User's Guide

SerialGhost Premium
SerialGhost Wi-Fi Premium

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Getting started

Already familiar with *SerialGhost* data loggers?

⇒ Make your logger go on-line in a few simple steps: section **Quick Start**

New to *SerialGhost* data loggers?

⇒ First, configure the logger: section **Configuration**
⇒ Then learn about recording data: section **Recording data**
⇒ Then, retrieve the recorded data: section **Viewing recorded data**
⇒ Finally, get the most out of your data logger by configuring network communications: section **Remote access**

Questions or problems?

⇒ Go through the **Troubleshooting** section.

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Introduction

About the product

The *SerialGhost Premium* and *SerialGhost Wi-Fi Premium* are advanced RS-232 and serial bus loggers with a memory capacity of 4 gigabytes, that may be accessed locally as a USB Flash Drive, remotely through Ethernet and Wireless LAN, or through USB Virtual COM port. 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, giving instant access to all captured data. The Ethernet and Wireless LAN functionality allows receiving logged data as E-mail reports, and on-demand via the local TCP/IP network.

The *SerialGhost Premium* and *SerialGhost Wi-Fi Premium* also feature a 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 Premium* and *SerialGhost Wi-Fi Premium* do not require any dedicated software or drivers.

Both versions feature Virtual COM port connectivity. The device 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)
- 4 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
- Virtual COM port mode
- Ethernet link (RJ-45)
- Time and date stamping (with built-in battery)
- Automatic E-mail reports with recorded data
- On-demand access at any time through TCP/IP
- Background connection to the Internet over a local Access Point (*SerialGhost Wi-Fi Premium)*
- Support for WEP, WPA, and WPA-2 encryption (*SerialGhost Wi-Fi Premium)*

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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 Wi-Fi compliant Access Point coverage (WPA-2, WPA, WEP64/128, or open network)
- Optionally *MS Windows XP/Vista/7/8/10* (only for running *KL Tools*)

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Quick Start

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

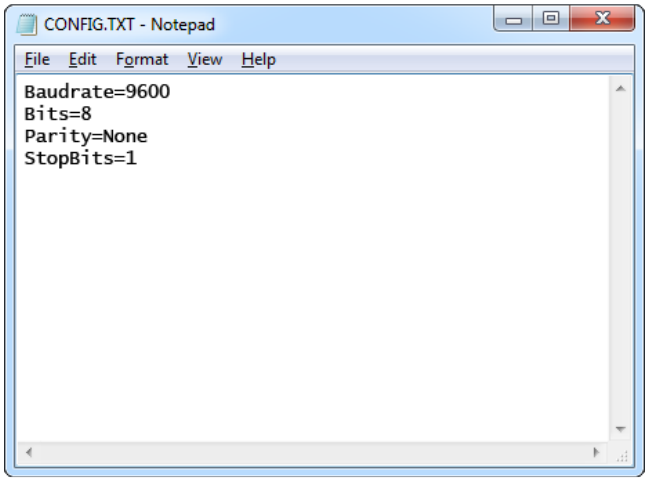
Before you start, make sure you have the following information about the serial bus you want to log data from:

- 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)

The device is configured by editing the CONFIG.TXT file on the internal Flash Drive. Press the button for a few seconds to switch to Flash Drive mode.

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.

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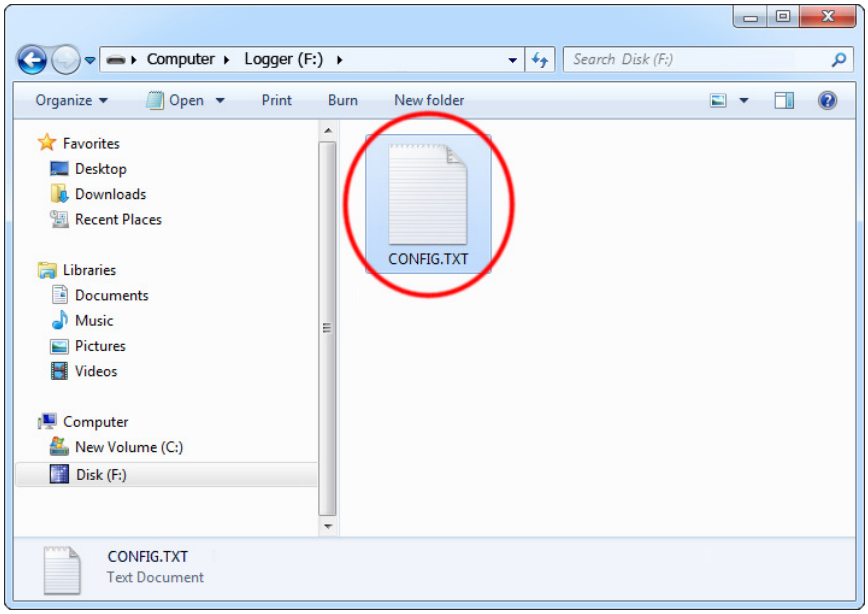
Step 2. Connect the serial logger and enable Flash Drive mode.

Connect the *SerialGhost* to a PC using the supplied USB cable. Wait a few seconds until the device runs up, then press and hold the button next to the USB port.

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.

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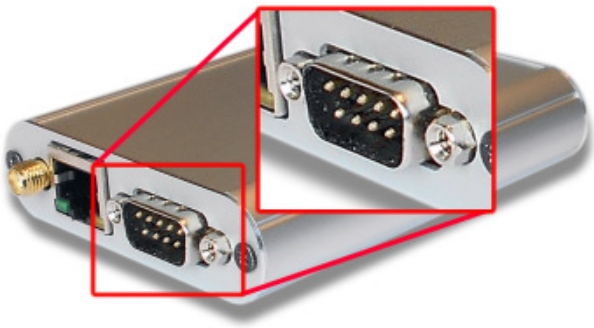
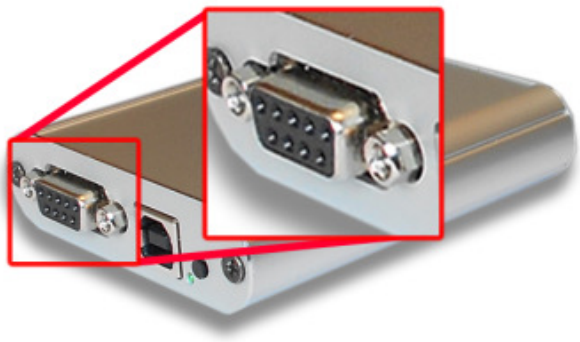
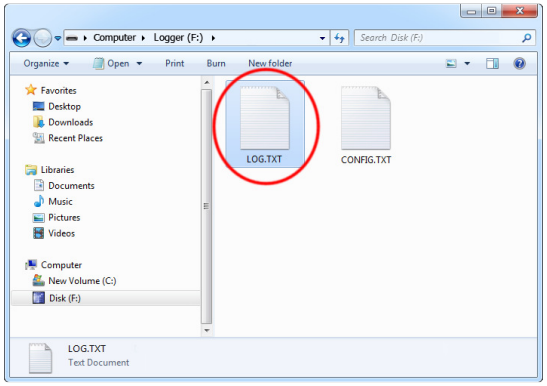
Step 4. To start logging, connect the logger in-line on a serial bus, powering the device through the USB port.

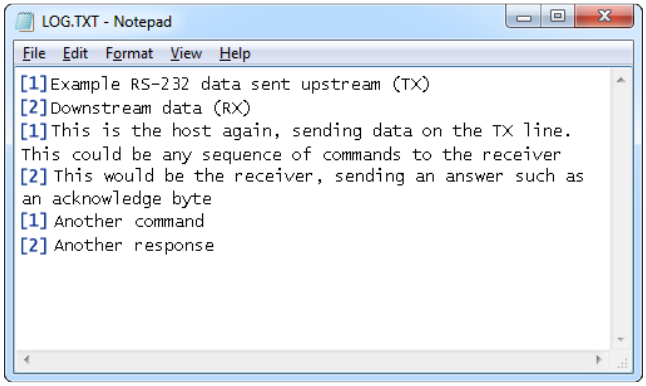




The device may be powered from a standard USB port. Alternatively, an external **+5V DC** (min. 200 mA) power supply may be used to power the device through the USB port.

Step 5. To retrieve the logged data, **enable Flash Drive mode using the push-button**, 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.

Step 6. To enable the LAN connection, edit CONFIG.TXT prepared in step 1 and add the following configuration options:

By default, the Ethernet connection is configured to used DHCP (Auto-IP). You don't need to supply any configuration data for this to work.

