User's Guide

SerialGhost
SerialGhost Pro

Check http://www.keelog.com/ for the latest version of this document.

Table of contents

Getting started

Already familiar with *SerialGhost* data loggers?

    ⇒ Configure your device and start logging in 5 simple steps: section **Quick Start**

New to *SerialGhost* data loggers?

    ⇒ First, configure the serial bus parameters: section **Configuration**
    ⇒ Then learn about recording data: section **Recording data**
    ⇒ Finally, retrieve the recorded data: section **Viewing recorded data**

Questions or problems?

    ⇒ Go through the **Troubleshooting** section.

Introduction

About the product

The *SerialGhost* and *SerialGhost Pro* are compact RS-232 and serial bus loggers with high-capacity internal memory, which may be accessed as a USB flash drive or USB Virtual COM port (*SerialGhost Pro*). Bidirectional data flowing through the serial bus will be captured and stored on the internal flash drive in a special file. This data may be retrieved by switching to flash drive mode. The logger will pop up as a removable drive, giving instant access to all captured data. The *SerialGhost* does not require any dedicated software or drivers.

The *SerialGhost* and *SerialGhost Pro* have an additional built-in time-stamping module and battery. This enables adding time and date information to the log file. Thanks to the internal battery, the time and date persist even when the device is not powered.

The *SerialGhost Pro* is an enhanced version of the *SerialGhost* with Virtual COM port connectivity. It may be controlled by commands sent over the serial port, allowing accessing the stored data and configuring the device. A special application named *KL Tools* is delivered free of charge to demonstrate this functionality.

Features

- Logs asynchronous serial transmission (RS-232 compatible)
- Baud rates up to 115200 bps
- Logs 2 streams simultaneously (RX and TX)
- High-capacity internal flash memory, accessible as a USB removable drive
- Powered from a USB port, or external power supply
- No software or drivers required, Windows, Linux, and Mac compatible
- USB flash drive mode
- Time and date stamping
- Built-in battery
- Virtual COM port mode (*SerialGhost Pro*)

Requirements

- Asynchronous serial bus with RS-232 logic levels (+/-12V)
- Operating system with USB Mass-Storage device support
- 5V DC power source (external power supply, or USB port)
- Optionally *MS Windows* (only for running *KL Tools*)

Quick Start

This section contains concise information on basic operation of the *SerialGhost* and *SerialGhost Pro*. If you need detailed instructions, please refer to sections **Configuration**, **Recording data**, and **Viewing recorded data**.

Before you start, make sure you have the following information about the serial bus you want to log data from:

- Baud rate (bits per second)
- Number of bits per transfer (usually 8)
- Parity bit configuration (usually not used)
- Number of stop bits per transfer (usually 1)

Step 1. Open a text editor (such as *Notepad*) and create a file named CONFIG.TXT. This file will later be used to configure the device. Use the following template:

```
Baudrate=9600
Bits=8
Parity=No
StopBits=1
```
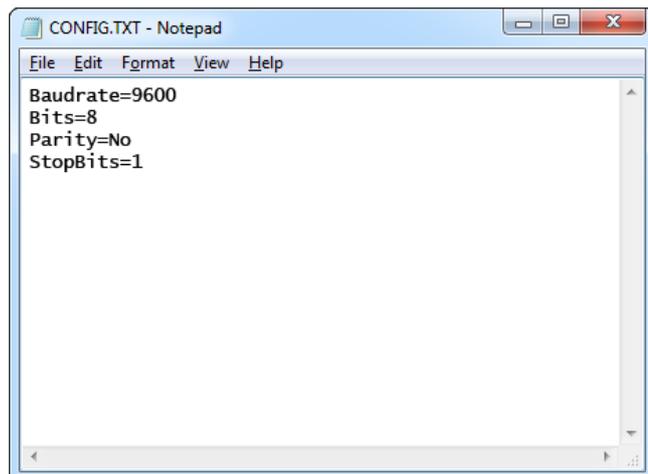
Replace *Baudrate* with the actual baud rate in bits per second of the serial bus you want to log data from. Replace *Bits* with the number of bits per transfer (5…8). Provide the parity check using one of the following strings: *No, Even, Odd, Space,* or *Mark*. Replace *StopBits* with the number of stop bits per transfer (1, 1.5, or 2).

Finally, save the configuration file as CONFIG.TXT.

