

Kvaser Memorator R SemiPro User's Guide



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<http://www.kvaser.com>

Last updated Thursday, 28 April 2011

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2 About this manual

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

3 Introduction

This section will describe the functions and features of the Kvaser Memorator R SemiPro.

3.1 Welcome to Kvaser Memorator R SemiPro



Figure 1. Kvaser Memorator R SemiPro

Kvaser Memorator R SemiPro 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 occasion. Connecting the logger to a PC provides direct access for configuring baud rates, trigger conditions, and filters using the standalone Kvaser Memorator Tools. To achieve a rugged design, the SD-disk is located inside the unit and soldered to the PCB. This ensures error free operation even when exposed to vibration and shock.

The Kvaser Memorator R SemiPro can also be used as a powerful two channel real time CAN to USB interface – two products in one!

An additional advantage of the Kvaser Memorator R SemiPro is ability to log J1587 traffic by connecting the Kvaser Linx J1587. With a combination of the Kvaser Linx J1587 and the Kvaser Memorator R SemiPro, you get an even more powerful and versatile data logger.

3.1.1 Triggers

You can setup the Kvaser Memorator R SemiPro to log continuously, or you can create triggers to control when frames are logged. You can create up to 16 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's rising or falling edge. You can define a post-trigger time to control the amount of data logged after the trigger expression becomes false, and/or 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 Memorator R SemiPro can filter out selected messages. 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. Stop filters prevent messages from being logged. Pass filters ensure a message is logged. Counting pass filters log the specified messages at enumerated occurrences so redundant data is reduced.

3.1.3 Memory card

To achieve a rugged and robust product, the memory card (a SD disk) is placed inside the shell and cannot be replaced.

3.2 Major features of Kvaser Memorator R SemiPro

- CAN interface and data logger – two 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 2 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 with Kvaser CANLib for other Kvaser hardware such as LAPcan, PCican, and USBcan.
- Two high-speed CAN channels (compliant with ISO 11898-2), 10 kbit/s up to 1 Mbit/s.
- 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 in USB 1.1 slots (with up to 12 Mbit/s).
- Power is taken from the CAN bus or from the USB bus. The device automatically switches power supply between the CAN (primary) and the USB (secondary), reducing power drain on a laptop's battery.
- Small, light aluminum housing with approximate dimensions 31 x 220 x 19 mm (1.2 x 8.7 x 0.8 inches) (W x L x H) – easy to tuck away (e.g. in a vehicle during a test drive).
- The CAN-cable is 40 cm (16 inches).
- The USB cable is 10 cm (4 inches).

3.3 CAN logger Functions

- One fixed 4GB memory card.
- Built-in real time (calendar) clock with battery backup.
- Easy to use graphic configuration tool.
- Logger status is indicated with five externally visible LEDs.
- Supports silent mode – you can log bus traffic without interfering with the bus.
- Handles 100% bus load at 1 Mbit/s with two channels (>20000 messages per second).
- Starts up in 500 milliseconds.
- Upload logged data via USB at 1.2 MB/s when connected via USB 2.0 HiSpeed.
- External trigger input (e.g. pushbutton).
- External trigger output (e.g. a 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 computers.
- Supports extreme data throughput, quick reaction times and precise time stamping – removing any bottlenecks. Handles up to 40 000 messages per second.
- Kvaser MagiSync™ - automatic time synchronization between all Kvaser products that uses the Kvaser MagiSync™ feature.
- Supports silent mode for analyzing tools – listen to the bus without interfering with traffic.
- 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 a variety of formats including CSV, ASCII, MDF, and Matlab formats.
- Configuration of the CAN controller (bit rate, sample point, etc.).
- Configuration of the trigger conditions.
- Configuration of message filters which control the messages stored.
- The configuration is downloaded via USB.

3.6 Additional software and documentation

- The Kvaser CANLIB SDK includes everything you need to develop software for Kvaser CAN hardware. Includes full documentation and many sample programs written in C, C++, C#, Delphi, and Visual Basic. All Kvaser CAN interface hardware shares a common software API. Programs written for one board type can run without modification on the other board types.
- On-line documentation in Windows® HTML Help format.
- Documentation, software, and drivers can be downloaded for free at www.kvaser.com.

4 Kvaser Memorator R SemiPro Hardware

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

4.1 Hardware installation

The Kvaser Memorator R SemiPro 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 Memorator R SemiPro 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 Memorator R SemiPro 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 Memorator R SemiPro delivery package contains:

- Kvaser Memorator R SemiPro.
- Software and Driver CD which contains drivers for Windows; Kvaser Memorator Tools; Kvaser CANKing, an easy to use CAN bus monitor; Drivers for RP1210A, LabView and DIAdem; and Kvaser CANlib Software Development Kit.
- Kvaser Memorator R SemiPro User's Guide.
- Adapter cable for a 15 pin DSUB to 2 x 9 pin DSUB

For driver installation information, see the driver and hardware installation guide which can be found at <http://www.kvaser.com>.

4.2 USB connector

The Kvaser Memorator R SemiPro has a standard USB type "A" plug connector. Connect the unit to your PC directly or by using any high quality USB 2.0 certified cable. The maximum USB cable length is 4.5 meters (approx. 165 ft.). If you need a longer cable, you can use USB hubs or USB extension cables with a built-in hub.

