MainProbe/MainProbeX- RS485 Communicator Manual

Version 1.1 – September 2025

Disclaimer

Mainstream Measurements reserve the right to make changes, corrections, enhancements, modifications, and improvements to our products and/or to this document at any time without notice.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

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Warranty

Mainstream Measurements Ltd warrants that the Mainstream MainProbe/MainProbeX is free from defects in material and workmanship and operate substantially as escribed in this manual.

If, during the warranty period specified below, the Mainstream MainProbe/MainProbeX is shown to the reasonable satisfaction of Mainstream Measurements Ltd to be faulty and not to operate substantially as described in this manual, Mainstream Measurements Ltd will repair or replace the MainProbe/MainProbeX.

Mainstream Measurements Ltd will not be responsible for any failure of the Mainstream MainProbe/MainProbeX caused by incorrect installation or extreme operating conditions and will not in any event be liable for any loss consequential or otherwise, caused by any error, defect, or failure of the Mainstream MainProbe/MainProbeX, howsoever arising, including but not limited to loss of use, loss of data, loss of profit or loss of contract. The warranty period is 24 months from the date of shipment.

Communicator Overview

MainProbe/MainProbeX Communicator is Windows software which allows the MainProbe/MainProbeX to be configured and managed. MainProbe/MainProbeX Communicator acts as a Modbus client device.

MainProbe/MainProbeX Communicator is either provided by USB drive, or from the web site.

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1. INSTALLING COMMUNICATOR

Minimum system requirements: Windows 10, .NET 5.0.1(*) desktop runtime SDK.

(*) Or better. Some Windows PCs will have the .NET 5 desktop runtime SDK installed already. Some may require manual installation.

Any USB drive provided by Mainstream or "MainProbe/MainProbeX Communicator.zip" file, will a include a setup file for Communicator. This setup file will install Communicator in a folder of the user's choice.

2. .Net 5.X

If you install Communicator and try to run the software without the .NET 5.x installed, you will be shown an error message, prompting you to install the .NET runtime.

Clicking yes on this message will direct you to a Microsoft webpage where .NET can be downloaded. At time of writing this is https://dotnet.microsoft.com/download/dotnet/5.0 . Ensure you download the **x64** SDK.

You can now run Communicator.

3. CONNECT DEVICE TO RS485 CABLE AND POWER

Listed below are the functions for each wire contained in the MainProbe/MainProbeX-V RS485 cable.

Insulation colour	Purpose
Yellow	RS485 Half Duplex B-
Brown	RS485 Half Duplex A+
Red	Power (+ve)
Black	Power (-ve)
Clear	Screen

Input voltage (1 device on bus): 6V – 28V

Input voltage (>1 device on bus): 7V – 28V

RS485 Drive capability: 25 unit loads RS485 Input impedance of device: 0.32unit load

Screen connection: Should be connected to 0V or terminated.

Line termination: See official Modbus documentation.

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Below, is an example of how the MainProbe/MainProbeX should be connected to an RS485 to USB adapter cable.

As always when dealing with electrical connections, care must be taken to avoid short circuiting when wiring up the MainProbe/MainProbeX to the power supply.

4. CONNECTING TO MAINPROBE/MAINPROBEX

After you have started Communicator, you will need to connect to the MainProbe/MainProbeX device. The definitions below assume you have the correct physical connections to the MainProbe/MainProbeX using an RS485 to USB converter to allow a connection to the product to be made via a PC.

4.1. Home

4.1.1. Connections settings

On the left-hand side there are menu items to setup the communications between the device and your computer.

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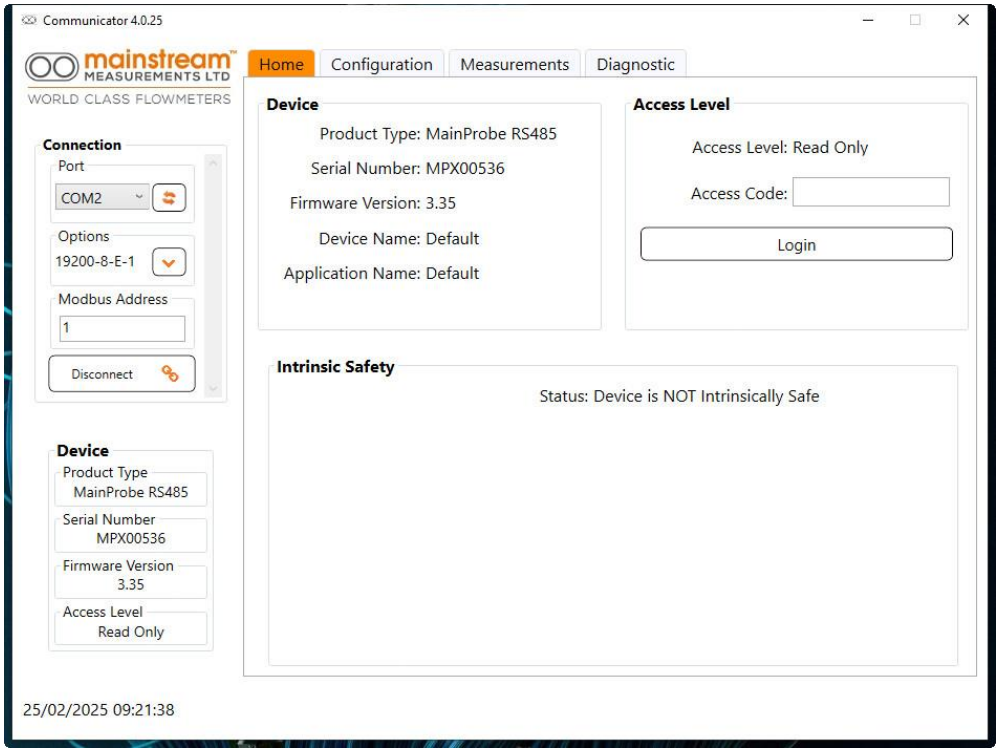

4.1.2. Choose Comm Port

The **PORT** box is used to specify which COM port the connection is on. The button to the right will scan the ports on your PC for appropriate connections.

