

Kvaser Eagle User's Guide



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<http://www.kvaser.com>

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2 About this Manual

This manual is intended for Kvaser Eagle users. It contains a description of the hardware's properties and general instructions for connecting the device to a computer. The setup software for the Kvaser Eagle is called the **Kvaser Memorator Tools** and is described in detail in the application's online help.

3 Introduction

This section will describe the functions and features of the Kvaser Eagle.

3.1 Welcome to Kvaser Eagle



Figure 1. Kvaser Eagle

The Kvaser Eagle is a small, yet advanced, portable CAN data logger. The device can be configured in many different ways to achieve the most suitable and effective logging for any situation. Connecting the logger to a PC provides direct access for configuring bit rates, trigger conditions, and filters using the Kvaser Memorator Tools. You can also use the Kvaser *t* language for even more advanced setups. A standard SD flash disk is included. These memory cards are robust, inexpensive, and small – about the size of a stamp.

Kvaser Eagle can also be used as a powerful two-channel real time CAN to USB interface.

3.1.1 Triggers

Log continuously or create triggers to control when frames are logged. You can create up to 32 trigger conditions. These conditions can include the reception of a specific message, the value of a specific signal in a message, or an external trigger input configured to trigger on either a rising or falling edge. Define a post-trigger time to control the amount of data logged after the trigger expression becomes false. Define a pre-trigger time to log events leading up to the trigger expression becoming true.

3.1.2 Filters

To enhance logging performance, the Kvaser Eagle can filter out selected messages to be logged. The identifiers to be filtered can be picked from a database file or entered manually. Three types of filters are provided: stop filters, pass filters, and counting pass filters. A stop filter prevents a message from being logged. A pass filter ensures a message is logged. A counting pass filter logs the specified message at enumerated occurrences so redundant data is reduced.

3.1.3 Memory Cards

Due to the high demands placed on the SD card used by an industrial product such as the Kvaser Eagle, we can only support cards tested and sold by Kvaser, see section 4.5.1.

3.1.4 The Kvaser *t* Programming Language

The versatile Kvaser *t* programming language provides the ability to turn the Kvaser Eagle into a powerful standalone device or an active logger.

Kvaser *t* is event driven and has a syntax that is very similar to C. Pre-compiled *t* programs/scripts are executed directly on the Kvaser Eagle.

When using *t* with the Kvaser Eagle, the possibilities are endless. Some examples include writing more advanced filters, simulating one or more CAN nodes, and creating a standalone ECU re-flash unit.

For more information about *t*, see “The Kvaser *t* Programming Language”.

3.2 Major Features of Kvaser Eagle

- CAN interface, data logger, and Kvaser *t* programmability – three products in one
- Quick and easy plug-and-play installation.
- Supports both 11-bit (CAN 2.0A) and 29-bit (CAN 2.0B active) identifiers.
- CAN messages are time-stamped with a 1 microsecond resolution.
- Large on-board RAM buffer for CAN messages.
- Supports silent (listen-only) mode for analyzing tools and data logging.
- 100% compatible with applications written for Kvaser hardware such as LAPcan, PCicanX, and USBcan with Kvaser CANlib.
- Two high-speed CAN channels (compliant with ISO 11898-2).
- Fully compatible with J1939, CANopen, NMEA 2000® and DeviceNet.
- One USB 2.0 HiSpeed connection with data rates up to 480 Mbit/s. The device can also be used with USB 1.1 ports (with up to 12 Mbit/s), and USB 3.0 ports (with up to 480 Mbit/s).
- Power is taken from the CAN bus or from the USB bus. The device automatically switches power supply between the CAN and the USB, reducing power drain on a laptop's battery.
- Small, light plastic housing with dimensions (W x L x H) approximately 46 x 115 x 22 mm (1.8 x 4.5 x 0.9 inch) – easy to tuck away (e.g. in a vehicle during a test drive).

3.3 *CAN Logger Functions*

- One flash disk connector that accepts SD and MMC cards, with sizes ranging from 32 MB up to 2 GB, as well as SDHC cards with sizes up to 32 GB.
- Built-in real time (calendar) clock with battery backup.
- Easy to use graphical configuration tool.
- Logger status is indicated with five externally visible LEDs.
- Supports silent mode – you can log bus traffic without interfering.
- Handles 100% bus load at 1 Mbit/s on each channel (>20 000 messages per second).
- Upload logged data via USB.
- External trigger input (e.g. pushbutton).
- External trigger output (e.g. LED or buzzer).
- Pre-trigger space is limited by available disk space only.
- Select trigger signals from a CAN database, or define them directly in the Kvaser Memorator Tools.

3.4 *Real Time CAN-USB Interface*

- Uses USB 2.0 HiSpeed, while maintaining compatibility with USB 1.x ports and working with USB 3.0 ports.
- Supports extreme data throughput, quick reaction times, and precise time stamping – removing any bottlenecks. Handles up to 40 000 messages per second.
- Supports silent mode for analyzing tools – listen to the bus without interfering.
- Simultaneous operation of multiple devices.
- Power supplied through the CAN bus interface or through the USB interface.