4.3 CAN channels

The standard Kvaser Memorator R SemiPro has two independent CAN channels in the 15 pin DSUB shown in Figure 2. The product comes with an adapter cable to split the two channels into two separate connectors if necessary. The CAN connectors in the adapter cable are also labeled for easy identification.

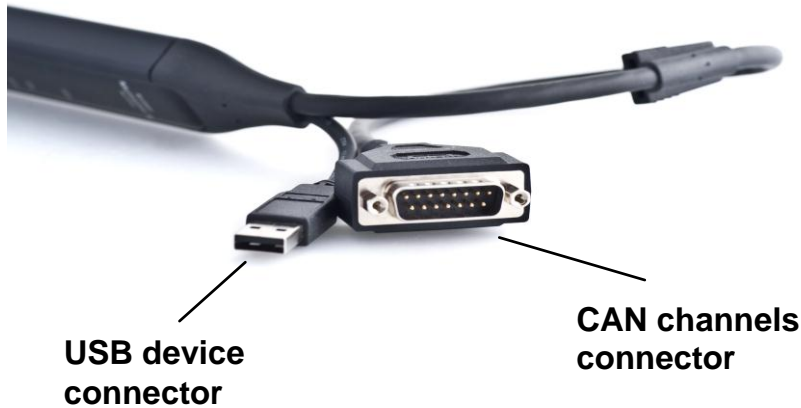


Figure 2. Connectors on the Kvaser Memorator R SemiPro. The two CAN channels are in the 15 pin DSUB on the right and the USB device connector is on the left.

4.4 Power supply

The Kvaser Memorator R SemiPro can be powered through the CAN connector and through the USB connector. To operate the Kvaser Memorator R SemiPro in logger mode, you **must** supply power through the CAN connector.

When you supply power on the CAN connector, provide power on channel 1. When using the adapter cable, use pin 9 for V+ and pin 3 for ground on the CAN1 connector. When connecting directly to the 15 pin DSUB, use pin 9 for V+ and pin 1 for ground.

The supply power should be in the range of 6 – 35 V DC. The power requirement is around 1 W (maximum). Supplying power on CAN2 is safe, but pointless. The device will tolerate higher input voltages, up to 48 V DC.

To use the device as a CAN interface or to configure the device for logging, power supplied through the USB connector is sufficient.

4.5 Flash disk

Due to the high demands placed on a rugged, industrial product such as the Kvaser Memorator R SemiPro, the memory card is fixed and sealed inside the unit. The card meets necessary performance requirements including industrial temperature range.

The selected size of 4 GB should cover most cases. This size provides a balance between duration logging and overly large logs which are cumbersome to analyze.

4.6 LED indicators



The LED indicators (see Figure 3) have somewhat different meaning depending on how the Kvaser Memorator R SemiPro is being used – as a CAN interface or as a CAN logger. The following tables describe how the LEDs behave in these two cases.

In the tables, “slow flash” means a frequency around 0.5 Hz, and “fast flash” means a frequency of around 2 Hz.

Table 1: LED indicators overview

LED	General meaning
PWR (Green)	Power and general status.
ERR (Red)	Indicates permanent errors.
INFO (Orange)	Indicates temporary errors.
CAN 1 (Yellow)	Status for CAN channel 1.
CAN 2 (Yellow)	Status for CAN channel 2.



Figure 3. LEDs on the Kvaser Memorator R SemiPro.

Table 2: LED indicators when used as a CAN interface

PWR (Green)	CAN 1 (Yellow)	CAN 2 (Yellow)	ERR (Red)	Meaning
Slow flash				Waiting for USB connection with the PC.
Steady				Power ON (The device is connected to the computer).
	Short flash			CAN traffic on channel 1. (The light becomes steady at high bus loads)
		Short flash		CAN traffic on channel 2. (The light becomes steady at high bus loads)
	Blink			CAN 1 error passive.
		Blink		CAN 2 error passive.
	Steady			CAN 1 bus off.
		Steady		CAN 2 bus off.
			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, so please contact support).

Table 3: LED indicators when the device is used as a logger

CAN status
<p>CAN1/CAN2 emitting short flashes: CAN messages are sent or received</p> <p>CAN1/CAN2 blinking and ERR blinking red: The CAN channel is <i>error passive</i></p> <p>CAN1/CAN2 blinking slowly and ERR blinking slowly red: The CAN channel is <i>bus off</i></p> <p>ERR emitting short yellow flashes: Error frames are received on CAN1 or CAN2</p>
Error conditions
<p>ERR constant red, INFO flashing with a single orange flash: CAN overrun</p> <p>ERR constant red, INFO flashing with a double orange flash: Disk full</p> <p>ERR constant red, INFO flashing with three orange flashes: Configuration file missing or corrupt</p> <p>ERR constant red, INFO flashing with four orange flashes: Disk error; try to reformat it.</p> <p>ERR constant red, INFO flashing with five orange flashes: Some other major error; please 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 Kvaser Memorator R SemiPro is off bus.</p>
When connected to Kvaser Memorator Tools
<p>“Running lights”: The device is communicating with the tool</p> <p>ERR blinking red: Disk activity such as formatting</p>
Other blink patterns
<p>All LEDs blinking slowly: Disk is not detected by the CPU, and there is no USB communication. If this happens, it is probably a hardware fault.</p> <p>PWR emits a flash every few seconds; the other LEDs are dark: No USB communication. Check USB cables and communication. Unplug the device and reconnect after a few seconds. Check that the device driver is installed correctly.</p>

PWR flashing, ERR constant red:

Firmware configuration error. This should not normally happen. Please contact support.