The **OPTIONS** box is used to specify the usual COM port settings (Hint, press the button next to the Options box to reveal all the settings).

4.1.3. Select Baud Rate

The Baud Rate, refers to the speed at which data is transmitted over the communication network.

Select the required Baud Rate.

The **default** setting of Baud Rate is 19200.

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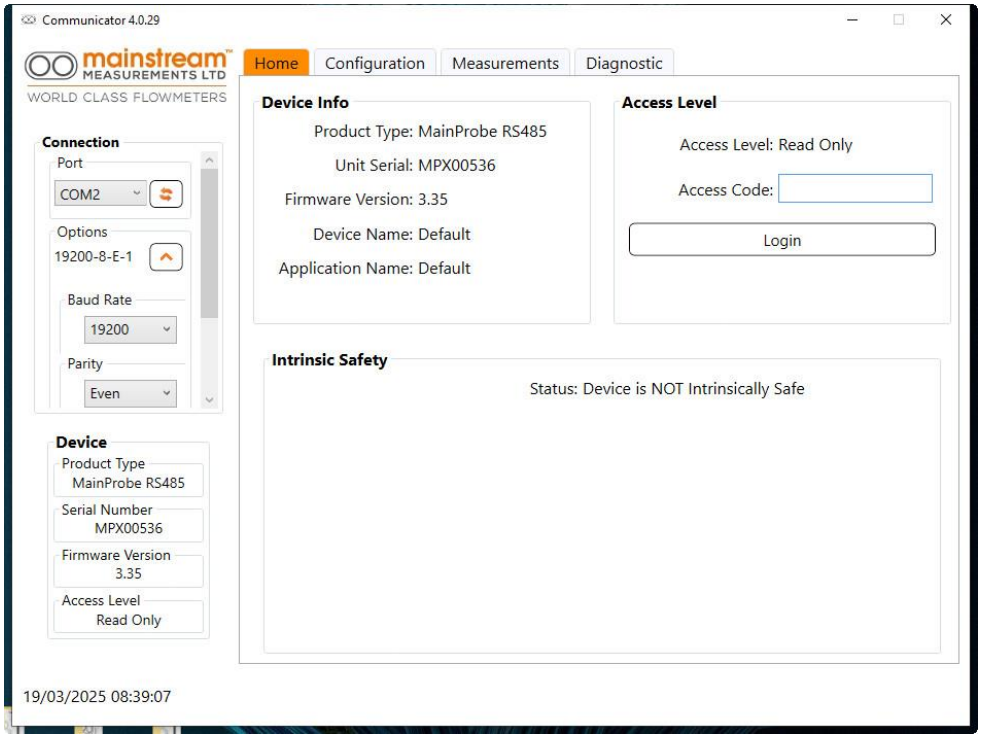

4.1.4. Select Parity

Parity in Modbus refers to a binary digit added to a data transmission to validate that the received data matches the original data. It's a configuration option for Modbus data packs, and can be set to even, odd, or none. The parity setting should match on all devices on the network.

The **default** setting of parity is even.

4.1.5. Select Modbus Address

The **MODBUS ADDRESS** box is used to specify which Modbus Address the software should interrogate. The button next to it will trigger a sequence of Modbus messages which will interrogate the attached Modbus bus, to determine if one or more MainProbe/MainProbeXs are attached to the bus. Default address is 1

The address can be entered as a single number (between 1-247), for example, "1" or "123". Or the address can be entered as a range, for example, "1-3" or "100-120".

Scanning each address can take up to 3 seconds.

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4.1.6. CONNECT

Click the **Connect** button to detect the MainProbe/MainProbeX.

If a MainProbe/MainProbeX is found during the scan, its details will be displayed in a panel on the left of the dashboard (pictured above).

4.2. Change Access Level

The Login button is used to change the access mode of the connected MainProbe/MainProbeX, you must be connected to a MainProbe/MainProbeX before clicking this button. Initially the software will log you in as **READ ONLY.**

Once connected to a MainProbe/MainProbeX, Communicator will issue regular messages to the MainProbe/MainProbeX to prevent the firmware from reaching its communications' timeout. If the communications' timeout (2 minutes 30 seconds) elapses without a message being sent to the MainProbe/MainProbeX, the probe will automatically return itself to Read-Only mode.

Enter a 4-digit, numerical Access Code into the **ACCESS CODE** text box before clicking the Login button.

Upon clicking the Login button, the MainProbe/MainProbeX will evaluate the access code you have submitted.

If the MainProbe/MainProbeX determines the access code submitted is valid, it will automatically update to the Access Mode, this change will be reflected on the Communicator interface, in the **ACCESS MODE** text box.

Valid Access Codes are listed below:

Access Mode	**Access Code**	Description
Read-Only	**0000**	Used to force measurements, edit measurement units, and view the device configuration.
Basic	**1234**	BASIC used to modify Modbus (Baud Rate, Parity, Modbus Address) and Velocity (Measurement Interval) settings.
Advanced	**5678**	ADVANCED used to modify all other configurable settings.

An incorrect password or closing the software, will cause the MainProbe/MainProbeX to reset and revert to Read-Only mode.