Step 2. Connect the device and enable flash drive mode.
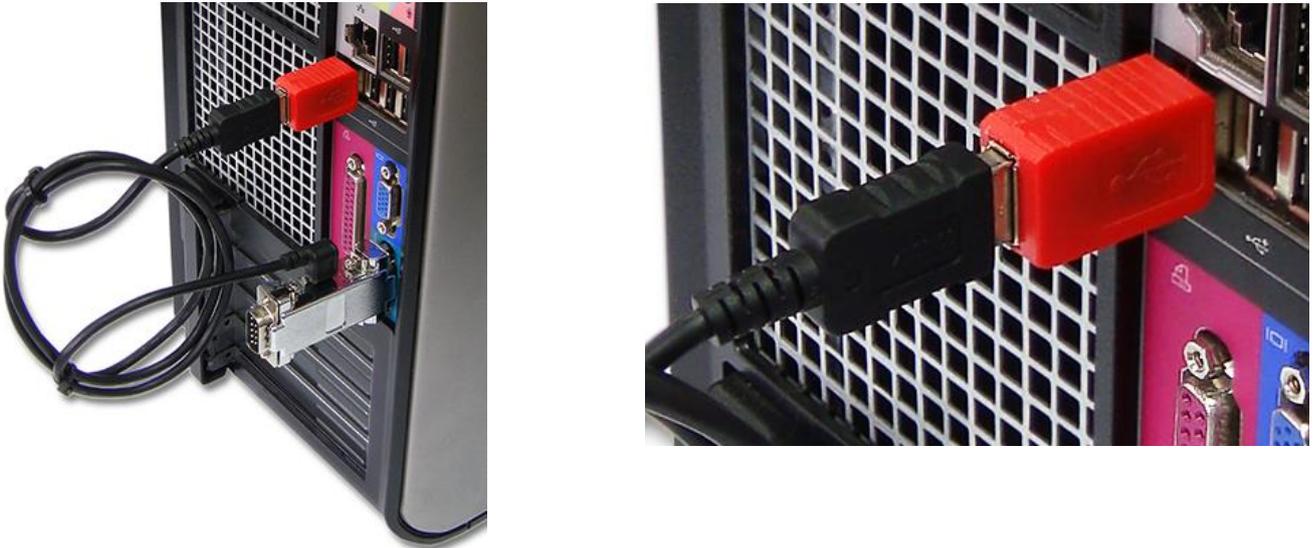
Take the supplied USB cable and connect it to the micro-USB port on the logger's side. Connect the USB cable to a free USB port **using the supplied red USB Key**.

After a few seconds, the device will automatically get detected as a mass storage device, and pop up as a removable drive.

Step 3. Copy the configuration file CONFIG.TXT to the logger's flash drive.
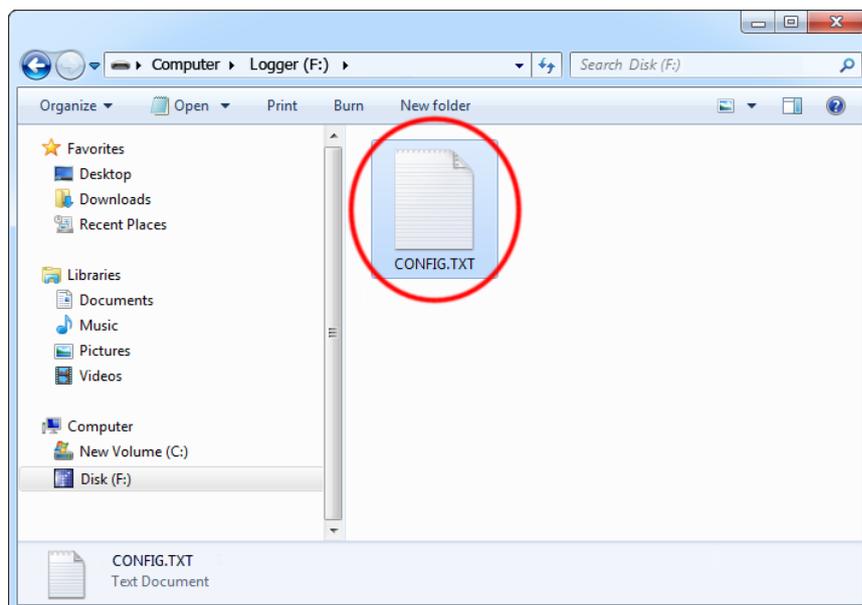
Then, safely remove the device, and disconnect it from the USB port. Disconnect the USB cable as well.

