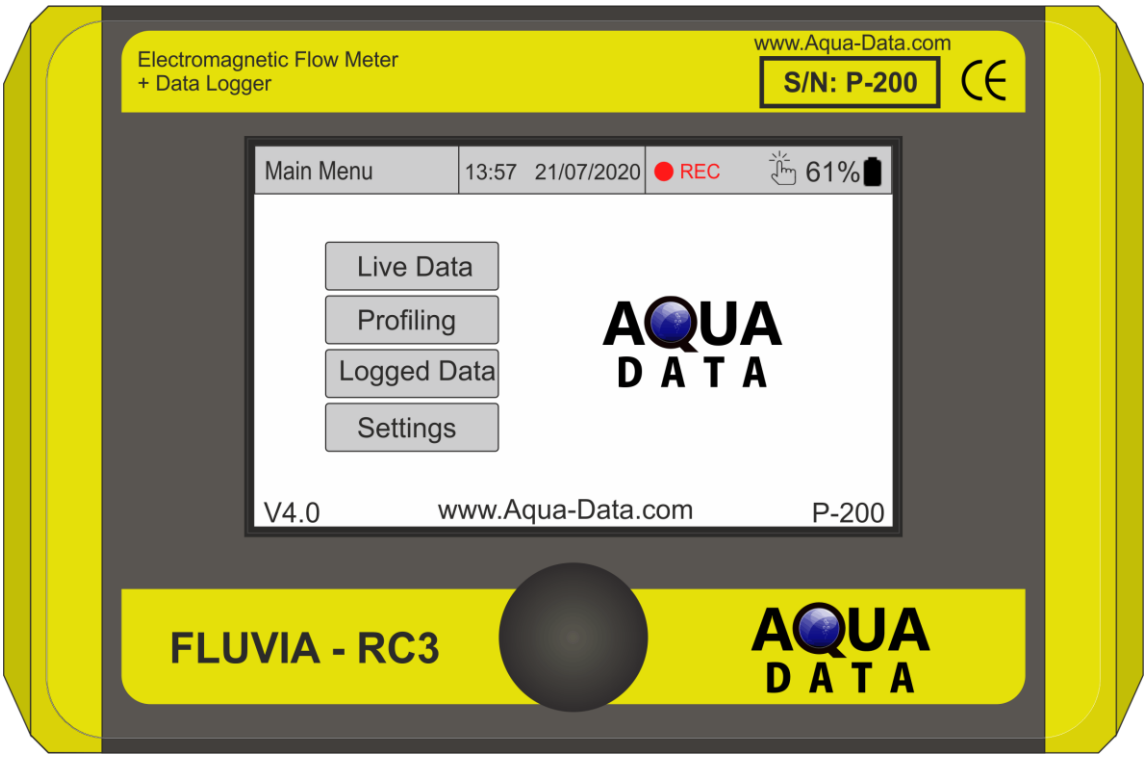
FLUVIA RC3

Portable Flow Meter

Part Number : 19 - 242 Hardware Version : 8.0 Software Version : 18.0



Revision L

September 2022

SPECIFICATION

Sensor

Method	Electromagnetic
Accuracy	1% max reading + zero stability
Zero Stability	Typically ± 0.01m/s or ± 0.03ft/s, max ± 0.03m/s or ± 0.1ft/s
Range	0 – 3m/s or 0 – 10ft/s, 0 – 6m/s or 0 – 20 ft/s (option)
Dimensions	RV2-158x50x19mm RV4-125x30x15mm
Cable Length	3m standard (extra lengths optional)

Portable Flow Meter

Environmental Rating	IP67
Dimensions	191x126x60mm
Weight	1.0kg
Operating Temperature	-20 to +60°C
Battery Type	Lithium-ion, Rechargeable 14.6v
Battery Life	Standard: 20hrs continuous usage (30hrs with reduced backlight)

****Note:** Battery life depends on usage and screen brightness

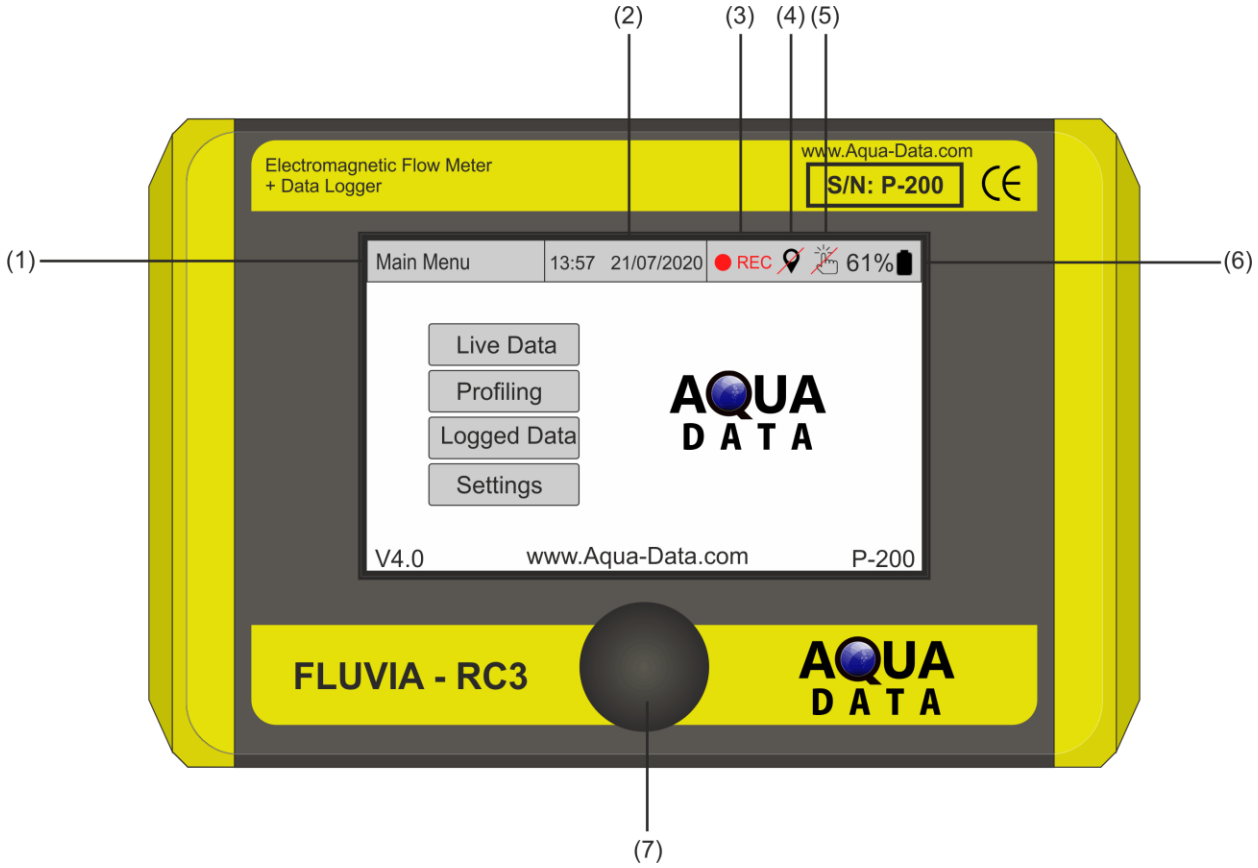
Battery Charger	AC wall outlet charger, 110, 230VAC
PC Interface	RS232
Display	Colour, LCD, touchscreen, 5”
Encoder	Waterproof, 25mm dia. knob
Data Storage	12000 data points, 32 river profiles
Units of Measurement	m, ft m/s, mm/s, ft/s m3/s, m3/h, m3/d, l/s, l/h, l/d, ft3/s, ft3/h, ft3/d

Languages

English, French, German, Danish, Dutch, Spanish and other languages on customer request

Optional Extras GPS, Bluetooth, GSM

USER INTERFACE



All pages of the RC3 display share a common format, with the page header containing the following information:

(1) The title of the current page
(2) The date and time
(3) The current logging status
(4) The GPS enabled/disabled icon (only on GPS enabled units)
(5) The touch screen enabled/disabled icon
(6) The current battery status

Physical Buttons on the device:

(7) The encoder

The main menu will also display the version of the unit in the bottom left hand corner and the serial number in the bottom right hand corner of the LCD.