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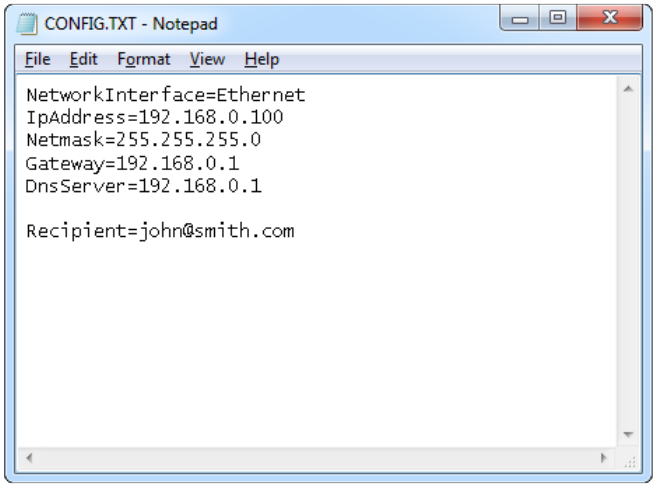
```
NetworkInterface=Ethernet
IpAddress=192.168.0.100
Netmask=255.255.255.0
Gateway=192.168.0.1
DnsServer=192.168.0.1

Recipient=john@smith.com
```

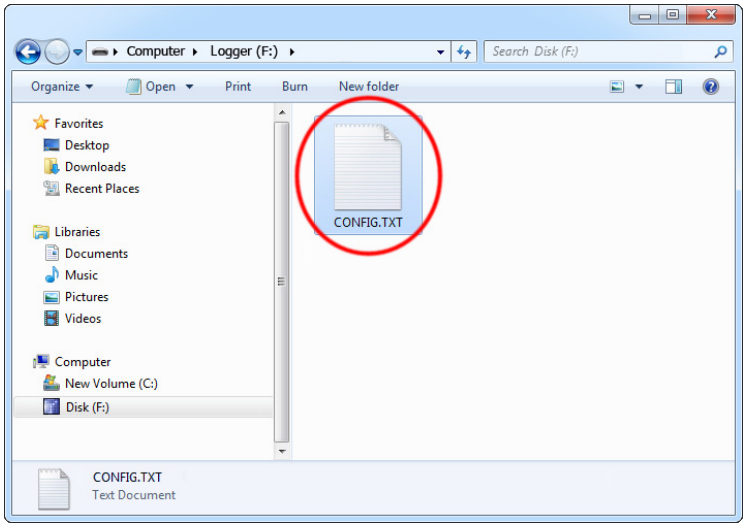


Replace *IpAddress* with the static IP address of the device, *Netmask* with the subnetwork mask, *Gateway* with the router IP address, and *DnsServer* with the primary DNS IP address. If DHCP should be used to obtain the configuration automatically, do not enter the lines containing *IpAddress, Netmask, Gateway,* and *DnsServer.*

Provide the E-mail address you would like to receive reports to after the *Recipient* string. Make sure you provide all strings in a case-sensitive manner.

Finally, save the configuration file as CONFIG.TXT.

Step 7. Enable Flash Drive mode, as in step 5, and copy the configuration file CONFIG.TXT to the Flash Drive.



Then, safely remove the device, and disconnect it from the USB port.

Step 8. On the next power-up, the logger will automatically connect to the Local Area Network as configure in CONFIG.TXT, and send an E-mail report to the specified recipient address every hour.

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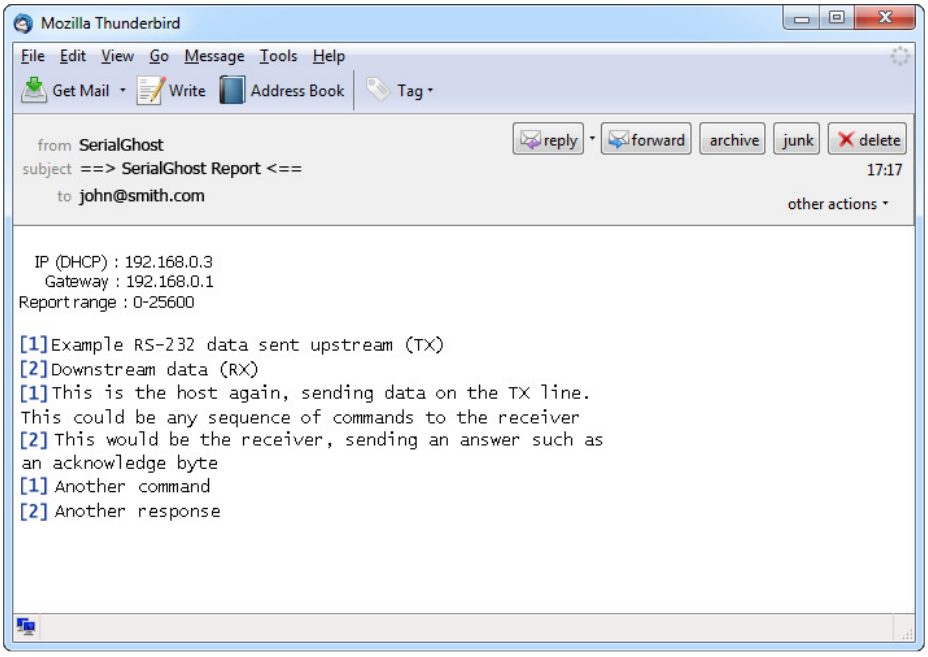


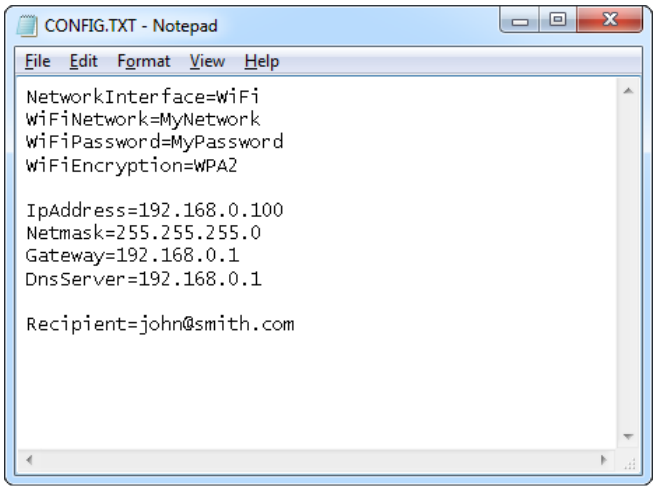
Step 9 (Wi-Fi version only). To configure the Wi-Fi connection (as an alternative to LAN), make sure you have the following data about the Wi-Fi network the device will operate in:

- WLAN Access Point ID (SSID)
- WLAN encryption type (WPA-2, WPA, WEP64/128, or open network)
- WLAN encryption password

To enable WLAN in the *SerialGhost Wi-Fi Premium*, you need to supply basic Access Point configuration data in CONFIG.TXT.

Add the following entries to CONFIG.TXT:

```
NetworkInterface=WiFi
WiFiNetwork=MyNetwork
WiFiPassword=MyPassword
WiFiEncryption=WPA2
```



Replace *MyNetwork* with the Access Point ID (SSID). Replace *MyPassword* with the WLAN password. Provide the encryption type using one of the following strings: *WPA2*, *WPA*,