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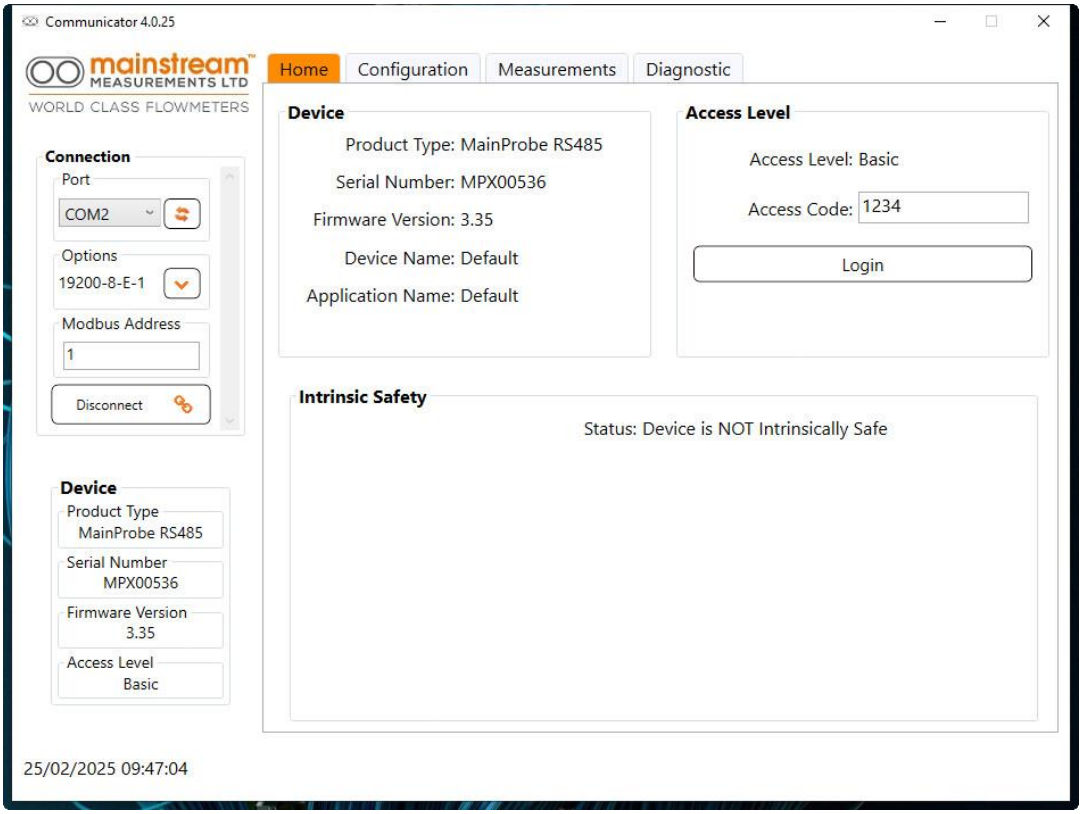
4.2.1. Basic

The Basic Access Mode is primarily intended for use by an installer and allows the measurement interval and communication parameters to be set.

Enter a **1234**, numerical Access Code into the **ACCESS CODE** text box before clicking the Login button.

Shown below is a successful login to a unit in BASIC Mode.



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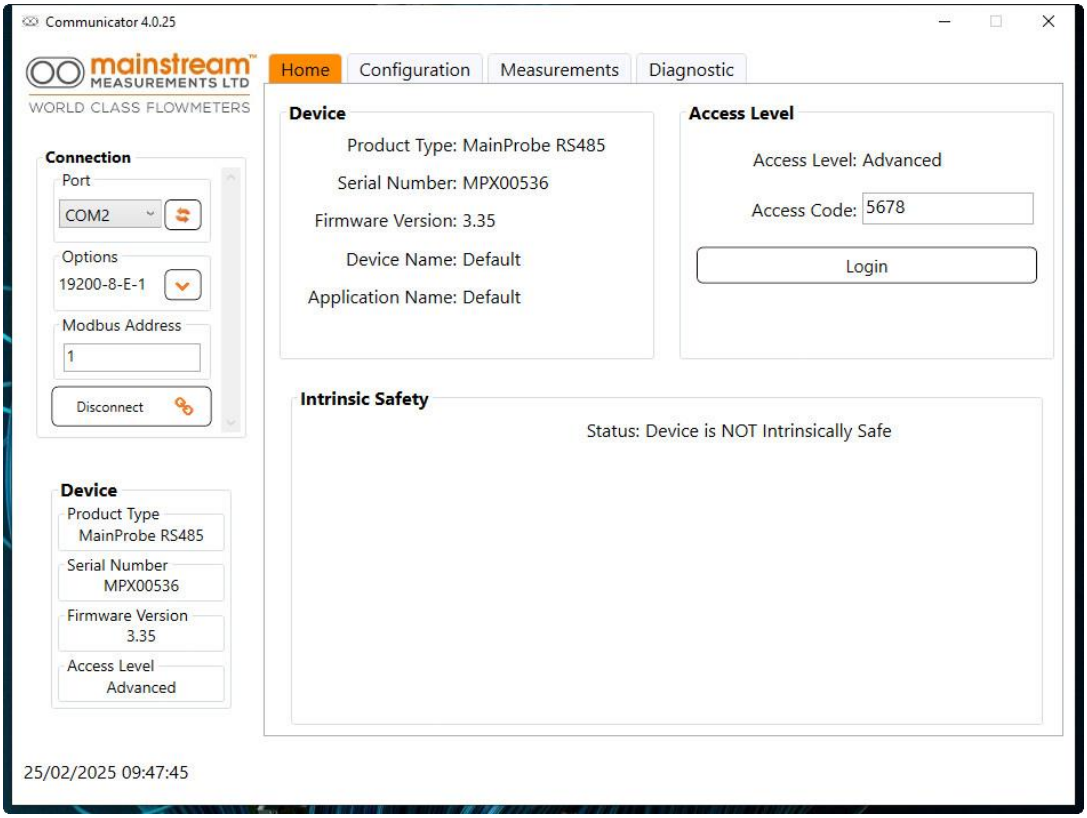
4.2.2. Advanced

In the Advanced Access Mode changes to all user configurable settings are permitted.

Enter a **5678**, numerical Access Code into the **ACCESS CODE** text box before clicking the Login button.

Shown below is a successful login to a unit in ADVANCED Mode.