LOGGING STATUS

The RC3 will display its logging status as one of the following:



Recording
This enables the user to automatically take logs at a time interval that can be specified in settings.



Stop
This is used to end an automatic log. If the user selects to stop a log, pressing the recording button again will start a new log.



Pause
This is used to pause an automatic log, once the user selects to pause a log, pressing the recording button again will resume that current log.

POWER UP / POWER DOWN

If the unit is off, pressing the encoder will initiate the power up sequence. This will consist of the FLUVIA - RC3 load up screen and the optional distributer credits before the user will be taken to the Main Menu. In order to power down, the user should press and hold the encoder. While the encoder is held, a 3 second countdown to power off will be displayed; releasing the encoder during this period will cancel the power off. When packaging the device into its case, the device will typically power on, however this will not drain the battery as it will immediately power off again.

BATTERY STATUS

While in normal operation, the battery icon located in the top right corner will be filled in black and adjacent to this the percentage of battery life remaining will be shown. If the battery is below 20%, the icon will turn red to indicate the battery is low. Once the unit is connected to a charger and powered, the icon will turn green to indicate the unit is charging.

USER OPERATION

There are currently two possible ways to control the device:

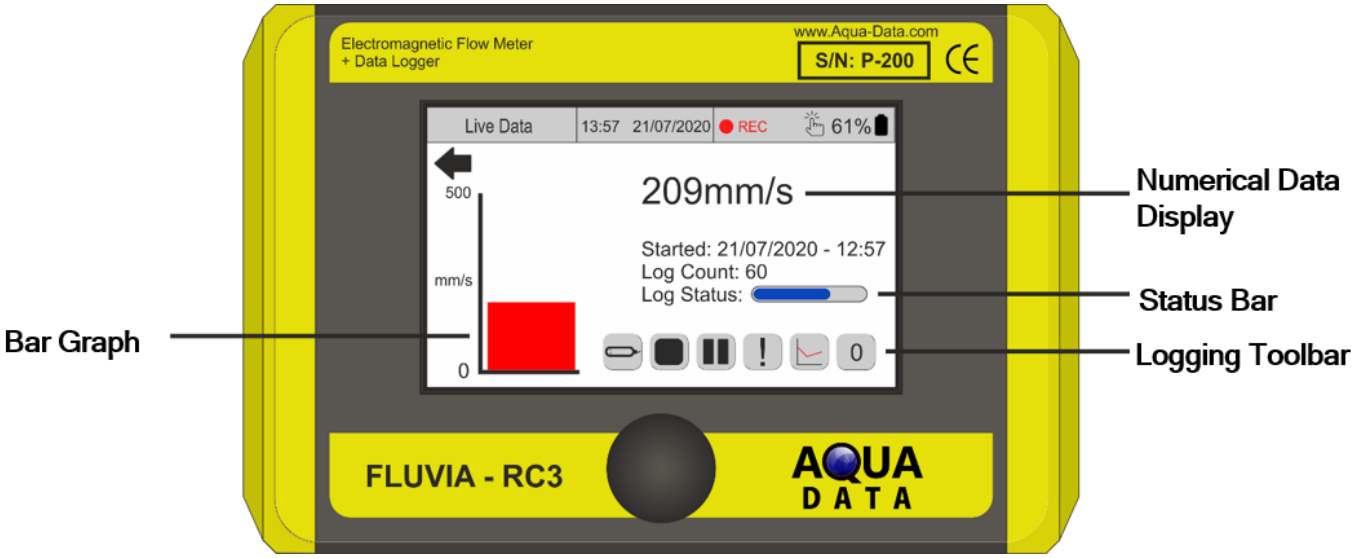
ENCODER

The encoder can be rotated to allow the user to cycle through the available options, highlighting the selected option. Pressing down on the encoder will confirm the selected option. The encoder can be used to fully operate the unit, and the user may disable the touch screen by double pressing the encoder. This feature is useful where water may be present on the screen and is preventing the touch LCD from sensing touch as it should. The touch screen can be re-enabled by double pressing the encoder again.

TOUCH LCD

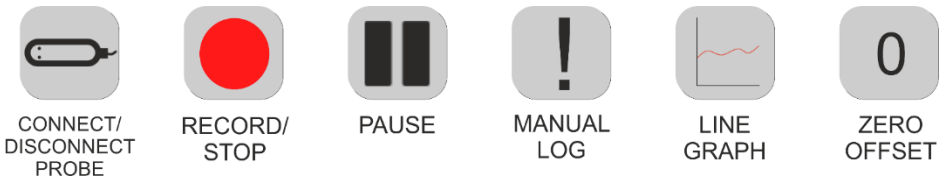
The touch screen buttons on the LCD will highlight once pressed but are only activated once the user releases their finger from the touch screen; this allows the user to drag and select buttons as well as preventing buttons from being pressed accidentally. The touch LCD also has a timeout feature which dims the screen brightness after the unit has not received a command for a specified period of time. If the RC3 is logging automatically it will continue to do so; the timeout is purely an energy saving feature. To return to normal screen brightness, the user must press or rotate the encoder, or touch the LCD providing it has not been disabled.

LIVE DATA



The Live Data section as viewed above, this can be selected on the device by selecting “Live Data” on the main menu.

LOGGING TOOLBAR



The Logging Toolbar allows the user to select a logging status, take a manual log, connect/disconnect the probe and select a line graph view. Another feature of the toolbar is the “zero offset” button. If the unit is producing a zero error, this button can be used to make a new zero reference for further velocity readings. It should be noted that the maximum possible zero offset allowed by the user is ±30mm/s or ±1.2 inch/s,

anything more than this suggests a faulty unit. When the unit is powered down, the zero-offset is removed and the unit will show non-zeroed values.

CONNECTING A PROBE

The probe will automatically connect if plugged in at power up. The user can connect/disconnect their probe by toggling the button on the Logging Toolbar. If the probe is unplugged or the user enters the “Upload Data” page in the “Logged Data” section, the probe will automatically disconnect and will need to be manually reconnected using the button.

FILTER TIME

The RC3 has the capability of taking a rolling average of the readings over a time period that can be specified in settings. This selected time period is called the filter time and it can be implemented to smooth the effects of turbulent flow and unstable readings.

NUMERICAL DATA DISPLAY

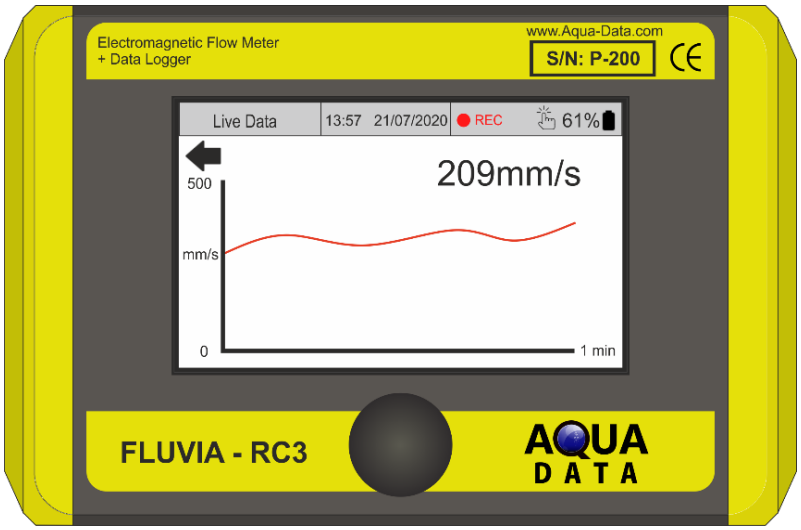
This will show the numerical, filtered readings of velocity of the water in units that can be specified in settings and is the value saved when data is logged.