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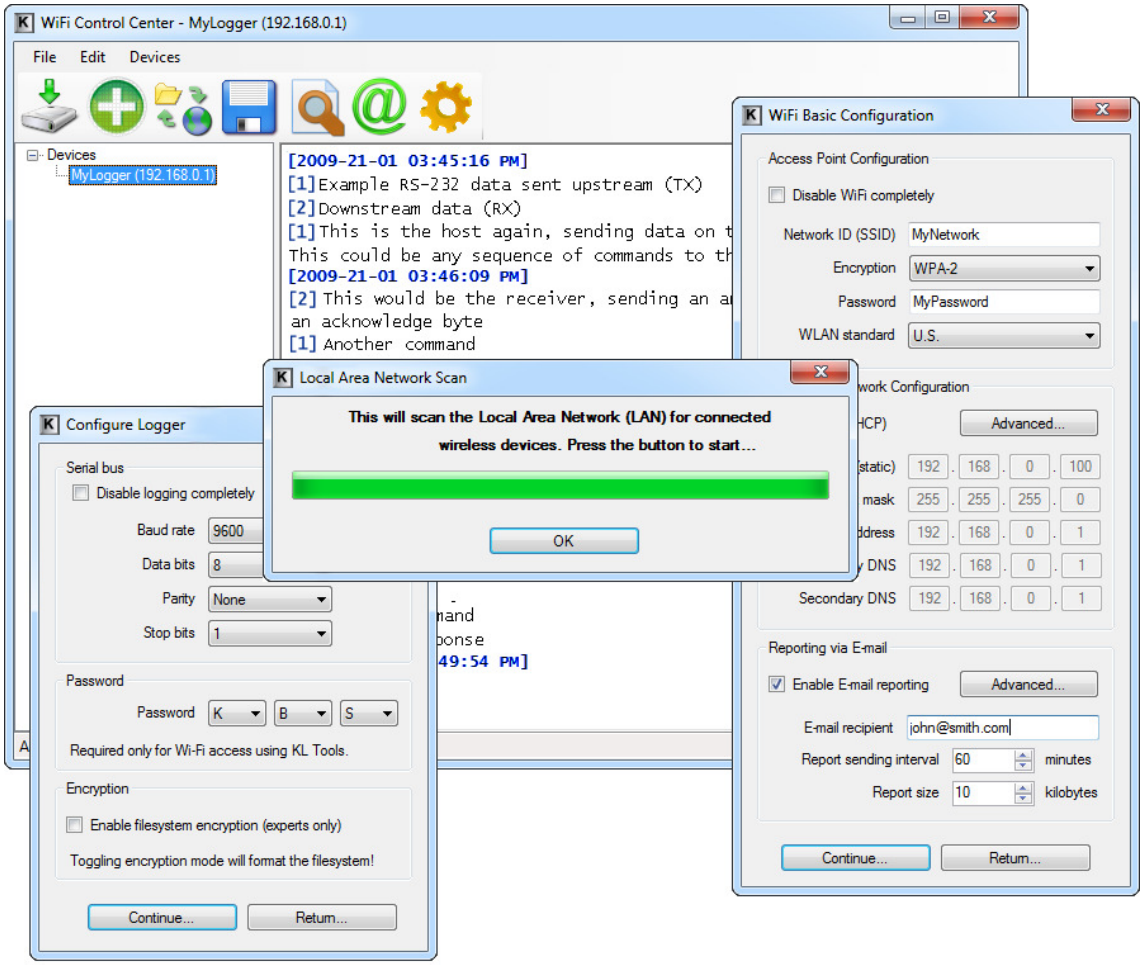
WEP64, *WEP128*, or *None*. Make sure you have set *NetworkInterface* to *WiFi* and that all strings are provided in a case-sensitive manner.

Step 10. Enable Flash Drive mode, as in step 5, and copy the configuration file CONFIG.TXT to the Flash Drive.

KL Tools is a good starting point for Ethernet and WLAN based communications.

Step 11. If E-mail reporting is not enough, you can take full control over the device from any computer in your Local Area Network. Install the supplied application *KL Tools*, add the logger to the list by its IP number, and explore the available features.



Using *KL Tools* you can communicate with multiple *SerialGhosts*, allowing creating entire networks of data loggers. This solution is particularly recommended for monitoring several devices in a system with a large number of devices using serial buses, such as RS-232.

To read more on *KL Tools*, jump to section **Remote access**.

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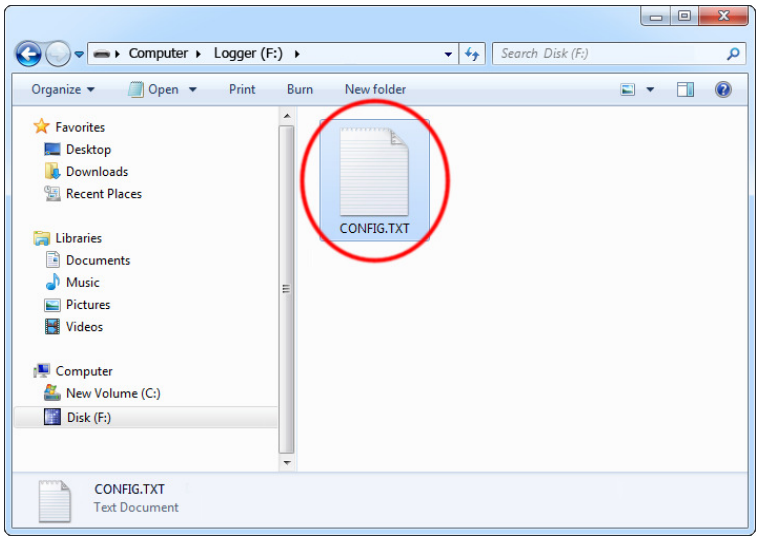
Configuration

The *SerialGhost Premium* (*SerialGhost Wi-Fi Premium*) 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. Allowed values are *Yes* (timestamping enable) and *No* (timestamping disabled). Default is *Yes*.

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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 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.

StreamMarkers configures if the markers designating the active stream (*[1]* and *[2]*) are logged or not. Allowed values are *Yes* (markers enabled) and *No* (markers disabled). Default value is *Yes*.

UsbMode allows to switching between Flash Drive mode and Virtual COM mode. 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**.

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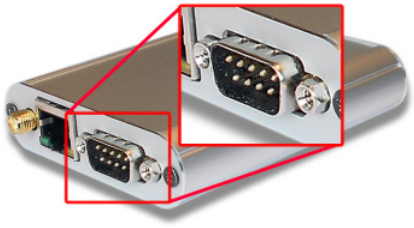
Recording data

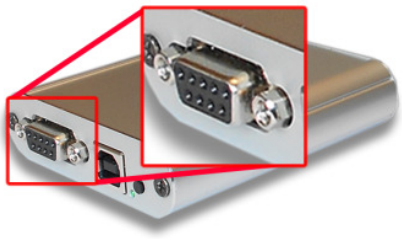
Record mode is the default mode of operation for the *SerialGhost Premium* (*SerialGhost Wi-Fi Premium*) data logger. In record mode, the device will silently monitor the bidirectional data flow on the serial bus and store the captured data on the internal Flash Drive in file LOG.TXT.

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 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).

Power the *SerialGhost* from a USB port or external 5V DC (min. 200mA) power supply.





Connect both DB-9 connectors in-line to a serial or RS-232 bus.

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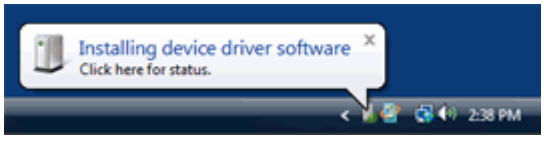
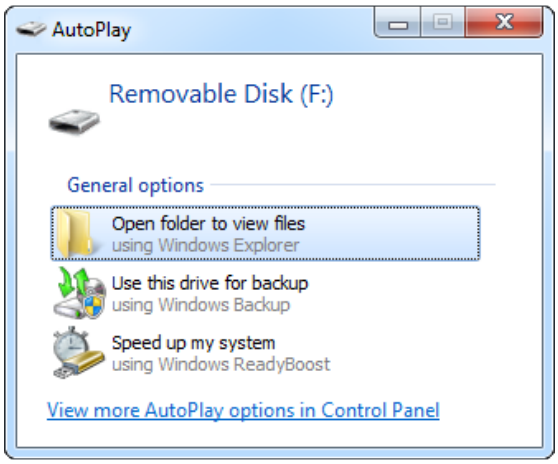
Viewing recorded data

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. Connect the *SerialGhost* to a PC using the supplied USB cable. Wait a few seconds until the device runs up, then press and hold the button next to the USB port.

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*).

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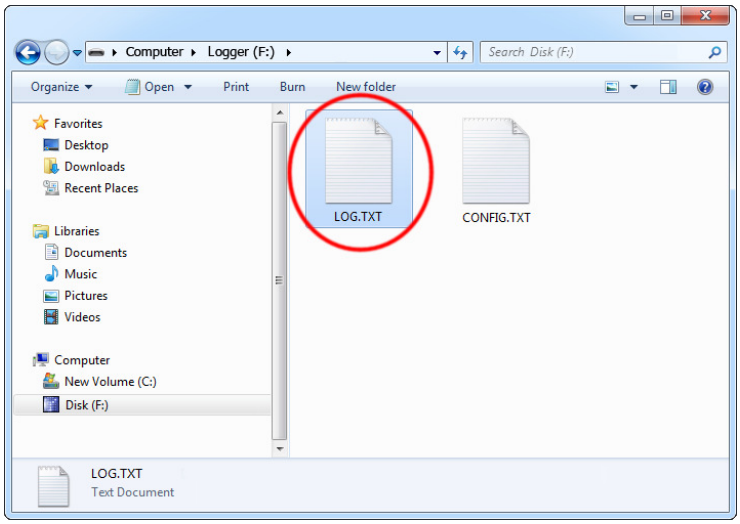
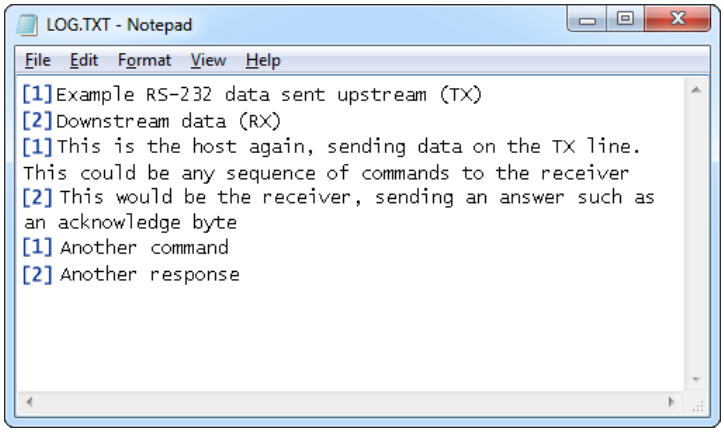


The removable disk will contain the file LOG.TXT with a text log of all captured data. The data is stored in the same format as appearing on the serial bus, without any encoding. The upstream data (TX) and downstream data (RX) will be differentiated by the markers [1] and [2] interleaved in the log file. 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.