3.5 *Kvaser Memorator Tools*

- Easy to use graphic configuration tool.
- File manager for organizing and converting log files to several formats, including: CSV, ASCII, MDF and Matlab.
- Configuration of the CAN controller (bit rate etc).
- Configuration of the trigger conditions.
- Configuration of message filters which control the messages stored.
- Configuration of auto starting Kvaser *t* scripts.
- Configuration is downloaded via USB.

3.6 *Additional Software and Documentation*

- Kvaser CANlib SDK includes everything you need to develop software for Kvaser CAN hardware. This SDK includes full documentation and many sample programs, written in C, C++, C#, Delphi, and Visual Basic.

All Kvaser CAN hardware share a common software API. Programs written for one board type can run without modifications on the other board types!

- On-line documentation in Windows® HTML Help and Adobe Acrobat format.
- Documentation, software, and drivers can be downloaded for free at <http://www.kvaser.com> or purchased separately on CD if preferred.

4 Kvaser Eagle Hardware

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

4.1 Hardware Installation

The Kvaser Eagle may be connected to any available USB port on the host computer. Power can remain on when connecting or disconnecting the device. For the Kvaser Eagle 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 Eagle and the driver is installed on the host computer. For additional information on how to upgrade the firmware, read section 6.6 Updating the Firmware.

The Kvaser Eagle delivery package contains:

- Kvaser Eagle
- Software and Documentation CD contains:
 - Windows drivers
 - Kvaser Memorator Tools: configuration tool
 - Kvaser CANKing: easy to use CAN bus monitor
 - Drivers for RP1210A, LabView, and DIAdem
 - Kvaser CANlib Software Development Kit
 - Kvaser Eagle User's Guide
 - The Kvaser *t* Programming Language
- USB cable
- SD card

4.2 USB Connector

The Kvaser Eagle has a standard USB type "B" receptacle connector. Connect the unit to your PC using any high quality, USB 2.0 certified cable. The maximum USB cable length is 5 meters (approx. 16.5 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 a cable length of up to 25 meters (approx. 83 ft.).

4.3 CAN Channels

The standard Kvaser Eagle has two independent CAN channels as shown in Figure 2. The first CAN channel is marked on the housing with the symbol '1'. The second channel (number 2) is not marked. See Figure 3. The CAN connectors are also labeled for easy identification.

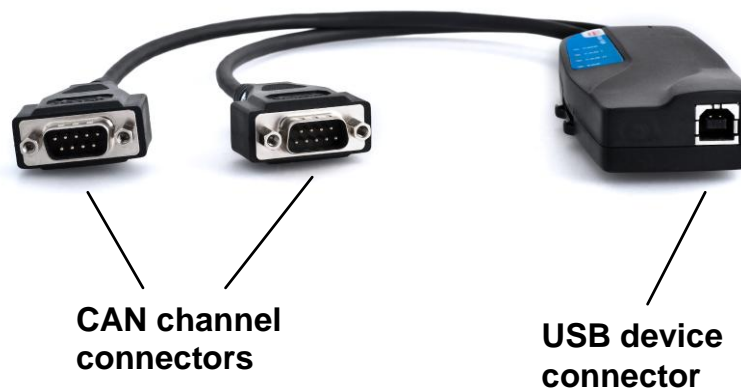


Figure 2: Connections on the Kvaser Eagle



Figure 3: CAN Channels on the Kvaser Eagle

4.4 Power Supply

The Kvaser Eagle can be powered from the CAN side and from the USB side. To operate the Kvaser Eagle in logger mode, you **must** supply power on the CAN side.

When you supply power on the CAN side, provide power on the channel 1 connector. Use pin 9 for V+ and pin 3 for ground. Supplying power on channel 2 is safe, but will not affect the unit.

4.4.1 Kvaser Eagle

To use the device as a CAN interface, or to configure the device for logging, supplying power from the USB side is sufficient.

4.5 Flash Disks

4.5.1 Supported Disk Types



IMPORTANT: For the Kvaser Eagle, we only support flash disks sold by Kvaser. For more information on available sizes and prices, contact us.

Due to the high demands placed on the SD card used by an industrial product like the Kvaser Eagle, we can only support cards tested and sold by Kvaser. Other cards might work; especially industrial grade cards, but we cannot guarantee their functionality.

If you want to use other disk brands, you can use SDHC (**Secure Digital High Capacity**) disks, SD (**Secure Digital**), or MMC (**MultiMediaCard**) disks with your Kvaser Eagle.

The following disk sizes can be used:

Table 1: Usable Disk Sizes

| | |
|------|--------------|
| MMC | 32 MB – 1 GB |
| SD | 32 MB – 2 GB |
| SDHC | Up to 32 GB |

4.5.2 Write Protection Switch

The Kvaser Eagle will **disregard** the write protection switch setting on SD and SDHC memories. This is by design. The intention is to minimize the risk of a logging failure when the write protection switch is set by accident.

4.5.3 How to Handle the Disk

Insert the flash disk into the slot on the side of the Kvaser Eagle (see Figure 4) with the disk's golden connector side up. Do not apply excessive force. The disk should slide smoothly into the socket. When fully inserted, the disk should fit well within the slot.