4.7 External trigger input

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

- On the 9 pin CAN1 connector, connect a switch from pin 4 to ground, which can be found on pin 3 of the same connector. See Figure 5.
- On the 9 pin CAN1 connector, connect a signal between 0 and 5 V to pin 4.

Internally, pin 4 on the 9 pin CAN1 connector has a pull-up to +5V. See Figure 4.

The trigger can be configured to react on both falling and rising edges.

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

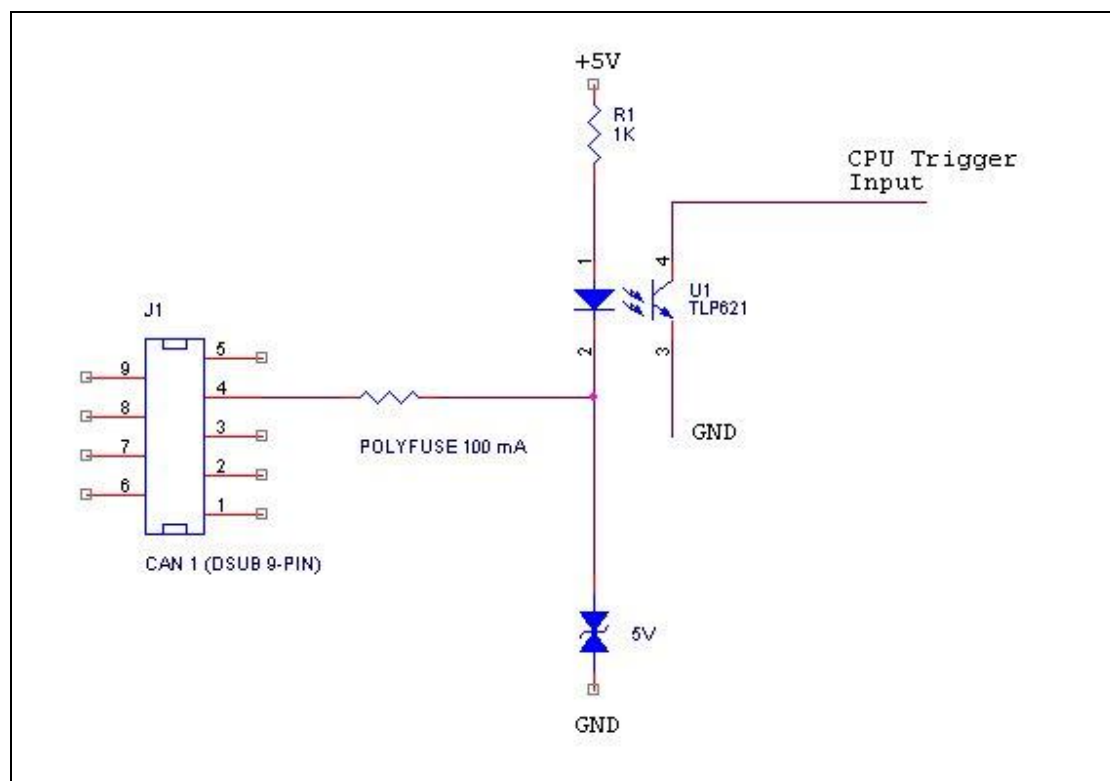


Figure 4. The trigger input inside the Kvaser Memorator R SemiPro.