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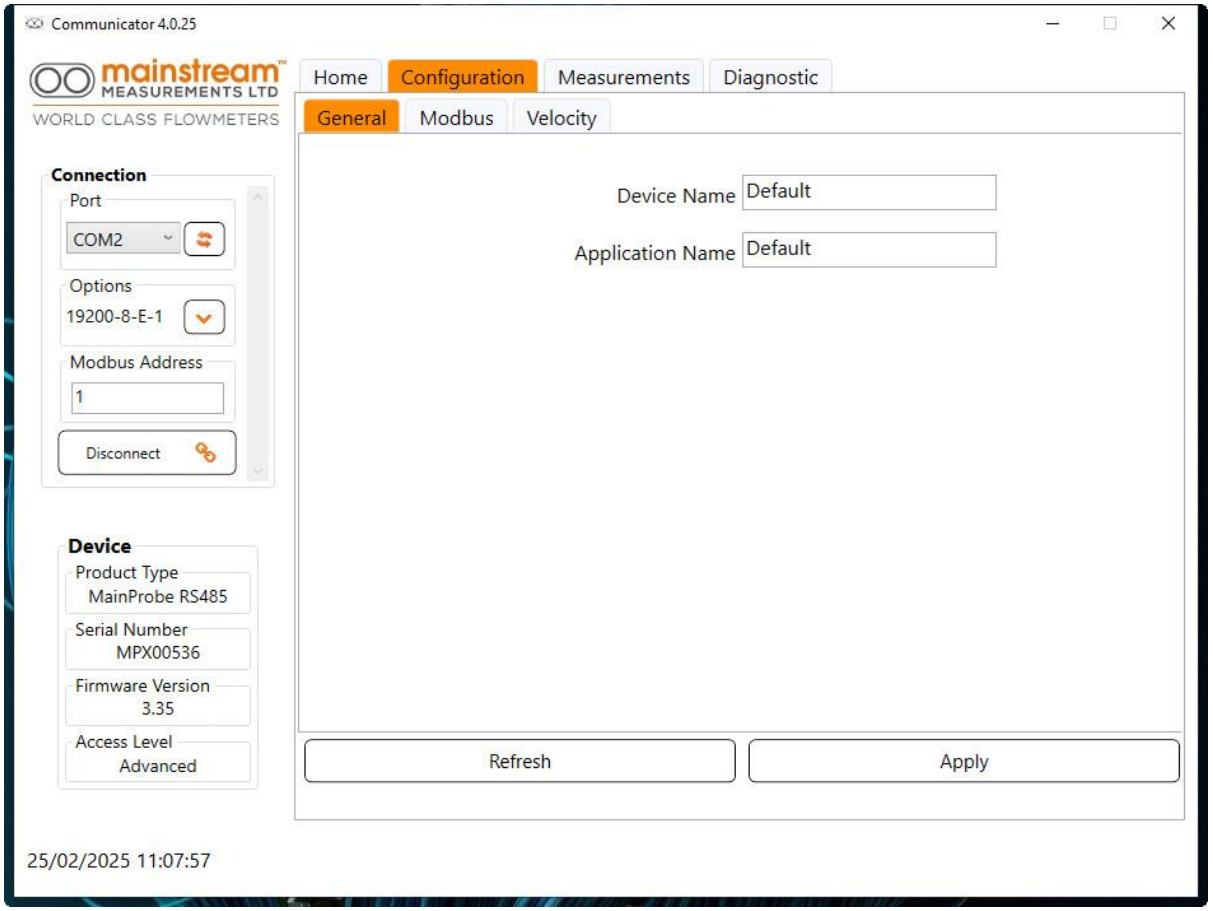
5. CONFIGURATION

5.1. General



5.1.1. Device Name

Device Name is a unique identifier for a device that helps distinguish it from other devices.

5.1.2. Application Name

It is a unique name that helps the user identify and locate a MainProbe/MainProbeX installation.

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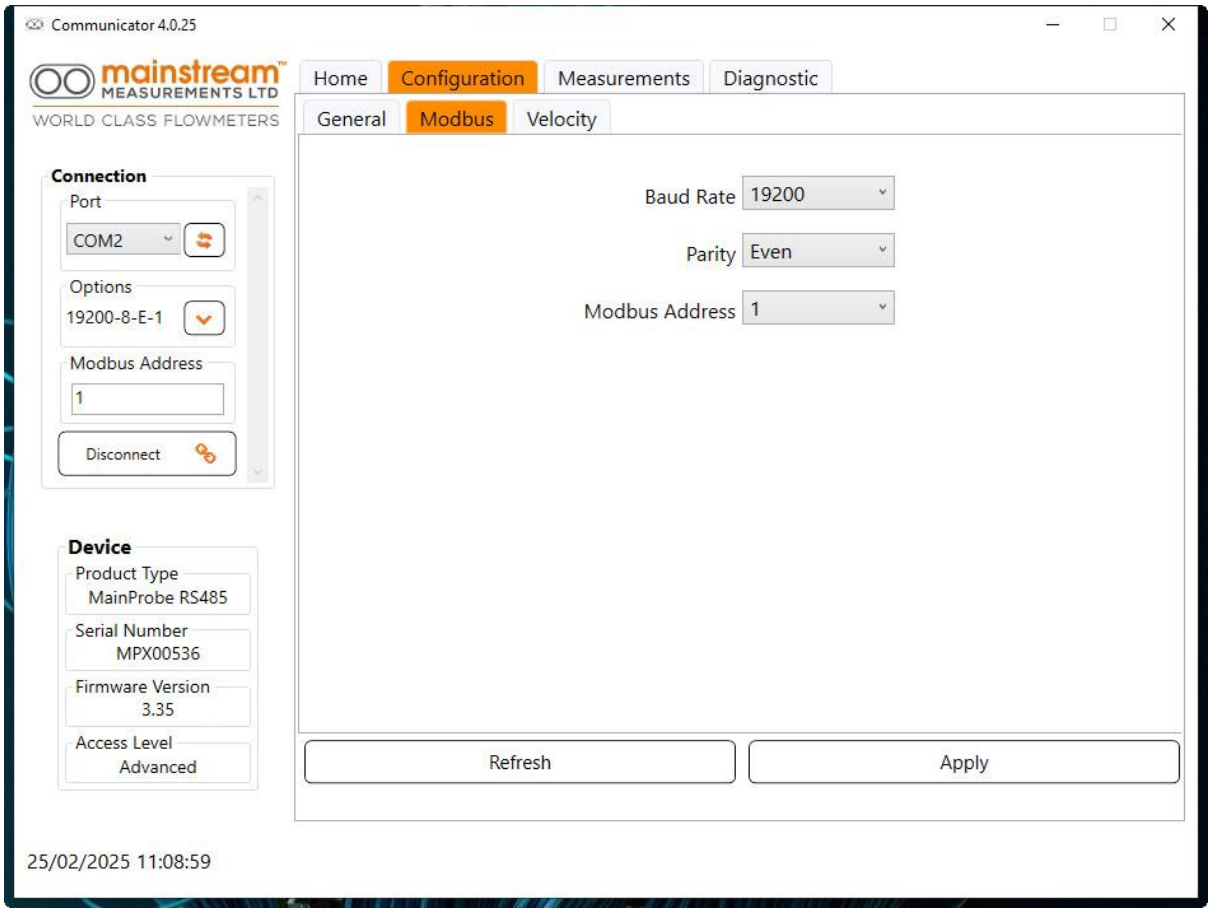
5.2. Modbus