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

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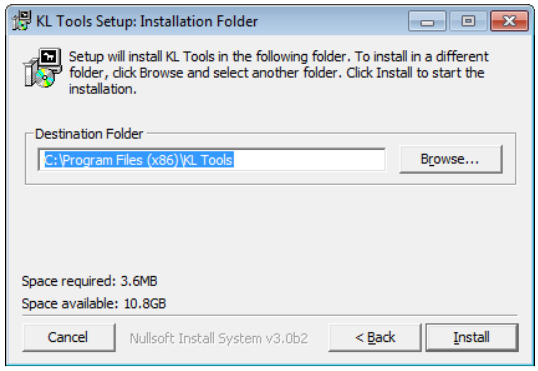
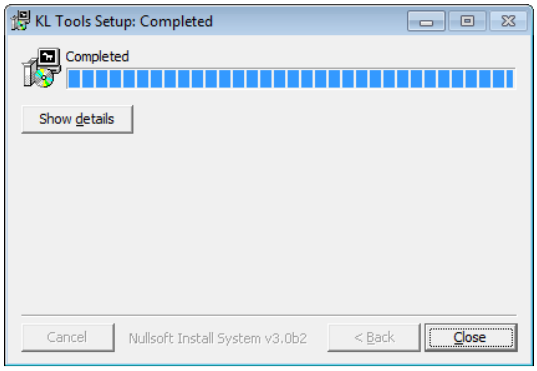
Remote access

This section guides through enabling E-mail reporting and TCP/IP access for the *SerialGhost Premium* and *SerialGhost Wi-Fi Premium* data loggers.

Installation

The supplied application *KL Tools* is the easiest way of remote communication with a *SerialGhost* on an MS Windows based platforms. The installation process is straightforward, just follow the wizard and answer a few standard questions.





Configuration

The *SerialGhost Premium* and *SerialGhost Wi-Fi Premium* can be configured and operated entirely from *KL Tools*. Launch the application, select the device model, and choose to configure your device. The application will first display a serial bus configuration dialog, and then a time configuration dialog. If changing the default password, memorize or note the new values, otherwise access to the internal memory will not be possible. If unsure about a certain configuration option, leave the default value.

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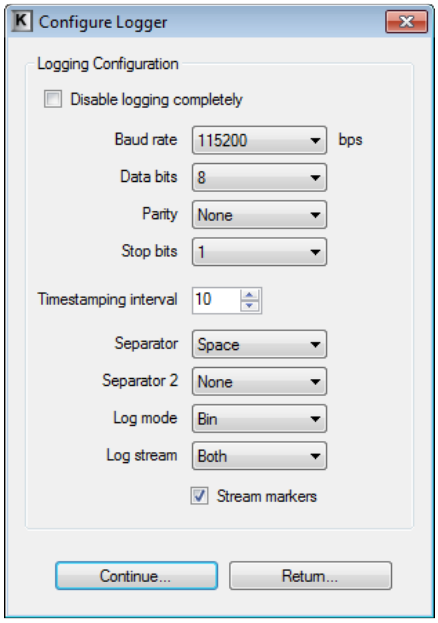
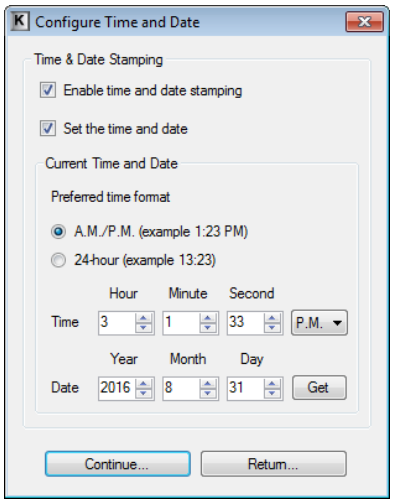
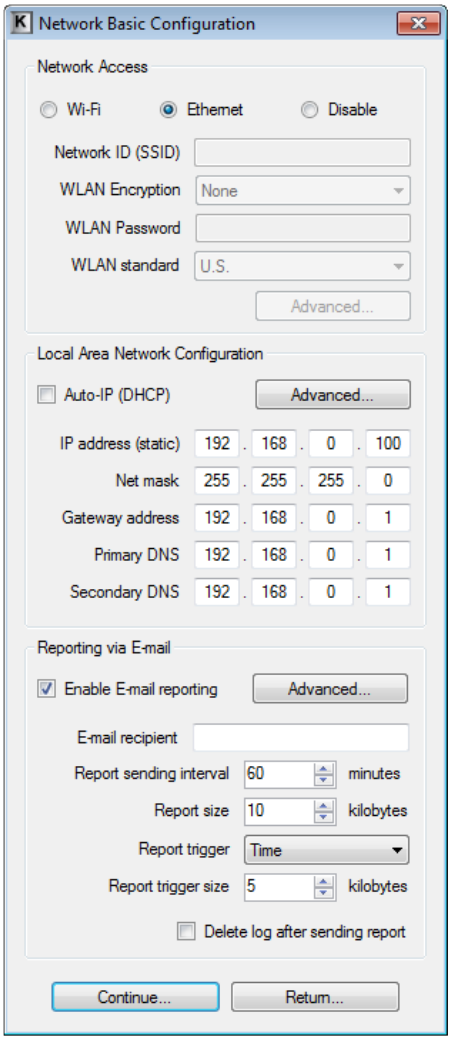


Serial bus configuration



Time-stamping module configuration



Finally, a network configuration dialog will be shown. Enter standard static IP, gateway and DNS data, or select the Auto-IP option to use DHCP.

The *SerialGhost Wi-Fi Premium* can connect to a wireless LAN network. In such case enter the data allowing the logger to connect to the WLAN Access Point:

- WLAN Access Point ID (SSID)
- WLAN encryption type
- WLAN encryption password

Remember, that these strings are case-sensitive.

To receive E-mail reports containing serial data, supply your E-mail address. You may adjust the reporting interval and report size.

When finished, make sure the device is connected as in record mode. *KL Tools* will automatically create configuration files (CONFIG.TXT, TIME.TXT), prompt for enabling Flash Drive mode, and copy the files to the loggers Flash Drive.

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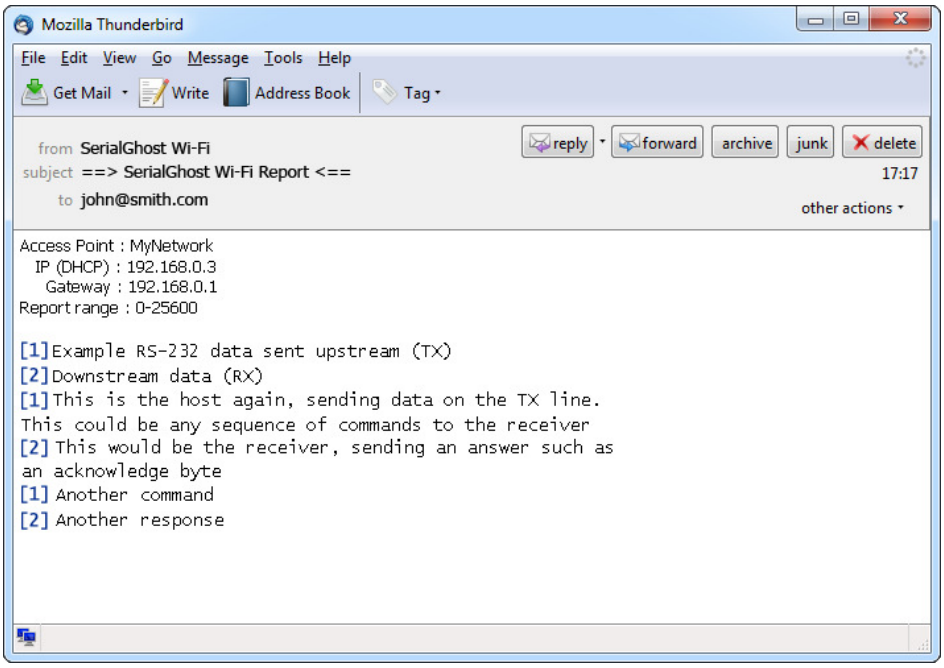
E-mail reporting

The *SerialGhost Premium* and *SerialGhost Wi-Fi Premium* will send E-mail reports to the specified recipient address, by default every hour. Besides logged data, the report will contain gateway information, IP configuration, and time-stamps.