STATUS BAR

The time until the next automatic log is shown with a bar progressing along the screen.

VISUAL REPRESENTATION

The live, unfiltered water velocity data will be shown by a bar graph on the “Live Data” page. The user can also select the “Line Graph” button on this page to view the unfiltered water velocity as a line graph. These graphs will auto scale depending on the reading of the water velocity, allowing for a more precise visual representation.



LOGGED DATA

VIEW DATA

This is where the user can view the data from previously recorded logs. Cycling through data entries can be easily done by rotating the encoder. Pressing on any data entry will show additional data relevant to that particular entry (including Longitude, Latitude and MSL Altitude on the GPS enabled units). Pages can be scrolled through by pressing the “Log Page” button and rotating the encoder. The first data point of every logging session is highlighted in green text. This page will also indicate to the user if the reading was taken while a zero offset was active, and if that log was taken manually.

UPLOAD DATA

This feature enables data to be uploaded from the FLUVIA - RC3 to a computer in either CSV or XML format (detailed guide in “DATA UPLOAD PROCEDURE” on page 12).

ERASE DATA

This allows the user to clear all logged velocity data readings. Note that this will not clear the data saved for river profiles.

PROFILING

The RC3 allows the user to obtain an estimate of the volume flow of a cross section of a conduit or river using its profiling algorithm. This makes it possible to calculate a total discharge of the cross section by combining measurements of the velocity of flow at particular points. The computation algorithms are as specified in the ISO748 standard.

CONDUIT

The RC3 has the capability of profiling a conduit of the following shapes:

- Circular
- Rectangular
- Trapezoidal

Once the user selects the shape of their conduit, they will be required to input measurements of their channel which depend on the shape selected and take readings using the flow meter. This will enable the RC3 to formulate a cross sectional profile while only requiring the user to take readings along the central vertical.

The RC3 presents the following 2 conduit profiling methods:

0.9 x VMAX METHOD

This method only requires the user to input a single velocity reading by pressing the "Set Vel" button. The user should slowly move the probe up and down the central vertical and take the reading at the maximum velocity (Vmax). The average velocity is then calculated to be 0.9xVmax. This is useful in shallow water where the depth of the channel makes it impractical to take multiple readings.

1 POINT METHOD

This method requires the user to take just one velocity measurement at a depth of 60% of the total depth of the channel along central vertical.

3 POINT METHOD

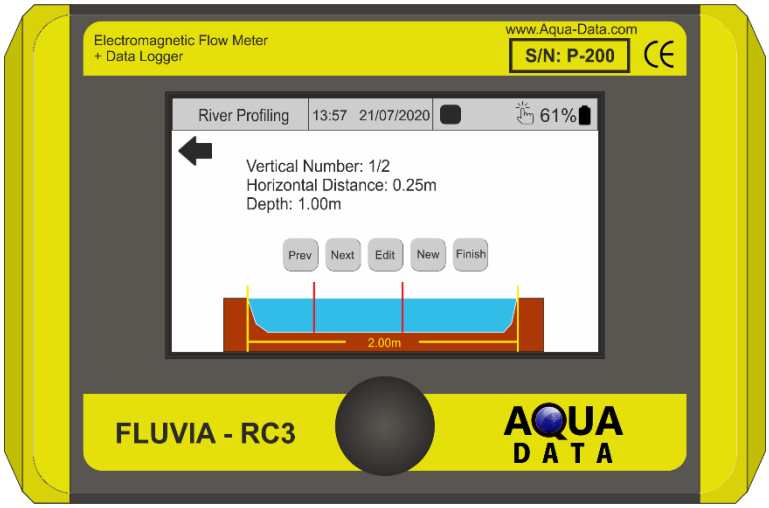
This method requires the user to take velocity measurements at depths of 20%, 40% and 80% of the total depth of the channel along central vertical.

Note that the velocities displayed are filtered and so the user should wait for a full cycle of the progress bar before taking a reading. For further details see below in the river profiling data entry procedure.

RIVER

This option allows the user to formulate a profile for a non-standard cross section. This is done by recording flows at up to 30 vertical positions, each of which require a horizontal position and up to 6 velocity readings at varying depths. It is possible to store up to 32 separate river profiles.

On the "Profiling" section, by selecting the river option a custom profile of the water flow may be done. Entering the width of the river will bring up the following page:

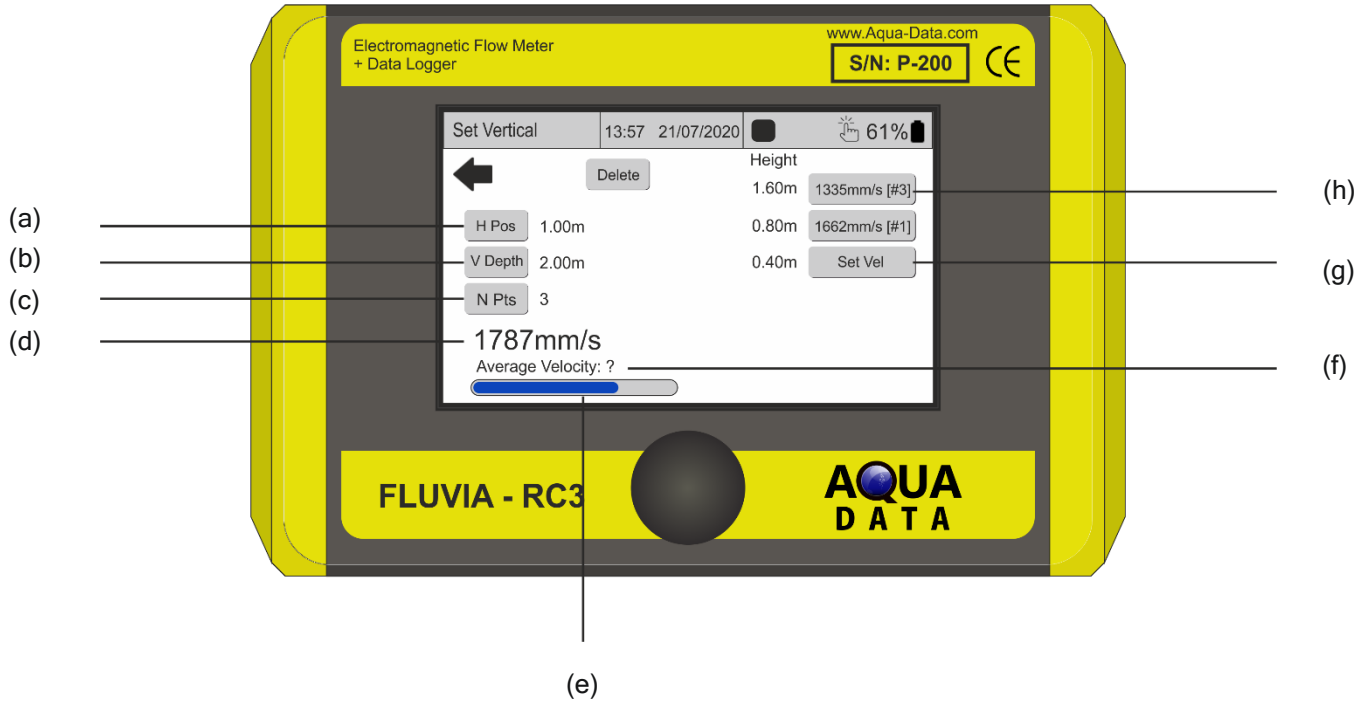


From here the user may select existing data entries using the “Prev” and ”Next” options, which can be edited by the “Edit” option, alternatively a new data entry may be created from “New”.

DATA ENTRY

On the river profiling page, the horizontal position from the river bank may be recorded on “H Pos” and the depth of the river may be recorded on “V Depth”. Up to 30 vertical sections may be recorded in a data entry, this is changed in “N Pts”.
The device will display the heights required for a specific “V Depth”. This can be displayed as either depth from the surface or height from the river bed as adjusted in the settings menu.