Before removing the disk, you must

- Connect the device to a PC via USB, or
- Completely remove power (disconnect CAN 1 and wait for the PWR LED to go off)



Figure 4: Inserting a Memory Card

4.6 LED Indicators

The LED indicators (see Figure 5) have somewhat different meaning depending on how your Kvaser Eagle is being used – as a CAN interface or as a CAN logger. The following tables describe how the LEDs behave in these two cases.

Table 2: LED Indicators, Overview

| Lamp | General meaning |
|----------------------|--|
| PWR (Green) | Power and general status |
| CAN 1 (Yellow) | Status for CAN channel 1 |
| CAN 2 (Yellow) | Status for CAN channel 2 |
| ERR (Yellow and red) | Indicates temporary and permanent errors |



Note that the ERR lamp is bi-colored and can be both red and yellow.



Figure 5. LEDs on the Kvaser Eagle

Table 3: LED Indicators, CAN Interface Mode

| PWR (Green) | CAN 1 (Yellow) | CAN 2 (Yellow) | ERR (Red) | Meaning |
|----------------|-------------------|-------------------|--------------|--|
| Slow flash | | | | Waiting for USB connection with the PC |
| Steady | | | | Power ON (Device is connected to the computer) |
| | Short flash | | | CAN traffic on channel 1 |
| | | Short flash | | CAN traffic on channel 2 |
| | | | Short flash | Error frame on either channel |
| | | | Steady | Self-test failed, wrong bit rate, CAN bus transceiver failure |
| Fast flash | | | | Firmware configuration error (should not normally happen, contact support) |

Table 4: LED Indicators, Logger Mode

| CAN status |
|---|
| <p>CAN1/CAN2 emitting short flashes: CAN messages are sent or received</p> <p>ERR emitting short yellow flashes: Error frames are received on CAN1 or CAN2</p> |
| Error conditions |
| <p>ERR constant red with one yellow flash: CAN overrun</p> <p>ERR constant red with two yellow flashes: Disk full</p> <p>ERR constant red with three yellow flashes: Configuration file missing or corrupt</p> <p>ERR constant red with four yellow flashes: Disk error</p> <p>ERR constant red with five yellow flashes: Some other major error; Contact support</p> |
| Logging status |
| <p>PWR 90% on and 10% off: Everything OK; logging started without problems. The device is “armed” and waiting for a trigger.</p> <p>PWR flashing: Everything OK, logging is active and actively logging traffic</p> <p>PWR blinking slowly 50/50: Logging has stopped due to a trigger condition and the Kvaser Eagle is off bus.</p> |
| When connected to Kvaser Memorator Tools |
| <p>“Running lights”: Device is communicating with the application.</p> <p>ERR blinking red: Indicates disk activity such as formatting.</p> |
| Other blink patterns |
| <p>All LEDs blinking slowly: Disk is missing or improperly inserted, and no USB communication is detected. Check the disk or the USB connection.</p> <p>PWR emits a flash every few seconds; the other LEDs are off: No USB communication. Check USB cables and communication. Unplug the device and reconnect it after a few seconds. Check that the device driver is installed correctly.</p> <p>PWR flashing, ERR constant red: Firmware configuration error. This should not normally happen. Contact support.</p> |

4.7 External Trigger Input

The Kvaser Eagle can be set up to trigger on an external signal. There are two ways to create this signal:

- Connect a switch between pin 4 of the CAN channel 1 connector and ground, which can be found on pin 3 of the same connector. See Figure 7.
- Connect a signal between 0 and 5 V to pin 4 of the CAN channel 1 connector.

Internally, pin 4 of the CAN channel 1 connector has a pull-up to +5V. See Figure 6.

The trigger can be configured to react on either falling or rising edges.

- If it is set to trigger on a falling edge, the trigger is activated when pin 4 is connected to ground.
- If it is set to trigger on a rising edge, the trigger is activated when pin 4 is disconnected from ground.