The report size and interval may be set by configuring the logger through the file CONFIG.TXT. Use *KL Tools* to do this, or view section **Configuration files**.

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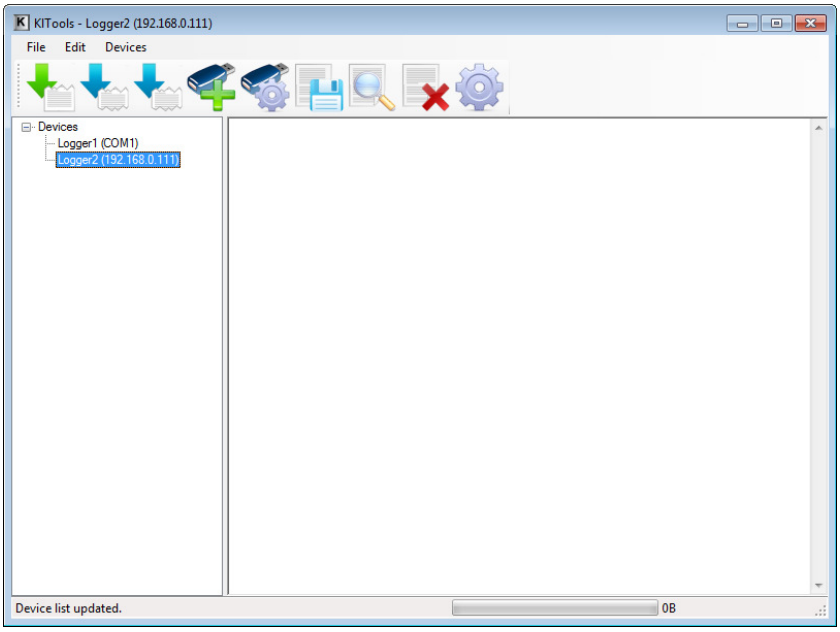
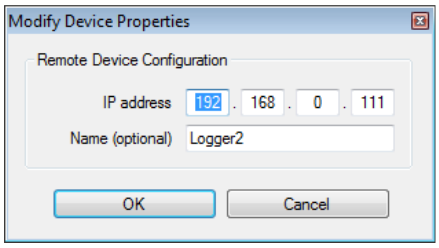
On-demand access

The *SerialGhost Premium* and *SerialGhost Wi-Fi Premium* offer on-demand access via TCP/IP from any computer connected to the network. This feature is usually limited to the Local Area Network, unless your local network segment is visible globally. To access the logger remotely, launch *KL Tools*, select the proper device version, and navigate through the wizard to remote access. The *Logger Control* window will be shown.



A remote device needs to be added first. This can be done by clicking the *Add Device* icon, checking the *Add Device Manually* option and supplying the IP address and name (optional).



The IP address of the remote device can be obtained in a few ways:

- from an E-mail report (see section **E-mail reporting**)
- from the device configuration (if using static IP)
- from the Access Point or gateway configuration (if using Auto-IP)

If the IP address is unknown, *KL Tools* will attempt to find all compatibles devices by sending a broadcast signal in the Local Area Network, to which remote devices should respond. Make sure that no firewall blocks UDP communication, otherwise the procedure will fail. When adding a new device uncheck the *Add Device Manually* option.

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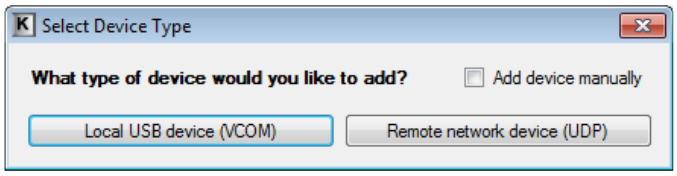
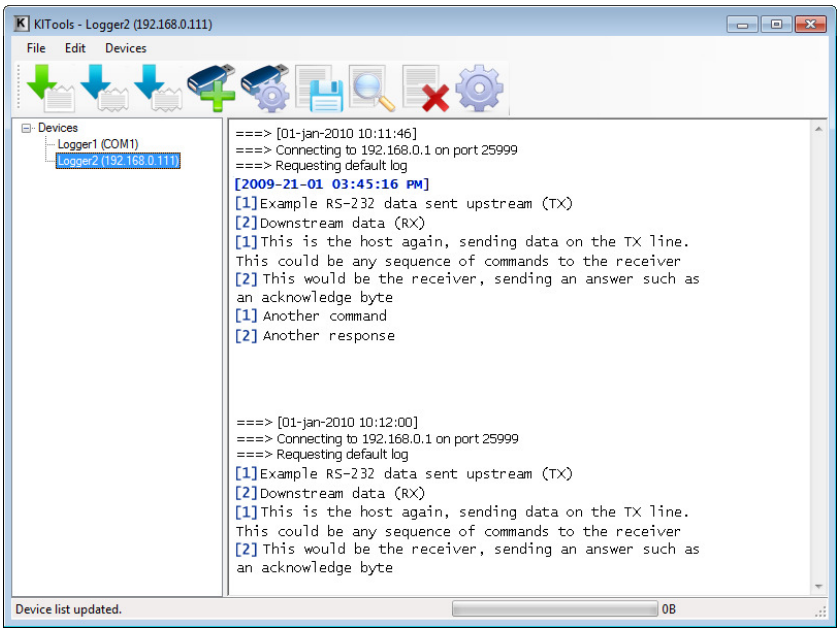


Once a remote device is added, the log may be retrieved using the *Download Log* option.



KL Tools offers a wide variety of options, such as Live Mode, data filtering, and remote file manipulation. Using *KL Tools* you can communicate with multiple *SerialGhosts*, allowing creating entire networks of wireless data loggers. This solution is particularly recommended for monitoring several devices in a system with a large number of devices using serial buses, such as RS-232.

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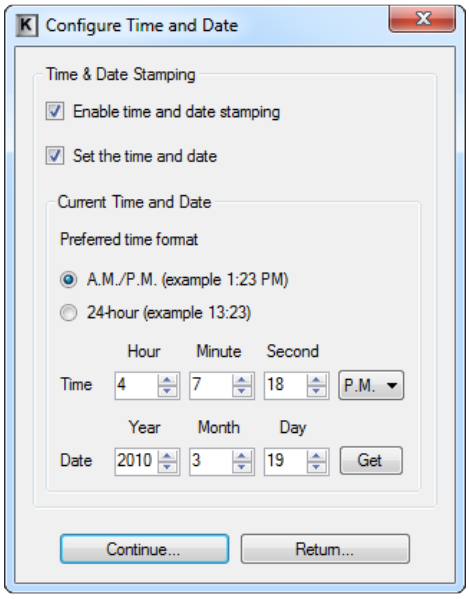
Clock configuration

It is necessary to configure the built-in clock module for getting correct date and time-stamps. This task can be performed by *KL Tools* (recommended), or can be done manually.

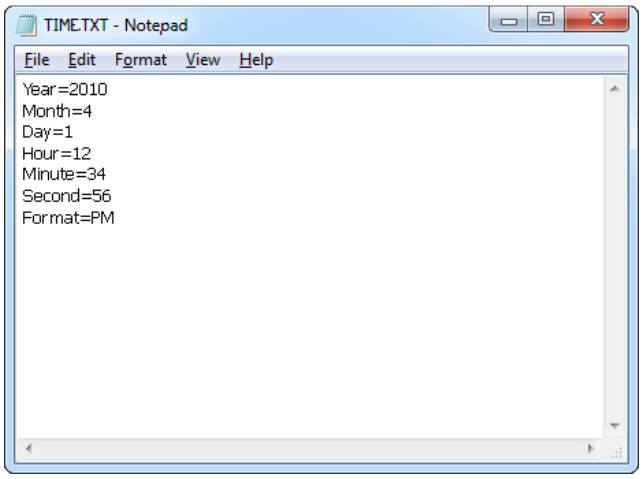
To configure the internal clock using *KL Tools*, launch the application, select the device model, and choose to configure the device. The application will display a time and date configuration dialog. Make sure date and time stamping is enabled, and that the *Set time and date* checkbox is clicked. Select the desired time format, and move to the succeeding dialogs.



