

Kvaser USBcan Light 4xHS User's Guide



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Contents

| | | |
|----------|---|-----------|
| 1 | About this manual | 4 |
| 2 | Introduction | 5 |
| 2.1 | Welcome to Kvaser USBcan Light 4xHS | 5 |
| 2.2 | Major features | 6 |
| 2.3 | Interface | 6 |
| 2.4 | Additional software and documentation | 6 |
| 3 | Kvaser USBcan Light 4xHS hardware | 7 |
| 3.1 | Hardware installation | 7 |
| 3.2 | USB connector | 7 |
| 3.3 | CAN channels | 8 |
| 3.4 | Power supply | 8 |
| 3.5 | LED Indicators | 8 |
| 3.6 | Troubleshooting | 9 |
| 4 | Appendices | 10 |
| 4.1 | Definitions of LED states and colors | 10 |
| 4.2 | Technical data | 11 |
| 4.3 | CAN connectors | 12 |
| 4.4 | CAN bus termination | 14 |
| 4.5 | Updating the firmware | 14 |
| 5 | Disposal and Recycling Information | 16 |
| 6 | Legal acknowledgements | 17 |
| 6.1 | Usage warning | 17 |
| 6.2 | EC Regulatory Compliance | 17 |
| 6.3 | Patents, Copyrights and Trademarks | 18 |
| 7 | Document Revision History | 19 |

1 About this manual

This manual is intended for Kvaser USBcan Light 4xHS users. This document contains a description of the hardware's properties and general instructions for connecting the device to a computer.

2 Introduction

This section will describe the functions and features of the Kvaser USBcan Light 4xHS.

2.1 Welcome to Kvaser USBcan Light 4xHS



Figure 1: Kvaser USBcan Light 4xHS

Kvaser USBcan Light 4xHS is a small, yet advanced, portable multi channel CAN to USB real time interface that handles transmission and reception of standard and extended CAN messages on the CAN bus with a high time stamp precision. The Kvaser USBcan Light 4xHS is compatible with applications that use Kvaser's CANlib.

This guide applies to Kvaser USBcan Light 4xHS devices listed in Table 1.

| Device | Product Number (EAN) |
|--------------------------|----------------------|
| Kvaser USBcan Light 4xHS | 73-30130-00831-1 |

Table 1: Kvaser USBcan Light 4xHS devices and their product numbers.

2.2 Major features

- Low cost USB CAN interface.
- Quick and easy plug-and-play installation.
- Supports both 11-bit (CAN 2.0A) and 29-bit (CAN 2.0B active) identifiers.
- Power is taken from the USB bus.
- 100% compatible with applications written for other Kvaser CAN hardware with Kvaser CANlib.
- High-speed CAN connection (compliant with ISO 11898-2), up to 1 Mbit/s.
- Fully compatible with J1939, CANopen, NMEA 2000[®] and DeviceNet.
- Simultaneous operation of multiple devices.
- Includes 4 channel breakout cable.

2.3 Interface

Kvaser USBcan Light 4xHS provides a CAN bus interface through a standard USB interface.

2.4 Additional software and documentation

The Kvaser CANlib SDK includes everything you need in order to develop software for the Kvaser CAN hardware. The SDK contains full documentation and many sample programs, written in C, C++, C#, Delphi, Python and Visual Basic. All Kvaser CAN interface hardware share a common software API. Programs written for 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 <http://www.kvaser.com/download/>.

3 Kvaser USBcan Light 4xHS hardware

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

3.1 Hardware installation

The Kvaser USBcan Light 4xHS may be inserted in any free USB socket on the host computer. You do not need to switch the power off before inserting or removing the device.

For the Kvaser USBcan Light 4xHS to communicate with the host computer, the correct version of the Kvaser driver and firmware must be installed. The firmware is downloaded and installed directly on the Kvaser USBcan Light 4xHS and the driver is installed on the host computer. The latest version of the driver and firmware can be downloaded from <http://www.kvaser.com/download/>.

The driver is installed by running the file `kvaser_drivers_setup.exe`.

For information on how to upgrade the firmware, see Section 4.5, Updating the firmware, on Page 14.

3.2 USB connector

The Kvaser USBcan Light 4xHS has a standard USB type "A" connector.



Figure 2: A standard USB type "A" connector.

Connect the device to your computer using any high quality USB 2.0 certified cable. The maximum USB cable length is 5 m (~ 16 ft). If you need a longer cable,

you can use USB hubs or USB extension cables with a built-in hub. By chaining up to 5 hubs, you can achieve an effective cable length of up to 25 m (~ 82 ft).



As USB cables become longer they are more sensitive to EMI, because they make a longer antenna that can pick up more noise. These issues can be mitigated by using higher quality cables with better shielding. Thicker cables tend to be better than thin ones, and braided shielding tends to be more reliable than only foil. Furthermore, longer cables may introduce signal degradation and timing issues that, if necessary, can be mitigated using shorter cable segments combined with hubs that amplify the signal and handle delays on a per-cable basis.

