

## User's Guide

# **SerialGhost SerialGhost TimeKeeper**

## **DB-9/DB-25**



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## 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* is a compact RS-232 and serial bus logger with a memory capacity of 2GB, that may be accessed as a USB Flash drive. 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 TimeKeeper* has an additional built-in time-stamping module and battery. This enables it to add 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.

### *Features*

- Logs asynchronous serial transmission (RS-232 compatible)
- Baud rates up to 115200 bps
- Logs 2 streams simultaneously (RX and TX)
- 2 Gigabytes internal memory
- 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 (*TimeKeeper* version)
- Built-in battery (*TimeKeeper* version)

### *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 XP/Vista/7/8* (only for running *KL Tools*)

## Quick Start

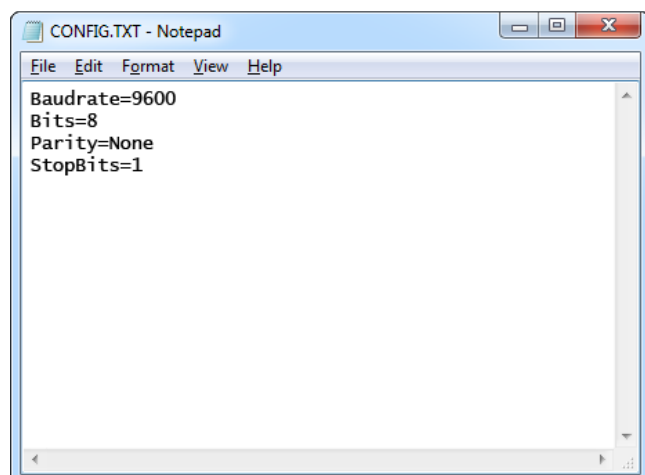
This section contains concise information on basic operation of the *SerialGhost*. If you need detailed instructions, please refer to sections **Configuration**, **Recording data**, and **Viewing recorded data**.

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:

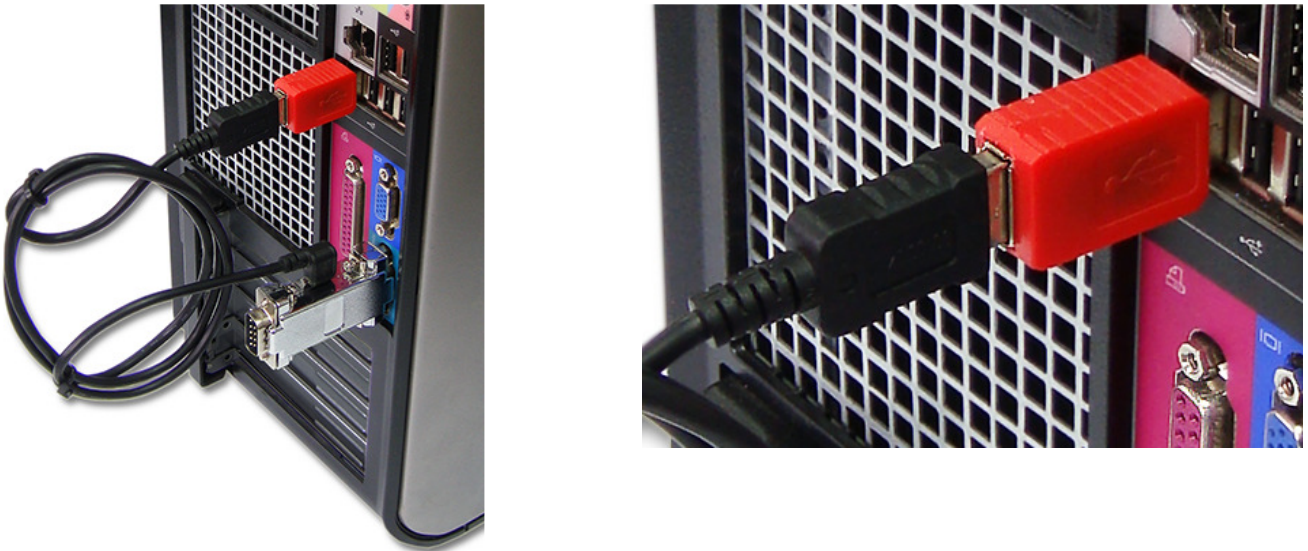
```
Baudrate=9600  
Bits=8  
Parity=None  
StopBits=1
```



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: *None*, *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.

