GP5W-Shell and CSView

Overview

GP5W-SHELL is an easy-2-use software interface for our <u>wireless</u> data loggers. Included in GP-Shell is CSView, a graphical viewer. The software can be used for local access of data loggers as well as remote access (for GPRS based INTERNET data).

Requirements

The GP5W-Shell package was tested on WIN 98 SE, WIN XP and VISTA. It was designed for low CPU load, so it even will run on very small Sub-Notebooks and Netbooks.

Installation

The latest version can be downloaded for free from our homepage. This manuals describes GP5W-Shell V1.00 and CSView V1.04.

<u>Please start the Setup-Program and follow the instructions **before connecting** the wireless USB-Dongle!</u>

The wireless USB-Dongle (here Version for 433 MHz (Europe/Asia/Africa) with built-in Antenna.

On Request other types of antennas might be available (e.g. beam antennas for longer ranges). The normal range is between 10 and up to 100 meters (depending on the environment, with special antennas up to 300 meters is possible). The 433 MHz signal is optimal for rugged and outdoor usage, it even can be used for loggers buried under soil, water or snow.

After starting GP5W-SHELL, we recommend to set up the parameters: Click on the button „Setup":
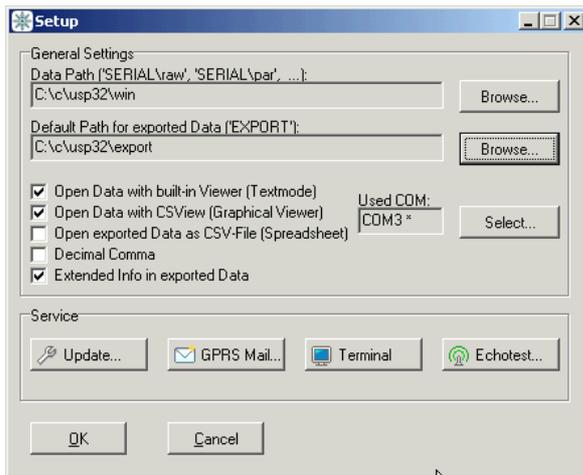
The Setup Form

We recommend to install the used paths: In „Data Path" the raw data are stored (in a compressed format), the other path is where the exported data are stored. Exported data are in the commonly used CSV format („Comma separated values"), which can be read by almost all spread sheet calculation software or databases.
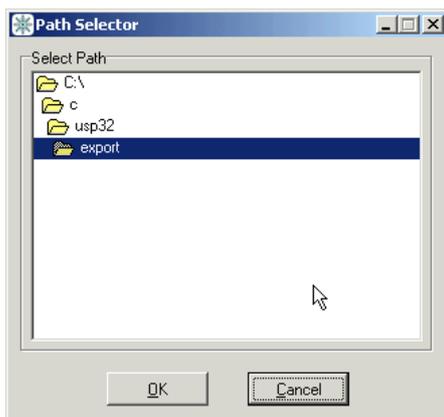
Selecting a path

Format settings: Two checkboxes control the format of the exported data: Some European areas use a decimal comma instead of a decimal point. The other checkbox controls, if extended information should (like the results of GPRS transmission, ...) should be included in the exported data.

All settings are saved on exit.

Normal usage for local communication

After starting the software, it might need several seconds until all available loggers are displayed in the tab on the right side. Select one logger and press „Identify".

After successful identification some of the dynamic parameters of the logger (used memory size, clock deviation, ...) are shown.

Hint: If there are problems with the transmission. The menu item „Echo" in the „Setup" tests the communication with the logger.

The time of the logger is compared to the PC time. After power on and if the logger does not include a battery backup for its real time clock, the logger starts at January 1st 1998, 00:00:00, so GP5W-SHELL will show a huge deviation.

Important remark: Systems with GPRS and Internet access periodically synchronise the logger's clock with the absolutely precise Internet time. Normally the PCs clock is much less accurate than the Internet time or there is a deviation because of daylight savings. So please, only manually synchronise the logger if it has no Internet access.

The menu item „Display Measure" will start a measure, that is not recorded and only displayed.

With „Upload Data" the logger is read and the uploaded data are stored on the PC.

Upload types „Incremental" und „Full": for local uploads the user can decide if all data (= full) should be read or if only the new data (since the last upload (= incremental)) should be uploaded. (Notice: for GPRS / Internet transmission always only incremental data are transferred, if GPRS is activated, it is not rcommended to read data locally, since these data will not be transmitted later again by GPRS!).