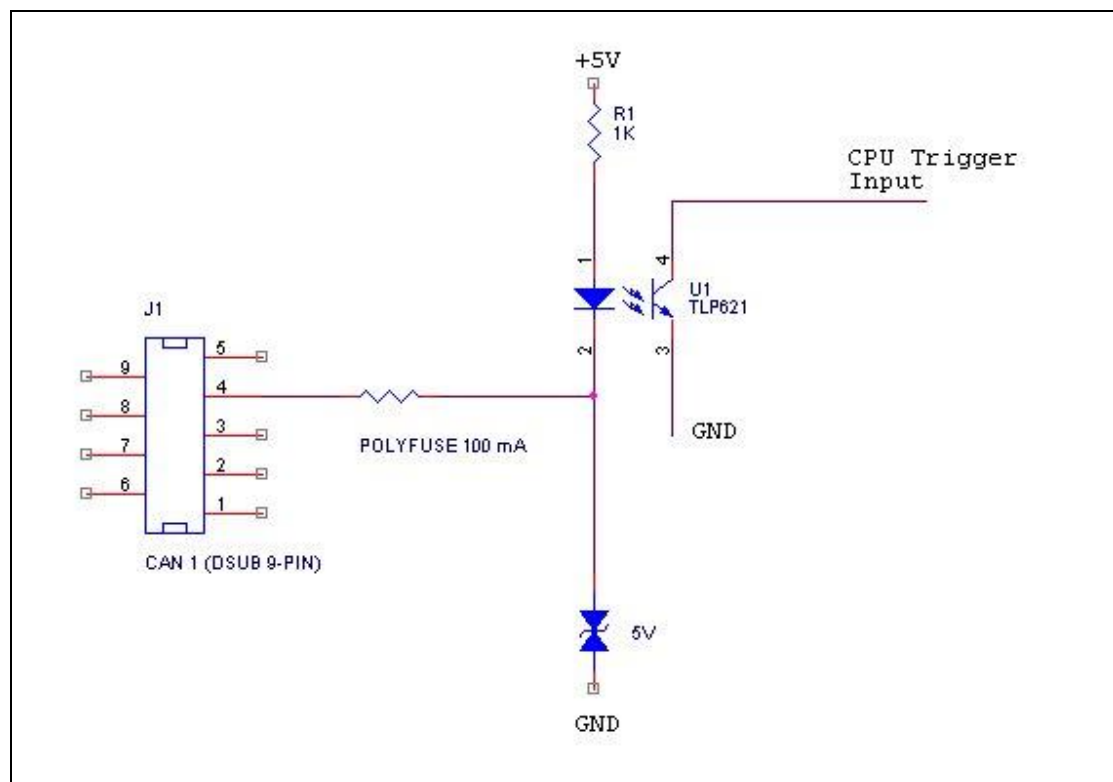


Figure 6: Trigger Input Inside the Kvaser Eagle

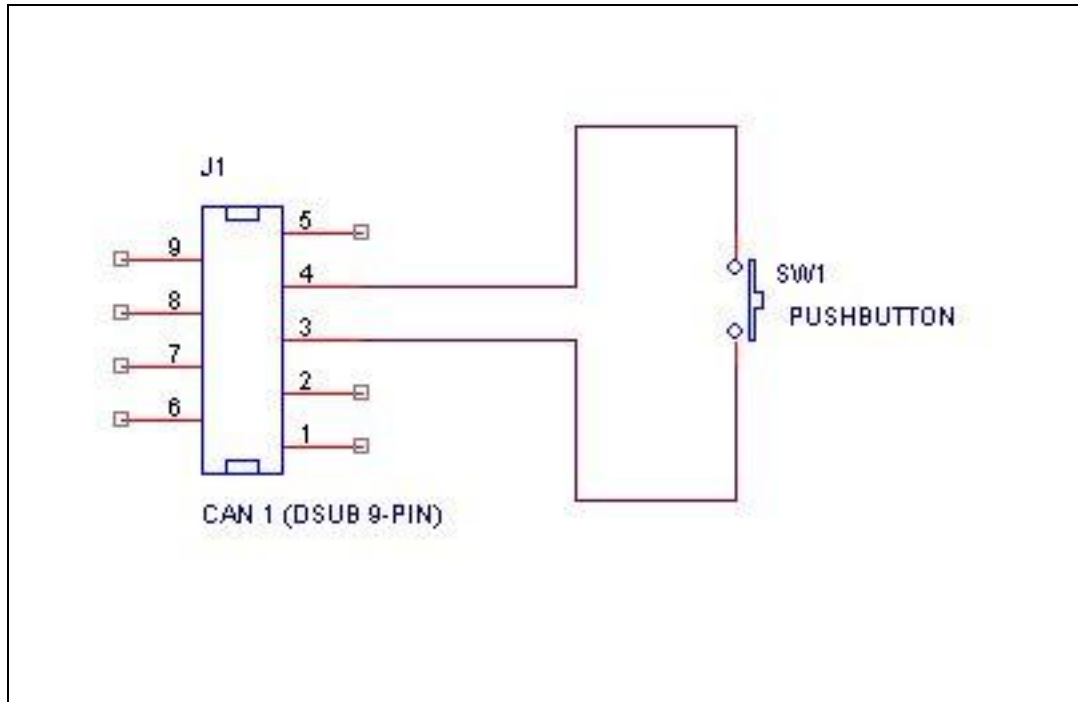


Figure 7: How to Connect an External Trigger Switch



Note: The trigger input is debounced by the firmware. A pulse with length shorter than approximately 30 ms will not be detected.

4.8 External Trigger Output

The Kvaser Eagle also supports sending an external pulse through channel two's CAN connector pin 4. For further information on how to configure the Kvaser Eagle to send an external pulse, refer to the Kvaser Memorator Tools online help.