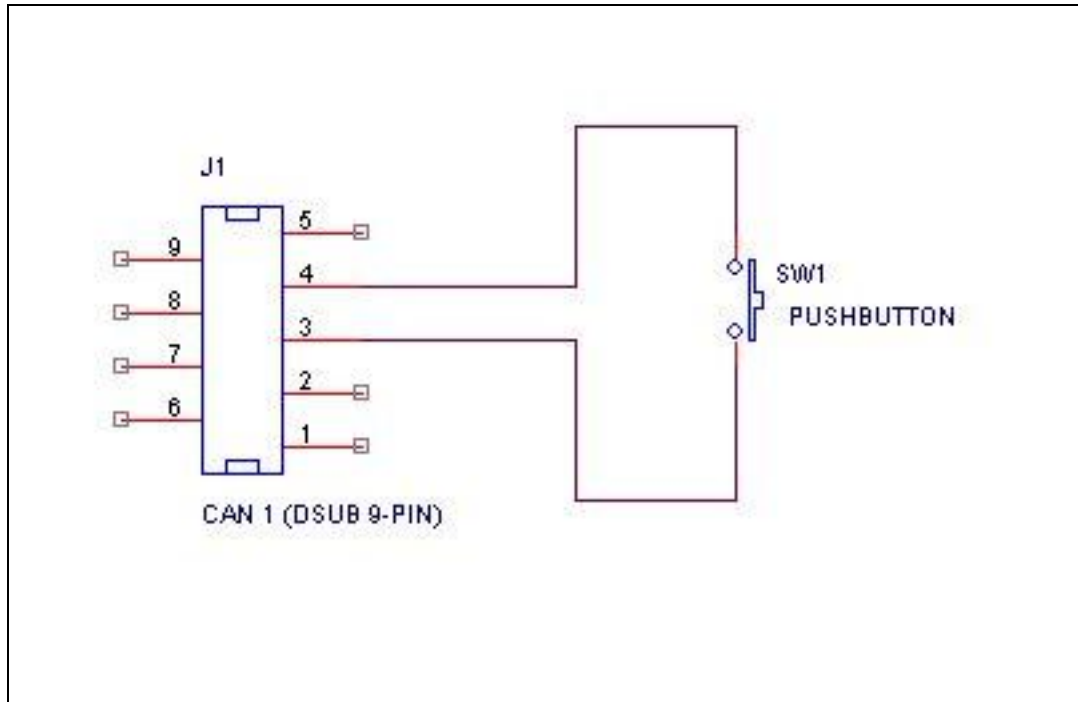


Figure 5. How to connect an external trigger switch.



The trigger input is debounced by the firmware. A pulse must have a minimum duration of approximately 30 ms to be detected.

4.8 External trigger output

The Kvaser Memorator R SemiPro can also be configured to send an external pulse on pin 4 of the 9 pin CAN2 connector. For further information on how to configure the Kvaser Memorator R SemiPro to send an external pulse, please refer to the Kvaser Memorator Tools online help.

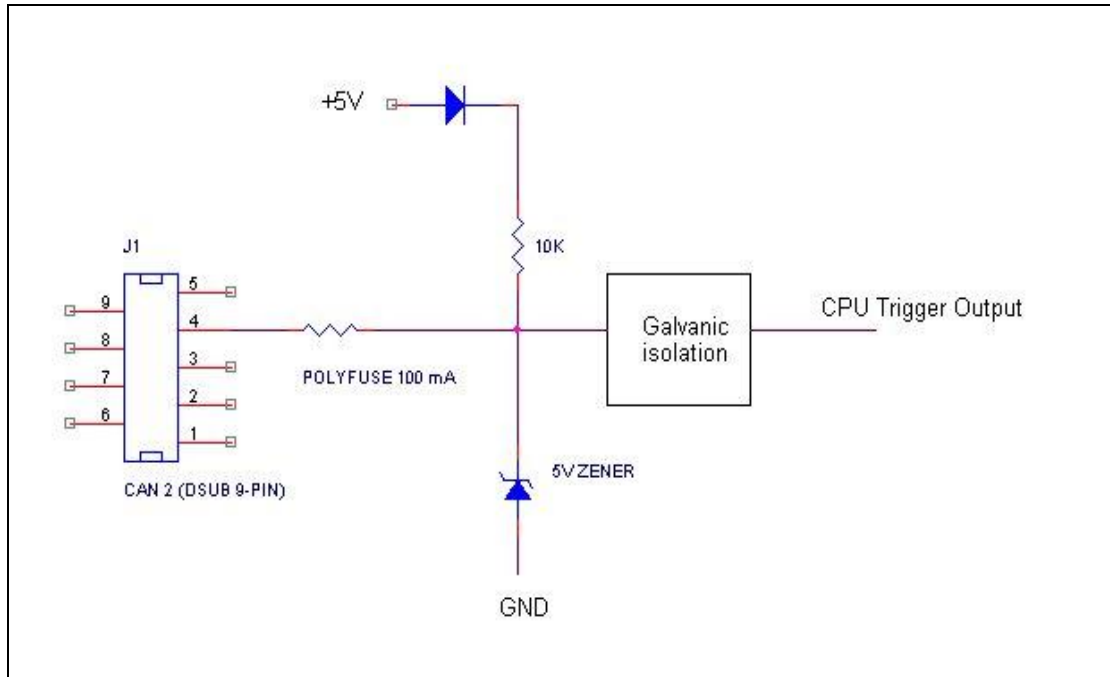


Figure 6. The trigger output inside the Kvaser Memorator R SemiPro.