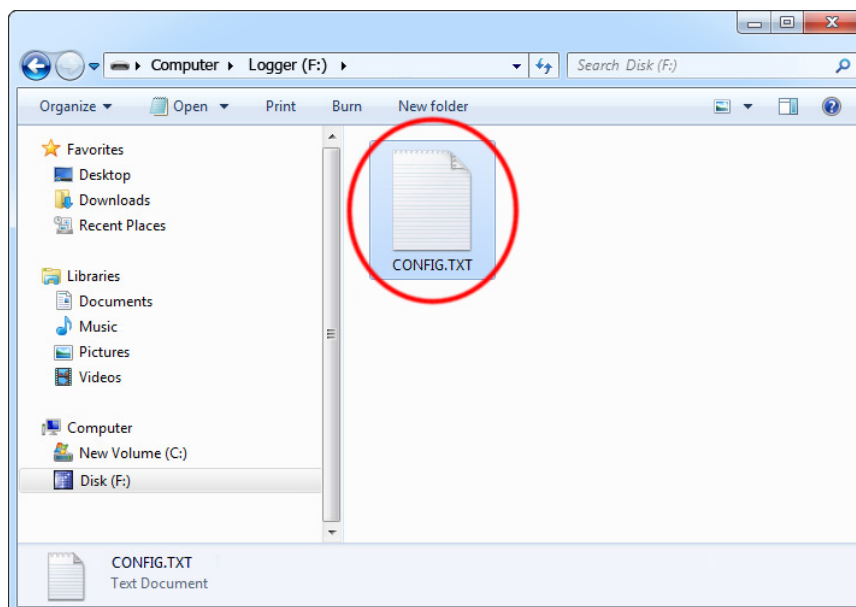
**Step 2.** Connect the device and enable Flash Drive mode.



Take the supplied USB cable and connect it to the mini-port on the logger's side. Connect the USB cable to a free USB port **using the supplied red USB Key**.

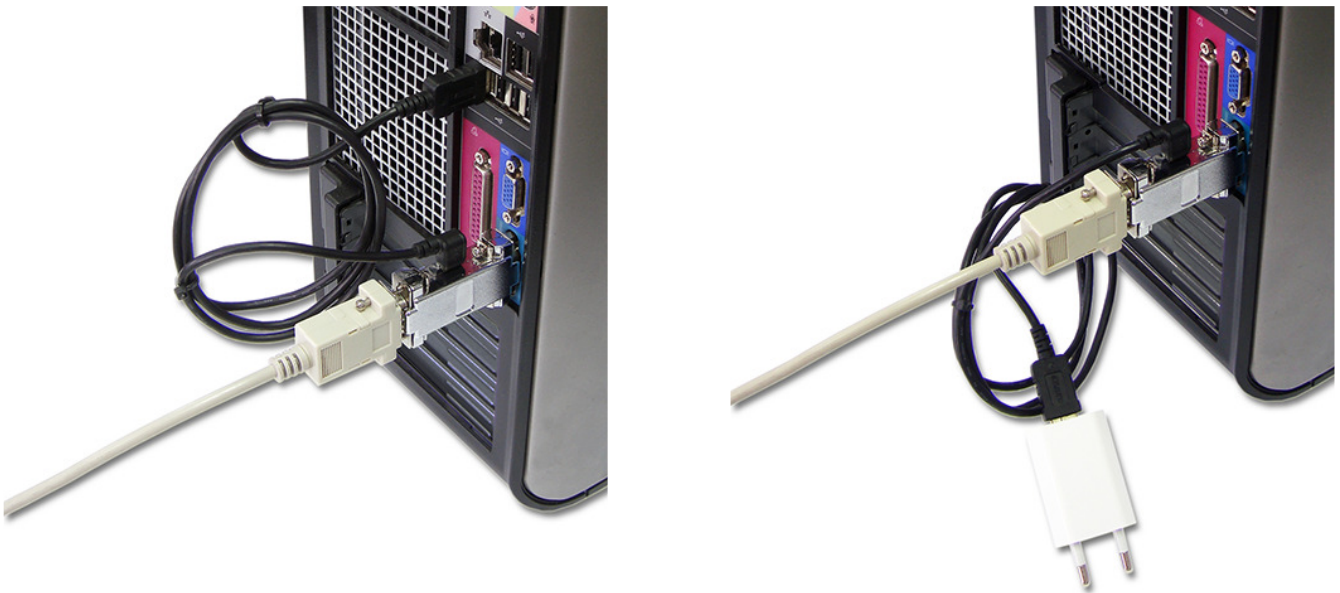
After a few seconds, the *SerialGhost* will automatically get detected as a mass storage device, and pop up as a removable drive.