The data entry procedure is shown below:



(a) Horizontal Position from the riverbank
(b) Vertical depth of the river
(c) Number of data points for that horizontal position
(d) Live (filtered) velocity reading
(e) Progress bar corresponding to the filter time. Once the probe is positioned, the user should wait for one full cycle of the progress bar to ensure that the reading they take is not affected by the rolling average.
(f) Average velocity calculated from the data points entered. Is only shown once all required data points have been entered

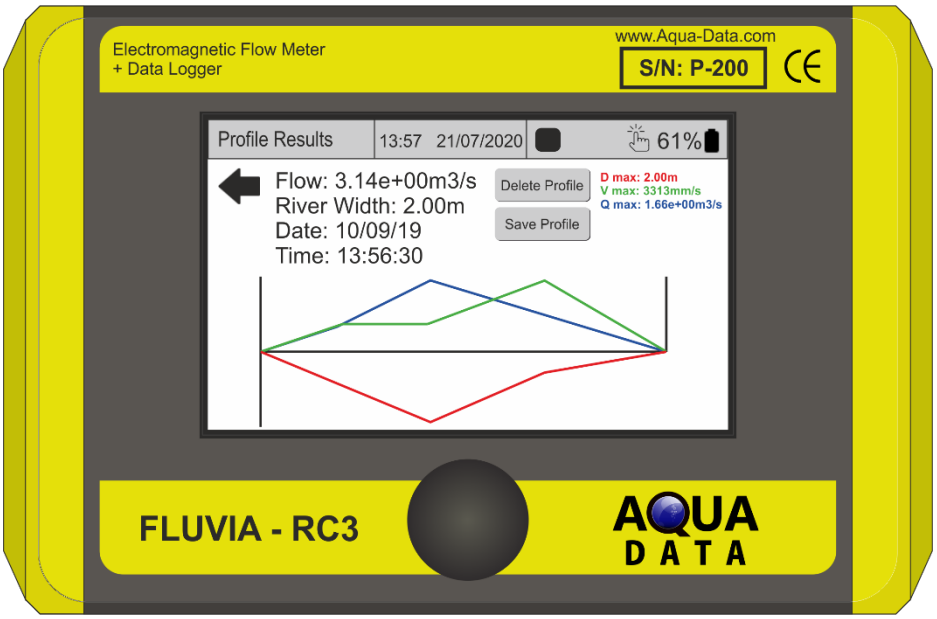
(g) Pressing “Set Vel” at the vertical position indicated adjacent to the button will make a data entry of the live, filtered reading
(h) Number of “multiple point readings” taken.

MULTIPLE POINT READINGS

The RC3 offers the ability to take up to 10 data points for any velocity reading and calculate the mean average. This is function can be toggled in the settings menu.

VIEW PROFILE

Once all of the data has been entered and the “finish” button has been selected, the river profiles can be viewed in the following format:



- The green is a graph of average velocity against horizontal position
- The red is a graph of river depth against horizontal position
- The blue is a graph of average river discharge against horizontal position

- The maximum value for each of the above is shown in the top right hand corner
- The total average flow volume, the river width, the date and the time of taking the profile is shown in the top left hand corner
- The river profile can either be deleted, or saved for later viewing

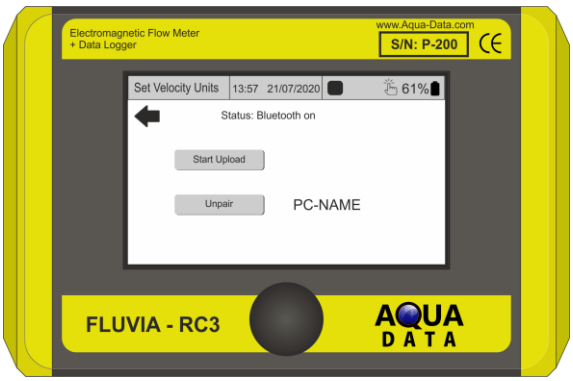
ERASE PROFILES

If the user wants to delete the currently saved river profiles he can do this by selecting “Erase Profiles”. This will delete ALL of the river profiles that are saved on the RC3.

BLUETOOTH PAIRING PROCEDURE

PREREQUISITES

- RC3 with Bluetooth Enabled
- Windows 10 with Bluetooth adaptor





PAIRING AND UPLOAD PROCEDURE

1. Navigate to either the View Profile->Upload Bluetooth or Logged Data->Bluetooth page
2. On the PC, press Win+I to open the settings app. Navigate to ‘Bluetooth and other Devices’.
3. Ensure the ‘Bluetooth’ slider is in the ON position
4. Press “Add a Bluetooth device” and follow instructions to pair with ‘Fluvia RC3:[serial number]’
    a. Windows may prompt, via a popup, that ‘Further setup is required for your device’, confirm that the PIN shown on the RC3 screen matches.
5. Once pairing is complete, enter the “Change Bluetooth settings” menu on the PC
6. In the COM ports tab, click add and select Incoming. This will be the Virtual Serial Port used by the terminal emulator (if no Port number is shown then you may need to wait or reboot the computer).
7. Continue with the upload procedure (without the serial cable) as outlined below but use ‘Upload Bluetooth’/’Bluetooth’ buttons instead of ‘Upload Serial’.

UNPAIRING PROCEDURE

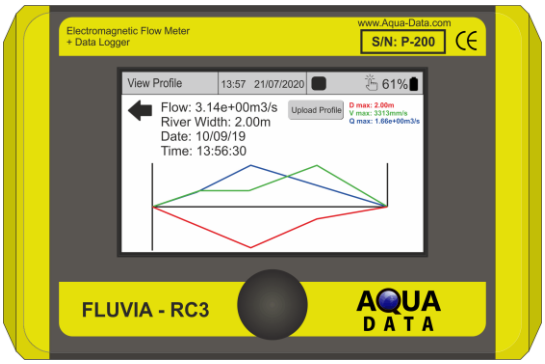
1. From either of the Bluetooth upload pages; wait until the module has started and press ‘UNPAIR’. When unpairing is complete the screen will show "No paired device".

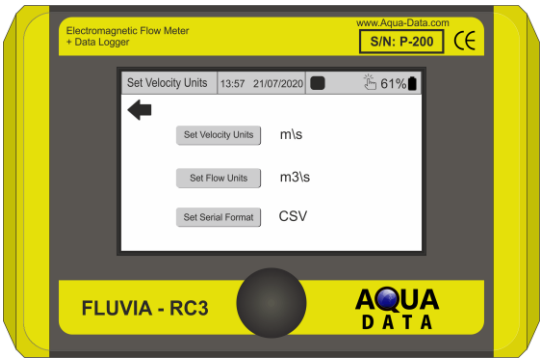
DATA UPLOAD PROCEDURE

PREREQUISITES

- Terminal emulator (On windows, Termite by CompuPhase is recommended)
- RC3 with saved profile/log data
- RC3 Download Cable or Charger/Download Cable, or Bluetooth Option
- USB to RS232 Adapter Cable, SDI12 or Bluetooth Option