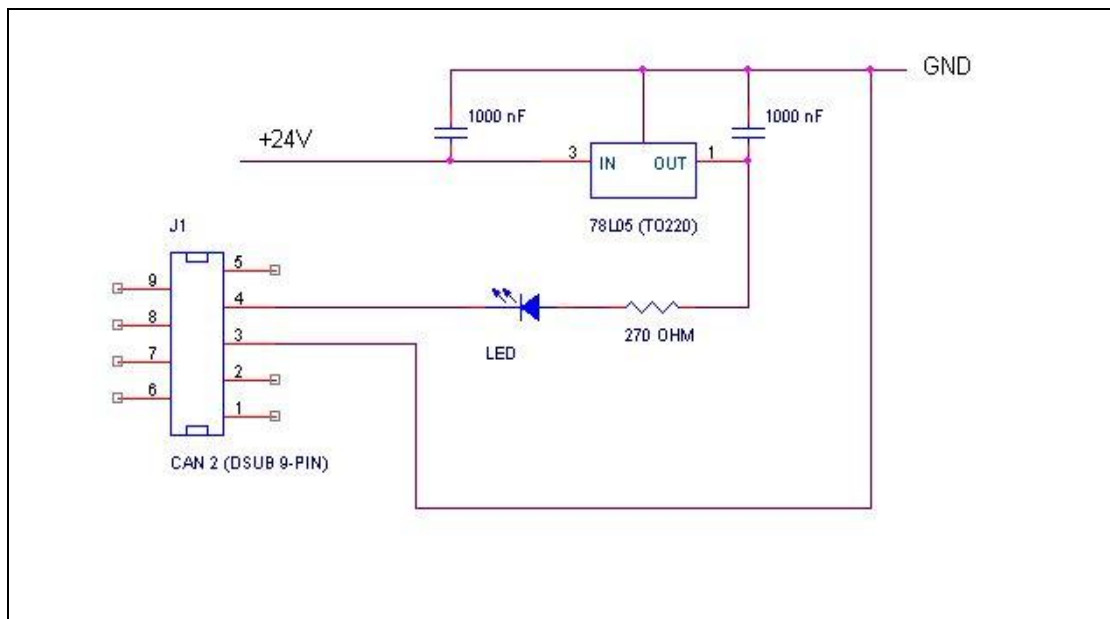


Figure 7. Sample circuit for connecting a LED to the trigger output.

5 How to use the Kvaser Memorator R SemiPro

The Kvaser Memorator R SemiPro can operate both as a high performance real time USB interface (USB-CAN mode) and as a data logger (logger mode). This section will describe how to use the different modes.

5.1 Use as a CAN interface

To use the Kvaser Memorator R SemiPro as a CAN interface; connect the unit to a free USB socket on your PC or USB hub.



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

5.2 Configure for logging

To prepare your Kvaser Memorator R SemiPro for logging:

1. Connect the unit to a free USB socket on your PC or USB hub.
2. Start the Kvaser Memorator Tools program and press the Connect button.

The device should immediately show a running light pattern on the LEDs.

5.3 Use as a logger

To use your Kvaser Memorator R SemiPro as a logger:

1. Ensure the unit has a valid configuration. Optionally, connect an external trigger switch to the CAN1 connector.
2. Optionally, connect the digital output pin on the CAN2 connector to your equipment.
3. Supply power on the CAN1 connector.

Logging will start based on the configuration downloaded to the unit. This could be immediately on power or delayed until a trigger condition is met.



If everything is OK, the green PWR LED should either blink quickly, or be illuminated 90% and dark 10% of the time. When CAN traffic is detected, the CAN1 and CAN2 LEDs should be illuminated in response.

5.4 Kvaser Memorator Tools

To log CAN traffic with the Kvaser Memorator R SemiPro, you need to create and download a configuration to the device. The Kvaser Memorator R SemiPro needs to be connected by the USB connector to a PC. Start the Kvaser Memorator Tools application and press the *Connect* button in the toolbar. If the LEDs on Kvaser Memorator R SemiPro are flashing in a "running light" pattern, the device is ready to communicate with the Kvaser Memorator Tools program.

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

5.5 Troubleshooting



- Use “Kvaser Hardware” in the Control Panel to verify that the computer really can talk to the Kvaser Memorator R SemiPro. Read out the firmware version. If the firmware version is all zeroes, there are communication problems.
- Verify that the disk is formatted. If in doubt, reformat the disk using the Kvaser Memorator Tools application.
- If configuration fails, verify that the Kvaser Memorator R SemiPro is in configuration mode when using the Kvaser Memorator Tools. The LEDs on the unit should flash in a “running light” pattern.
- Examine the pattern of flashing/glowing LEDs on the unit. Compare the observed pattern against those described in Table 2 and Table 3 of this document.
- If the LEDs are not flashing or glowing at all, check the power supply.

6 Appendices

In this section you will find technical information about the Kvaser Memorator R SemiPro and the device's connectors.

6.1 System requirements

- A USB interface: Use USB 2.0 HiSpeed for optimum results, although the device will also work with a USB 1.1 interface.

6.2 Technical data

In Table 4 below you will find the Kvaser Memorator R SemiPro's technical specifications.

