HOW-TO

How-to Log Data to a USB drive in ADU

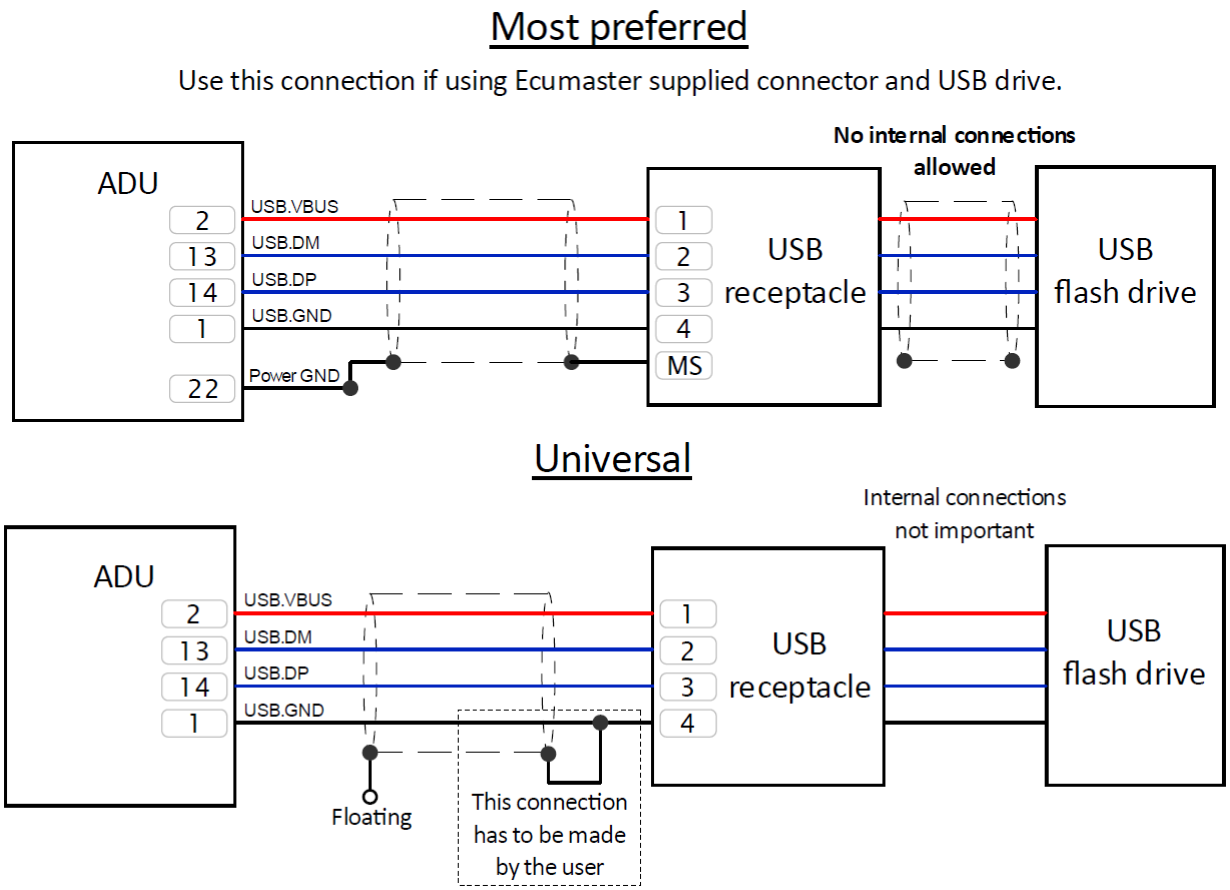
Document version: 1.0
Software version: 120.2.2 or later
Published on: 28 July 2025

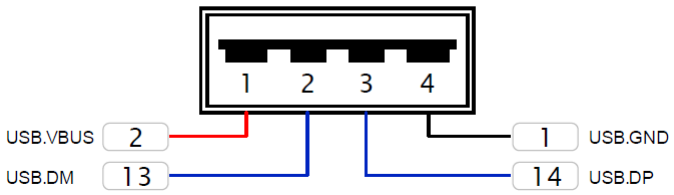
1. Introduction

The ADU can log data at up to 500 Hz, either to a USB drive or directly to a connected PC.
To log without a PC, the USB drive must be properly configured. This guide covers how to prepare the system, ensure proper wiring, and troubleshoot common issues.
With correct wiring and USB drive, the system works out of the box—adjustments to the logging configuration are optional and explained here. For more information refer to full ADU manual https://www.ecumaster.com/files/ADU/adu_manual_en.pdf.

