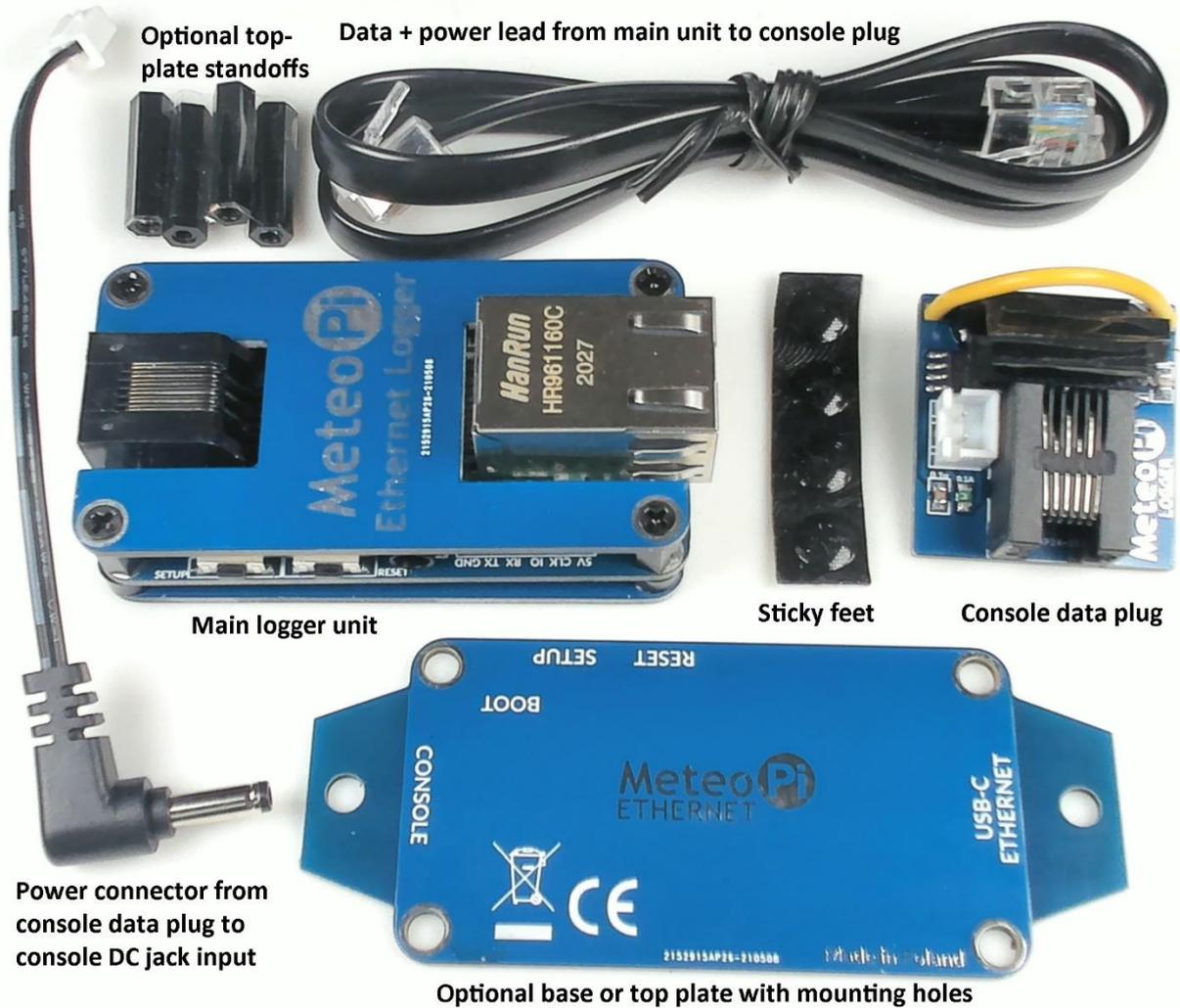# Meteo-Pi Ethernet logger

These Meteo-Pi Ethernet user notes are in 4 sections:

1. A brief quick-start guide;
2. A detailed description;
3. Full set-up instructions - see the section headed 'Setting up the Meteo-Pi Ethernet logger';
4. Utility functions;

Quick start

Assembly

Parts supplied can be seen in the graphic below.

