks are the property of their respective owner. Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

Adobe, the Adobe logo, and Reader are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

MagiSync is a trademark of Kvaser AB.

DeviceNet is a trademark of Open DeviceNet Vendor Association, Inc.

NMEA 2000 is the registered trademark of the National Marine Electronics Association, Inc.

For information about Kvaser related CAN patents, see www.kvaser.com/patent.

The products described in this document are protected by U.S. patent 5,696,911.

9 Document Revision History

Version history for document UG_98211_ethercan_hs:

Revision	Date	Changes
1.0	2018-08-28	Initial version.
2.0	2018-11-12	Updated EU Regulatory Compliance, updated restrictions in t.
2.1	2019-02-11	Minor textual changes.
2.2	2019-08-09	Url protocol updated.
2.3	2020-01-27	Added sdoc.
2.4	2020-08-19	Windows 7 or later supported.
2.5	2022-04-01	Minor textual changes.
2.6	2023-02-13	Added more information about Kvaser t programming. Added section about intended use.
2.7	2024-04-25	Updated Kvaser logo and the section about troubleshooting.
2.8	2025-01-10	Updated EU Declaration of Conformity.