Step 4. To start logging, connect the logger in-line on a serial bus, powering the device through the micro USB port.
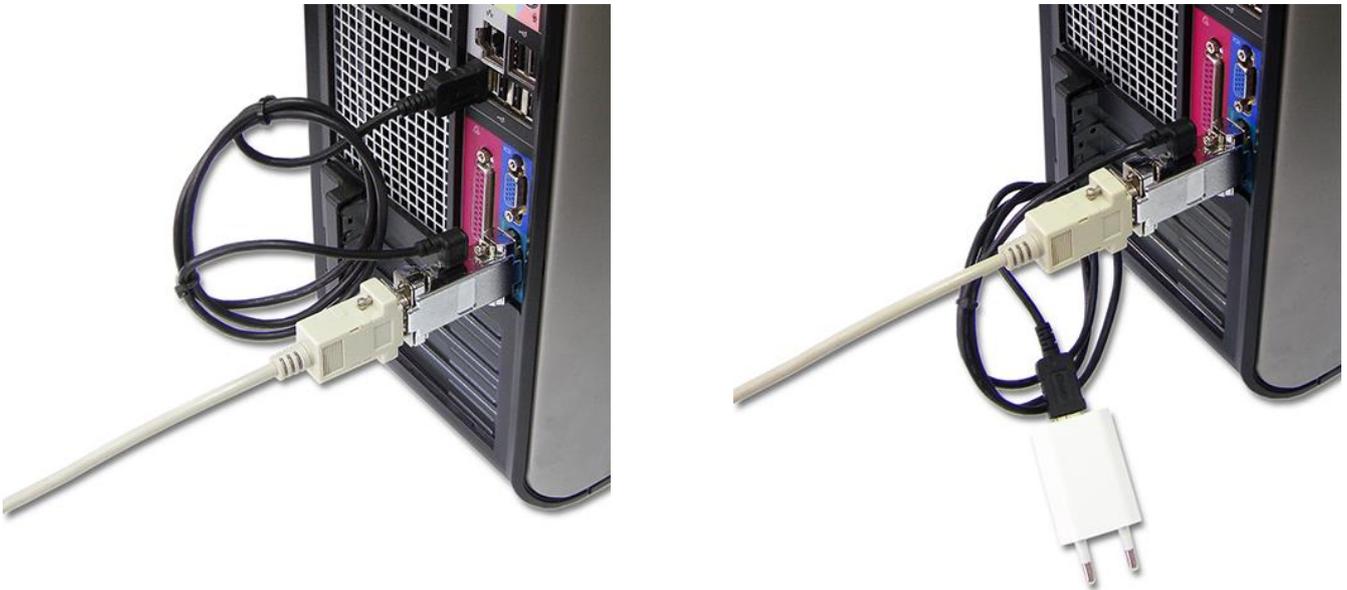
The device may be powered from a standard USB port. **Do not** use the red USB key.

Alternatively, an external **+5V DC** (min. 200 mA) power supply may be used to power the device through the micro-USB port (cell phone chargers with USB connectors are well suited for this).

Step 5. To retrieve the logged data, **enable flash drive mode using the red USB Key**, just like in step 2. A removable drive will pop-up, containing the file LOG.TXT with recorded data.
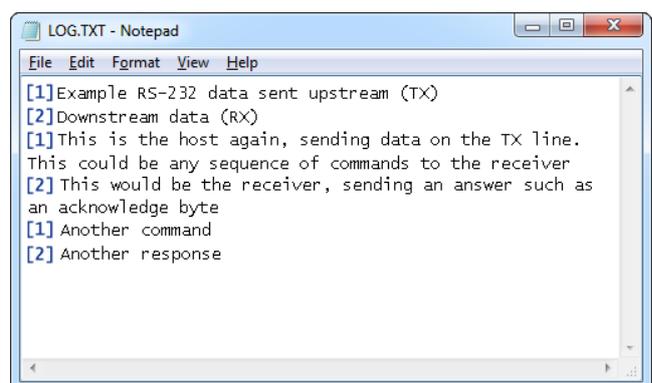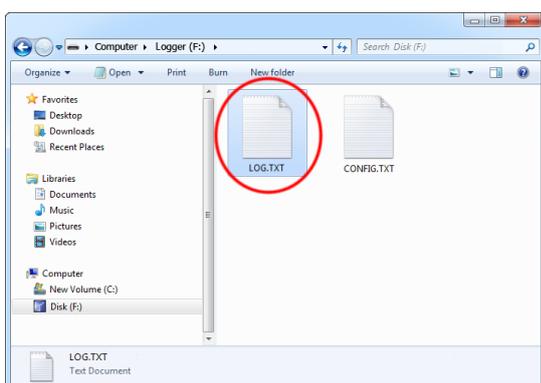
The upstream data (TX) and downstream data (RX) will be differentiated by the markers [1] and [2] interleaved in the log file.

Configuration

The *SerialGhost* and *SerialGhost Pro* may be configured through the file CONFIG.TXT, placed in the flash drive root folder. Use any text editor to prepare such a configuration file, containing the following text:

```
Baudrate=9600
Bits=8
Parity=No
StopBits=1
```

Copy this file to the root folder in flash drive mode. The new configuration will be loaded on next power-up.
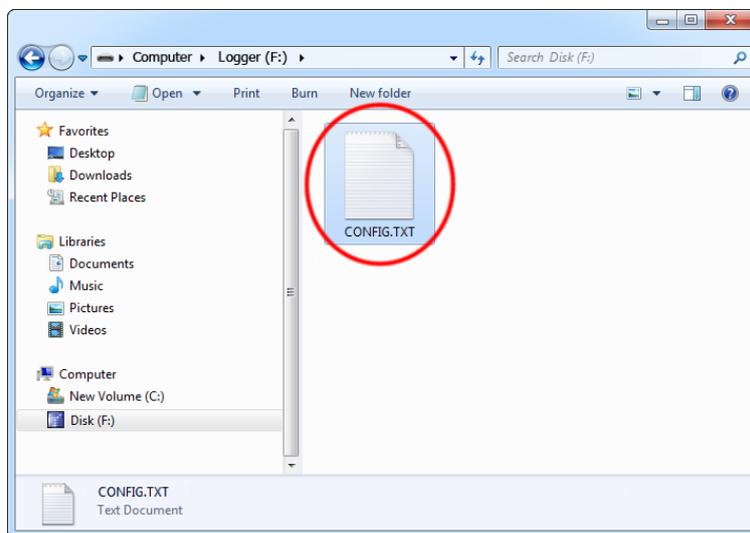
The following list presents the most common configuration options. All variable and value strings are case insensitive.