Optional top-plate standoffs

Data + power lead from main unit to console plug

Main logger unit

Sticky feet

Console data plug

Power connector from console data plug to console DC jack input

Optional base or top plate with mounting holes

The main logger unit comprises three main parts: There is the main PCB circuit board on which all electronic components are mounted. There is then a base plate and top cover plate attached to the main circuit board by means of screws and standoffs of different sizes – see image below, which shows the default configuration as supplied.

Default top plate

Main PCB circuit board

Default base plate
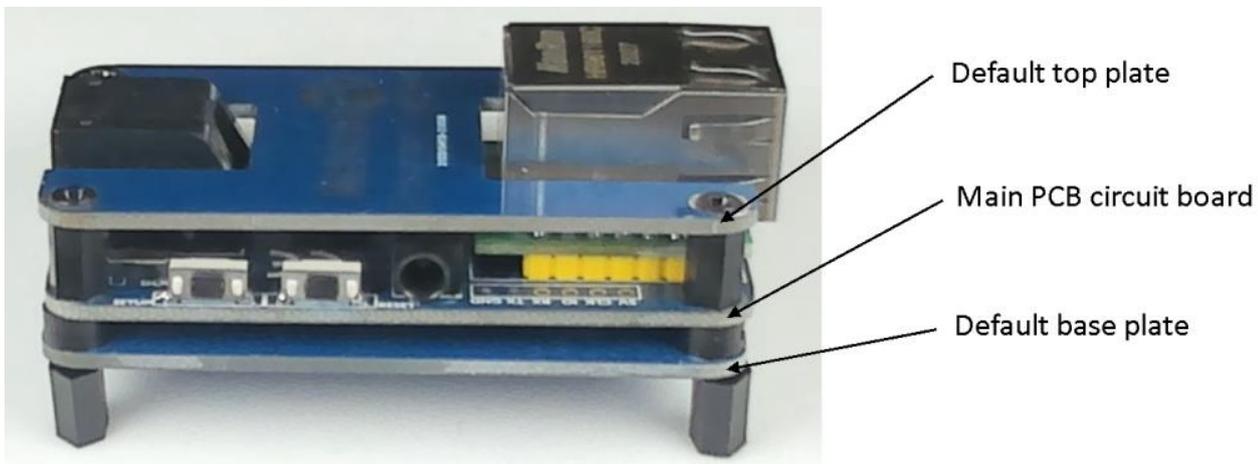
The top and bottom plates can be interchanged according to user preferences. The extra plate supplied will be seen to have two mounting holes on its 'wings', which can obviously be used if the logger needs to be fixed to some surface (this is entirely optional). This extra plate can be positioned either as the top or bottom/base plate. If mounted as the top plate then the longer standoffs included will need to be used. If the extra plate is mounted as a replacement base plate then the default base plate can be repositioned as the top plate, to provide a more complete cover for the logger. The configuration of plates is purely down to the user's preferences and many users may find it simplest to stick with the default 'out-of-the-box' configuration.

Take care when swapping plates around to orient the plates so that the labels align with the logger items that they relate to.

Set-up

Detailed instructions are provided further below to help those who are new to setting up Davis-compatible loggers, but for more experienced users there are 3 main steps:

a) Connect the logger to your Vue or VP2 console (fully powered off) and then to Ethernet and, *finally*, power for each component. The assembly/connection process should be reasonably intuitive. The various components included are all listed and described in the 'Packing list' at the top of Section 3

b) Establish the IP address of the logger (using Weatherlink for Windows, router settings or a network scanner). Several methods are described in more detail here: https://www.manula.com/manuals/pws/davis-kb/1/en/topic/find-ip-address-for-network-loggers ;

c) Connect to the logger's configuration web page using its IP address in a standard web browser and edit any key settings that you need;

If you are unsure about any step then please refer to the relevant detailed topic in section 3.

A copy of these user notes can be downloaded from:

https://www.weatherstations.co.uk/wp-content/uploads/Meteo-Pi-Ethernet-instructions-v0.86.pdf .

Description

Meteo-Pi Ethernet (MPE) is a new but traditional-type Davis-compatible logger that connects to a VP2 or Vue console, logs data in the familiar legacy Davis formats and can pass both real-time and archive data to local software via the local network. MPE also has a range of Internet upload features as described in the Data Features section below.