Table 4. Kvaser Memorator R SemiPro Technical specifications

CAN Channels	2 (CAN 2.0A and 2.0B active).
CAN Transceivers (HS)	SN65HVD251 (Compliant with ISO 11898-2)
CAN Controller	Built into the M32C
Microcontroller	Renesas M32C
CAN Bit Rate	10 kbit/s to 1 Mbit/s
Timestamp resolution	2 μ s
Error Frame Detection	Yes, both channels.
Error Frame Generation	Yes, when used as a USB-CAN interface.
PC interface	USB 2.0. Supports HiSpeed (HS) at 480 Mbit/s. Compatible with USB 1.1 at 12 Mbit/s.
Power consumption	~ 5V and 130mA if powered through the USB connector and ~ 850mW if powered through the CAN connector.
External power	Power via the 15 pin DSUB or the 9 pin DSUB for channel 1. Minimum operating voltage 6.2 V DC (cold start) and 5.6 V DC (during operation). Maximum operating voltage 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 Kvaser support.)
Hardware configuration	Done by software (Plug & Play).
Dimensions (W x L x H)	31 x 220 x 19 mm (1.2 x 8.7 x 0.8 inches)



Operating temperature	-40 °C ... +85 °C
Weight	179 g including cables and connectors. The adapter cable will add another 77g.
Storage temperature	-40 °C ... +85 °C
Relative Humidity	0% ... 95% (non-condensing.)
External trigger	Available in 15 pin DSUB at pin 3 relative ground pin 1 or on CAN1 pin 4. The input is protected by a self-healing fuse and has a 1,5 kOhm pull-up to +5V. The firmware can detect both rising and falling edges. The allowed voltage is 0 – 5 V DC relative to channel 1 ground.
External output	Available in 15 pin DSUB at pin 5 relative to ground at pin 11 or on CAN2 pin 4. The output is a pull-down to ground and is protected by a self-healing fuse. The allowed voltage is 0 – 5 V DC.



The two CAN channels are galvanically separated. Therefore, when connecting both channels to the same bus, each channel's ground must be connected.



When running in temperatures below -30 °C (-20 °F), the **Time to live** setting must be set to 0 seconds in the logging configuration.

6.3 Performance

Table 5. Performance of the Kvaser Memorator R SemiPro

Kvaser Memorator R SemiPro	
RX performance per channel (when used as a CAN interface)	20000 messages/s
TX performance per channel (when used as a CAN interface)	20000 messages/s
Logging performance	20000 messages/s
Time stamp accuracy	2 μ s
Message filter support	Stop filters Pass filters Counting filters
Memory card	4GB, fixed
Upload of logged data	1.4 MB/s (when connected via USB 2.0 HiSpeed)
Galvanic isolation	Yes
Number of triggers	16
Startup time when used as a logger	500 milliseconds

6.4 Disk capacity

Each CAN message occupies 24 bytes in the log file. The following table gives an approximate value of the capacity of the built-in disk.

Table 6. Disk capacity

Disk size	Approximate capacity	Approximate time to fill the disk (at 500 messages per second)
4 GB	155,000,000 messages	46h

6.5 CAN connectors

The Kvaser Memorator R SemiPro has two CAN channels.

The device has a 15 pin DSUB (see Table 7). With the cable adapter, the connection is split into two standard 9 pin DSUB connectors with pinning as shown in Table 8 and Table 9.



The two ground connections for the two channels are galvanically separated in the unit.

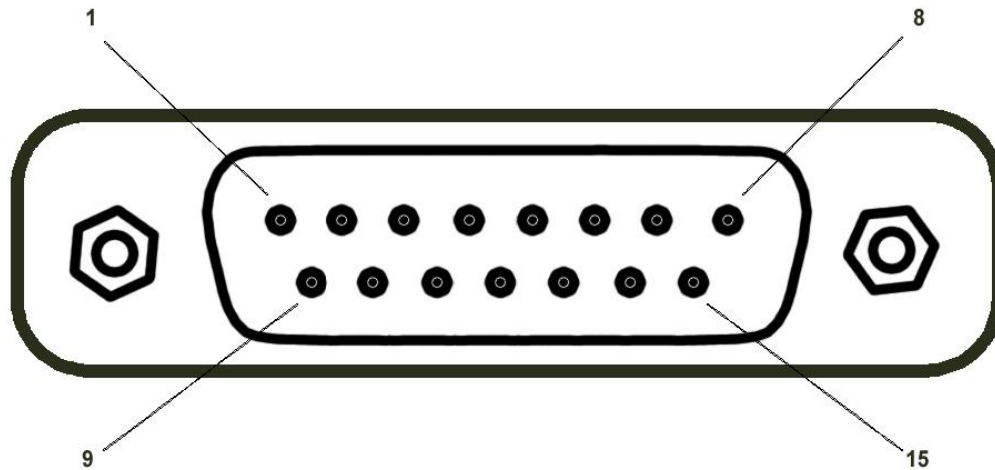


Figure 8. The 15 pin DSUB connector.

Table 7. 15 pin DSUB configuration

The 15 pin DSUB connector has the following pin configuration.
(Self-healing fuses protect all pins except GND and shield)

D-SUB pin number	Function
1	Power, relative GND on channel 1
2	CAN_L, channel 1
3	External trigger input, relative GND on channel 1
4	CAN_L, channel 2
5	External trigger output, relative GND on channel 2
6	Not connected
7	Not connected
8	Not connected
9	Ground, channel 1
10	CAN_H, channel 1
11	Ground channel 2
12	CAN_H, channel 2
13	Not connected.
14	Not connected.
15	Shield channel 2
Shell	Shield channel 1

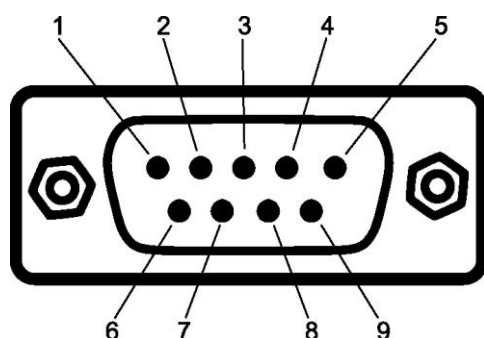


Figure 9. The 9 pin DSUB connector.