The logger uses non volatile memory („Flash memory"). The contents of this memory are keep even during power off (only the clock might be reset). The Flash memory is organised like traditional data recorders: Only new data can be added. The user must manually clear the memory (either locally with the menu item „Clear Logger" or remote over GPRS / Internet).

Data representation

The data loggers use a compressed data format (also called „raw" format) for communication. This format has the file extension „*.G2D". Compared to a textual representation it requires only 10-20% of memory. Also the „*.G2D" format includes other logger information.

Normally the „*.G2D"-files are automatically expanded as text into a directory the user can select in the GP-Shell's „Setup"-Menue (as already mentioned). It is also possible to read raw data files later with the GP-Shell2 with „Data from Disk".

Parameters

There are three kinds of parameters:

1. Parameters concerning settings for logging („Global Parameters")

2. Parameters for the GPRS/Internet transmission

3. Probe/version specific parameters („Sensor Power" and „Channel Parameters").

After selecting the „Parameters" button, a form containing type 1.) and 3.) will be displayed:

Parameter form

The displayed buttons and edit field are depending on the logger's configuration. Here only the „Global Parameters" are explained, the Prove/version specific parameters are described in a separate addendum to this document.

„Period" is the logging period. Together with „Offset" the times for logging can be selected very easily: The „Period" is the distance between two measures, „Offset" may shift the absolute time: As an example: If the „Period" might be 12 hours, the logging times without „Offset" would be: 00:00h, 12:00h, 00:00h, ... „Offset" can shift this interval: If e.g. „Offset" is set to 1h, the new logging times would be 01:00h, 13:00h, 01:00h, 13:00h , ... It is obvious, that Offset hence must be smaller than „Period".

With „Name" the logger can be named. If GPRS/Internet transmission is used, use only standard characters and the space character for the name. Avoid special characters.

The „Clock Adjust" might be a useful feature for stand alone systems, especially with no GPRS/Internet time synchronisation. By default (and design) the clock is about 3-5 seconds per day too slow (assuming an environment temperature of about 0-10 degrees Celsius, for room temperature the deviation is less). The default value is the factory setting.

The logger monitors periodically some housekeeping-data, like battery voltages, internal temperature and others. The „HK-Counter" is decremented every logged measure. If it reaches zero, the housekeeping-data (as marked in the checkboxes) are recorded in addition to the regular data. Also after and before each GPRS transmission the housekeeping-data are recorded

To manage different settings, each parameter set is marked with a (almost) unique name. This field is only informative.

The button „GPRS/GSM"-Setup opens another form:

GPRS/GSM Setup

The „Period" and „Offset" follow the same system as before, but the „GSM Period" must be equal or higher than the logger's period. The minimum recommended „GSM Period" is 1 hour, for tests also smaller periods are possible, but not recommend because of higher required power. Our loggers are ultra-low-power systems, designed to work for very long times with one battery pack.

Hint: It is good practice to avoid transmissions at full hours (especially at 0:00h, 6:00h, ...), because of other users (like e-mail clients on PCs, ...) If possible, we recommend to set the „GSM Offset" to some minutes, but please note, that this only works, if the loggers period is also smaller than 1h.

Hint: a quite rough calculation is about 600 transmissions per Ah of battery capacity.

For GPRS/Internet a SIM card with activated GPRS is required. The optimal tariff depends on the local GSM providers. There are two types of SIM cards: prepaid and contract.

Hint: For Germany (spring 2008) we can currently recommend prepaid SIM cards of „Blau.de" and „Congstar". Both SIM cards offer very low costs (spring 2008: around 0.20 - 0.50 ct/MB of data, calculated to blocks of 10kB). „Blau.de" uses the E-net, whereas „Congstar" uses the D1-net. So transmission costs of <1 EUR per month are possible (costs for transmission every 4 hours of <10kB per transmission can be as low as 1.2 ct per day for „Blau.de" and 3 ct per day for „Congstar".

Hint: For China we recommend to use local SIM cards from „China Mobile". The costs are very low too.

Some SIM cards require a 4-digit PIN. If applicable, enter it. If this PIN is wrong, after 3 attempts the SIM card may lock itself and must be unlocked (see manual of the SIM card).

Because the high energy consumption of the GPRS modem stresses the battery much more on low temperatures and also the modem degrades on lower temperatures (typically lower than -10°C to -20°C), the loggers maintain a temperature limit. Below this temperature, transmission are delayed until it is warmer.