2. Wiring

Proper wiring is essential for reliable USB logging.
Ensure good shielding and connect the USB shield and ground at only one end to prevent ground loops and maintain stable data transfer.
If possible, use twisted pair wiring for the D+ and D− (DP and DM) lines. Keep the USB cable as short as possible.





Recommended shielding configurations (see diagrams on previous page):

- **Most preferred:** connect the shield to a power ground on the ADU side. No internal connections between USB ground and shield are allowed.
- **Universal:** connect the shield on the USB drive side. In this case, other connections between shield and ground are not important.
- **Not good:** shield connected at both ends.
- **Not good:** shield not connected to ground at either end.

Internal USB connections

The USB shield and ground may be internally connected. This is often not considered and can create shield/ground issues. Internal connections can occur:

- inside the USB drive (only if the casing is metal, not present in any plastic USB drive),
- inside the USB socket (always the case for sockets with 4 connections/wires).

How to check your setup

1. Remove the shield and ground terminals from the ADU connector.
2. Perform a continuity test (or measure resistance):
    - If continuity exists between shield and ground: do not connect the shield to any ground on the ADU side.
    - If there is no continuity: connect the shield to a power ground (preferred), or to a ground.
3. If you're using a cut USB cable or one with unknown wire assignment, use a continuity test to properly identify each wire by mapping it to the correct USB pin on the connector.
   Do not rely solely on wire colors—always verify connections with a multimeter.

Ecumaster-supplied connectors and USB drives

Ecumaster supplies two types of USB connectors and a USB drive. None of them have an internal connection between the USB shield and ground. Therefore, it is essential to use the "Most Preferred" wiring configuration described above.

3. Logging Configuration & Management

Selecting Channels to Log

Open the ***Logged Channels*** window from the *Select panel* menu (F9). This is where you configure:

- Which groups or individual channels should be logged
- Logging frequency per channel or per group
- Bandwidth usage per condition

To quickly enable or change logging frequency, use keyboard shortcuts:

Shortcut	Frequency
Alt + 1	1 Hz
Alt + 2	5 Hz
Alt + 3	25 Hz
Alt + 4	50 Hz
Alt + 5	125 Hz
Alt + 6	250 Hz
Alt + 7	500 Hz
Alt + ~	Deactivation of channel / group logging

You can also right-click on a group or channel and choose frequency from the context menu.

Conditional Logging Profiles

ADU supports up to four logging profiles (*Cond1–Cond4*), each with different sets of channels and frequencies.

- A condition (e.g., engine running, track armed, GPS fix) activates a specific profile
- If no condition is met, the *Default log condition* is used

To configure:

- Assign condition channels under the *Log* panel → *Log Cond2/3/4 Channel* settings
- Prioritize important data under higher-frequency profiles

Conditions can be based on any internal or custom channel.

Each logging condition is evaluated 25 times per second. If multiple conditions are active, the one with the highest priority (*Cond2* > *Cond3* > *Cond4*) is used.

USB Logging & File Storage

ADU automatically logs to a connected USB stick (more on the USB can be found in the next chapter):

- Files are saved in `.ADULOG` format, split by time (default: every 1 hour)
- By default, logging starts automatically upon USB detection
- LED1 can indicate logging status (green = logging; red = error)

Logs can be downloaded from the USB via **Devices > Receive Logs** in the ADU Client (Shift+F4) or simply open/copied from the USB drive.

Real-Time Clock (RTC)

To ensure meaningful file name, the ADU must have the correct date and time. This setting does not update automatically.

Common situations requiring RTC setup:

- Initial installation - when configuring the device for the first time
- Time zone changes - after moving the device to a different time zone
- Daylight saving adjustments - when transitioning between standard time and daylight saving time

Setting the RTC:

- Connect to the device via **ADU Client**
- From the top menu, go to ***Devices / Set Real Time Clock***

The ADU maintains RTC settings using its internal backup supply under normal conditions.

4. Preparing a USB drive

To enable reliable data logging via USB, the storage device must be correctly prepared. Improper formatting or usage can prevent logging or cause data loss.

> **Warning:**
> The ADU supports only the FAT32 file system. Drives formatted as exFAT or NTFS are not compatible.

Formatting the Drive as FAT32

To format a USB drive in Windows:

1. Insert the USB drive into your PC.
2. Open **File Explorer**, right-click the drive, and select **Format**.
3. In the **File System** dropdown, select **FAT32**.
4. Ensure **Quick Format** is checked.
5. Click **Start** to begin formatting.

> **Note:**
> On some versions of Windows, FAT32 may not appear for drives larger than 32 GB. You may need to use a third-party tool (e.g. Rufus) to format larger drives.