**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.

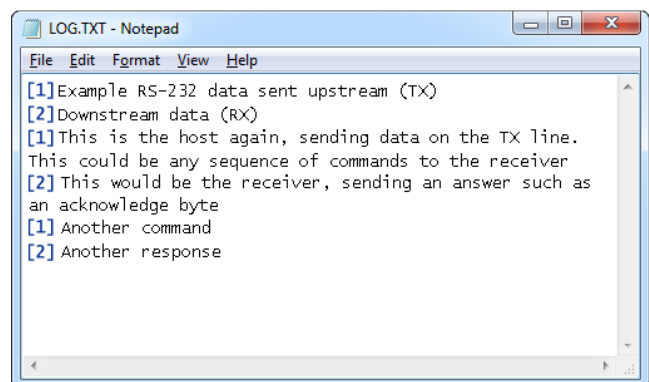
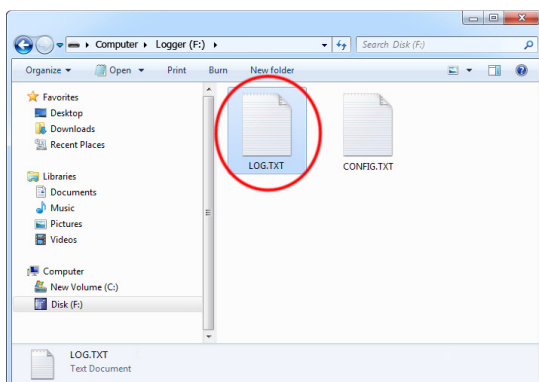
**Step 4.** To start logging, connect the logger in-line on a serial bus, powering the device through the mini USB port.



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 mini-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.



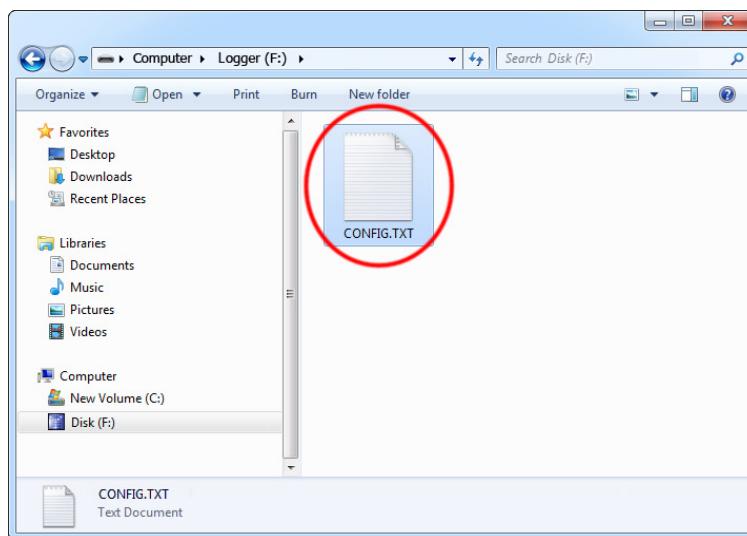
The upstream data (TX) and downstream data (RX) will be differentiated by the markers [1] and [2] interleaved in the log file.

## Configuration

The *SerialGhost* 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=None
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 *None*, *Even*, *Odd*, *Space*, *Mark*. Default value is *None*.

**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, available in the *SerialGhost TimeKeeper* only. 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*.

**Encryption** enables flash disk encrypting. Encryption will ensure full confidentiality of the stored data, even if the device is physically tampered with. Allowed values are *Yes* (encryption enabled) and *No* (encryption disabled). Default is *No*.

Important: toggling the encryption setting will format the entire flash disk. All data will be lost, including the configuration file!

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

**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 stream 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.

A full list of parameters is available in section [Configuration files](#).