5.2.1. Baud Rate

The common baud rates for Modbus vary depending on the type of network and the application. For serial networks, the typical baud rates range from 1200 to 115200 baud.

The **default** is 19200 baud rate.

5.2.2. Parity

The parity is a configuration setting for data packs that relates to error checking.

The **default** is **Even** parity.

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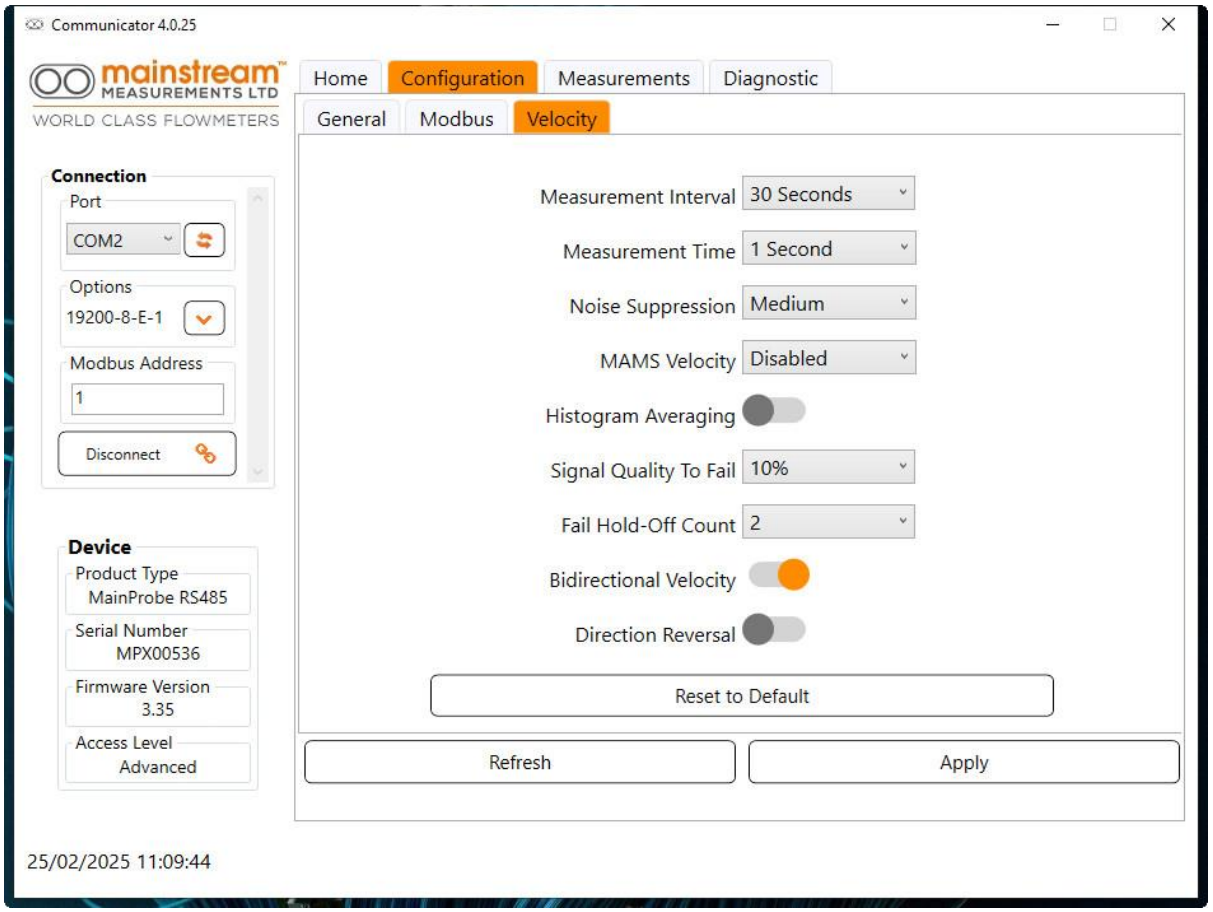
5.2.3. Modbus Address

Set required Modbus Address for MainProbe/MainProbeX, device is assigned a unique slave ID in the range of 1-247.

The **default** address is 1.

5.3. Velocity



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5.4. Measurement Interval

The measurement interval is the time elapsed between successive measurements of the liquid flow rate. This can be Continuous, 15 secs, 30 secs, 1 min, 2 min, 5 mins, 10 mins, 15 mins, 20 mins, 30 mins, 1 hour.