The GPRS modem always tries to select the best GSM provider. Especially if the logger is close to the national border, the best provider might foreign, which either might block GPRS/Internet roaming or

charge much higher costs. If roaming is not activated, the logger will try to register to its national GSM (home) network, but it will not try to transmit using the foreign network.

To access the GPRS service an APN, an optional user and a password are required. These parameters are specific to the SIM card provider and can be found in the Internet (search for „APN").

For Germany: „Blau.de" (and most other E-net SIM cards) use APN: „internet.eplus.de", user: „gprs" and password „eplus". Please note, that E-plus cards normally must be activated with one single phone call (this can be done using a normal mobile phone).

For „T-Mobile"-Germany the APN is „internet.t-d1.de", set user and password both to „t-d1".

For „Vodafone"-Germany the APN is „web.vodafone.de", no user or password is required.

For „E-Plus"-germany the APN is „internet.eplus.de", user: „eplus", password „gprs" or „interne"

For „O2"-Germay the APN is „surfo2t", no user or password is required.

For China - „China-Mobile": APN is „cmnet", no user or password is required.

Normally the GPRS service is, due to the nature of the Internet, a „not 100% reliable service". So it can be selected, that the logger retries 3 times in case of failures, if the checkbox is marked.

Notice: The GPRS service requires a minimum signal strength and quality for reliable work. If a transmission fails, the logger will retry with the next logger period. If this fails again twice, it will retry after 6 hours or if the next GPRS transmission is due. In no cases data is lost, the logger will always keep everything in its non volatile flash memory. There is also a very small chance, that the logger can transmit the data successfully, but the reply from the Internet is lost. In this case the logger might attempt to retransmit the data again.

Hint: during the transmission the GPRS modem tries to estimate the GSM signal strength. This is not very precise and also sometimes fails, but in most cases it can a value of 12 or higher is OK, where 31 is the maximum. Normally a signal strength of <8 is too low.

The last parameters contain the name and path of the Internet server. This server is used as an intermediate transportation service to forward the data as e-mail. It will only store the data for a certain time, after that they will be deleted without any notice. Any further processing of the data is in the user's responsibility.

Hint: Internet servers can be accessed dynamically (by using a textual URL) or by a static IP address (this is a 4 byte number, like „212.227.4.224"). Using the server's IP is slightly faster, but not all servers have a fixed IP.

The Internet server also may keep the time of the logger synchronised (if enabled). Since the server software is based on GMT (Greenwich) time, the local offset of the logger must be entered (in seconds). For Germany this is 3600 sec or 1h (also known as „GMT +1").

A word about the default server: for our customers we provide a server, that can be used free of charge. This are the default setting on any new logger. But it is very easy to install the server software on own servers. Typically such a server costs only a few EUR per month, but can maintain the data of several hundreds of loggers. An own server can automatically add new data e.g. to a custom database.

Default behaviour of the GPRS transmission: After power on the logger might have lost the time (unless the model is equipped with a backup battery). In such a case, the logger will wait for 12 hours unless it continues the automatic transfer (where normally the time is synchronised to the correct time). This feature is especially very useful for changing batteries for

GPRS/MAIL

To test the GPRS/Internet transmission, a manual transmission can be triggered: After identifying the logger, open click on „Setup" in the main form, then click on the button „GPRS/Mail":

Terminal for GPRS/Mail

The screen shows the complete transfer. The most important output is „Reply: Accepted". This shows, that the server has confirmed the transmission.

„Sync." indicates, that the server has adjusted the time of the logger.

Hint: Manual transmissions automatically open the „Terminal" window. This window is used to display data during measurements, transmissions and other activities. In case of problems (e.g. wrong sensor settings), sometimes useful info may be found. The „Terminal" can be opened manually.

After successful transfer, the recipient of the data should have received the e-mail (if the address in the logger's parameter is valid). This e-mail will look like this:
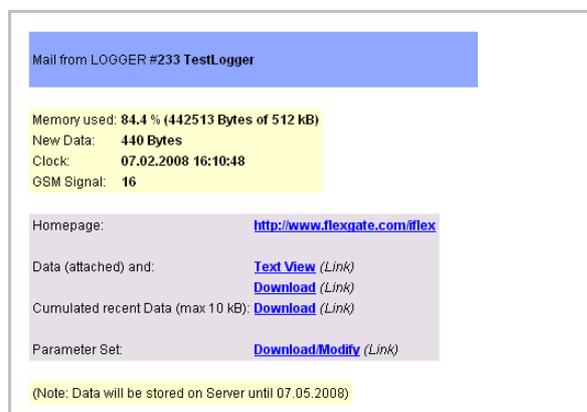
E-mail from a logger

The e-mail contains only the latest transferred data (as attachment). But the e-mail contains some links to access directly the data on the server. Please note, that these data are automatically removed from the server after a certain time (the default is 3 months, can be changed by software).