## Recording data

Record mode is the default mode of operation for the *SerialGhost* 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* 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 or DB-25 connectors. 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 mini-USB port (cell phone chargers with USB connectors are well suited for this).



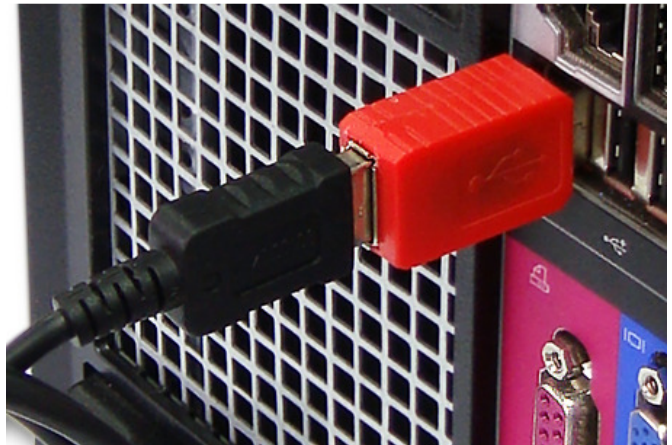
*SerialGhost* in record mode powered from a USB port.



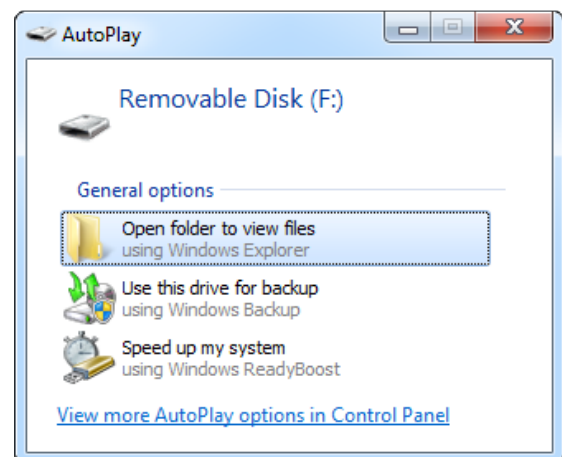
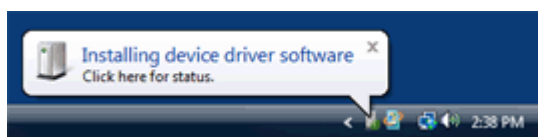
*SerialGhost* in record mode powered by an external 5V DC (min. 200mA) power supply.

## Viewing recorded data

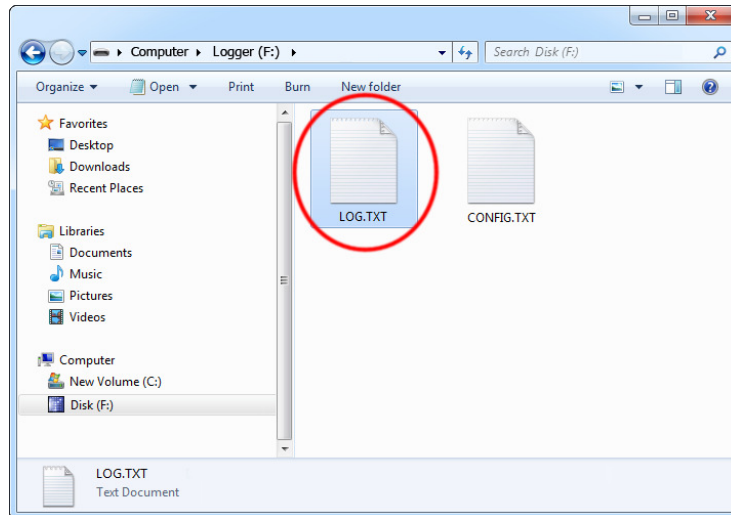
Once serial data has been recorded, it may be retrieved on any computer with a USB port. This is done by switching to Flash Drive mode. Take the supplied USB cable and connect it to the mini-port on the logger's side. Connect the USB cable to a free USB port **using the supplied red USB Key**.