Baudrate sets the baud rate in bits per second of the monitored serial bus. Range is 300 bps to 115,200 bps. Default value is *9600*.

Bits sets the number of bits per transfer of the monitored serial bus. Possible values are *5*, *6*, *7*, *8*. Default value is *8*.

Parity sets the parity bit type of the monitored serial bus. Possible values are *No*, *Even*, *Odd*, *Space*, *Mark*. Default value is *No*.

StopBits sets the number of stop bits per transfer of the monitored serial bus. Possible values are *1*, *1.5*, *2*. Default is *1*.

Timestamping configures the built-in time- and date-stamping module. Allowed values are *Yes* (timestamping enable) and *No* (timestamping disabled). Default is *Yes*.

TimestampInterval sets the interval of serial bus inactivity in seconds, that will trigger a new time-stamp being logged. Range is 1 second to 9999 seconds. Default value is *10*.

DisableLogging allows to disable logging. Allowed values are *Yes* (logging disabled) and *No* (logging enabled). Default value is *No*.

LogMode sets the logging mode. Possible values are *Bin* (data is logged as binary data), *Hex* (data is logged as hexadecimal numbers), *Dec* (data is logged as decimal numbers). Default value is *Bin*.

Separator sets the separator character between data values in logging mode *Dec/Hex*. Possible values are *None*, *Space*, *Comma, Tab, Newline*. Default is *Space*.

LogStream configures which serial streams are to be logged. Possible values are *Both* (both RX and TX get logged), *Rx* (only Rx is logged), *Tx* (only Tx is logged). Default is *Both*. If the mode is set to *Both*, the *[1]* and *[2]* markers will be used to differentiate between streams.

UsbMode allows to switching between flash drive mode and Virtual COM mode (Pro version only). Allowed values are *Flash* (flash drive mode) and Com (Virtual COM mode). Default value is *Flash*.

A full list of parameters is available in section **Configuration files**.

Recording data

Record mode is the default mode of operation for the *SerialGhost* (*SerialGhost Pro*) data logger. In record mode, the device will silently monitor the bidirectional data flow on the serial bus and store the captured data on the internal flash drive in file LOG.TXT.

The *SerialGhost* (*SerialGhost Pro*) must first be configured to the appropriate serial bus parameters, such as baud rate. Refer to section **Configuration** for detailed instructions.

Installation of the *SerialGhost* in record mode is quick and easy, no software or drivers are required. Simply plug it in-line on the serial bus, using the DB-9 connector. The device may be powered from a standard USB port, using the supplied cable. Alternatively, an external **+5V DC** (min. 200 mA) power supply may be used to power the device through the micro-USB port (cell phone chargers with USB connectors are well suited for this).


*SerialGhost* in record mode powered from a USB port.

SerialGhost in record mode powered by an external 5V DC (min. 200mA) power supply.