Table 8. 9 pin DSUB configuration (CAN channel 1)

The CAN channel 1 has the following pin configuration.
(Self-healing fuses protect Pins 2, 3, 4, 7 and 9.)

DSUB pin number	Function
1	Not connected
2	CAN_L
3	GND
4	External trigger input
5	Shield
6	Not connected
7	CAN_H
8	Not connected
9	Power supply to the device
Shell	Shield channel 1

Table 9. 9 pin DSUB configuration (CAN channel 2)

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

DSUB pin number	Function
1	Not connected
2	CAN_L
3	GND
4	External trigger output
5	Shield
6	Not connected
7	CAN_H

8	Not connected
9	Not connected
Shell	Shield channel 2



Always connect the ground pin on the DSUB to the ground of your CAN bus.

6.6 Updating the firmware

The Kvaser Memorator R SemiPro's firmware can be updated using the Kvaser Memorator Tools application or our standalone firmware update program. For instructions on using the Kvaser Memorator Tools application to update the device's firmware, read the application's online help.

To use the standalone firmware update program, connect the Kvaser Memorator R SemiPro to your PC with the USB cable. Double-click on the file "update.exe". A small application opens where you should see the device listed if correctly connected to your PC (see Figure 10). Select the device to program and click the *Next* button.

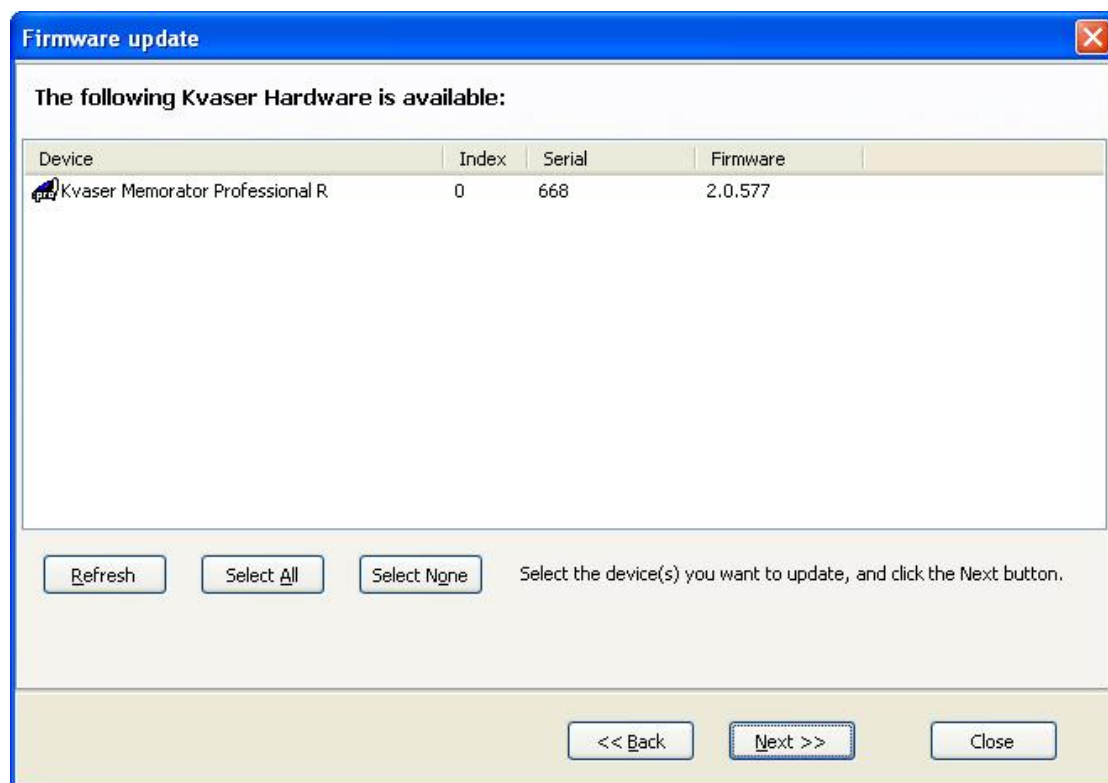


Figure 10. Firmware update, select device.

Click on the *Start Upgrade* button to start programming (see Figure 11). The programming takes approximately 20 seconds. The progress is printed on the screen and typically looks like Figure 11.