PROCEDURE





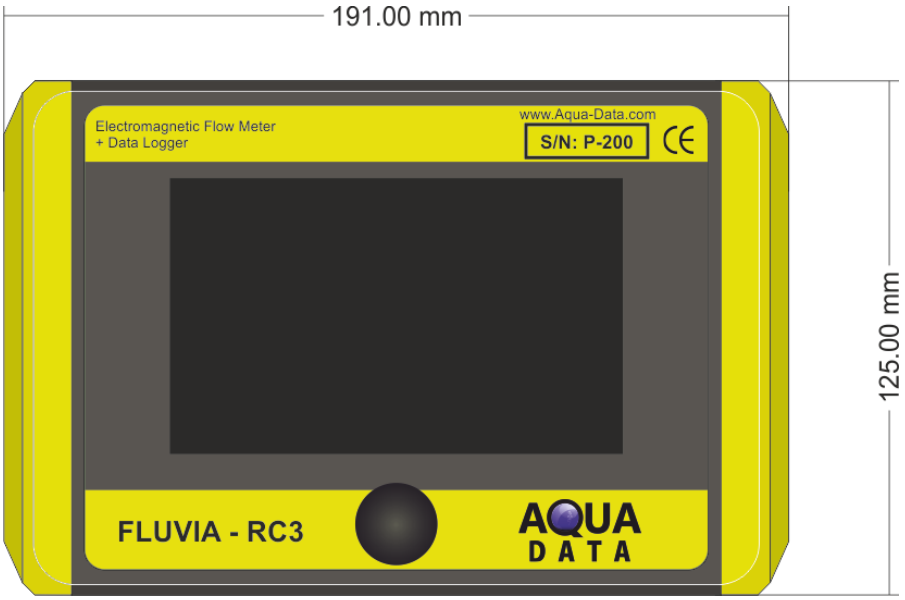
1. Change settings in terminal emulator:
   - BAUD rate 9600; 8N1 (8 Data bits, no parity bit, 1 stop bit)
2. Change format setting on RC3:
   - Navigate to “Settings” from the “Main Menu”, then navigate to “Units”
   - Choose between XML and CSV format using the Encoder
   - Ensure that the RC3 is connected to PC via RS232 to USB adapter
3. Uploading river profile data:
   - Navigate through “Profiling”, select river profile, then press “View profiles”
   - Select a profile, press “View Profile” and then press “Upload Profile”
   - When data has been uploaded onto the terminal emulator, select all the data, copy it and paste it into a text editor
   - Save the file in the text editor as either a .csv or .xml, depending on the format selected in step 2
4. Uploading probe log data:
   - Navigate to “Main Menu”
   - Press “Logged Data”, “Upload Data”, and “Start Upload” to begin uploading data starting from the most recently logged data
   - When you want to stop uploading data, press stop upload
   - When upload has been stopped, select all the output of the terminal emulator, copy and paste it into a text file.
   - Save the text file as a .csv or .xml file depending on the format selected in step 2

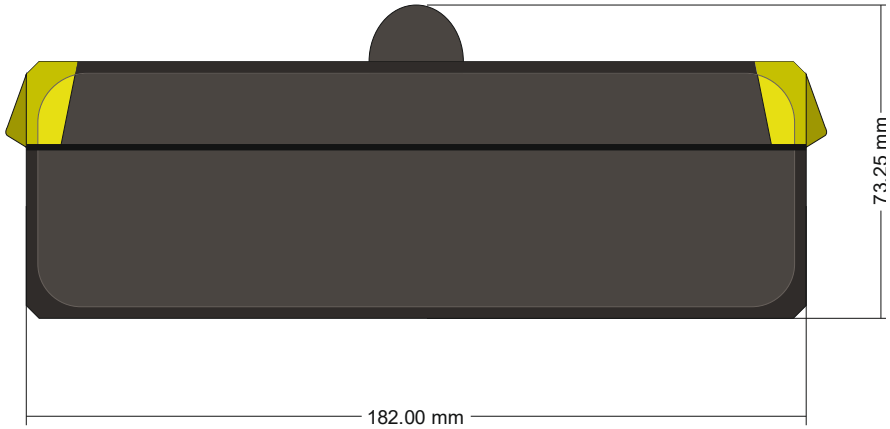
SETTINGS

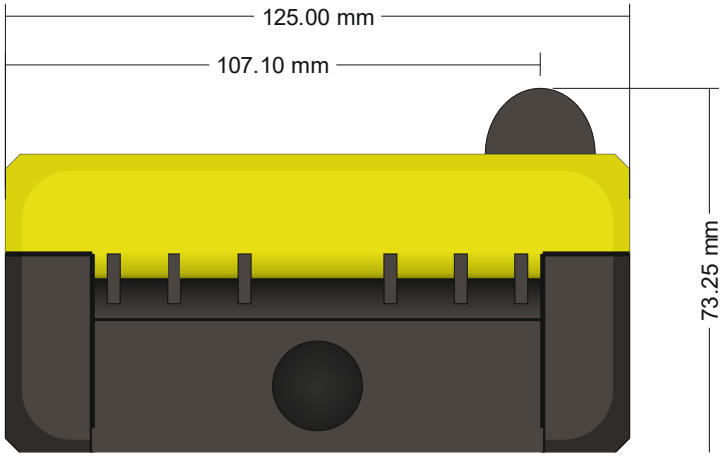
The RC3 presents a more tailored experience with the ability to change the following settings:

- User Preferences
  - Sounder Volume
  - Screen Brightness (lower brightness will increase the battery life)
  - LCD Timeout. This feature allows you to set a time period after which the screen will automatically dim. The unit will continue to operate as usual as this feature is purely to conserve battery power.
- Data logging mode
  - Set filter time (5 seconds, 10 seconds, 15 seconds, 30 seconds, 60 seconds, off)
  - Set logging time for period of automatic log (1 second, 10 seconds, 30 seconds, 1 minute, 5 minutes, 30 minutes)
  - Set line graph time base (1 minute, 5 minutes, 30 minutes, 1 hour)
- Language
  - English
  - French
  - German
  - Danish
  - Dutch
  - Others on request
- Date / Time
- Units
  - Set velocity units (meters per second, millimeters per second, feet per second)
  - Set flow units (meters cubed per second, meters cubed per hour, meters cubed per day, litres per second, litres per hour, litres per day, feet cubed per second, feet cubed per hour, feet cubed per day)
  - Set length units (meters, feet)
  - Set serial format (XML, CSV)
- Profiling
  - Set Measure mode (height or depth)
  - Enable multiple point readings

DIMENSIONS


191.00 mm
Electromagnetic Flow Meter
+ Data Logger
www.Aqua-Data.com
S/N: P-200
CE
FLUVIA - RC3
AQUA
DATA
125.00 mm


73.25 mm
182.00 mm


125.00 mm
107.10 mm
73.25 mm

IMPORTANT NOTES

Bluetooth

The strong Bluetooth signal can affect the precision probe measurement. It is strongly recommended that you keep Bluetooth disabled while taking measurements.
Bluetooth is automatically enabled when entering the Logged Data Bluetooth upload page and the View Profile Bluetooth upload page.
If Bluetooth is enabled then the Bluetooth logo in the top status bar will be blue.
When Bluetooth is enabled simply rebooting your unit will disable Bluetooth.

TROUBLESHOOTING

Bluetooth

1. RC3 Bluetooth Upload pages only display ‘waiting for connection’:
    - Ensure the Bluetooth Adaptor is enabled on the computer.
    - Ensure a terminal program is open and connected to the Bluetooth virtual COM port.
    - Ensure the RC3 is in range of the computer and the RC3 Bluetooth antenna is fitted.
    - Perform the Bluetooth Pairing procedure in this manual.
    - Reboot the computer.
2. The RC3 Bluetooth Upload pages show ‘connection established’ but data is not transferred:
    - Try the upload again. Bluetooth Virtual COM ports are dynamically assigned, and your computer may not have been ready.
    - Ensure your terminal program is reporting that it has successfully opened the Port.
    - If the problem persists then try un-pairing and re-pairing the RC3 with your computer.
    - Reboot the computer.

SCIENTIFIC NOTATION

Scientific notation may be used to represent very large or very small numbers. This is shown by a decimal number followed by E ± another number. E represents “10 to the power of” the positive or negative integer that follows.

Examples:

- 1.23E+9m3/d means 1.23×10^{9} meters cubed per day.
- 1.23E-9m3/d means 1.23×10^{-9} meters cubed per day.

RC3 CABLE DOWNLOADING

Materials required.

1. Fluvia RC3 USB cable
2. Termite, or another terminal program
3. Windows 10 computer with VCP support

Connecting to the device.