KL Tools will guide you through enabling Flash Drive mode, and placing the configuration file TIME.TXT on the internal flash disk.

The clock can also be configured manually, without using *KL Tools*. 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.

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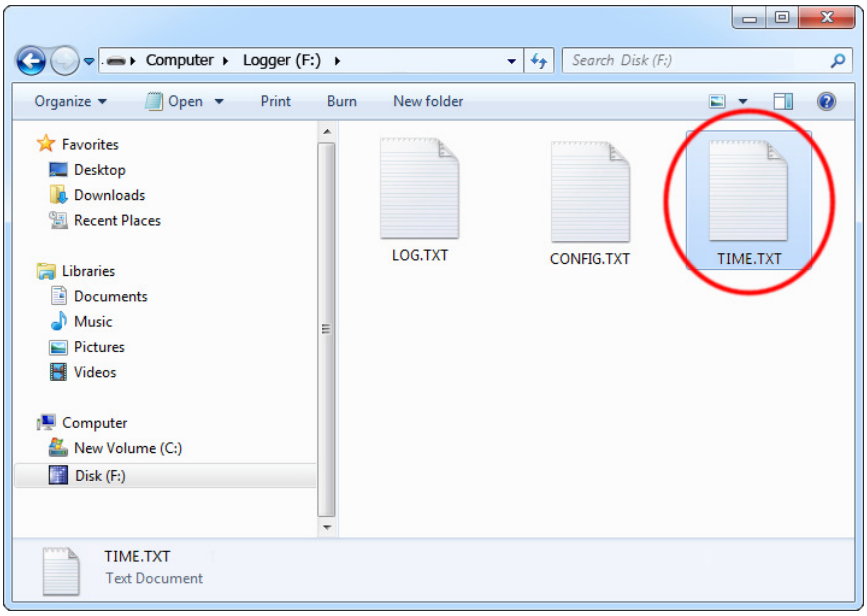

After copying the file, safely remove the Flash Drive. The new clock configuration will be loaded on next power-up.

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
```


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Virtual COM mode

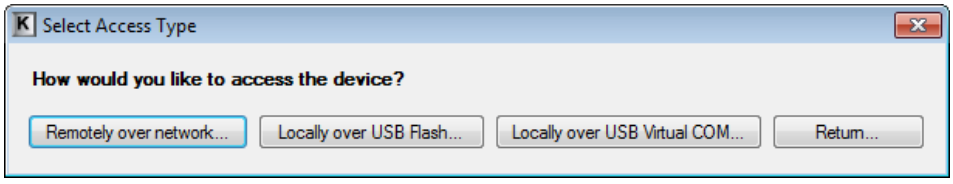
Virtual COM mode is a special mode in which the device connects as a serial COM port. The CDC (Communications Device Class) driver class will be used, which is built-in most operating systems. To enable Virtual COM mode, the following entry needs to be present in CONFIG.TXT (refer to the **Configuration**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

```
UsbMode=Com
```

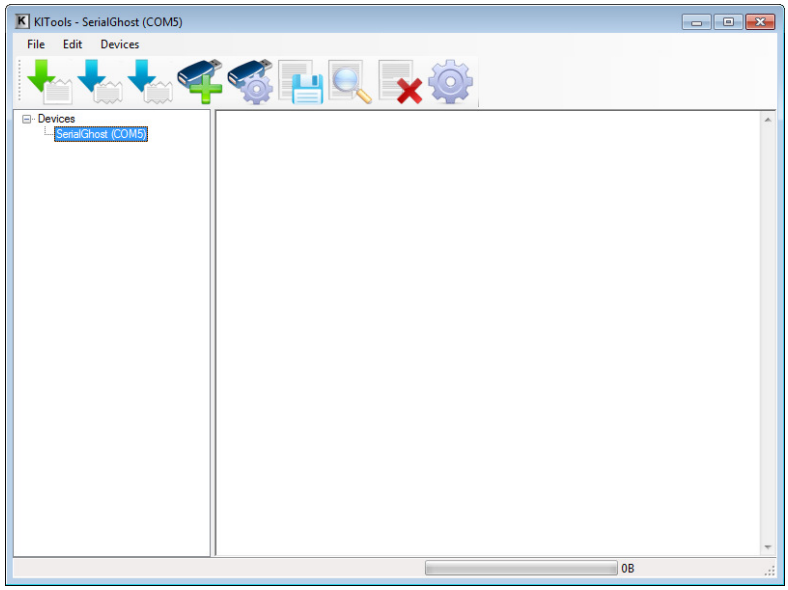
Virtual COM mode drivers will be installed automatically after connecting the device to USB.
In case this fails, use the operating systems automatic search feature, or download the drivers manually from http://www.ftdichip.com/FTDrivers.htm

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 and 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.

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

1) For a single session, by the push-button for a few seconds
2) Permanently, by using the device configuration dialog window in *KL Tools*
3) Permanently, by changing the following entry in CONFIG.TXT to:

```
UsbMode=Flash
```


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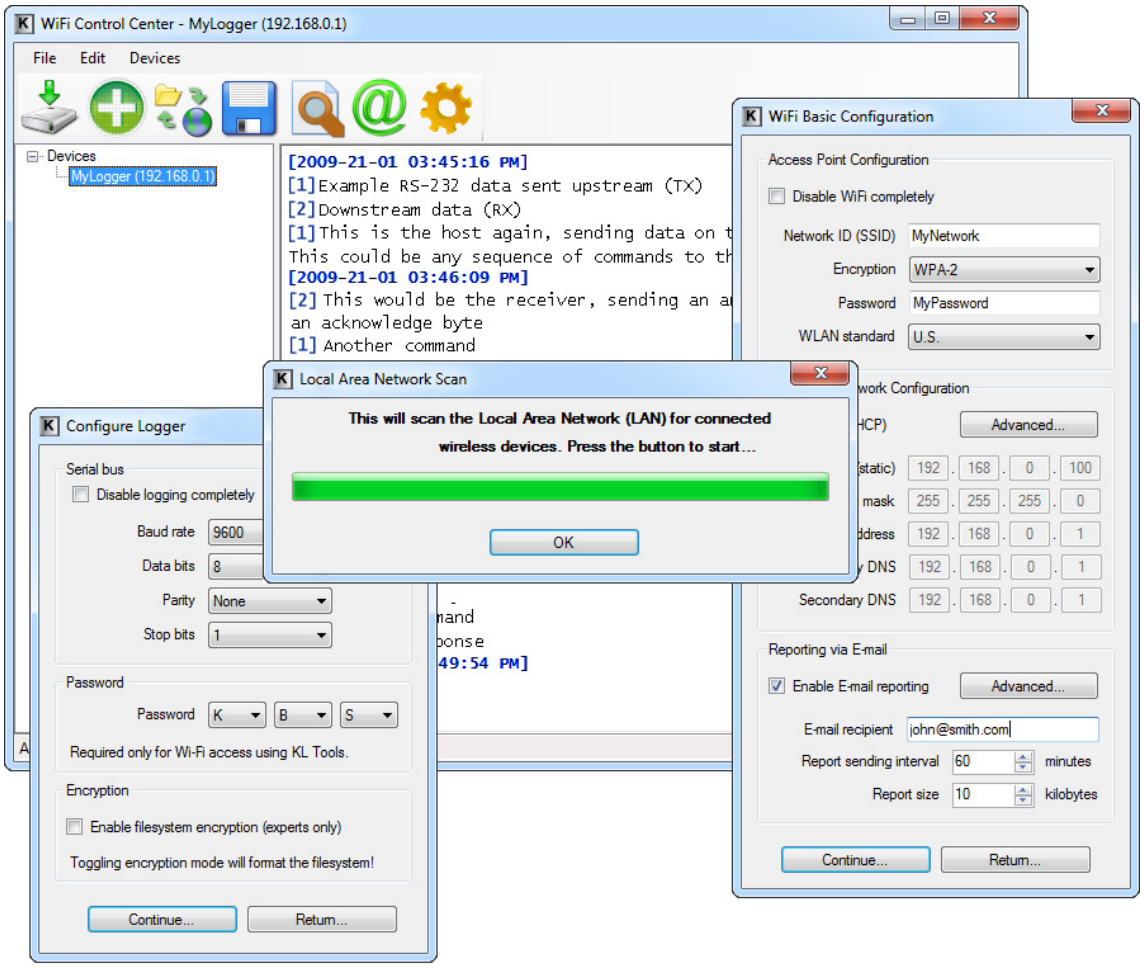
Using KL Tools

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 for sonlinedownload. 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.



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Configuration files

The *SerialGhost Premium* and *SerialGhost Wi-Fi Premium* is configured via two text files placed on the internal Flash Drive:

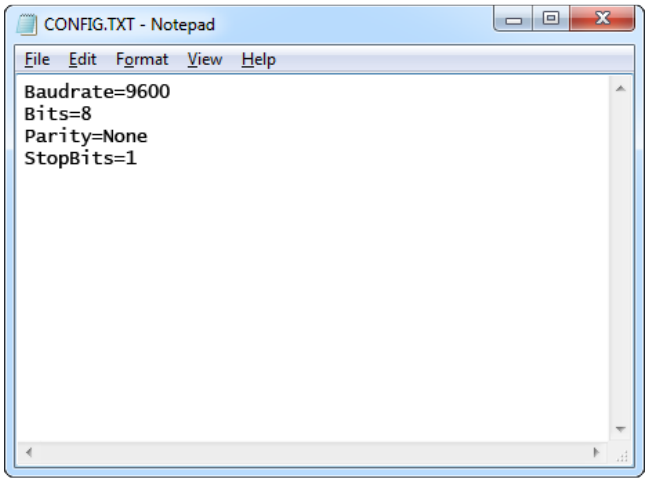
- CONFIG.TXT (configures serial bus parameters and network functionality)
- TIME.TXT (configures the internal clock for time-stamping)

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

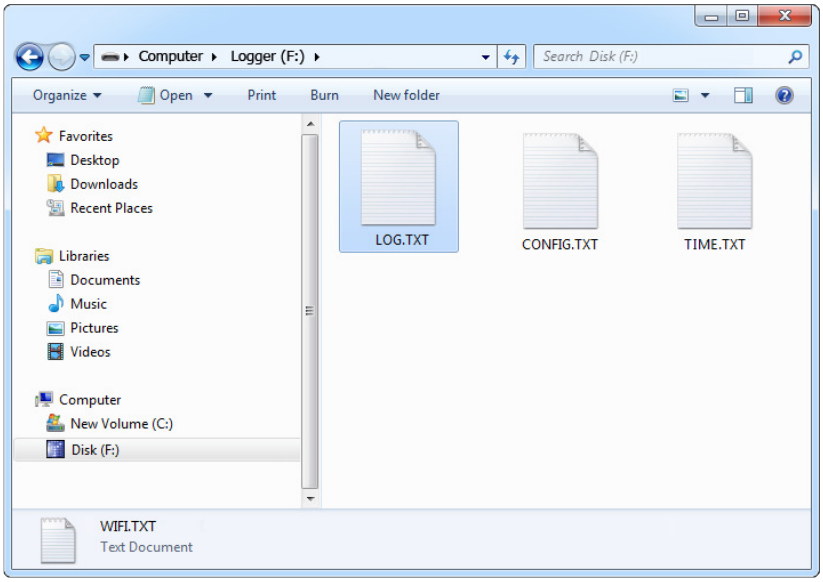
```
Parameter1=Value
Parameter2=Value
Parameter3=Value
...
```

Example of CONFIG.TXT

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



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*.

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CONFIG.TXT

The file CONFIG.TXT is responsible for configuring serial bus and network 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	None (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.
Password	3-character password (default KBS)	Password=SVL	Three-character combination for accessing the device over TCP/IP (for example using *KL Tools*).
Separator	None Space (default) Comma Tab Newline	Separator=Comma	The separator between data values in Dec/Hex modes.
Separator2	None (default) Space Comma Tab Newline	Separator2=Newline	The separator added when the stream direction changes.
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.
StreamMarkers	Yes (default) No	StreamMarkers = No	Stream marker disable flag. Disables logging of [1] and [2] stream markers.
Target	Flash (default) Com Network	UsbMode = Com	Target destination for logged data. Can be internal memory, Virtual COM connection, or network connection.

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Network parameter list

Parameter	Values	Example	Description
NetworkInterface	None (default) WiFi Ethernet	NetworkInterface=WiFi	Network access type. WiFi is available only in the Wi-Fi version.
WiFiNetwork	SSID string (no default)	WiFiNetwork=MyWiFi	Access Point ID (SSID), case-sensitive. If omitted, Wi-Fi functionality will be disabled.
WiFiEncryption	None (default) WEP64 WEP128 WPA WPA2	WiFiEncryption=WPA2	Access Point encryption type. If omitted, Wi-Fi functionality will be disabled.
WiFiPassword	Password string (no default)	WiFiPassword=MyPass	Access Point password, case sensitive. If open network, skip this parameter.
IpAddress	IP address string (no default)	IpAddress=192.168.0.100	Static IP address of device. Skip this parameter if using Auto-IP.
NetMask	Network mask string (no default)	NetMask=255.255.255.0	Network mask of device. Skip this parameter if using Auto-IP.
Gateway	Gateway address string (no default)	Gateway=192.168.0.1	Default gateway. Skip this parameter if using Auto-IP.
DnsServer	First DNS address string (no default)	DnsServer= 216.231.41.2	First DNS. Skip this parameter if using Auto-IP.
DnsServer2	Second DNS address string (no default)	DnsServer2= 206.124.64.1	Second DNS. Skip this parameter if using Auto-IP.
Recipient	E-mail recipient string (no default)	Recipient=john@server.com	Recipient E-mail address for E-mail reporting. If omitted, reporting will be disabled.
ReportInterval	Interval value (min. 600 sec. or 3600 sec., default 3600 sec.)	ReportInterval=7200	Interval for E-mail reporting in seconds. Minimum interval is 600 seconds (10 minutes) for custom SMTP server, and 3600 seconds (1 hour) for default server.
ReportSize	Size value (max. 102400 bytes, default 10240 bytes)	ReportSize=20000	E-mail report size in bytes.
NetworkDisable	Yes No (default)	NetworkDisable=Yes	Network disable flag.
TargetIp	Target IP address string (no default)	TargetIp=192.168.1.123	Defines the target IP address for logged data in Target=Network mode.

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Advanced parameter list (use only when you know what you're doing!)

Parameter	Values	Example	Description
WiFiStandard	US (default) Canada Europe Spain France Japan	WiFiStandard=Europe	Standard for Wi-Fi operation. Select the region that fits best.
WiFiAdHocMode	Yes No (default)	WiFiAdHocMode=Yes	Wi-Fi ad-hoc enable flag.
WiFiPassiveMode	Yes No (default)	WiFiPassiveMode=Yes	Wi-Fi passive mode enable flag.
WiFiChannel	Channel value (1…13, default 11)	WiFiChannel=1	Wi-Fi preferred channel.
WiFiDataRate	2 4 11 12 18 22 (default) 24 36 48 72 96 108	WiFiDataRate=11	Wi-Fi preferred data rate.
DisableTcp	Yes No (default)	DisableTcp=Yes	TCP disable flag. Disables on-demand access through TCP/IP.
TcpPort	Port value (0…65535, default 25999)	TcpPort=12345	TCP communication port. Must match setting in *KL Tools*.
DisableUdp	Yes No (default)	DisableUdp=Yes	UDP disable flag. Disables answering to broadcasted network searches.
UdpPort	Port value (0…65535, default 25998)	UdpPort=23456	UDP communication port. Must match setting in *KL Tools*.
DisableSmtp	Yes No (default)	DisableSmtp=No	SMTP disable flag. Disables E-mail reporting.
CustomSmtp	Yes No (default)	CustomSmtp=Yes	Custom SMTP flag. Enables user defined SMTP server.
SmtpServer	Server string (no default)	SmtpServer=smtp.mail.com	Custom SMTP server. Defines user SMTP server address.
SmtpUser	User string (no default)	SmtpUser=John	Custom SMTP user. Defines user SMTP user name.
SmtpPassword	Password string (no default)	SmtpPassword=MyPass	Custom SMTP password. Defines user SMTP password.
SmtpSender	Sender string (no default)	SmtpSender=John Smith	Custom SMTP server. Defines user SMTP sender string.
SmtpPort	Port value (0…65535, default 25)	SmtpPort=25	Custom SMTP communication port.

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SmtpReportTrigger	Time (default) Size Both	SmtpReportTrigger=Both	SMTP trigger selection between time, size, or both.
SmtpTriggerSize	Trigger size	SmtpTriggerSize=2048	Number of logged bytes to trigger an SMTP report. Valid only is SMTPReportTrigger is set to Size or Both.
SmtpDeleteLog	Yes No (default)	SmtpDeleteLog=Yes	Sets whether the log file is deleted after each SMTP report is sent.
NtpDisable	Yes (default) No	NtpDisable=No	Network Time Protocol enable flag. When enabled and properly configured, the device will self-configure its internal clock from an NTP server.
NtpTimeout	NTP timeout (in seconds)	NtpTimeout=60	Sets the timeout when waiting for a response from each configured NTP server.
NtpLoop	Yes (default) No	NtpLoop=No	Sets whether NTP servers are queried in a loop.
NistServer1…10	IP addresses of up to 10 NIST servers	NistServer0=66.219.116.140 NistServer1=216.229.0.179 NistServer2=24.56.178.140 NistServer3=64.236.96.53 NistServer4=64.250.177.145 NistServer5=207.223.123.18 NistServer6=216.171.120.36 NistServer7=96.226.242.9 NistServer8=162.17.148.102 NistServer9=64.113.32.5	Configures up to 10 NTP servers given by IP addresses. Go to: http://tf.nist.gov/tf-cgi/servers.cgi for an updated list of servers.
TimeZone	Time zone offset (in hours)	TimeZone=-6	The time zone offset from UTC time. This is necessary for properly calculating the time based on NTP server response.
DaylightSavingTime	Yes No (default)	DaylightSavingTime=Yes	Adds an offset of +1 to the time returned from an NTP server is day-light saving time is enabled.

Sample configuration files:

No encryption, Auto-IP