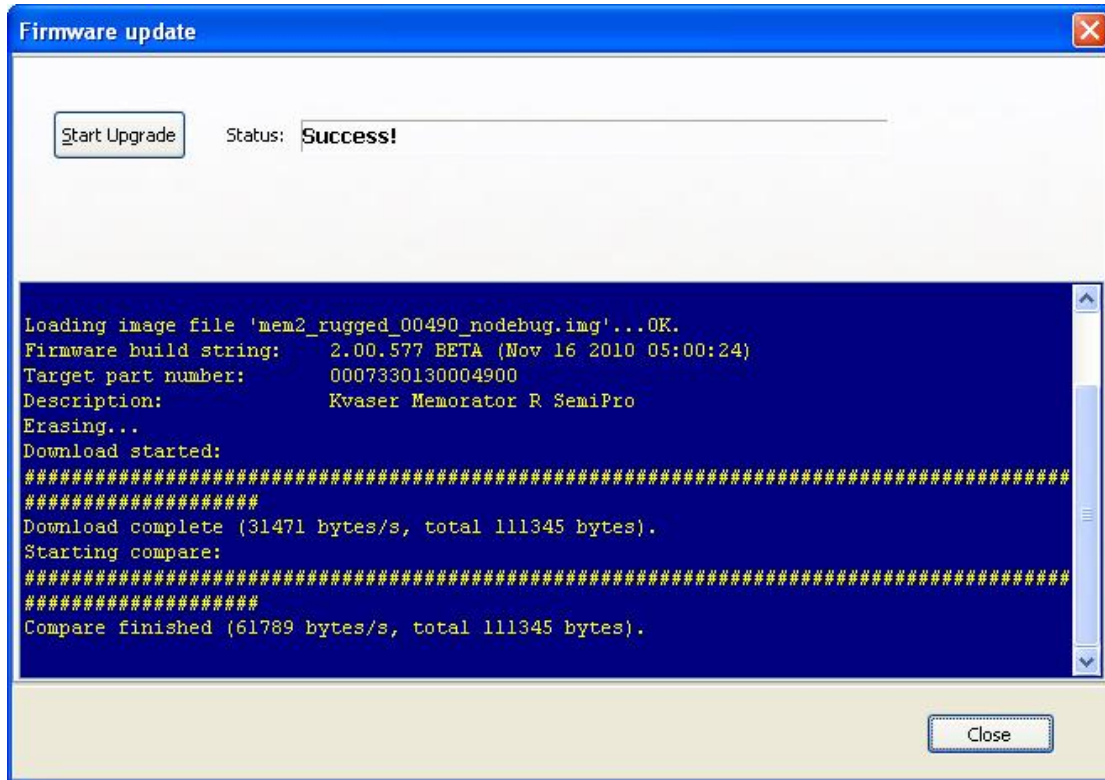


Figure 11. Firmware update, start upgrade.



No error messages should appear. If you see error messages, try to disconnect and reconnect the device, and then perform the operation again.

To verify that the firmware is updated,

- Double-click on “Kvaser Hardware” in the Control Panel. Select “Kvaser Memorator R SemiPro” in the tree view to the left and click on either channel. The firmware revision information appears in the right half of the window.

6.7 Required software versions

- You need at least driver (CANLIB) version 4.3 to use your Kvaser Memorator R SemiPro.
- Kvaser Memorator Tools must be version 2.7 or later.

6.8 CAN bus termination

Every CAN bus must be properly terminated at each end of the bus, typically with a 120 Ohm resistor. The Kvaser Memorator R SemiPro does not contain any CAN bus terminators. The inclusion of a terminator 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.

6.9 CAN bus overrun

Under extremely heavy load, high bit rates and long bursts of messages, the Kvaser Memorator R SemiPro 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 file is extracted. Some of the file formats will also indicate when the overrun occurred. (See the Kvaser Memorator Tools help for details about file formats.)



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

6.10 Daisy-chaining several interfaces

You can daisy chain several Kvaser Memorator R SemiPro 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 unit becomes full.

7 Frequently Asked Questions

Q: How many messages per second can Kvaser Memorator R SemiPro store on the disk?

A: The disk can typically accommodate 20000 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 Memorator R SemiPro be able to handle that?

A: Most likely. J1939 operates at 250 kbit/s, which means up to 2000 8 byte messages per second. In contrast, the measured logging capacity of the Kvaser Memorator R SemiPro is 20000 messages per second, which is around 10 times higher.

Q: How many hours will the built-in memory card last?

A: The duration you can log depends on the CAN bus load. To get a feeling for the numbers involved, see section Disk capacity on page 21.

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

A: If the logger was interrupted while writing to the disk, the device might, on certain rare occasions, need a long time to extract the list of files. This is because the software needs to rebuild certain internal data structures first. Please, be patient – eventually the list of files will appear.

8 Legal acknowledgements

8.1 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-LEVER SYSTEM, WHICH MAY BE DEFECTIVE.



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

8.2 EMC compliance statement

EMC Tests

The equipment has been tested for compliance with the EN61000-6-3:2007 (emission) and the EN 61000-6-2:2005 (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. NA for 490 in all details

8.3 WEEE compliance statement



This product is sold in compliance with the directive 2002/96/EC of the European Parliament on Waste Electrical and Electronic Equipment (WEEE.)

8.4 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.)

8.5 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.

Linux® is the registered trademark of Linus Torvalds in the United States and 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.

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

9 Document revision history

Revision	Date	Changes
1	2010-11-23	Original revision
2	2011-01-14	Updated supported OS list