1. Ensure your Fluvia RC3 is turned on and has sufficient battery charge.

2. Open Device Manager on your Windows computer by typing ‘Device Manager’ in the Windows Search bar. Or by pressing the WIN(Windows Key) and R keys together, then typing ‘devmgmt.msc’ and pressing enter.

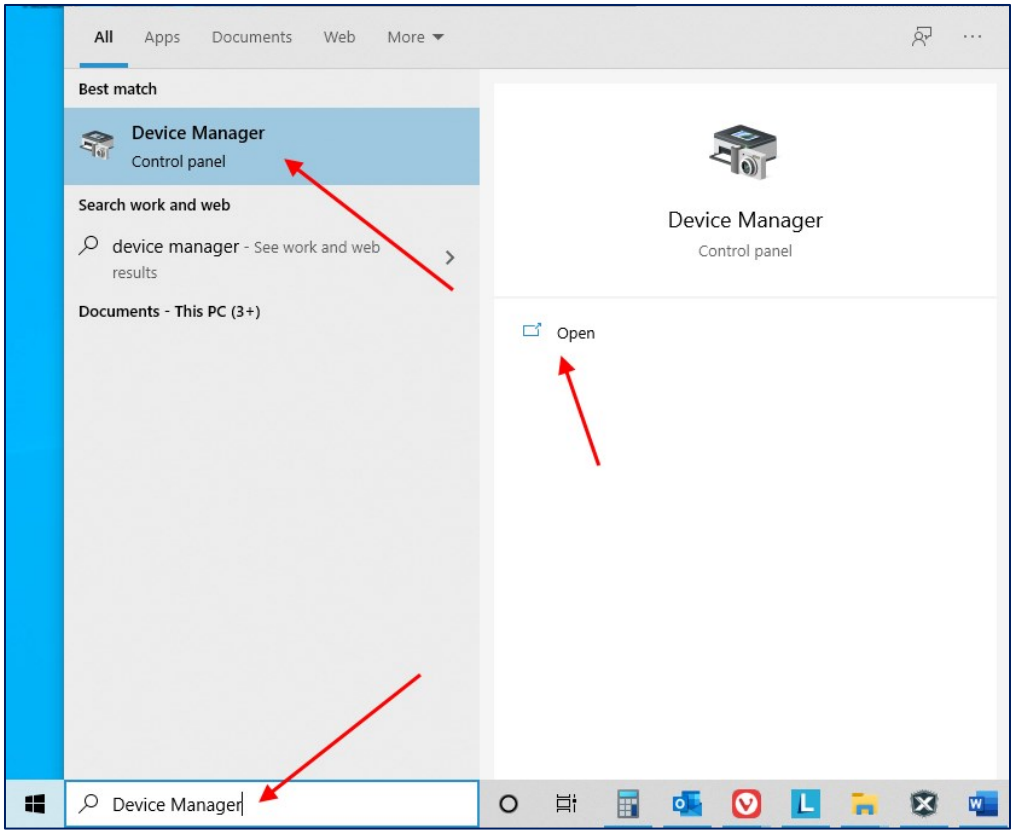


Figure 1- Opening Device Manager via Windows Search

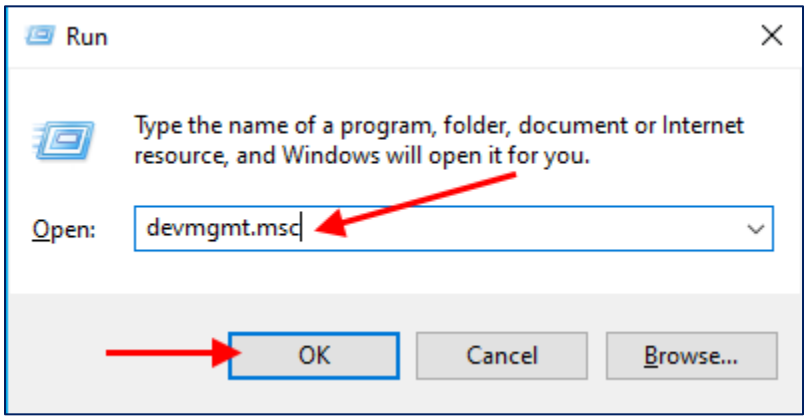


Figure 2- Opening Device Manager via WIN+R

3. Locate the 'Ports (COM and LPT)' section in Device Manager, note that this section may be missing entirely at this step.
   If there are any entries listed, then please make a note of the 'COMx' numbers listed at the end of the entries:

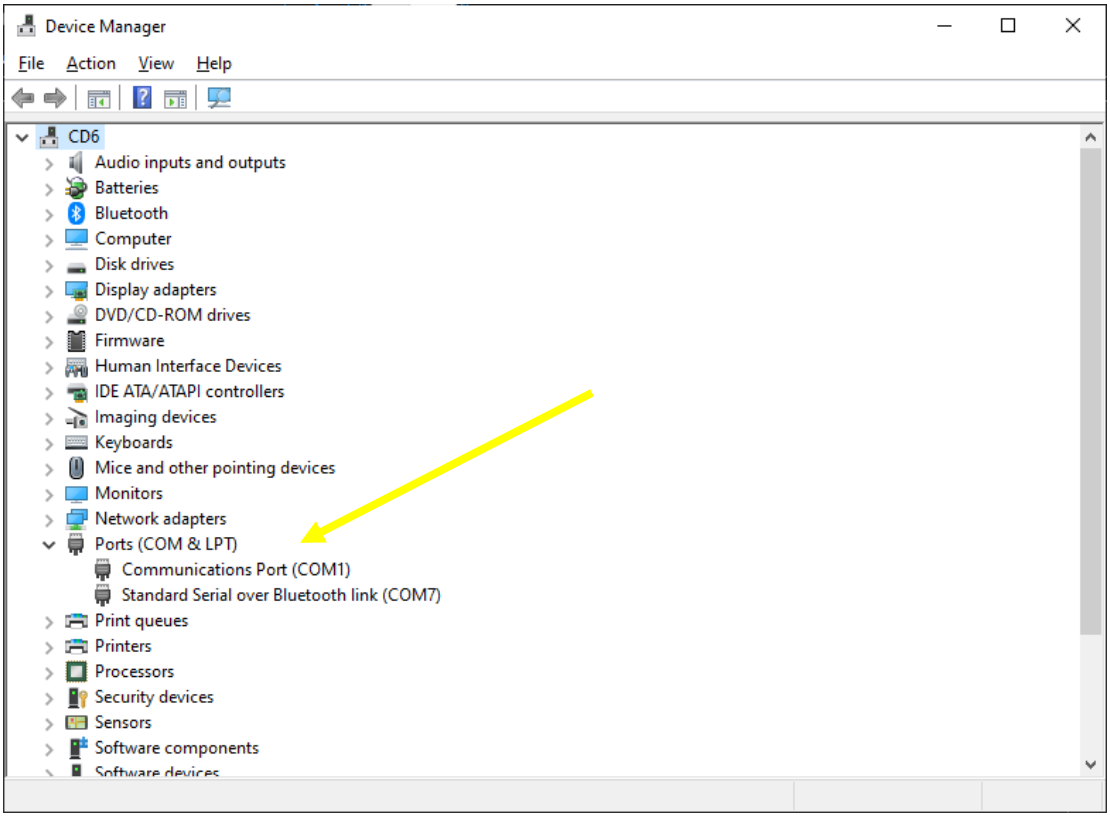


Figure 3 - Example of Ports entry before the Fluvia RC3 is connected

4. Now connect the Fluvia RC3 to your computer using the USB cable:

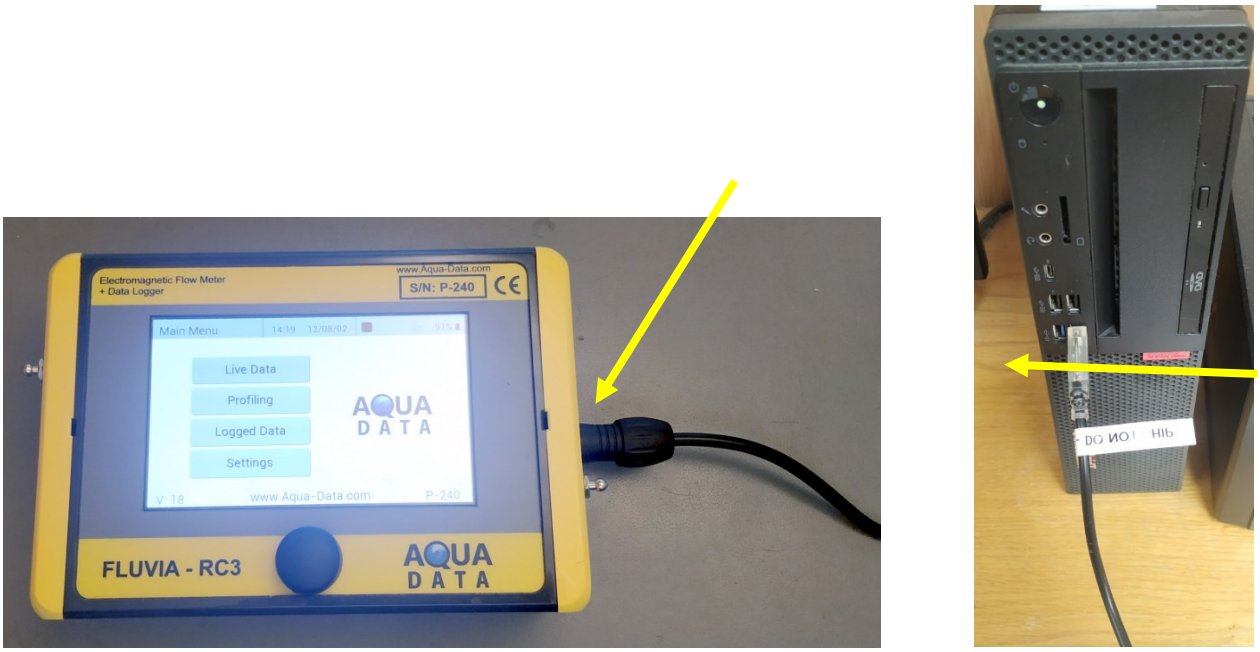


Figure 4- Connecting USB cable to Fluvia RC3 and computer

The Device Manager will update to show the **new** connection, make a note of the 'COMx' number for the **new** connection:

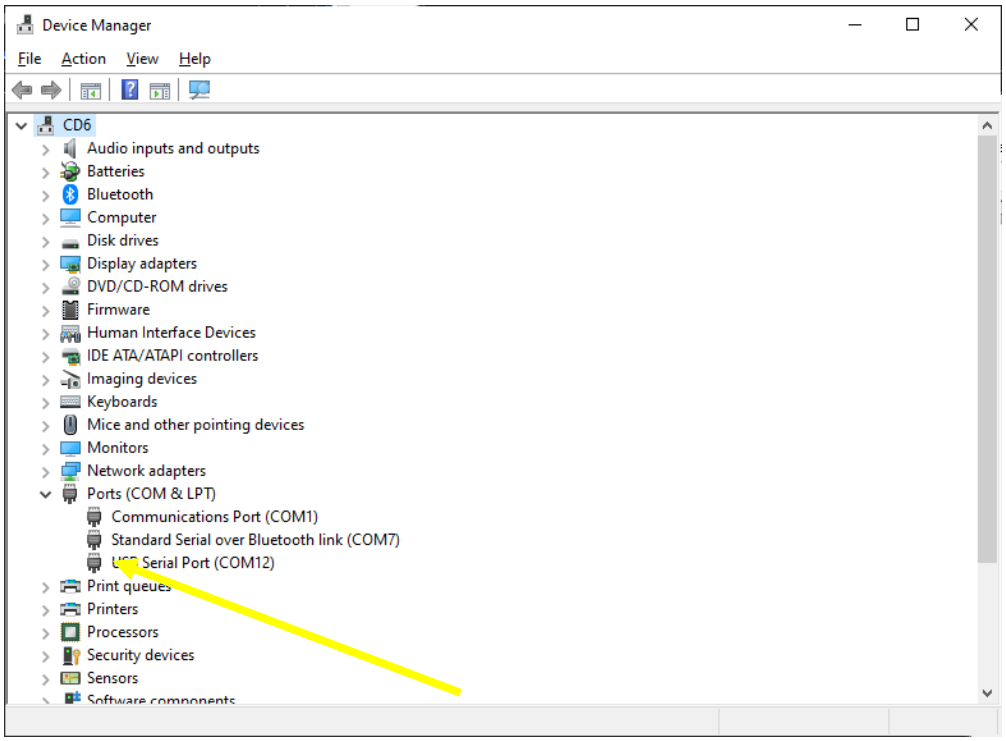


Figure 5- Example of Ports entry with Fluvia RC3 connected

5. Open the terminal program and configure the settings as shown:

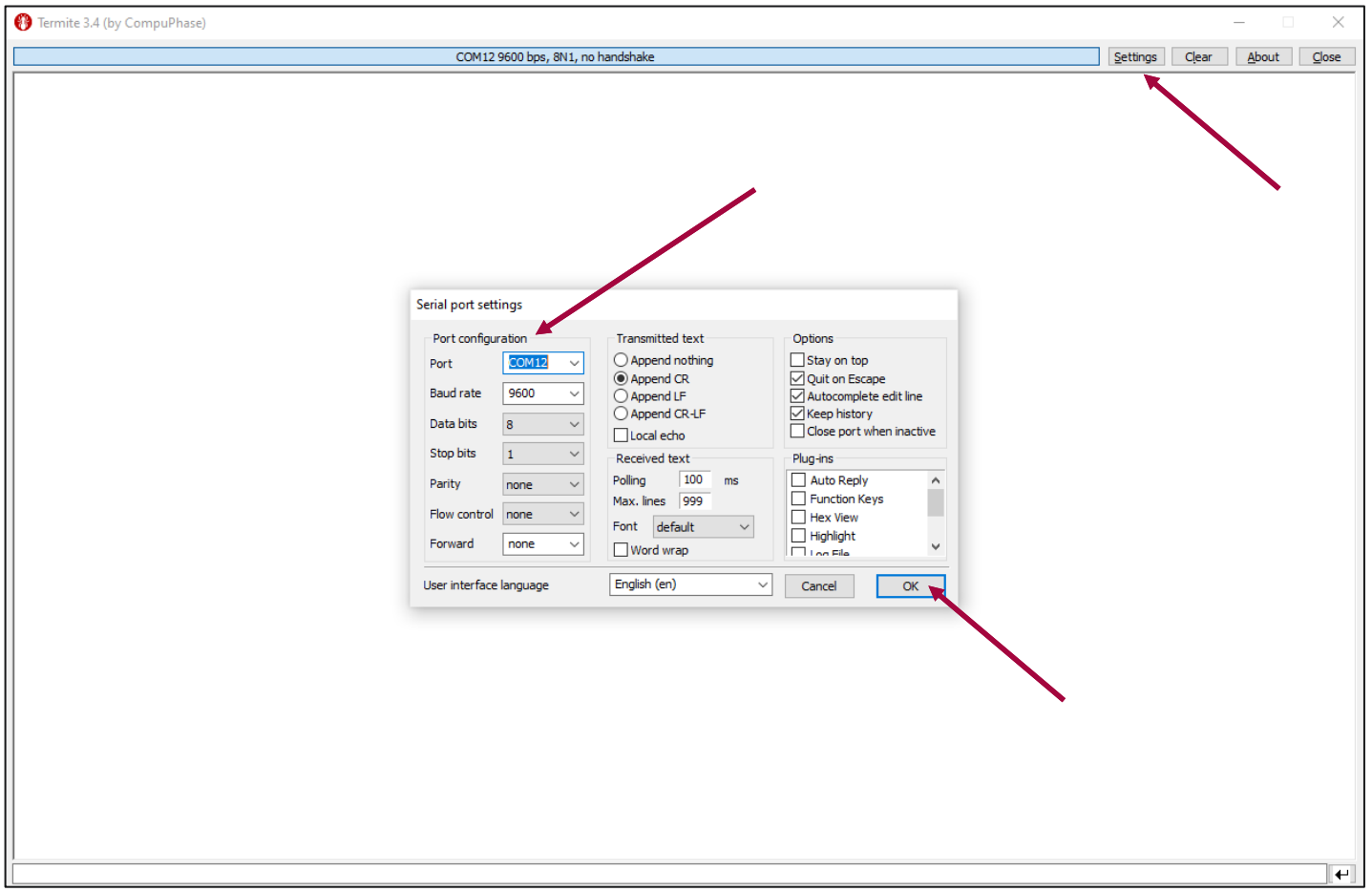


Figure 6- Terminal program configuration

Port – The port number determined in Step **4**
Baud Rate – 9600
Data bits – 8
Stop bits – 1
Parity – none
Flow Control – none