Note that the MPE logger is a **network logger**, i.e. it connects to the local network **via an Ethernet cable only** and is not intended to cable direct to a computer (except when updating the logger firmware). Also, unlike the Wi-Fi logger from the same manufacturer, this is **not** a Wi-Fi device. Network loggers obviously allow for a considerable Ethernet cable or WiFi distance between the logger and any linked computer.

This MP Ethernet logger provides comparable features to the old Davis WeatherlinkIP (WLIP) logger (no longer manufactured), but also adds some extra functionality.
In essence, MPE is a modernised and enhanced version of WLIP!

Physically, the MPE is a little different from the old WLIP logger; MPE is a small, separate, free-standing device connecting to the console's logger pins via a 6-conductor ribbon cable and interface plug rather than being fully internal to the console. As a result, using the MPE logger causes no additional heat to be generated inside the console, thus allowing the console's inside temperature/humidity to read more accurately. (Inside temperature will still, however, read high if the console backlight is left on for any significant period.)
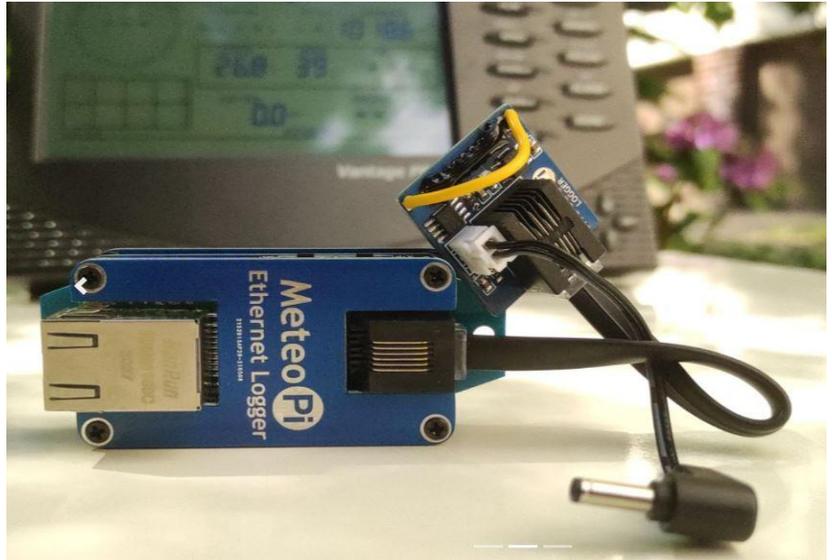
Overall, the MPE is designed to be simple to set up and to use. For configuration there is a single basic web page interface through which settings can be entered and edited. Main MPE features are as follows:

Data-handling features

The MPE has two core data-handling features:

- Passing data across the local network via TCP port 22222 to a computer running any software that is compatible with the legacy WeatherlinkIP logger;

- Data uploads across the Internet to a compatible software platform or server;

Both local and Internet uploads can be enabled simultaneously if required but, as with all such loggers powered by a single-core microcontroller, some 'tuning' of the upload settings may be needed for optimum results.

Local data uploads

In practice, almost all of the well-known Davis-compatible weather station programs can receive data from a WeatherlinkIP logger and hence are compatible with the MPE logger. Examples include Windows PCs running programs like Weatherlink for Windows or Cumulus/CumulusMX or a Raspberry Pi running suitable Linux software. But the list includes essentially **any** computer type running WLIP-compatible software;

Internet data uploads

The number of upload targets to export data over the Internet is deliberately limited in the interests of robust operation and to minimise maintenance updates and support issues. The five chosen targets are:

- The Davis Weatherlink.com platform, with the usual caveat that this is a third-party upload;
- Weather Underground;
- UK Met Office WOW platform;
- US CWOP platform;

- A custom PHP-based mechanism by which users can upload data to a MySQL database running on their own server;