If you are formatting the drive in the third-party tool the most important settings are:

- Type: *Non-bootable drive*
- Partition scheme: *MBR*
- File system: *Large FAT32*
- Extended label and icon files: *Disabled*

Recommended Drive Size

For best compatibility and reliability, use USB drives between 8 GB and 32 GB. Logging capacity is approximately 11h of logging per 1GB.

Use an Empty, Freshly Formatted Drive

Always use a USB stick that has been freshly formatted and contains no other files or folders. Unrelated files may interfere with logging.

Folder and File Structure

The ADU saves log files directly in the root folder of the USB drive. Files follow this naming scheme:
YYYYMMDD_HHmm_ss.adulog
Example: 20250617_1458_32.adulog
This naming depends on the device's real-time clock (RTC). An incorrectly set RTC will result in misleading timestamps, making log management difficult.

5. Reviewing and Exporting Logs

Using the *Graph Log* panel

The ***Graph Log*** panel is often used to verify which channels are being logged and at what frequency. It also allows for basic editing of the logging configuration.

You can:

- Add or remove channels from the graph
- Right-click on a channel to change the logged channel or adjust Log frequency

Logging frequency set in *Graph Log* is reflected in the main *Logged Channels* configuration.

Exporting & Reviewing Logs

In ADU Client:

- Use *Open Log* to load files
- Compare laps or channels using *Graph Log*
- Export data as: CSV, VBO (for VBOX tools), PNG (graph snapshot)

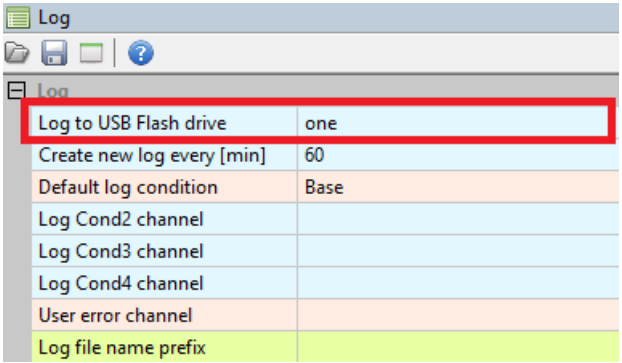
For advanced data analysis, Ecumaster provides a free, professional analysis tool – **Data Master**. Download it from: https://www.ecumaster.com/products/data-master/.

6. Troubleshooting

If logging to USB is not working as expected, the following steps will help identify and resolve common issues.

1. **Confirm Logging is enabled**

Ensure that USB logging is properly activated in the software. *Log / Log to USB* should be set to '*one*' for most cases. Change this value only if you're an advanced user. (Logging to USB is enabled by default, so in most cases, it should start automatically once a USB drive is inserted.)



If a conditional log profile (*Cond2–Cond4*) is used, make sure the associated condition channel is active when logging should start.

2. **Check USB Status in the Software**

The ADU Client displays USB logging information in the bottom status bar. The most relevant messages include:

- **USB logger state** – indicates the current USB activity:
  Disconnected – USB drive not connected
  Accessing USB – device is recognizing the USB
  Saving – logging is active and working
  Memory Is Full – USB storage is full; logging will stop
  Memory Too Slow – USB cannot keep up with the logging rate
  Unrecognized File System – USB is not formatted in a supported format (e.g., exFAT)

> **Note:**
> **Expected sequence when USB works correctly:**
> Disconnected → Accessing USB → Saving
> **If misconfigured (with exchanged DP and DM pins):**
> Disconnected → Accessing USB → Disconnected (stable, not changing again)

- **USB buffer usage** – includes **Grade (A–F)** indicating USB quality:
  A or B – recommended
  C or lower – may cause instability

3. **Use a reliable Power Source**

Unstable or fluctuating power can interrupt logging or corrupt log files. Use a stable power supply and ensure good electrical connections.

4. **Use Proper Shielding**

Proper shielding of all connections is crucial to prevent electromagnetic interference, which can disrupt the data logging process. Use shielded cables, particularly for the USB connection, and verify that the shielding is properly grounded. Poor shielding can lead to gaps or incomplete logs by allowing noise to interfere with data transmission. For more details, see chapter Wiring *(on page 2)*.

5. **Use a Suitable USB Drive**
   - Use short, compact USB sticks to avoid disconnections due to vibration.
   - Avoid low-quality or physically large drives.
   - Format the USB as FAT32. For more information, see chapter Preparing a USB drive *(on page 5)*.
   - Monitor the *Grade value* in the status bar to evaluate performance.

If issues persist after following these steps, refer to the ADU Manual for detailed diagnostics and hardware recommendations.

7. Document history

Version	Date	Changes
1.0	2025.07.28	Initial release