6. The 'Log File' plug-in can be selected if you would like to log the session/download data to a file.

Ensure the Connection bar shows Termite is initialized and ready. Check the settings if there is an error. If the error cannot be resolved, then disconnect the USB lead and reboot the computer before the next attempt.

Downloading Logged or Profile Data.

7. To Upload logged data from your Fluvia RC3, navigate to **Logged Data**, **Upload**, and click the **Start Upload** button:



Figure 7- Fluvia RC3 Logged Data Upload menus

8. The Terminal window should now show your logged data, this can be cut-and-pasted into other applications such as Microsoft Excel:

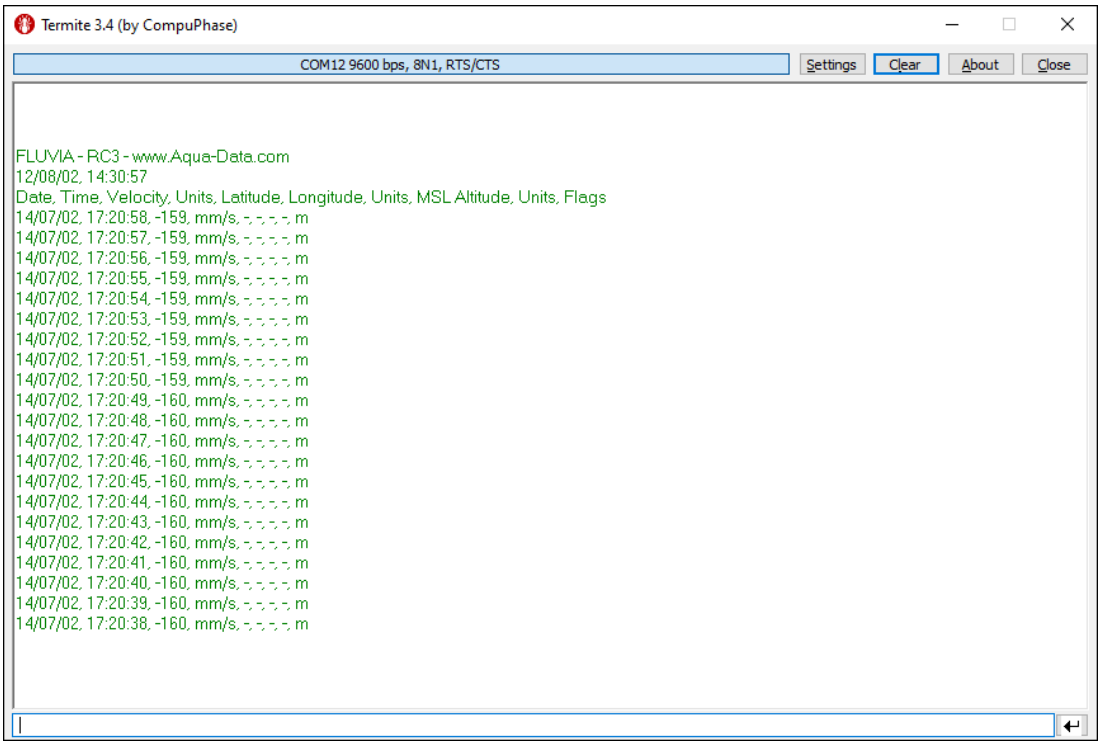


Figure 8- Logged data in Terminal Window

9. To Upload Profile data from your Fluvia RC3, navigate to one of the **Profiling** menus, click **View Profile**, select the desired profile, and click the **Upload Profile** button:

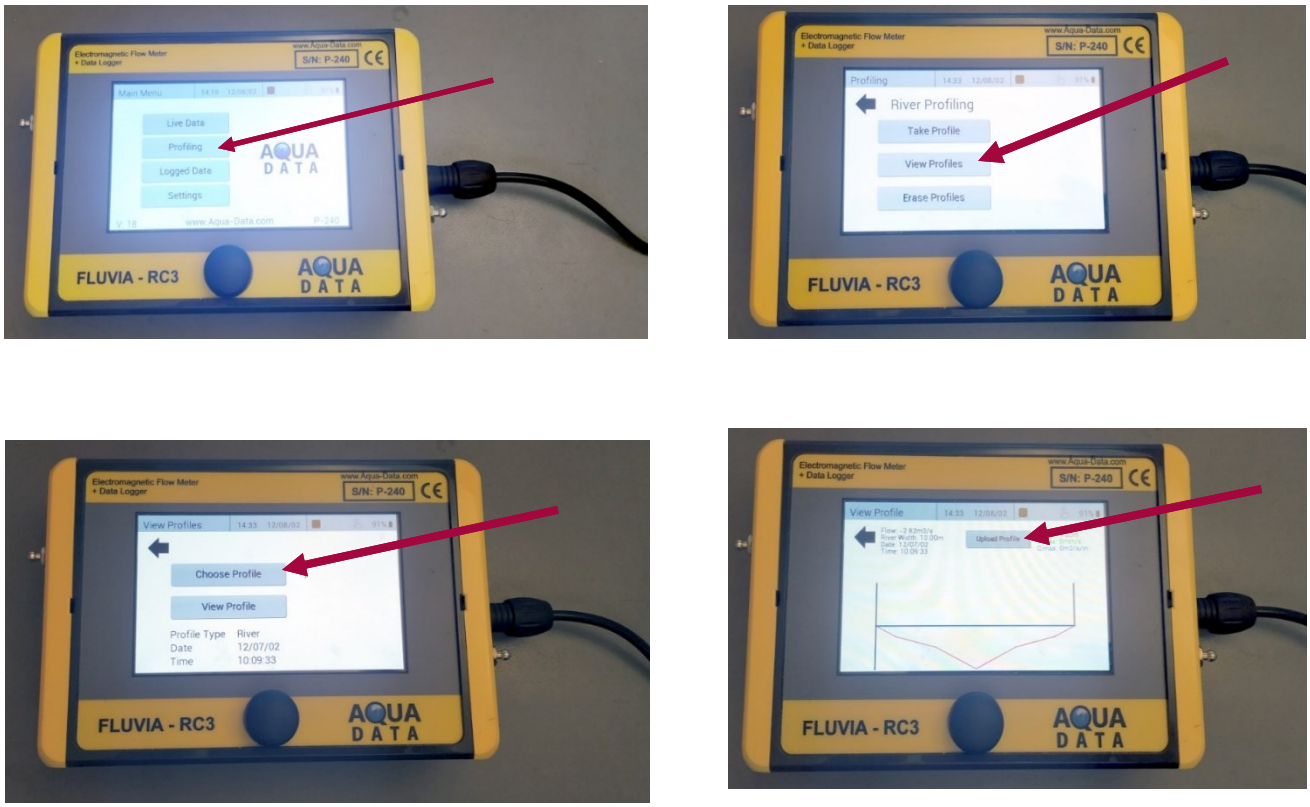


Figure 9- Fluvia RC3 Profile Upload menus