Other notable features

- **Single DC power input for both console and MPE:** Network loggers always need more power than console batteries can provide. Powering the console from an AC mains adapter is the usual solution; but with MPE, the standard DC console connector can be moved to the MPE unit, which will then supply power both to the logger **and** to the console via the ribbon cable plus a short, attached lead that plugs into the console's DC input. DC power can also be applied via the USB-C connector located below the Ethernet socket, which may be a useful option if the user chooses to use a PoE (Power over Ethernet) connection in conjunction with a USB-C splitter unit. Finally, the logger also has soldering points for a custom 5 V power source;

- **Logging continues even with mains outage:** Provided the console contains C cells in good condition, logging by the MPE will continue even if the DC supply to the MPE/console is lost temporarily. New batteries should last for at least 3 months of continuing MPE logging since no battery power is supplied to the MPE circuitry except to maintain the basic logging function. Note that all uploads, both local and Internet, will stop during a power outage, but generation and storage of archive data will continue as normal for upload once mains power is restored;

- **Logger capacity:** The MPE logger has the same archive capacity of 2560 records as other standard Davis loggers (in order to retain full compatibility with the VP2 and Vue consoles);

- **NTP clock synchronisation:** The MPE logger is able to maintain time accurately by calls to NTP Internet time servers (provided this function is enabled and there is an Internet connection). At startup and subsequently at the NTP interval, the logger checks the console time and corrects it if there is a discrepancy of more than 5 seconds;

- **Reset buttons:** The Ethernet-linked MPE is designed to run robustly for extended periods and – unlike Wi-Fi sometimes – should recover automatically from any network outages. But very occasionally there may still be a need for a forced reset and MPE provides for this in stages through to a full reset to factory settings.

- **LED indicators** There are also 5 coloured LEDs on the logger PCB that provide a constant visual check on various aspects of current logger activity, plus the network activity and line-speed LEDs within the Ethernet socket and a red power LED below the same socket. The 5 MPE activity LEDs are:
  - Network side:
    - Green = Ethernet/network indicator
    - Yellow = Internet data uploads
    - Blue = Local data connection (e.g. to PC)
  - Console side:
    - Yellow = Commands being transmitted to console;
    - Green = Data being received from console

- **Firmware updates:** There is provision for firmware updates to be applied via the USB-C connector and a special (free) software utility. MPE is designed to be simple and robust to run and so firmware updates will not often be needed. But this update feature is there as and when required.

Setting up the Meteo-Pi Ethernet logger

Packing list

Please check that you have all the following items in your MPE box:

- Main MPE logger device;
- Console interface plug board (with yellow wire loop);
- Black ribbon cable to connect console interface plug to main logger;
- Short DC console power cable with white plug on one end and DC jack on the other;
- Sundries:
  - Self-adhesive feet;
  - Alternative mounting plate with 'wings' at each end with a mounting hole, should you wish to fix the logger to some other surface;
  - 4 tall hexagonal stand-offs;

MPE logger assembly

The main logger unit can be used exactly as supplied, but the case layout can also be modified a little if you prefer. As supplied, the case is in its low-profile, default format and it will usually be simplest just to use this out-of-the-box layout.

Once your preferred layout has been chosen and, if necessary, modified from the default (as below) then the 4 adhesive feet can be attached to the underside of the base plate – symmetrically at points adjacent to the 4 screws but not covering the screws.

If you prefer, the two cable sockets can be covered by a full-width plate and/or the alternative base-plate may be used. This is easily achieved as follows:

i. Remove the 4 screws and spacers that attach the default base plate to the logger;
ii. Also remove the 4 screws and stand-offs holding the H-shaped upper plate in place and replace this with the default base plate using the longer stand-offs supplied;
iii. Refit the alternative mounting plate as the new base plate. Take care when refitting this alternative plate to orientate it correctly, i.e. with the printed legends to the underside;

Note: These assembly instructions apply to the first release of the MPE logger. It is possible that there may be slight modifications to the protective plates in later releases.

Main set-up instructions

Powering the logger

Before starting, you should decide how the console and logger are to be powered. (This can be easily changed subsequently.) The main MPE **logger** must be powered from a DC source able to provide at least 200mA at 5v, but there are options for the **console** power.

The simplest option is to power the logger directly from the standard console AC mains adapter and to use the ribbon cable to forward DC power to the console.