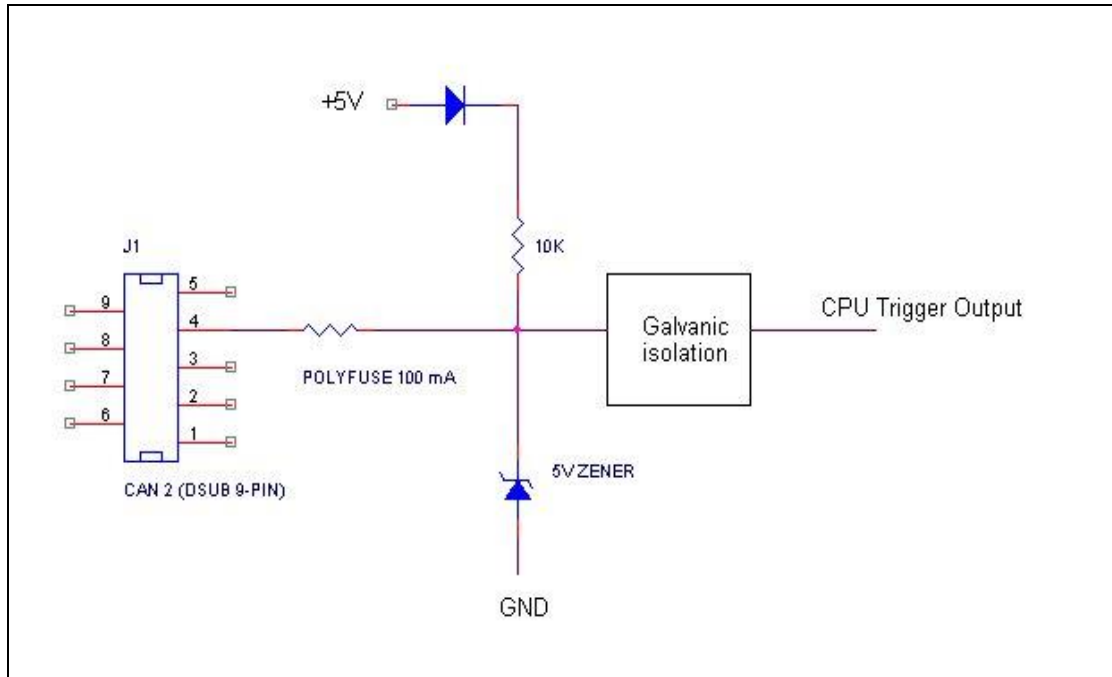


Figure 8: Trigger Output Inside the Kvaser Eagle

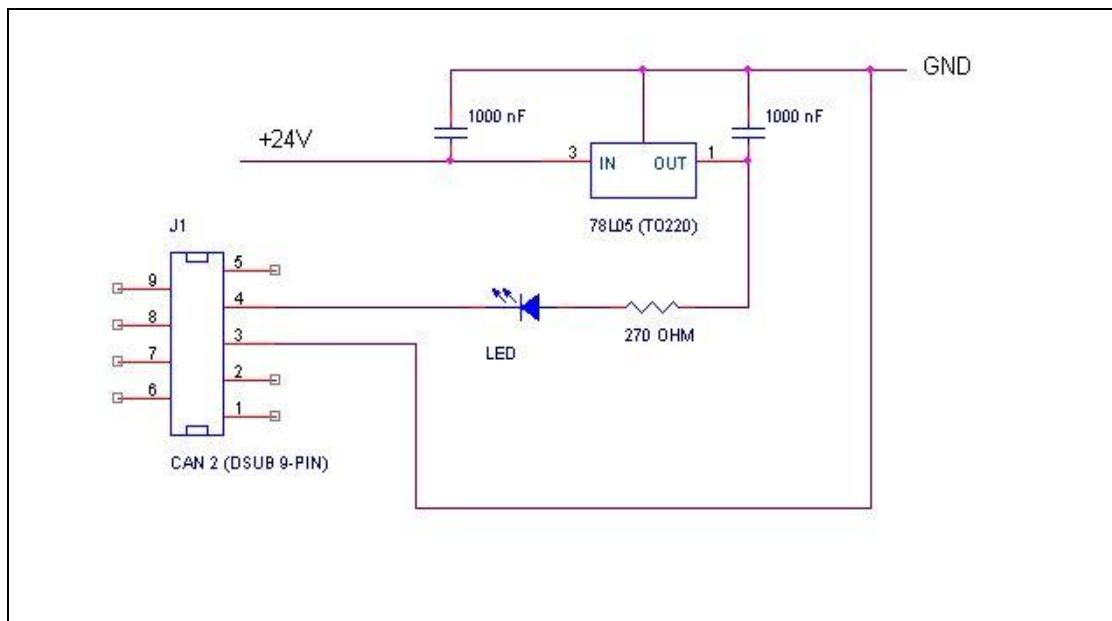


Figure 9: Sample Circuit for Connecting a LED to the Trigger Output

5 How to Use the Kvaser Eagle

The Kvaser Eagle can operate either as a high performance real time USB interface (USB-CAN mode) or as a data logger (logger mode). This section will describe how to use the different modes.

5.1 Kvaser Memorator Tools

The Kvaser Memorator Tools is the user's interface for downloading Kvaser *t* scripts and creating and downloading configuration files.

To log CAN traffic with the Kvaser Eagle, you need to create and download a configuration to the device. The Kvaser Eagle needs to be connected by USB and have a disk inserted to be configured. Start the PC application Kvaser Memorator Tools and press the *Connect* button in the toolbar. If the LEDs on the Kvaser Eagle are flashing in a “running light” pattern, the device is ready to communicate with the Kvaser Memorator Tools.

For further information about the Kvaser Memorator Tools, refer to the application's online help.