Viewing recorded data

Once serial data has been recorded, it may be retrieved on any computer with a USB port. This is done by switching to flash drive mode. Take the supplied USB cable and connect it to the micro-USB port on the logger's side. Connect the USB cable to a free USB port **using the supplied red USB Key**.
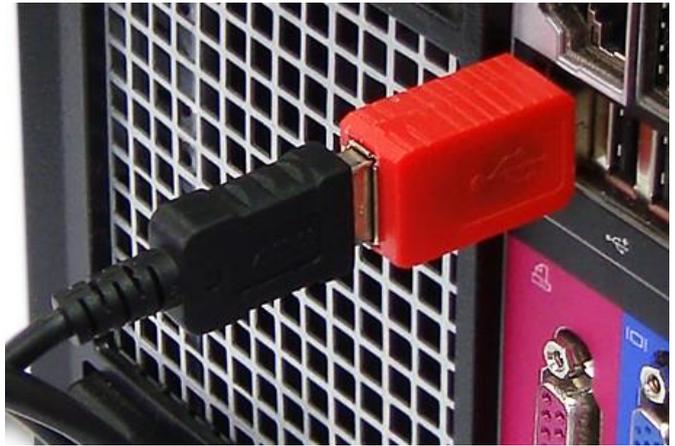
After a few seconds, the *SerialGhost* (*SerialGhost Pro*) will automatically get detected as a mass storage device, and pop up as a removable drive. The operating system will use the standard built-in mass storage driver (*MS Windows* in the following examples).
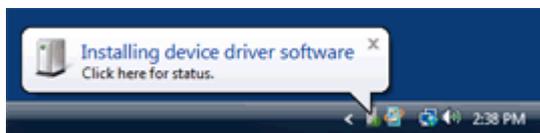
Depending on the drive letters available, the device will be visible as a new drive, for example F:. Use the systems file manager to browse this disk (for example *Explorer*).
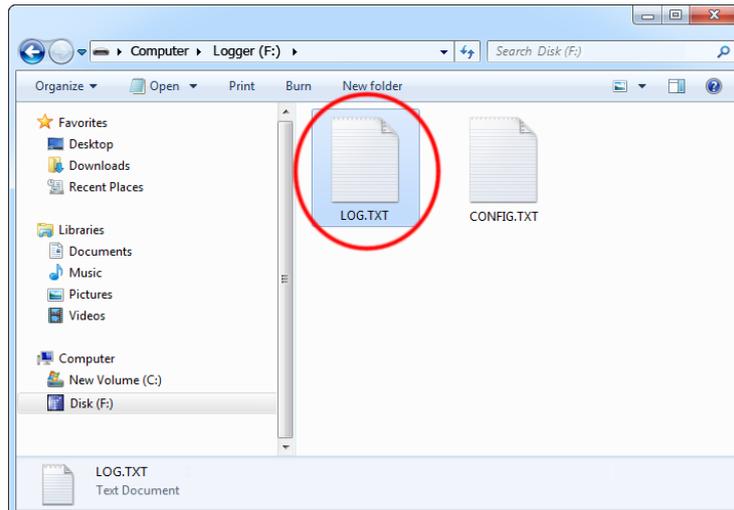
The removable disk will contain the file LOG.TXT with a text log of all captured data. The data is stored in the same format as appearing on the serial bus, without any encoding. The upstream data (TX) and downstream data (RX) will be differentiated by the markers [1] and [2] interleaved in the log file. The *SerialGhost* will also interleave time-stamps. The file LOG.TXT can be viewed and searched with any text editor, such as *Notepad* or *MS Word*.
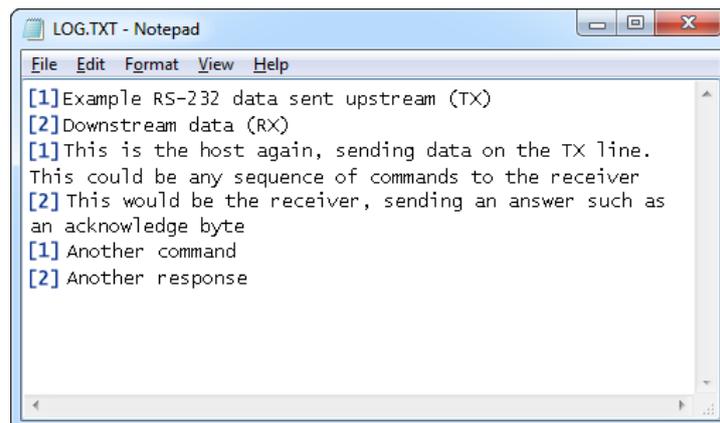
Switching back to record mode can be achieved by a safe software removal of the flash disk. Use the systems standard disk removal procedure. For *MS Windows*, left-click on the *Safe Removal* icon in the system tray and select the appropriate drive. Then reconnect the *SerialGhost* to the USB port, however without the supplied USB Key.

To get the most out of the *SerialGhost*, install the supplied application *KL Tools*. Go to section **Using KL Tools** to find out more.

Clock configuration

It is necessary to configure the built-in clock module for getting correct date and time-stamps. To do this, a text file named TIME.TXT should be prepared with the following format:

```
Year=2019
Month=4
Day=1
Hour=12
Minute=34
Second=56
Format=PM
```
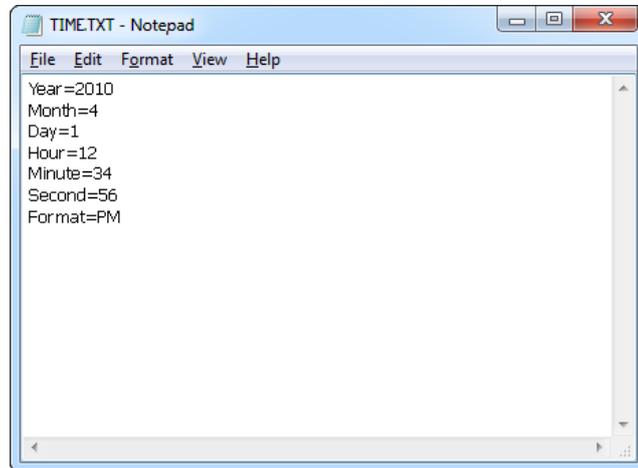

The fields should contain the current time and date. The field *Format* allows distinguishing between A.M., P.M., and 24-hour time (use the value *AM*, *PM*, or *24*). After the file has been prepared, switch to flash drive mode and copy the file TIME.TXT to the root folder of the flash disk. The supplied USB Key has to be used to switch to flash drive mode.
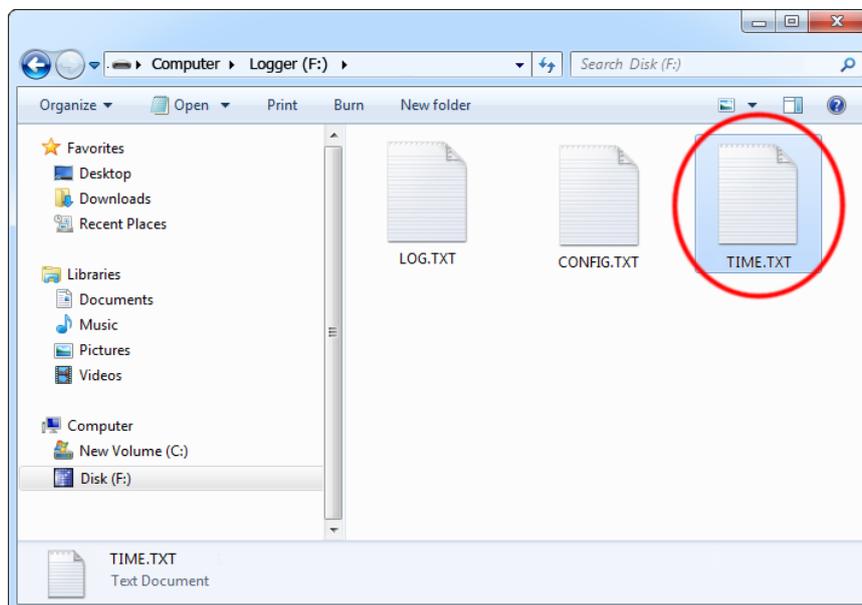
After copying the file, safely remove the flash drive and disconnect the USB Key. The new clock configuration will be loaded during the next power-up.