5.5. Measurement Time

The measurement time is the time that the MainProbe/MainProbeX requires to make a velocity measurement. Rapidly varying flows require a short response time. For slower flows a longer response time may be appropriate.

5.6. Noise Suppression

This allows for unwanted background noise from the signals to be reduced. Noise suppression can reduce the effects of acoustic noise.

5.7. MAMS Velocity

Mainstream Adaptive Measurement System (MAMS) automatically adjusts the ultrasonic signal acquisition time based on flow conditions, so that each velocity measurement is based on the same quantity of information regardless of the signal quality.

For example, if the signal quality is low, it increases the measurement time and thereby increases the quantity of signal processed.

Conversely if the signal quality is high, it decreases the measurement time. This means that if the flow conditions are favorable, there will be a reduction in measurement time and therefore less power consumed.

5.8. Histogram Averaging

The histogram shows the distribution of tracer velocities in the Zone of Inspection of the MainProbe/MainProbeX. It shows the relative amounts of the ultrasound signal corresponding to each flow velocity. Histogram averaging may be set to either DISABLED or ENABLED.

The normal setting is DISABLED. When histogram averaging is DISABLED, each velocity measurement is based only on information accumulated during the latest measurement interval.

When histogram averaging is ENABLED, part of the information from the previous measurement interval is retained and combined with new information accumulated during the measurement period. This has the effect of smoothing changes in the measurement and can be used to improve measurement repeatability whilst conserving power consumption.

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5.9. Signal Quality to Fail

The signal quality to fail is the value of the measured ultrasound signal quality below which is considered unsafe to determine the flow velocity from the velocity histogram data. When the signal quality falls below the signal quality to fail, the MainProbe/MainProbeX gives the velocity measurement as zero.

5.10. Fail Hold Off Count

Where the signal quality drops below a configured parameter selected by the user, between 0 and 5 readings, the probe will take a number of sequential velocity measurements before the measured velocity is set to zero.

5.11. Bi-directional Velocity

When enabled (the default is enabled), forward flows (towards the probe nose) are represented as positive velocities and reverse flows are represented as negative velocities. When disabled, both forward and reverse flows are represented as positive velocities.

5.12. Directional Reversal

When enabled, forward flows (towards the probe nose) are represented as negative velocities and reverse flows are represented as positive velocities.

5.13. Reset to Default

Resetting to default, also known as a factory reset, restores a device to its original settings.

This button is only visible in advanced mode.

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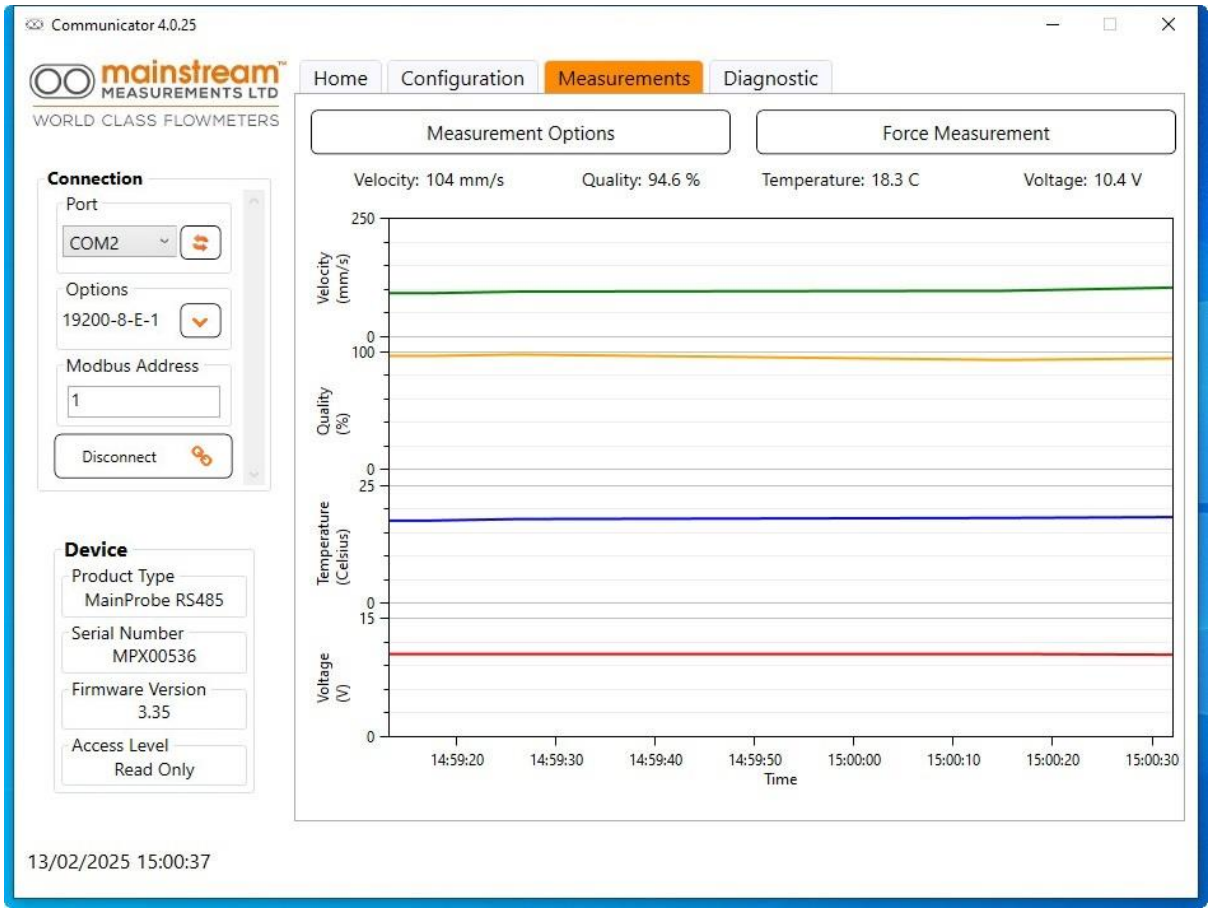
6. MEASUREMENTS



6.1. Measurement Options

These are graphs representing the readings. The legend above the graphs displays the last reading.