5.2 Disk Management

- Handle the disks with care. They *are* robust, but better safe than sorry.
- Avoid removing the disk when the device is powered. You should first disconnect external power and wait for the PWR LED to go out, then remove the disk. If the device is connected via USB, you should make sure the Kvaser Memorator Tools is not writing to the disk before removing.
- You **may** remove and reconnect the disk, the external power and the USB in any order you like without damaging the **hardware**. But if you follow the advice above, you will not damage **your logged data**.
- If you need to remove the disk when the device is being used as a logger and you cannot disconnect the external power, try to connect the USB cable to a running PC first. When the Kvaser Eagle discovers the active USB connection, the device will stop logging and close the log file in an orderly fashion.

5.3 Use as a CAN Interface

To use the Kvaser Eagle as a CAN interface; connect the unit to an available USB port on your PC or USB hub. You do not need to insert a flash disk. If a flash disk is inserted, you do not need to remove the disk.



When used as a CAN interface, the green lamp will be illuminated and the yellow lamps will emit short flashes when CAN messages are transmitted and received.

5.4 Configure for Logging

To prepare your Kvaser Eagle for logging:

1. Connect the unit to a free USB port on your PC or USB hub.
2. Insert a flash disk (see Figure 4).
3. Start the Kvaser Memorator Tools program and press the Connect button.

When connected, the device should show a running light pattern on the LEDs.

5.5 Use as a Logger

To use your Kvaser Eagle as a logger:

1. Insert a formatted flash disk that contains a valid configuration.
2. Optionally, connect an external trigger switch to the CAN1 connector.
3. Optionally, connect the digital output pin on the CAN2 connector to your equipment.
4. Supply power on the CAN1 connector.

Logging should start immediately.



If everything is OK, the green PWR lamp should either blink quickly, or be illuminated 90% and dark 10% of the time. If CAN traffic is detected, the CAN1 and CAN2 lamps will be illuminated.

5.6 Using the Kvaser *t* Programming Language

The Kvaser Memorator Tools is used for downloading Kvaser *t* scripts to the device. See "The Kvaser *t* Programming Language" for more information about using Kvaser *t*.

5.7 Troubleshooting



- Use "Kvaser Hardware" in the Control Panel to verify that the computer can communicate with the Kvaser Eagle. Read out the firmware version. If the firmware version is all zeroes, there is a communication problem.
- Verify that the disk is formatted. If in doubt, reformat the disk using the Kvaser Memorator Tools.
- If configuration fails, verify that the Kvaser Eagle is in configuration mode when you are using the Kvaser Memorator Tools. You can see this by looking at the LEDs – they should flash in a "running light" pattern.
- If the LEDs are flashing or illuminated, compare the pattern with the specified LED indicators in Table 3 and Table 4.
- If the LEDs are not flashing or completely off, check the power supply.

6 Appendices

In this section, you will find technical information about Kvaser Eagle and its connectors.

6.1 Technical Data

In Table 5 below, you will find the Kvaser Eagle's technical specifications.

Table 5: Kvaser Eagle Technical Specifications

| | |
|------------------------|---|
| CAN Channels | 2 (CAN 2.0A and 2.0B active) |
| CAN Transceivers (HS) | SN 65251 (Compliant with ISO 11898-2) |
| CAN Controller | Built into the processor |
| CAN Bit Rate | 50 kbit/s to 1 Mbit/s |
| Error Frame Detection | Both channels |
| Error Frame Generation | Available when used as an USB-CAN interface |
| PC interface | USB 2.0; Supports HiSpeed (HS) at 480 Mbit/s Compatible with USB 1.1 at 12 Mbit/s and with USB 3.0 at 480 Mbit/s |
| Power consumption | Typical values are: 150 mA if powered from the USB (~ 5V) 900 mW when powered from the CAN bus |
| External power | Allowed operating voltage 7-35 V DC Absolute maximum input voltage 48 V DC |
| Software requirements | Windows XP or later (For other operating systems, see Kvaser web or contact support.) |
| Hardware configuration | Done by software (Plug & Play) |
| Dimensions (W x L x H) | 46 x 115 x 22 mm (1.8 x 4.5 x 0.9 inch) |
| Operating temperature | -40 °C ... +85 °C |
| Weight | 142 g including cables and connectors |
| Storage temperature | -40 °C ... +85 °C |
| Relative Humidity | 0% ... 85% (non-condensing) |
| External trigger | Available on CAN connector 1 pin 4 |
| External output | Available on CAN connector 2 pin 4 |

6.2 Performance

Table 6: Performance of the Kvaser Eagle

| Kvaser Eagle | |
|--|--|
| RX performance per channel (when used as a CAN interface) | 20 000 messages/s |
| TX performance per channel (when used as a CAN interface) | 20 000 messages/s |
| Logging performance | 20 000 messages/s |
| Time stamp accuracy. | 1 μ s |
| Message filter support. | Stop filters Pass filters Counting filters Scripted filters |
| SD memory size support. | 2 GB |
| SDHC memory support | 32 GB |
| Galvanic isolation. | Yes |
| Number of triggers. | 32 |

6.3 Disk Capacity

The following table gives some **approximate** values for the capacity of various disk sizes.

Table 7: Disk Capacity

| Disk size | Capacity | Time to fill the disk (at ~500 messages per second) |
|-----------|--|--|
| 32 MB | ~1 million messages | half an hour |
| 512 MB | ~10 million messages | half a day |
| 4 GB | ~100 million messages | a couple of days |
| 32 GB | ~1 billion (10 ⁹) messages | a couple of weeks |



The setting of the write protection switch on SD and SDHC memories is disregarded. The Kvaser Eagle will write to the disk even if the write protection switch is set.