The clock configuration file must be named TIME.TXT and must be placed in the root folder. Variable and value strings are case insensitive, however they must match the options listed below.

- *Year* sets the clock year value. Valid range is from 2000 to 2099.
- *Month* sets the clock month value. Valid range is from 1 (January) to 12 (December).
- *Day* sets the clock day value. Valid range is from 1 to 31. If the specified day exceeds the maximum number of days in the specified month, the next valid day value will be chosen.
- *Hour* sets the clock hour value. Valid range is from 1 to 12 for 12-hour time (A.M./P.M.), and 0 to 23 for 24-hour time.
- *Minute* sets the clock minute value. Valid range is from 0 to 59.
- *Second* sets the clock second value. Valid range is from 0 to 59.
- *Format* sets the time format. Valid values are *AM*, *PM*, and *24*. If *AM* is chosen, the 12-hour format is selected and the specified hour is treated as before noon. If *PM* is chosen, the 12-hour format is selected and the specified hour is treated as afternoon. If *24* is chosen, the 24-hour format is selected and the specified hour is treated as 24-hour format.

Sample TIME.TXT for 12-hour time:

```
Year=2019
Month=10
Day=25
Hour=5
Minute=51
Second=43
Format=PM
```

Sample TIME.TXT for 24-hour time:

```
Year=2019
Month=10
Day=25
Hour=17
Minute=51
Second=43
Format=24
```

A full list of parameters is available in section **Configuration files**.

Virtual COM mode (SerialGhost Pro only)

Virtual COM mode is a special mode available in the *SerialGhost Pro* in which the device connects as a serial COM port. The CDC (Communications Device Class) driver class will be used, which is built-in most operating systems. To enable Virtual COM mode, the following entry needs to be present in CONFIG.TXT (refer to the **Configuration** section for details):

```
UsbMode=Com
```

Make sure the CONFIG.TXT file is properly saved in the flash drive root folder. Upon next power-up, the device will connect as a Virtual COM port.

The simplest way of accessing the device in Virtual COM mode is using the application *KL Tools* (refer to the **Using KL Tools** section for details). Upon start-up select the proper device:

Then, use the wizard to access the device using Virtual COM mode. Finally a window will appear, allowing full control of any devices connected in Virtual COM mode. Adding a device will scan all available serial ports, searching for compatible devices.
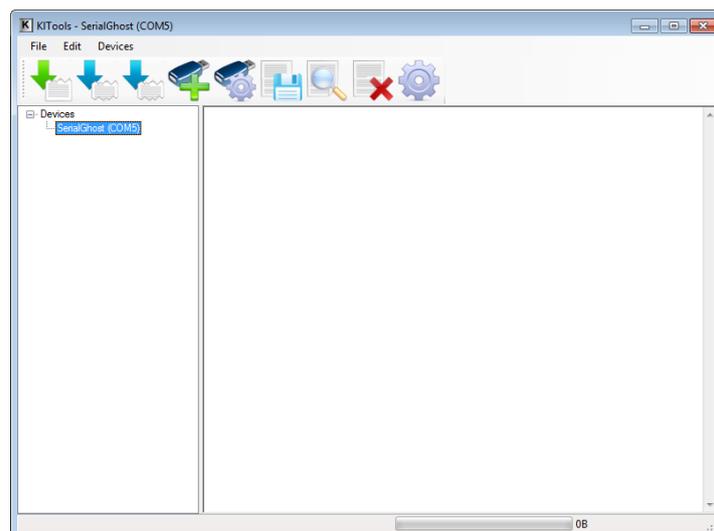
KL Tools will guide through all features of the device with its intuitive user interface.

Switching the device back to Flash drive mode can be achieved in three ways:

1) For a single session, by using the red USB key during powerup
2) Permanently, by using the device configuration dialog window in *KL Tools*
3) Permanently, by using the red USB key and changing the following entry in CONFIG.TXT to:

```
UsbMode=Flash
```

Configuration files

The *SerialGhost* (*SerialGhost Pro*) is configured via two text files placed on the internal flash drive:

- CONFIG.TXT   (configures serial bus parameters)
- TIME.TXT   (configures the internal clock for time-stamping)

These files should contain configuration parameters, placed in successive lines in the following format:

```
Parameter1=Value
Parameter2=Value
Parameter3=Value
…
```

These configuration files must be placed in the device internal memory using flash drive mode. Device configuration can be performed by *KL Tools*, or manually by the user. *KL Tools* performs the same operation as would be done manually, that is creates the configuration files, requests switching to flash drive mode, and copies the files to the flash disk.