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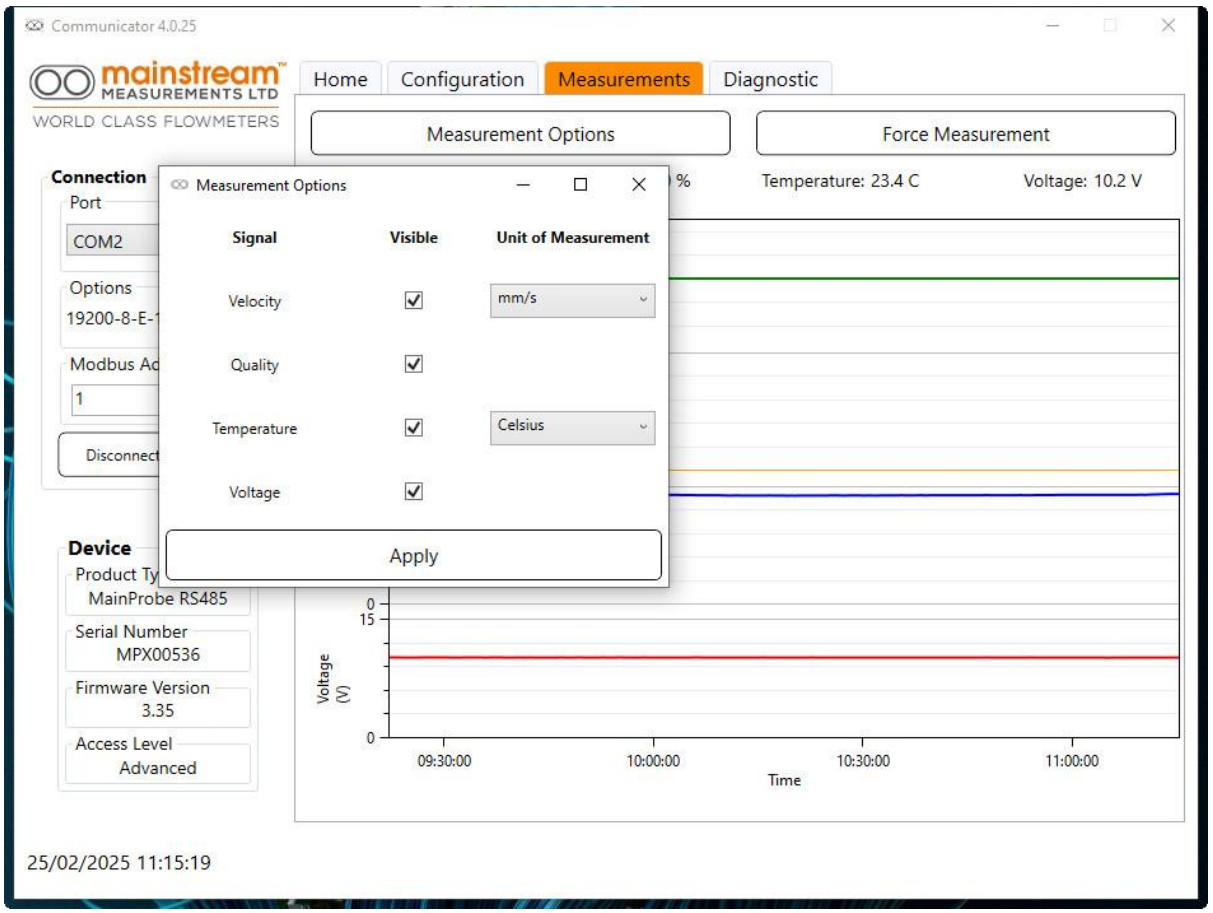
6.2. Select Measurands



If you activate the Measurement Options you can select the Unit of Measurement that will be used in the chart. Make your selections and click **Apply** button.

6.3. Force Measurements

The FORCE MEASUREMENTS tab allows you to manually invoke a measurement.

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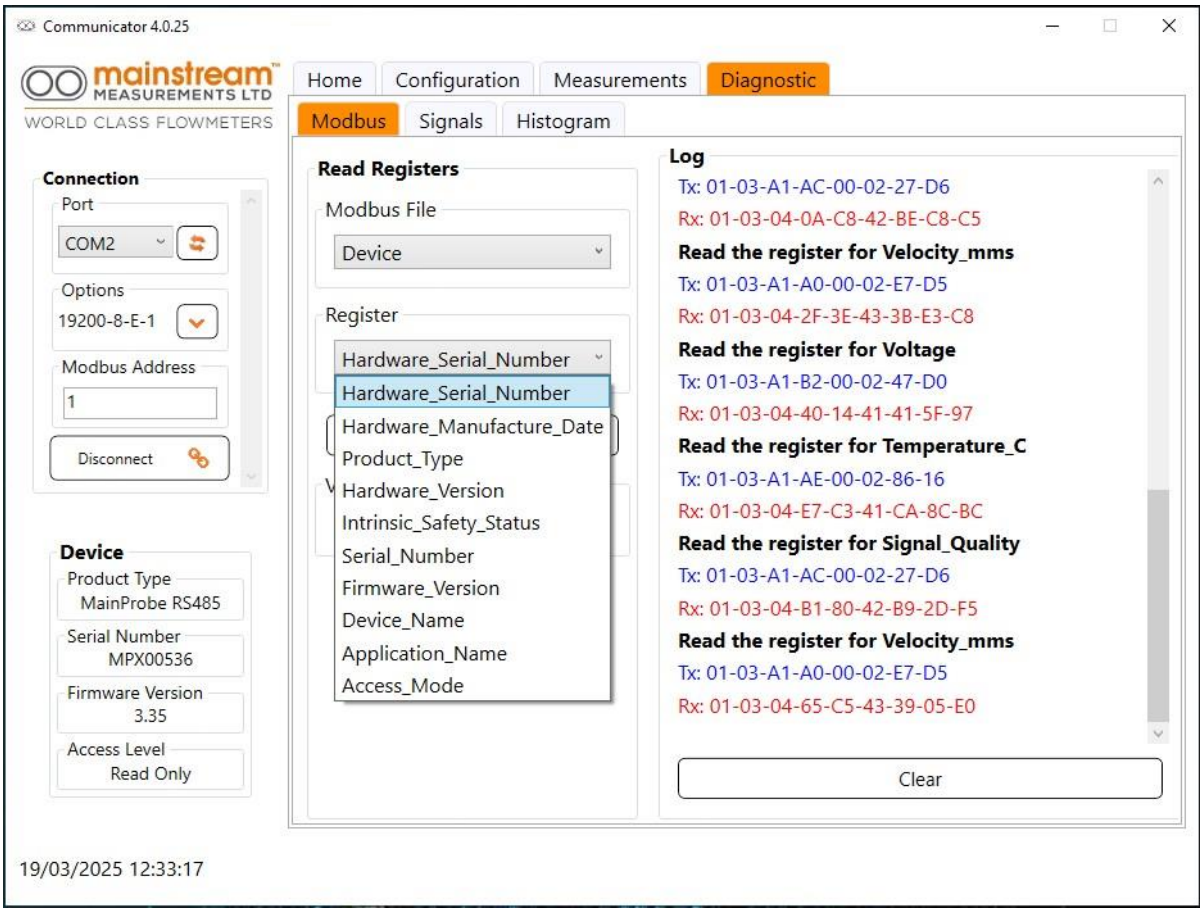
7. DIAGNOSTICS