6.4 Disk Structure

You can use an external card reader to read the files on the flash disk. The Kvaser Memorator Tools can read the log data directly via the external card reader, so you do not need to copy the files to your hard disk.



Note: It is essential that the flash disks be formatted using the Kvaser Memorator Tools, which will create several special files on the disk. These files must be contiguous and the structure and position of the files must be determined by the firmware, or data logging will fail.

Do not touch these files using an ordinary flash disk writer.

Kvaser Memorator Tools will create the following files on the flash disk when formatting:.

LOGDAT nn .KMF
PARAM.LIF
DATABASE.BIN

The LOGDAT nn .KMF will by default occupy nearly the whole disk, regardless of whether the file contains any logging data or not. PARAM.LIF and DATABASE.BIN will use around 2 MB.

6.5 CAN Connectors

The Kvaser Eagle has two CAN channels. Both CAN channels have 9-pin D-SUB connectors (see Figure 10) with the pinning described below (see Table 8 and Table 9).

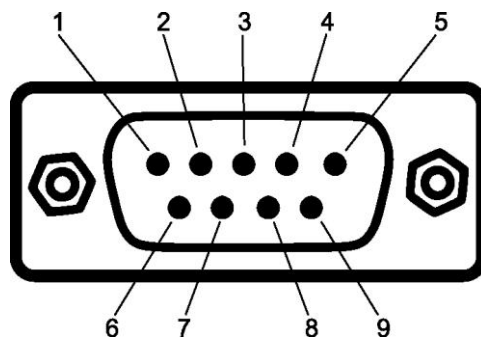


Figure 10: CAN Channel D-SUB Connector Pin Numbers

Table 8: CAN Channel 1 D-SUB Pin Configuration

The CAN channel 1 has the following pin configuration:
(Auto-reset fuses protect Pins 2, 3, 4, 7 and 9)

| D-SUB pin number | Color code | Function |
|------------------|------------|----------------------------|
| 1 | N/A | Not connected |
| 2 | Green | CAN_L |
| 3 | Brown | GND |
| 4 | Orange | External trigger input |
| 5 | Black | Shield |
| 6 | N/A | Not connected |
| 7 | Red | CAN_H |
| 8 | N/A | Not connected |
| 9 | Yellow | Power supply to the device |

Table 9: CAN Channel 2 D-SUB Pin Configuration

The CAN channel 2 has the following pin configuration.
(Auto-reset fuses protect Pins 2, 3, 4, 7 and 9.)

| D-SUB pin number | Color code | Function |
|------------------|------------|-------------------------|
| 1 | N/A | Not connected |
| 2 | Green | CAN_L |
| 3 | Brown | GND |
| 4 | Orange | External trigger output |
| 5 | Black | Shield |
| 6 | N/A | Not connected |
| 7 | Red | CAN_H |
| 8 | N/A | Not connected |
| 9 | Yellow | Not connected |



Note: Always connect the ground pin on the D-SUB to the ground of your CAN bus.

6.6 Updating the Firmware

Connect the Kvaser Eagle to your PC with the USB cable. A flash disk may be present but is not necessary. Double-click on the file “update.exe”. The Kvaser Memorator Tools can also update the Kvaser Eagle firmware by the click of a button (see the online help if you want to learn more). A small application opens where you should see the device listed if correctly connected to your PC (see Figure 11). Select the device to program and click the *Next* button.