```
NetworkInterface=WiFi
WiFiNetwork=MyWiFi

Recipient=john@server.com
```

WPA-2 encryption, static IP

```
NetworkInterface=WiFi
WiFiNetwork=MyNetwork
WiFiPassword=MyPassword
WiFiEncryption=WPA2

IpAddress=192.168.0.100
NetMask=255.255.255.0
Gateway=192.168.0.1
DnsServer= 216.231.41.2
DnsServer2= 206.124.64.1

Recipient=john@smith.com
```


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TIME.TXT

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

Parameter	Values	Example	Description
Year	Year value (range 2000…2099, default 2010)	Year=2010	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 after noon. If 24 is chosen, the 24-hour format is selected and the specified hour is treated as 24-hour format.

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Command interface

The *SerialGhost* can be controlled through Virtual COM, Ethernet, or Wi-Fi with a proprietary set of commands. A full list of commands follows:

KL Tools is an example of communicating with the device using commands sent over Virtual COM, Ethernet, or Wi-Fi.

Command contents	Response contents	Description
GETPARAM PARAM	Runtime parameter value on success, ERROR on failure	Gets the runtime value of the parameter PARAM. Example: GETPARAM UsbMode
LOADPARAM PARAM	Default parameter values on success, ERROR on failure	Gets the default value of the parameter PARAM read from CONFIG.TXT. Example: LOADPARAM UsbMode
SETPARAM PARAM VALUE	New runtime parameter value on success, ERROR on failure	Sets the runtime value of the parameter PARAM to VALUE. Example: SETPARAM UsbMode Com
STOREPARAM PARAM VALUE	New default parameter value on success, ERROR on failure	Sets the default value of the parameter PARAM to VALUE in CONFIG.TXT. Example: STOREPARAM UsbMode Com
GETFILE FILENAME	Size of file followed by file contents on success, ERROR on failure	Initiates a file transfer from the internal Flash drive given by the file name. The device will first send the file size as a decimal ASCII string, followed by a space, then followed by the file contents. Example: GETFILE LOG.TXT
GETFILE FILENAME SIZE		Extended command syntax returning only the last SIZE bytes of file given by FILENAME. The device will first send the expected payload size as a decimal ASCII string, followed by a space, then followed by the requested file contents. Example: GETFILE LOG.TXT 1876
GETFILE FILENAME START-END		Extended command syntax returning only the contents between bytes START and END of file given by FILENAME. The device will first send the expected payload size as a decimal ASCII string, followed by a space, then followed by the requested file contents. Example: GETFILE LOG.TXT 534-1876
GETFILE FILENAME -END		Extended command syntax returning only the first END bytes of file given by FILENAME. The device will first send the expected payload size as a decimal ASCII string, followed by a space, then followed by the requested file contents. Example: GETFILE LOG.TXT -1876
GETFILE FILENAME START-		Extended command syntax returning only the contents starting from byte START of file given by FILENAME. The device will first send the expected payload size as a decimal ASCII string, followed by a space, then followed

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		by the requested file contents. Example: GETFILE LOG.TXT 534-
SETFILE FILENAME SIZE CONTENTS	OK on success, ERROR on failure	Initiates a file transfer to the internal Flash drive given by the file name. The file name should be sent first, followed by a space, followed by the file size as a decimal ASCII string, followed by a space, followed by the file contents. Example: SETFILE CONFIG.TXT 13 UsbMode=Flash
CANCEL	No response	Terminates a pending file transfer. Example: CANCEL
DELETE FILENAME	OK on success, ERROR on failure	Deletes a file on the internal Flash drive given by the file name. Example DELETE CONFIG.TXT
SETTIME Y M D H M S	New date and time in the format Y M D H M S	Sets the internal device clock with the following values: Y (year, 00...99), M (month 1...12), D (day 1...31), H (hour 0...23), M (minute 0...59), S (second 0...59). Example: SETTIME 16 8 22 13 12 00
GETTIME	Current date and time in the format Y M D H M S	Returns the current device date and time in the following format: Y (year, 00...99), M (month 1...12), D (day 1...31), H (hour 0...23), M (minute 0...59), S (second 0...59). Example: GETTIME
RESET	OK on success, ERROR on failure	Initiates a device reset. Example: RESET
GETIP	OK	Returns the string OK. Used for locating network devices. Example: GETIP
GETVID	19AE	Returns the device USB VID (always 19AE). Example: GETVID
GETPID	Device USB PID	Returns the device USB PID (device dependent). Example: GETPID

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Specifications

Power supply	4.5 V – 5.5 V DC
Max. power consumption	250 mA (1.25 W)
Maximum continuous log speed (approx.)	100 kB/s (both streams)
Memory capacity	4 GB
Data retention	100 years
Device support	Asynchronous serial devices operating at RS-232 logic levels (+/-12V)
Maximum log read speed	1 MB/s
Access Point support	Wi-Fi CERTIFIED™ devices
WLAN encryption support	WPA-2, WPA, WEP64, WEP128
WLAN range	150 m (165 yards) in open terrain, approx. 50 m (55 yards) through one concrete wall
Dimensions including connectors (L x W x H)	91 mm x 72 mm x 19 mm (3.6" x 2.8" x 0.7")

All 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.

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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 pinouts
5. SPI, I2C, TWI, USB, PS/2, SATA, FireWire, etc. buses
6. Non Wi-Fi-conformant Access Points (Wi-Fi CERTIFIED™)

The SerialGhost does not switch to Flash Drive mode

Please check the following:

1. Are you pressing the push-button long enough?
2. Is the parameter *UsbMode* set to *Flash*? Check CONFIG.TXT.
3. Does the operating system support removable USB flash disks?
4. Have you checked the drive list?
5. Have you tried on a different USB port?
6. 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?

I'm not receiving E-mail reports

Please check the following:

1. Have you configured network access by using *KL Tools* or creating CONFIG.TXT manually?
2. Have you provided a valid recipient E-mail address? Are you checking the recipient mailbox?
3. Is the Access Point ID (SSID) set correctly? Remember, that it is case-sensitive.
4. Have you configured the encryption type and password correctly (case-sensitive)?
5. Is the remote device within WLAN range? Is the signal strong enough? Please verify this by using a second WLAN device located in the same position.
6. Does the Access Point configuration allow Auto-IP? If not, please provide a static IP configuration.

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I cannot retrieve the log using KL Tools

Please check the following:

1. Have you added the remote device to the device list in *KL Tools* by providing its IP address?
2. Has the remote device established a connection to the Access Point? Check if you are receiving E-mail reports.
3. Have you performed a communication test? Right-click on the device in *KL Tools* and select *Test Communication*.
4. Have you performed a network search? Run a network search from *KL Tools*.
5. Is a firewall blocking communication? Check if the TCP and UDP ports (default 25999 and 25998) are available for communication.
6. Have you provided the correct 3-character combination? The remote device configuration must match the data entered in *KL Tools* (default values are KBS or KBD).
7. Is the remote device located in the same LAN segment as the host computer? If not, TCP/IP communication will not work.

The SerialGhost does not 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* 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?

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.

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Can I run KL Tools on Mac OS or Linux?

KL Tools is currently only available for *MS Windows*. For configuring the device under *Mac OS* or *Linux*, the configuration files CONFIG.TXT and TIME.TXT must be created manually, using a text editor.

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).

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Manufacturer 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 the 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.

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.

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