3.3 CAN channels

The Kvaser USBcan Light 4xHS has four CAN Hi-Speed channels in a single 26-pin HD D-SUB CAN connector (see Figure 3). See Section 4.3, CAN connectors, on Page 12 for pinout information.



Figure 3: CAN connector on Kvaser USBcan Light 4xHS

3.4 Power supply

The Kvaser USBcan Light 4xHS is powered from the USB port.

3.5 LED Indicators

The Kvaser USBcan Light 4xHS has one power LED and one traffic LED for each CAN channel as shown in Figure 4 on Page 9. Their functions are described in Section 4.1, Definitions of LED states and colors, on Page 10.



Figure 4: LEDs on the Kvaser USBcan Light 4xHS.

3.6 Troubleshooting

Use “Kvaser Hardware” in the Control Panel to verify that the computer can communicate with the Kvaser USBcan Light 4xHS, if the firmware version shown is all zeroes, there are communication problems.

If the LEDs are not flashing or do not light up at all, check that power is supplied correctly.

4 Appendices

In this section you will find technical information about the Kvaser USBcan Light 4xHS and its connectors.

4.1 Definitions of LED states and colors

A Kvaser device has two basic types of LEDs; Power and Traffic. These are dual colored as shown in Table 2. A device with multiple CAN channels has one Traffic LED for each CAN channel. When the device has more than one channel a space and digit is added on the label, CAN 1, CAN 2 etc. Low cost products, such as Kvaser USBcan Light 4xHS, are not equipped with any red Traffic LEDs.

| LED | Label | Color |
|---------|-------|--------------|
| Power | PWR | Green/Yellow |
| Traffic | CAN | Yellow |

Table 2: The different type of LEDs.

The following definitions is used to describe the state of an LED:

Off The LED is off and no light is emitted.

Flash The LED is lit up during a very short time. A single flash may be hard to see and a continuous set of flashes will look the same as On.

Slow Blink The LED is repeatedly turned On and Off. The On and Off phase is equal in time.

Fast Blink The LED is repeatedly turned On and Off but with a higher frequency than Slow Blink. The On and Off time is still equal.

On The LED is constantly emitting light.

Slow Waver This is a variant of Slow Blink but instead of being Off, a second color is On. This is only possible with a dual colored LED.

Fast Waver The LED is alternating between two colors as in Slow Waver but using a higher frequency.

Running This means that all LEDs are lit, one at the time, in sequence with every color available i.e. "Power green->Power yellow->Traffic 1 yellow->Traffic 2 yellow->..."

As an example, "Slow Waver (Green/Yellow)" means that the LED is slowly blinking by alternating between green and yellow.

4.1.1 Interface mode

The device is in Interface mode when it is connected to the PC via USB. If the Power LED is showing a steady green light, the device is in Interface mode and working correctly. When connected to the computer for the first time, the Power LED will blink slowly in yellow until the driver is installed and it has received a USB configuration. If the Power LED is showing yellow in the Interface mode for an extended period something is wrong, see Table 3 on Page 11.



The power should never be removed when firmware update is in progress.

| Power LED | Traffic LED | Description |
|---------------------------|-------------------------|---|
| Slow Blink (Yellow) | All off (-) | Waiting for USB configuration |
| Slow Waver (Green/Yellow) | Slow Blink(Yellow) | Firmware configuration error ¹ |
| Slow Waver (Green/Yellow) | All Slow Blink (Yellow) | Power problem ² |

Table 3: Yellow Power LED shows problems in Interface mode.

| Traffic LED | Description |
|-------------------------|--------------------------------|
| Off (-) | Idle, no CAN traffic |
| Flash (Yellow) | CAN message received or sent |
| All Fast Blink (Yellow) | Firmware update is in progress |

Table 4: Traffic LED shows CAN bus status in Interface mode .

4.2 Technical data

In Table 5 on Page 12 you will find the Kvaser USBcan Light 4xHS's technical specifications.

¹This should not normally happen. If it does, please contact Kvaser support.

²This indicates low power supply, such as using an unpowered USB hub.

| | |
|------------------------|--|
| CAN Channels | 4 |
| CAN Transceivers | TJA1051T (Compliant with ISO 11898-2) |
| CAN Controller | Kvaser CAN IP in FPGA |
| Galvanic isolation | Yes |
| CAN Bit Rate | 50 kbit/s to 1 Mbit/s |
| Time stamp resolution | 100 µs |
| Max message rate | 8000 msg/s per channel |
| Error Frame Detection | Yes |
| Error Frame Generation | No |
| Silent mode | No |
| Kvaser MagiSync | No |
| PC interface | USB Hi-Speed |
| Power consumption | max 500 mA |
| Hardware configuration | Done by software (Plug & Play). |
| Software requirements | Windows Vista or later. (For other operating systems, contact Kvaser support.) |
| Dimensions | 50 x 170 x 20 mm for body incl. strain relief |
| Weight | 150 g (300g including HD26-4DS9 Splitter) |
| Operating temperature | -20 °C to +70 °C |
| Storage temperature | -20 °C to +70 °C |
| Relative humidity | 0 % to 85 % (non-condensing.) |

Table 5: Technical Specifications.