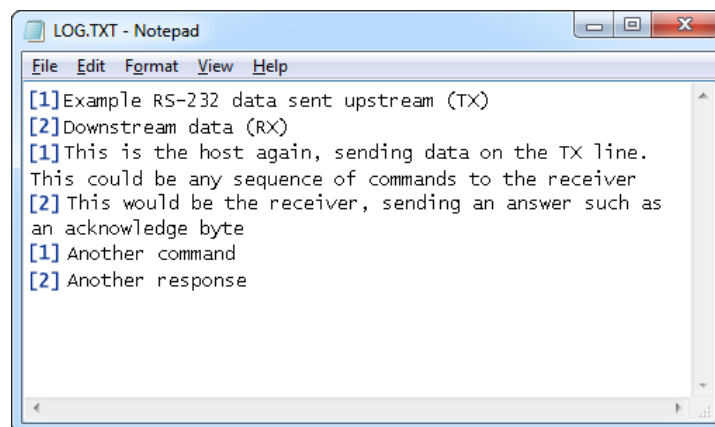
After a few seconds, the *SerialGhost* will automatically get detected as a mass storage device, and pop up as a removable drive. The operating system will use the standard built-in mass storage driver (*MS Windows 7* in the following examples).



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 TimeKeeper* will also interleave time-stamps. The file LOG.TXT can be viewed and searched with any text editor, such as *Notepad* or *MS Word*.



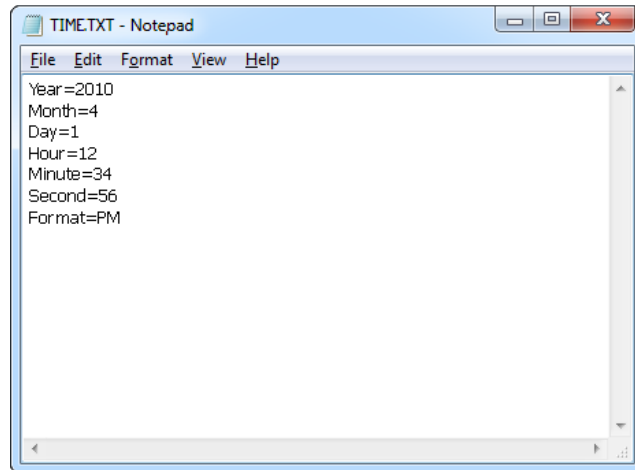
Switching back to record mode can be achieved by a safe software removal of the flash disk. Use the systems standard disk removal procedure. For *MS Windows*, left-click on the *Safe Removal* icon in the system tray and select the appropriate drive. Then reconnect the *SerialGhost* to the USB port, however 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.

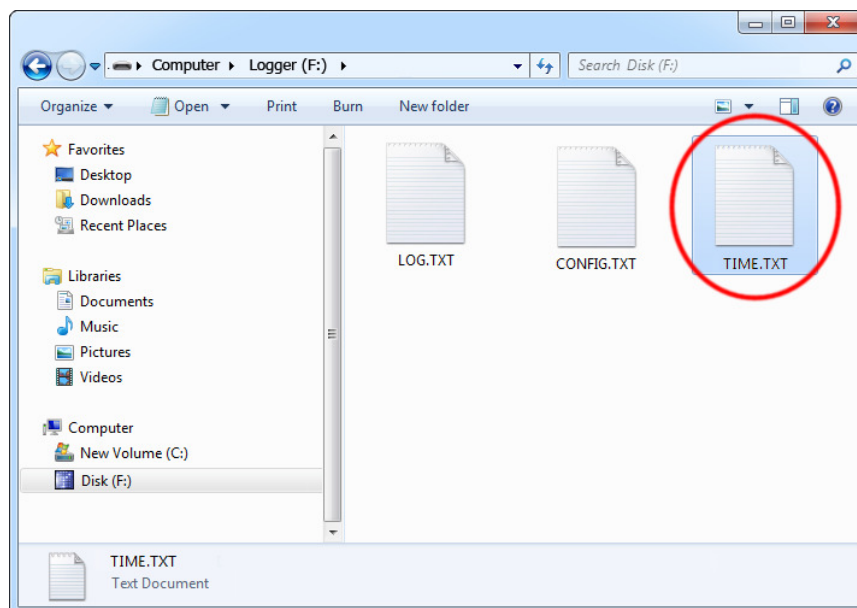
## Clock configuration (*TimeKeeper* version only)

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=2010
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 after noon. 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=2010
Month=10
Day=25
Hour=5
Minute=51
Second=43
Format=PM
```

Sample TIME.TXT for 24-hour time:

```
Year=2010
Month=10
Day=25
Hour=17
Minute=51
Second=43
Format=24
```

A full list of parameters is available in section [Configuration files](#).

## Configuration files

The *SerialGhost* 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
<b>Baudrate</b>	Baud rate in bps (default 9600)	Baudrate=115200	Serial bus baud rate in bits per second (300...115200).
<b>Bits</b>	5 6 7 8 (default)	Bits=7	Number of bits per transfer on the monitored serial bus.
<b>Parity</b>	None (default) Even Odd Space Mark	Parity=Even	Type of parity bit on the monitored serial bus.
<b>StopBits</b>	1 (default) 1.5 2	Parity=1	Number of stop bits per transfer on the monitored serial bus.
<b>Timestamping</b>	Yes (default) No	Timestamping=Yes	Time-stamping disable flag ( <i>TimeKeeper</i> version only).
<b>TimestampInterval</b>	Timestamp interval in seconds (default 10)	TimestampInterval=1	Interval of bus inactivity which will result in a time-stamp being added ( <i>TimeKeeper</i> version only).
<b>DisableLogging</b>	Yes No (default)	DisableLogging=Yes	Data logging disable flag.

<b>Encryption</b>	Yes No (default)	Encryption=No	Flash drive encryption setting (caution: changing this value will re-format the flash drive).
<b>Separator</b>	None Space (default) Comma Tab Newline	Separator=Comma	The separator between data values in Dec/Hex modes.
<b>LogMode</b>	Ascii (default) Hex Dec	LogMode=Hex	Data format in log file.
<b>LogStream</b>	Both (default) Rx Tx	LogStream=Tx	Selection of serial data streams to be logged.

## TIME.TXT

The file TIME.TXT is responsible for configuring the built-in real-time clock (available in *SerialGhost TimeKeeper* only).

Parameter	Values	Example	Description
<b>Year</b>	Year value (range 2000...2099, default 2010)	Year=2010	Year setting (range 2000 to 2099).
<b>Month</b>	Month value (range 1...12, default 1)	Month=10	Month setting (1 is January, 12 is December).
<b>Day</b>	Day value (range 1...31, default 1)	Day=15	Day setting (range 1 to 31).
<b>Hour</b>	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).
<b>Minute</b>	Minute value (range 0...59, default 0)	Minute=37	Minute setting (range 0 to 59).
<b>Second</b>	Second value (range 0...59, default 0)	Second=49	Second setting (range 0 to 59).
<b>Format</b>	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 after noon. If 24 is chosen, the 24-hour format is selected and the specified hour is treated as 24-hour format.

## Specifications

<b>Power supply</b>	4.5 V – 5.5 V DC
<b>Max. power consumption</b>	65 mA (0.33 W)
<b>Maximum continuous log speed (approx.)</b>	15 kB/s (both streams)
<b>Memory capacity</b>	2 GB
<b>Data retention</b>	100 years
<b>Device support</b>	Asynchronous serial devices operating at RS-232 logic levels (+/-12V)
<b>Maximum log read speed</b>	150 kB/s
<b>Dimensions including connectors (L x W x H)</b>	
<b>DB-9 version</b>	62 mm x 31 mm x 16 mm (2.4" x 1.2" x 0.6")
<b>DB-25 version</b>	62 mm x 54 mm x 16 mm (2.4" x 2.1" x 0.6")

All Keydemon products come with 1 year warranty against manufacturer defects. Defect products must be shipped by the customer. All warranty repairs and delivery to the customer will be paid by the manufacturer.



## Troubleshooting

The *SerialGhost* 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 or DB-25 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.

***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

Keydemon does not take responsibility for any damage, harm or legal actions caused by misuse of its products. 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 Keydemon products. Please also consider, that not knowing the law does not allow to not obeying it. A good example is the U.S. Department of Justice Letter on Keystroke Monitoring and Login Banners, according to which a clear notice should be displayed, warning that user keystrokes may be logged. Please check with your legal representative for logging requirements in your country.

**For more information on Keydemon products,  
visit our website:**

**<http://www.keydemon.com/>**

You should not use this device to intercept data you are not authorized to possess, especially passwords, banking data, confidential correspondence etc. Most countries recognize this as a crime. Please consult a legal representative for logging requirements in your country.

**Notes:**

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✓ **RoHS**