Alternatively, the logger can be powered from any standard 5v supply fitted with a USB-C connector. If you have a PoE (Power over Ethernet) adapter fitted with a USB-C connector then this is a further option. It is recommended that good alkaline batteries are also loaded into the console as a back-up against mains outage.

But, if you wish, you could also use a console mains adapter to power the console directly and power the logger separately as described above.

Set-up instructions

1. Connect ribbon cable to console interface plug board;

2. Connect the other end of the ribbon cable to main MPE logger unit;

3. Disconnect any power source connected to the Davis console (AC adapter **and**, if fitted, batteries);

4. Insert the console interface plug board on to the pins of the logger interface in the battery compartment of the console. Take care to line up the pins accurately and once you are confident that the socket is correctly engaged then push evenly but firmly until the socket is **fully** home on the pins;

5. Make the DC power connection to the console:

   a. If the console is to be powered from the MPE logger: Attach the small DC power cable to the console interface board. The small white 2-pin plug inserts into logger board and DC plug goes to the console power socket;

   b. If you prefer to power the console directly then restore power source to the Davis console;

6. Attach Ethernet cable to the main MPE logger;

7. Connect power to the main MPE logger via one of the options described above;

8. Allow the logger 1-2 minutes to initialise and then proceed to the next stage of configuration;

Configuration interface

If all is well, then you should see:

- A red LED below the Ethernet socket to indicate that the logger is powered up;
- Two fainter LEDs on the rear (cable) end of the Ethernet socket indicating network speed and activity;
- Some activity on the 5 LEDs along the side of the logger. A solid green LED on the first ETH LED shows a good network connection;

Assuming this is all correct then we are ready to complete the configuration via the logger's network interface page. If not, then investigate and correct before proceeding.

Find the logger's IP address

The key next step is to find the IP address that the logger has been assigned on the local network. This needs a little detective work and there are three suggested methods to find the IP address:

1. **Use the Weatherlink for Windows program**: Instructions for downloading this program can be found at https://www.manula.com/manuals/pws/davis-kb/1/en/topic/download-weatherlink-program . The **Find** button in the 'Communications Port' dialog on the Setup menu can usually find a logger's IP address – for details see the 'Using WLIP with Weatherlink for Windows' topic on the page at: https://www.manula.com/manuals/pws/davis-kb/1/en/topic/weatherlinkip-configuration . If this approach is inconvenient or fails for some reason or if you're not using a Windows PC then you will need to try one of the other options;

2. **Check router settings**: Log in to your network router and you should be able to find a table of devices currently attached to the network along with their assigned IP addresses. How to perform this step will vary with the make/model of router, but it should usually be fairly easy to do. Look for a device with the default name 'MeteoPi-Ethernet' (unless of course you rename to logger);

3. **Use a network scanner**; There are free programs available that can scan your network and return the details of attached devices. A utility called AngryIP is one such program. If the name 'MeteoPi-Ethernet' doesn't show up in the table (sometimes it doesn't) then you may need to look for 'IeeeRegi' in the MAC Vendor column;

Users already familiar with Weatherlink for Windows (WLfW) may well find option [1] the easiest option. But if you don't already have WLfW installed then the quickest option might well be option [2], i.e. looking at the router table.

If you have correctly established the logger's IP address then entering this IP address into a the address bar of a standard web browser should display the logger's configuration interface.

Using the Configuration Interface

Note: The initial MPE production batch had a simpler, single-page user interface than that described below. But as from firmware release v1.21r the interface described below is used to provide extra features. Any earlier example should be updated to firmware v1.21r (or whatever is the latest available release) to install the latest features.

The Configuration Interface calls up one of three web-pages that returns various properties of the logger and sensor readings, and allows important settings to be updated. The 3 pages are titled: Real-time Data; Export Setup; and Device Setup. It is possible that additional features may be added to any of these pages in future firmware updates.

Real-time Data: As it says on the tin, this page provides a read-out of all current sensor readings, updated at the interval set for this page in the Device Setup settings.

Export Setup: Allows control and entry of credentials for data uploads to various server/cloud platforms.

Section	Comments
Weatherlink.com Export Settings	Sets Device ID and Key for uploads to Weatherlink.com. See note below
Weather Underground Export Settings	Sets Station ID, Key and Interval for Weather Underground uploads
Met Office WOW Export Settings	Sets Site ID, PIN and interval (eg 5 mins) for UKMO WOW uploads
CWOP export settings	Sets Callsign, APRS Server & Password for uploads to US WOW service
Custom HTTP->MySQL Export Settings	Sets parameters for PHP/MySQL uploads. See Additional Note below.