4.3 CAN connectors

Kvaser USBcan Light 4xHS devices that use the 26-pin HD D-SUB connector (see Figure 5) have the pinning described in Table 6 on Page 13. This table also describes how the HD26-4xDS9 splitter (see Figure 7 on Page 14) connects to four separate 9-pin DSUB connectors, CAN 1 to CAN 4.

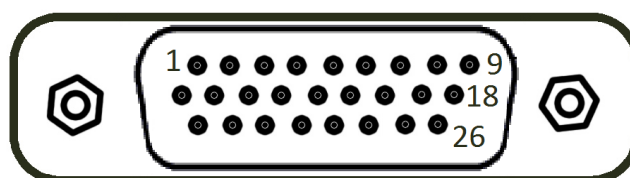


Figure 5: The male 26 pin HD D-SUB connector pin numbers

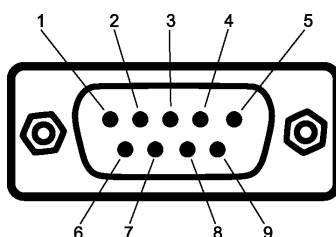


Figure 6: The male D-SUB 9 connector pin numbers

| HD D-SUB | CAN 1 | CAN 2 | CAN 3 | CAN 4 | Function |
|----------|-------|-------|-------|-------|-----------------|
| 1 | 2 | | | | CAN_L channel 1 |
| 2 | | 2 | | | CAN_L channel 2 |
| 3 | | | 2 | | CAN_L channel 3 |
| 4 | | | | 2 | CAN_L channel 4 |
| 5 | | | | | Not connected |
| 6 | | | | | Not connected |
| 7 | | | | | Not connected |
| 8 | 4 | | | | Not used |
| 9 | | | | | Not connected |
| 10 | 9 | | | | Not used |
| 11 | 7 | | | | CAN_H channel 1 |
| 12 | | 7 | | | CAN_H channel 2 |
| 13 | | | 7 | | CAN_H channel 3 |
| 14 | | | | 7 | CAN_H channel 4 |
| 15 | | | | | Not connected |
| 16 | | | | | Not connected |
| 17 | | | | | Not connected |
| 18 | | 4 | | | Not used |
| 19 | 3 | | | | GND channel 1 |
| 20 | | 3 | | | GND channel 2 |
| 21 | | | 3 | | GND channel 3 |
| 22 | | | | 3 | GND channel 4 |
| 23 | | | | | Not connected |
| 24 | | | | | Not connected |
| 25 | | | | | Not connected |
| 26 | | | | | Not connected |

Table 6: Pin configuration of the 26-pin HD D-SUB (and HD26-4xDS9 splitter)



Figure 7: The HD26-4xDS9 Splitter

4.4 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser USBcan Light 4xHS 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.

4.5 Updating the firmware

For the Kvaser USBcan Light 4xHS to communicate with the host computer, compatible versions of the Kvaser CANlib (including driver) and firmware must be installed.

The latest versions of firmware and drivers can be downloaded for free at <http://www.kvaser.com/download/>.

Connect the Kvaser USBcan Light 4xHS to your PC with the USB cable and start the update.exe application. A window opens showing the Firmware Update Instructions, read and follow those carefully.

To check the current firmware version, open "Kvaser Hardware" which can be found in the Control Panel. Select "Kvaser USBcan Light 4xHS" in the tree view to the left, and click on the channel. The firmware revision information now appears in the right half of the window.

5 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:
<http://www.kvaser.com/en/kvaser/recycling-policy.html>

6 Legal acknowledgements

6.1 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.

6.2 EC Regulatory Compliance

The product(s); 73-30130-00831-1, is in conformity with the essential requirements of the following regulations and directives:

- DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 (WEEE)
- REGULATION (EC) No. 1907/2006 (REACH), Annex XIV (the 'Candidate list') and Annex XVII ('Restriction of Substances')

The products listed above also complies with DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 (RoHS) and is in conformity with the following standards and/or other normative documents:

| Standard | Description |
|------------------|--|
| EN 50 581 (2012) | Assessment with respect to restriction of hazardous substances |

Table 7: Standards and normative documents for RoHS 2011

The products listed above also complies with DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 December 2004 (EMC-directive) and is in conformity with the following standards and/or other normative documents:

| Standard | Description |
|------------------|--|
| EN 55 022 (2010) | Class B, radiated. IT equipment, commercial emission |
| EN 55 024 (2010) | IT equipment, commercial immunity |

Table 8: Standards and normative documents for EMC 2004

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

6.3 Patents, Copyrights and Trademarks

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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.

7 Document Revision History

Version history for document UG_98176_usbcan_light:

| Revision | Date | Changes |
|----------|------------|-----------------|
| 1.0 | 2015-09-02 | Initial version |