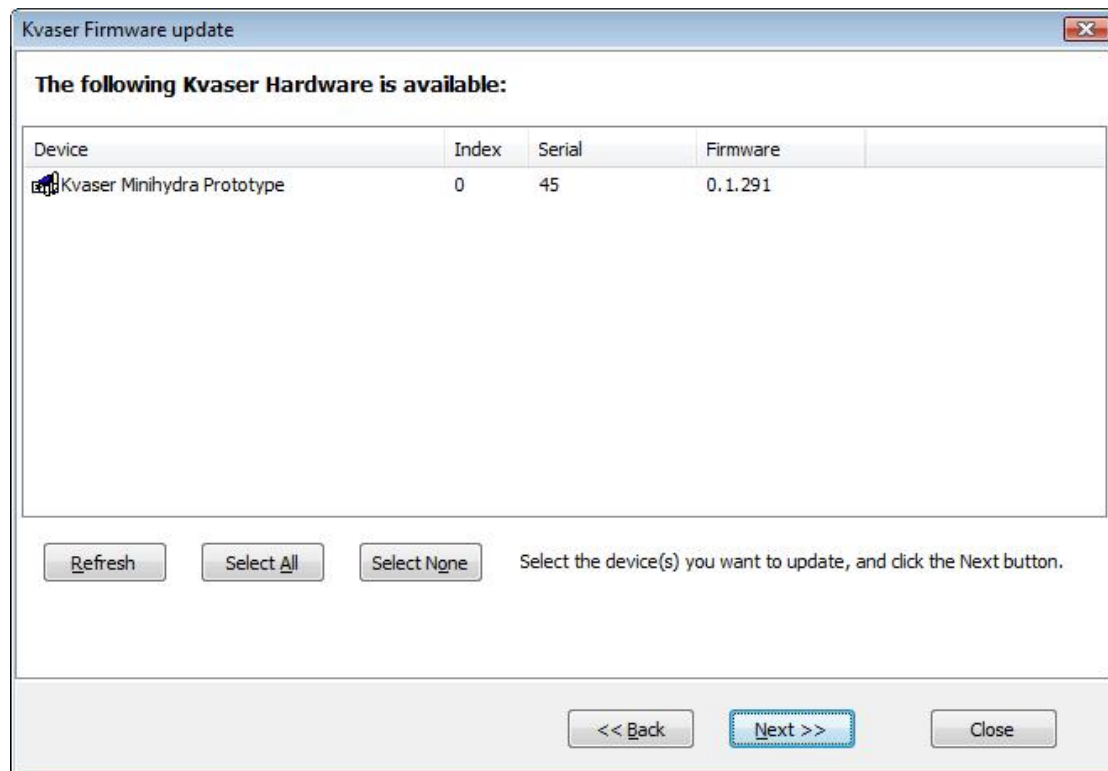


Figure 11: Firmware Update, Select Device

Click on the *Start Upgrade* button to start programming (see Figure 12). The programming typically takes approximately 30 seconds. The progress is displayed on the screen, and typically looks like this:



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

6.9 CAN Bus Overrun

Under extremely heavy load, high bit rates and long bursts of messages, the Kvaser Eagle can lose messages. This loss should be a rare occasion. If such a loss occurs, the Kvaser Memorator Tools will display a notification message when the log file is extracted. Some of the file formats, that support such a feature, will also indicate when the overrun occurred. (See the help section in the Kvaser Memorator Tools for details about file formats.)



To avoid losing important messages during logging, filters can be used. This will decrease the load on the Kvaser Eagle and ensure that important information is not lost.

6.10 Daisy-chaining Several Interfaces

You can daisy chain several Kvaser Eagle units to gain additional logging capacity. To do this,

1. Connect the trigger output of one device to the trigger input of the next device.
2. Using the Kvaser Memorator Tools, configure the trigger output of the first device to emit a pulse when the disk becomes full.
3. Configure the trigger input of the second device to start logging when a falling edge is detected. Set the post-trigger time to 0 (infinite) and the pre-trigger time to 1 second.

You now have a setup where the second unit starts logging when the first one becomes full.

7 Frequently Asked Questions

Q: How many messages per second can Kvaser Eagle store on the disk?

A: It depends on the flash disk type. Fast disks can typically accommodate 20 000 messages per second. For all practical purposes, this means full busload even at 1 Mbit/s.

Q: I have a very busy J1939 network. Will the Kvaser Eagle be able to handle that?

A: Most likely. J1939 operates at 250 kbit/s, which means up to 2000 8-byte messages per second. As a contrast, the measured logging capacity of the Kvaser Eagle is 20 000 messages per second, which is around 10 times higher.

Q: How many hours will a 4 GB disk last?

A: It depends on the CAN bus load. To get a feeling for the numbers involved, see section Disk Capacity on page 20.

Q: Can I use 2 (4, 8, 16, ...) GB disks?

A: Yes, the largest supported disk size is 32 GB.

Q: Can I use any MMC/SD/SDHC disk?

A: Yes, in principle, but due to the high demands placed on the SD card used by an industrial product such as the Kvaser Eagle, we can only support cards tested and sold by Kvaser, see section 4.5.1.

Q: Can I use an external SD/MMC card reader to read the logged data?

A: Yes, the Kvaser Memorator Tools can read data from external disk readers, as well as directly from a connected Kvaser Eagle.

Q: I have logged a lot of data on my Kvaser Eagle and now I'm trying to open the list of files inside Kvaser Memorator Tools, but it seems to hang. What's up?

A: The Kvaser Memorator Tools might be a bit slow after about 10 000 log files, but just be patient – eventually the list of files will appear.

8 Disposal and Recycling Information



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



Dispose of batteries according to your local environmental laws and guidelines.

For information about Kvaser's recycling programs, visit:
<http://www.kvaser.com/en/kvaser/environment/recycling>

9 Legal Acknowledgements

9.1 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.

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-LEVER SYSTEM, WHICH MAY BE DEFECTIVE.



THIS PRODUCT CONTAINS A RECHARGEABLE LI-PO BATTERY. MUST BE DISPOSED OF PROPERLY. MAY EXPLODE IF DAMAGED OR DISPOSED OF IN FIRE. DO NOT SHORT CIRCUIT.

9.2 EMC Compliance Statement

EMC Tests

The equipment has been tested for compliance with the EN 50 081-2:1993 (emission) and the EN 61000-6-2:1999 (immunity) standards.

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.

9.3 RoHS Compliance Statement

This product is manufactured in accordance with directive 2002/95/EC on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS.)

9.4 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.

DeviceNet™ is a Trademark of Open DeviceNet Vendor Association, Inc.

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

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

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10 Document revision history

| Revision | Date | Changes |
|----------|------------|----------------------------|
| 2.0 | 2011-09-12 | Updated for first release. |