Creating configuration files manually may be necessary on systems not supported by *KL Tools*, such as *Mac OS* or *Linux*.

CONFIG.TXT

The file CONFIG.TXT is responsible for configuring serial bus parameters.

Parameter	Values	Example	Description
Baudrate	Baud rate in bps (default 9600)	Baudrate=115200	Serial bus baud rate in bits per second (300…115200).
Bits	5 6 7 8 (default)	Bits=7	Number of bits per transfer on the monitored serial bus.
Parity	No (default) Even Odd Space Mark	Parity=Even	Type of parity bit on the monitored serial bus.
StopBits	1 (default) 1.5 2	Parity=1	Number of stop bits per transfer on the monitored serial bus.
Timestamping	Yes (default) No	Timestamping=Yes	Time-stamping disable flag.
TimestampInterval	Timestamp interval in seconds (default 10)	TimestampInterval=1	Interval of bus inactivity which will result in a time-stamp being added.
DisableLogging	Yes No (default)	DisableLogging=Yes	Data logging disable flag.

| Separator	None Space (default) Comma Tab Newline	Separator=Comma	The separator between data values in Dec/Hex modes.
LogMode	Bin (default) Hex Dec	LogMode=Hex	Data format in log file.
LogStream	Both (default) Rx Tx	LogStream=Tx	Selection of serial data streams to be logged.
UsbMode	Flash (default) Com	UsbMode=Com	USB mode configuration setting, allowing switching between flash drive mode and Virtual COM mode. Effective only on device startup.

TIME.TXT

The file TIME.TXT is responsible for configuring the built-in real-time.

Parameter	Values	Example	Description
Year	Year value (range 2000…2099, default 2010)	Year=2019	Year setting (range 2000 to 2099).
Month	Month value (range 1…12, default 1)	Month=10	Month setting (1 is January, 12 is December).
Day	Day value (range 1…31, default 1)	Day=15	Day setting (range 1 to 31).
Hour	Hour value (range 1…12 or 0…23, default 1)	Hour=6	Hour setting (range 1 to 12 for A.M./P.M. format and 0 to 23 for 24-hour time).
Minute	Minute value (range 0…59, default 0)	Minute=37	Minute setting (range 0 to 59).
Second	Second value (range 0…59, default 0)	Second=49	Second setting (range 0 to 59).
Format	AM PM (default) 24	Format=24	Time format setting. If AM is chosen, the 12-hour format is selected and the specified hour is treated as before noon. If PM is chosen, the 12-hour format is selected and the specified hour is treated as afternoon. If 24 is chosen, the 24-hour format is selected and the specified hour is treated as 24-hour format.

Using KL Tools

KL Tools is a free application delivered with all *SerialGhost* series devices. *KL Tools* assists in configuring a *SerialGhost* and retrieving the recorded data it contains. It is not necessary to operate the device, but may speed up usage by its intuitive user interface.

KL Tools is available on the CD-ROM attached with the device. Installing *KL Tools* is straightforward. Simply follow the installation wizard and answer standard questions. When initialized, *KL Tools* will ask for the device type, and assist in configuring the device and retrieving the recorded images. There is no special knowledge required to use *KL Tools* – simply follow the instructions displayed by the application.