Device Setup: This page displays and configures various logger settings.

Section	Comments
Logger details	Current data about firmware version, date-time settings etc
Reboot Ethernet Module	Reboots logger
Ethernet Settings	IP settings, including option to set static IP
Device Name	Option to edit default device name for the MPE logger
TCP Port Settings	Sets blocking mode during archive downloads
RTD Refresh interval	Set refresh interval for real-time data page
NTP Server Settings	Allows editing of NTP server settings for optimum timekeeping
Set latitude/longitude	Required for some uploads
Set Archive Interval	Allows logger archive interval to be varied (requires confirmation tick)
Send Command to Console	Allows commands to be sent to console as per Davis Serial Tech Ref PDF

Additional notes

Weatherlink.com settings: If you have an existing pair of Device ID (DID)and Key settings (either from an old WeatherlinkIP logger or from a previous Weatherlink for Windows installation that uploaded to Weatherlink.com) then these can be reused for the MPE logger. But the old devices must be inactive – you cannot have two devices trying to upload to Weatherlink.com with the same credentials.

If you do not have existing DID/Key credentials then you can obtain a set as described in the section headed 'Problems configuring uploads from Weatherlink for Windows to weatherlink.com' on the help page at: https://www.manula.com/manuals/pws/davis-kb/1/en/topic/troubleshooting .

Custom PHP/MySQL Export Settings: This feature is not fully operational at present. In future, it will allow data to be uploaded to a user-designated SQL server to allow a database of weather readings to be maintained locally or remotely.

Device name: If the device name is changed at all then the logger should be rebooted for the new name to be seen across the local network.

Utility functions

Updating the logger firmware

Updating the logger firmware is not difficult to do but does require a couple of downloads and following a few steps to perform the update. The process is simpler in practice than it may seem from the detail below. It's also always worth double-checking that your logger is not already at the latest firmware version before attempting a new update.

The MPE logger is designed to be a simple and robust logger with a fixed and relatively limited set of features. As such, it is not envisaged that the firmware will need to be updated often. However, it is certainly possible to update the firmware via the procedure below. **Note that the MPE logger does not currently possess a built-in updater function and requires a direct USB connection to a computer running a special updater utility during the firmware update process**, i.e. the update cannot currently be performed across the network.

The latest available firmware can be found at http://wifilogger.net/support.html . Please be sure to choose firmware for the Ethernet logger and not for other types. At the time of writing, the latest MPE firmware was v1.21r. The downloaded firmware file **needs to be unzipped to reveal the .bin file which should be placed in a known folder location on the computer performing the update**.

Updating the firmware requires a utility called *STM32CubeProgrammer*, which may be downloaded from: https://www.st.com/en/development-tools/stm32cubeprog.html . (Alternatively, search online for 'stm32cubeprogrammer'.) This utility passes the new firmware from the update computer to the logger over a direct USB connection via the logger's USB-C port (i.e. and not via a network connection) and with the logger placed in a special update mode. NB A first download of the STM32CP utility will require you to register an email address with STM and to receive an email with a download link.

Firmware update procedure

This assumes that the new firmware and the *STM32CubeProgrammer* utility have both been downloaded, that the *STM32CubeProgrammer* utility is running, and **the logger is connected to the update computer via a USB connection**. (NB The USB cable requires a USB-C connector at the logger end.) Nothing else needs to be connected to the logger and indeed it may be simplest to perform the update with **only** the USB cable connected. It's probably worth reading through these instructions in advance to understand the steps involved.

1. Find a miniature slide switch on the logger named Boot and located between the Set-up button and the adjacent standoff and click this slide to the left using eg a miniature screwdriver or similar;

2. Click and briefly hold the Reset switch. This should cause the MPE logger to be discovered by the linked computer with the usual USB connection noises. NB Looking in the 'USB Devices; section at the bottom of Windows Device Manager listings you should see 'STM32 BOOTLOADER' listed as a connected device. If this cannot be seen then try again until it does show up – this entry must be present before continuing. (Checking Device Manager is more a troubleshooting tool than an essential step in the firmware update, but certainly if the update does not work first time then Device Manager should be checked. Similar tools may be available for other operating systems.)