Also the server can cumulate several sets of data into one file. This is optimal for a short-term historical overview („short-term" because the server will deliver 10 kB at maximum).

Normally the CSView software will be used to display the data (see following section).

Remote changing of parameters: a main focus during development of the loggers was to easy remote changing of the parameters. This is very easy by clicking on the appropriate mail or the parameter set in the logger's home page: GP5W_Shell will be opened and the parameters can be changed:
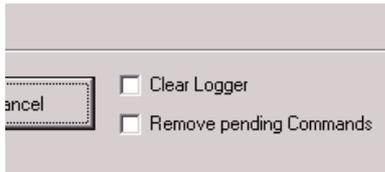
GP5W_SHELL In the Remote Mode with additional checkboxes

By marking the checkboxes the logger can be cleared or pending parameter changes can be removed.

Parameters are transferred to the logger on the next communication. The server software checks, if the transfer was successful. If not, the transfer will be repeated.

Application example for remote parameter changes: Some kinds of water level sensors require periodically calibration (every few months). Normally the calibration is done by using a normal tape-measure. Hence at the logger's site no PC or notebook is required. This job can even be done by unskilled staff. If any correction is required, this can be checked and done later in the office!

CSView

Working with CSView is very intuitive, so only a few words. CSView comes in two different versions:

CSView for PC, and CSView online. Both version are quite similar.

- „Events" are displayed for GPRS/GSM-Information, GPRS/GSM-Errors and parameter changes:
  Green: GPRS/GSM transmission OK
  Blue: New File
  Red: GSM Error
  Yellow: All others (like parameter changes, ...)

  The „Events" in CSView are displayed if the zoom-level is set to high:
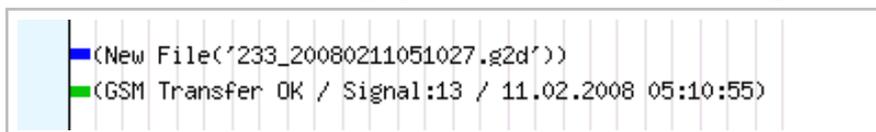
  „Events" in CSView (turned by 90 deg.)

- In CSView for PC, the colours can be selected by clicking RIGHT on the channel list.

Installing the Server Software

All server software and scripts are included for free on the CD delivered with logger! Updated are periodically available at low costs for registered users.

On CD is a 1:1 image of our current demo server www.flexgate.com or www.flexgate.de .

Running the server software on an own Internet server is very simple. These are the requirements:

- Standard Webserver (operating system: Linux or WIN)

- PHP Version 4 or 5.

- Possibility to run own CGI scripts (compiled C). Executables for Linux and WIN are included

- No database required

Hint: In Germany (spring 2008) such an account is available starting at 3 EUR/month. All major Web-hosting companies (like Strato, 1&1, Freenet, ...) offer this.

The installation procedure is very simple: Simply copy all HTML-, PHP,- and other files from the directory on CD to your webserver into a directory „iflex" (this is normally done via FTP). The main page of the server software should be located as „http://xxx.yourserver.com/iflex/index.html".

In the next step the binary files on Linux systems (in directory „./iflex/bin", currently „usp2_exp" and „usp_coll") must explicitly set to „executable".

In the last step: The demo makes use of Google-Maps. For using Google-Maps, please regard their license agreement (especially for business usage). To use Google-Maps, a Key must be changed in the PHP code displaying the pages. More info can be found in appropriate PHP source code.

The data are converted by „./iflex/bin/usp2_exp(.exe)" to CSV formated text files. Reading of CSV files in PHP is very easy. Samples can be found in the PHP source code for „csview.php" or „csplot.php". It is very easy to use CSV files for further processing (e.g. databases).

For modifications of the server software, request are welcome. We and our partner companies will be happy to realise individual projects. Please understand that the server software is free, but we can not give free support.