Copyright © www.keelog.com
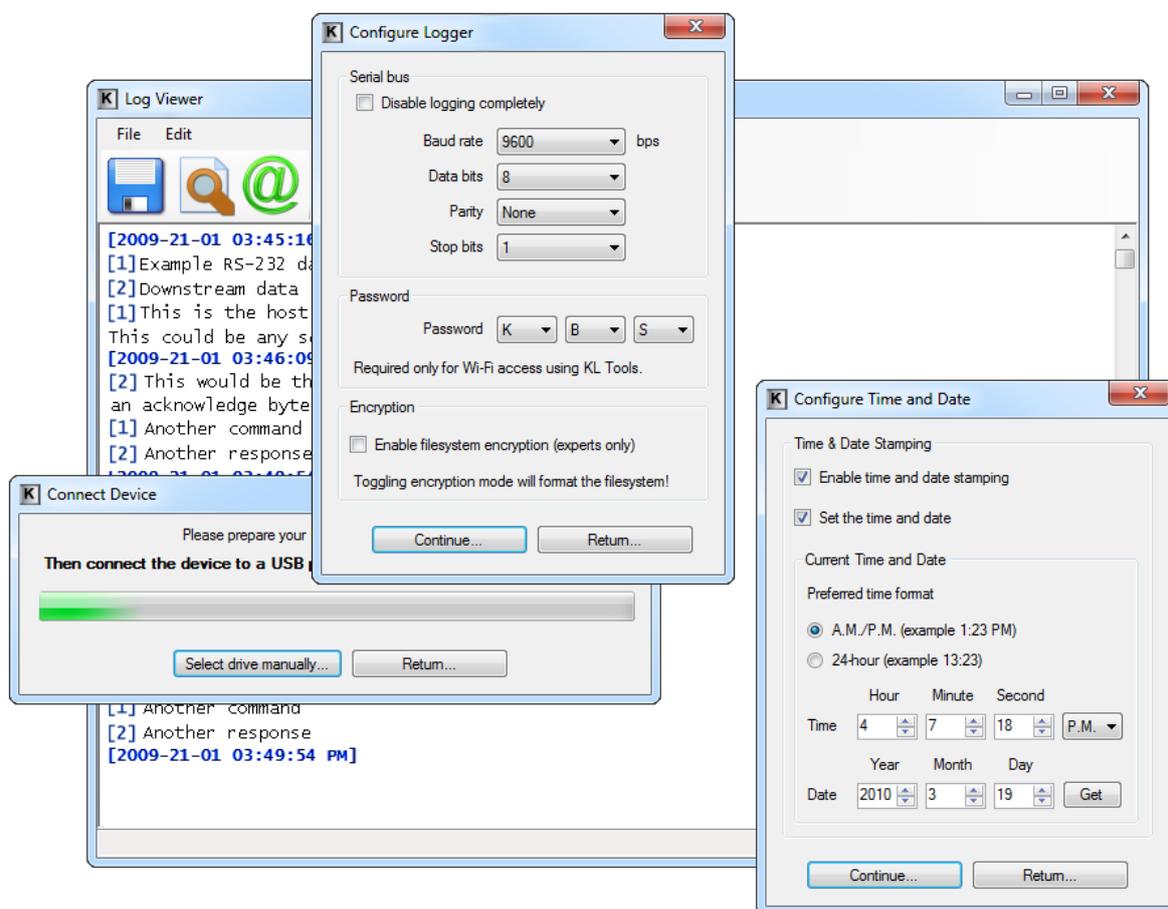
Specifications

Power supply	4.5 V – 5.5 V DC
Max. power consumption	65 mA (0.33 W)
Maximum continuous log speed (approx.)	100 kB/s (both streams)
Data retention	100 years
Device support	Asynchronous serial devices operating at RS-232 logic levels (+/-12V)
Maximum log read speed	1 MB/s
Dimensions including connectors (L x W x H)	62 mm x 31 mm x 16 mm (2.4" x 1.2" x 0.6")

Troubleshooting

The *SerialGhost* (*SerialGhost Pro*) will **not** work with the following hardware configurations:

1. Synchronous serial buses
2. Devices operating at speeds higher than 115,200 bps
3. Serial buses using logic levels different than +/-12V
4. Serial devices using non-standard DB-9 pinouts
5. SPI, I2C, TWI, USB, PS/2, SATA, FireWire, etc. buses

The SerialGhost does not switch to flash drive mode

Please check the following:
1. Are you using the delivered USB Key to connect the device to a USB port?
2. Does the operating system support removable USB flash disks?
3. Have you checked the drive list?
4. Have you tried on a different USB port?
5. Have you checked on a different computer?

I can't find any data after switching to flash drive mode

Please check the following:
1. Have you powered the device from the USB port while recording?
2. Did you properly configure the device through CONFIG.TXT?
3. Have you actually transmitted any data over the serial bus while recording?

The SerialGhost always shows up as a removable drive

Connect the USB plug directly to a USB port, without the USB Key.

Problems with time-stamps

Set the correct time by creating a clock configuration file TIME.TXT. Make sure you have not disabled time-stamping. Refer to the **Clock configuration** section for detailed instructions.

The SerialGhost Pro does show up as a Virtual COM device

Please check the following:
1. Have you configured the device to Virtual COM mode? Refer to the **Virtual COM mode** section for detailed instructions.
2. Does the operating system support Virtual COM devices (CDC support)?
3. Have you tried on a different USB port?
4. Have you checked on a different computer?

KL Tools cannot connect to the device ("Device not found!" error)

The *SerialGhost Pro* has probably not enumerated properly as Virtual COM device. Please check the following:
1. Have you configured the device to Virtual COM mode? Refer to the **Virtual COM mode** section for detailed instructions.
2. Does the operating system support Virtual COM devices (CDC support)?
3. Have you tried on a different USB port?
4. Have you checked on a different computer?

I've checked everything, nothing helps!

If you are still experiencing problems, please do the following:

1. Check if the problem appears with a different baud rate and serial bus configuration.
2. Check if the problem appears with a different serial bus driver.
3. Check if the problem appears using a different USB port.
4. Contact the dealer you have purchased the device from. Please supply all necessary information (hardware type, model and manufacturer, OS type and version, and a short description of the problem).

Legal disclaimer

No responsibility is taken for any damage, harm or legal actions caused by misuse of this product. The user should follow the guidelines contained in this document, otherwise no liability will be assumed. It is the user's responsibility to obey all effective laws in his/her country, which may prohibit usage of this product.

For more information, visit the following websites:

http://www.keelog.com/

http://www.airdrivewifi.com/