3. Start the STM32CubeProgrammer utility and you should see a window similar to that below. It may be worth doing this in advance of performing an update for the first time just for familiarisation purposes. This interface is relatively complex but we only need to use a few of its features. Note the following areas, each highlighted as a red box:

    a. At the top right there is a Connected (green)/Disconnected (red) flag. This will be red initially and must go green once the correct settings are in place before the update can start;

    b. The main feedback area of the interface is tabbed. The interface will open with the Device Memory tab active and once a successful connection is made then the Open File tab can be clicked to navigate to the new firmware file. The main tabbed area will report various data items as the update progresses. Note the presence of the blue 'Read' button on the main tab, which is what you see when the STM32CP utility opens, but this will change to a blue 'Download' button once the new firmware file has been correctly located;

    c. On the same line as the tabs are two buttons towards the right. The blue one currently showing 'USB' will probably say something different when you open the utility. This sets the type of connection to the logger and we need to select 'USB' from the dropdown. To the right of this button is the Connect button – see below;

d. Below the two buttons in (c) in the USB configuration section are two further buttons. The one labelled 'USB1' shows the USB port set to be used. The one to the right is important and is a refresh button;

e. Finally, the 'Log' area towards the bottom reports on the actions in progress;

4. The steps to actually flash the new firmware to the logger are then as follows:

a. Select USB as the port type from the dropdown in 3c above;

b. Click the Refresh button noted in 3d above. With luck this will correctly identify the USB port in use and the port button readout will change from something undefined to eg USB1 (it may be a different port number on your computer);

c. Now click the green Connect button noted in 3c above. All being well, this will allow the STM32CP utility to recognise and connect to the logger. The status button in 3a should change to green/Connected and various messages will appear in the Log window. Note that the connection times out within a minute or two with a lost-connection warning and the connection status reverts to red/Not Connected. If this happens then repeat steps 4b and 4c as necessary.

d. Click on the Open File tab and navigate to and select the new firmware .bin file that you downloaded before starting. Click on the Open button and the Select File dialogue will close.

e. Click the blue Download button which should now be visible in the main tabbed area – see 3b above. This should initiate the actual transfer of firmware – you are effectively downloading the file from the host computer to the logger. This step will probably happen fairly quickly and success is signalled by a 'File download complete' message;

5. Step 4e completes the update process but you now need to return the logger to its normal configuration, remembering to reset the slide switch in step 1 above to its normal position to the right and to reboot the logger. Remember also that a complete logger reboot may sometimes result in it getting a new IP address. Check on the Device Setup page of the logger's configuration interface that the new firmware version has installed as expected and that the version number has updated appropriately.
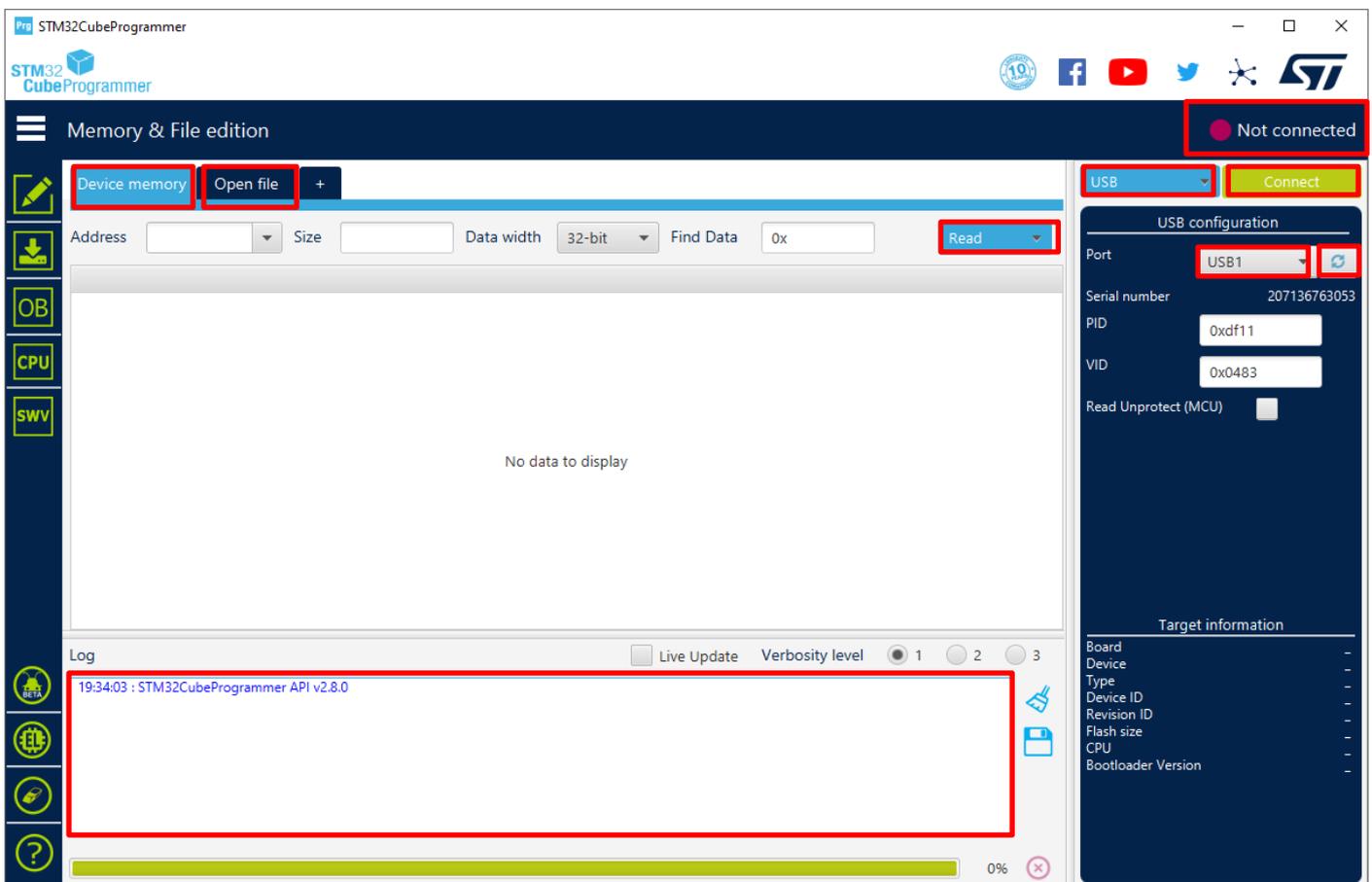
Resetting the logger

There are 4 reset options, mostly controlled by the Reset and Setup buttons.

1. If the logger needs resetting for any reason <u>and still has network connectivity</u>, then there is a button right at the bottom of the web configuration page that will reboot the unit.

2. If any network issues should cause the logger to lose its network connection, then the first step is to try the RESET button. This should reboot the logger and usually allow a network connection to be re-established. If the logger is set to receive IP addresses via DHCP then remember that under certain circumstances the logger might receive a different IP address from that assigned previously.

3. Stage [1] will not work sometimes, e.g. if the logger has been assigned a static IP address but is moved to a different network with different IP settings. In this case, a sustained press of the SETUP button for around 3 seconds will force a change of IP assignment from static to DHCP. The yellow LED should blink as confirmation that this change is under way.

4. In the rare circumstance that the logger still seems to have locked up or if a complete reset is required for other reasons, then a **long** sustained press of the SETUP button for 10 seconds will force a reset of the logger back to factory settings. The green, yellow and blue LEDs should all blinking as confirmation that this change has been triggered.

In general, the logger should perform reliably for extended periods and the need for any resets should be rare. But if the need should arise then the four options above are available.

Note: If the logger does need resetting at any level, then it will be best to close any linked software until the logger is back online and then restart the software. Remember, as above, that a reset logger may sometimes receive a different IP address from that assigned previously.

Footnotes

Additional information and firmware downloads can be found online at: http://wifilogger.net/ethernet.html and http://wifilogger.net/support.html respectively;

Manual version = v0.86 (15th October 2021);

Written by John Dann at Prodata Weather Systems, based on full original information from the MPE manufacturer;