7.1. Modbus



7.1.1. Read Registers

In this window we can read the values of the MainProbe/MainProbeX registers.

To read the register value, select the required register and then press the **Get Value** button.

7.1.2. Log

The Log window displays information packets sent (Tx transmit) and (Rx receive) from MainProbe/MainProbeX in binary form.

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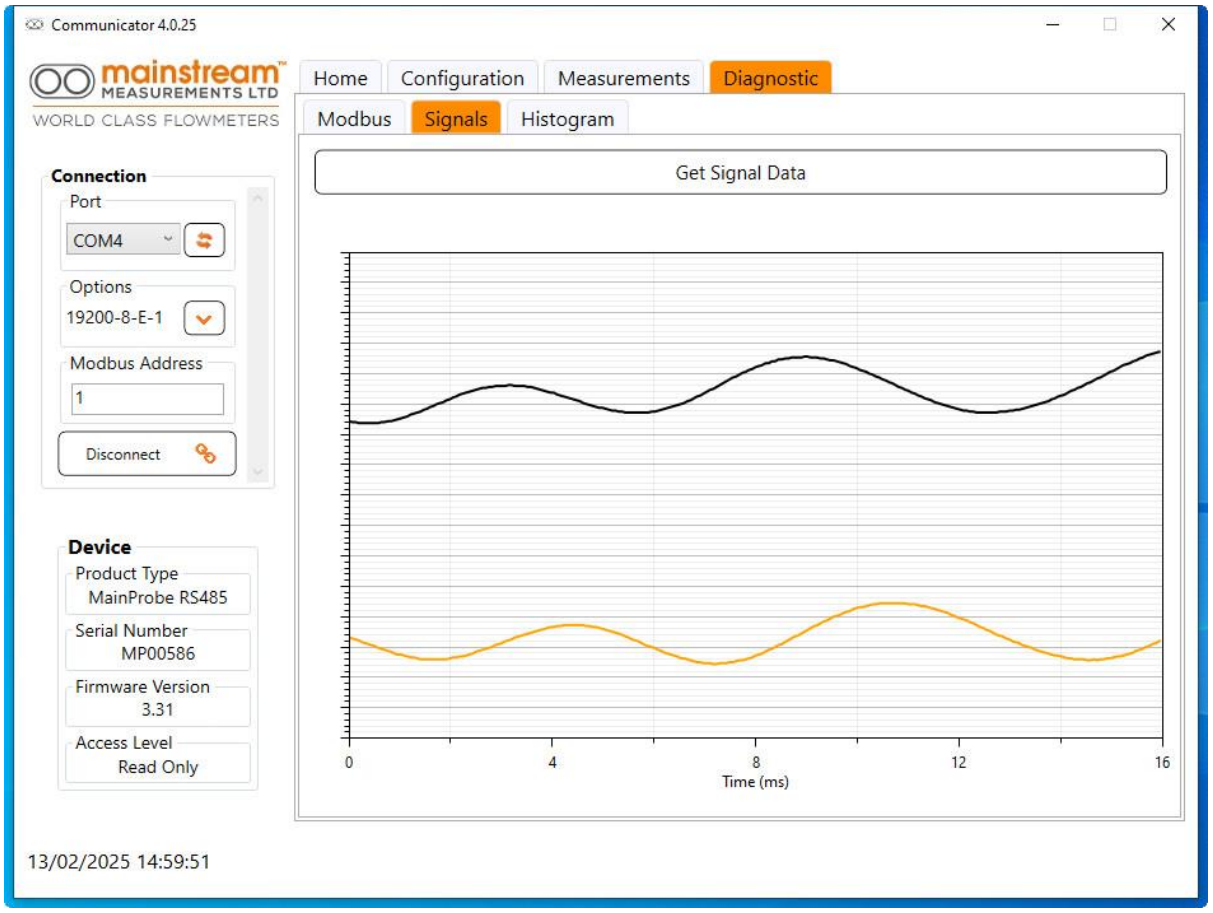
7.2. Signals



The Signals function gives access to data captured from the MainProbe/MainProbeX velocity sensor. This shows the transmit and receive signals in synchronisation.

This function also allows the user to establish if the installation is correct.

You can refresh the signal using the **Get Signal Data** button.

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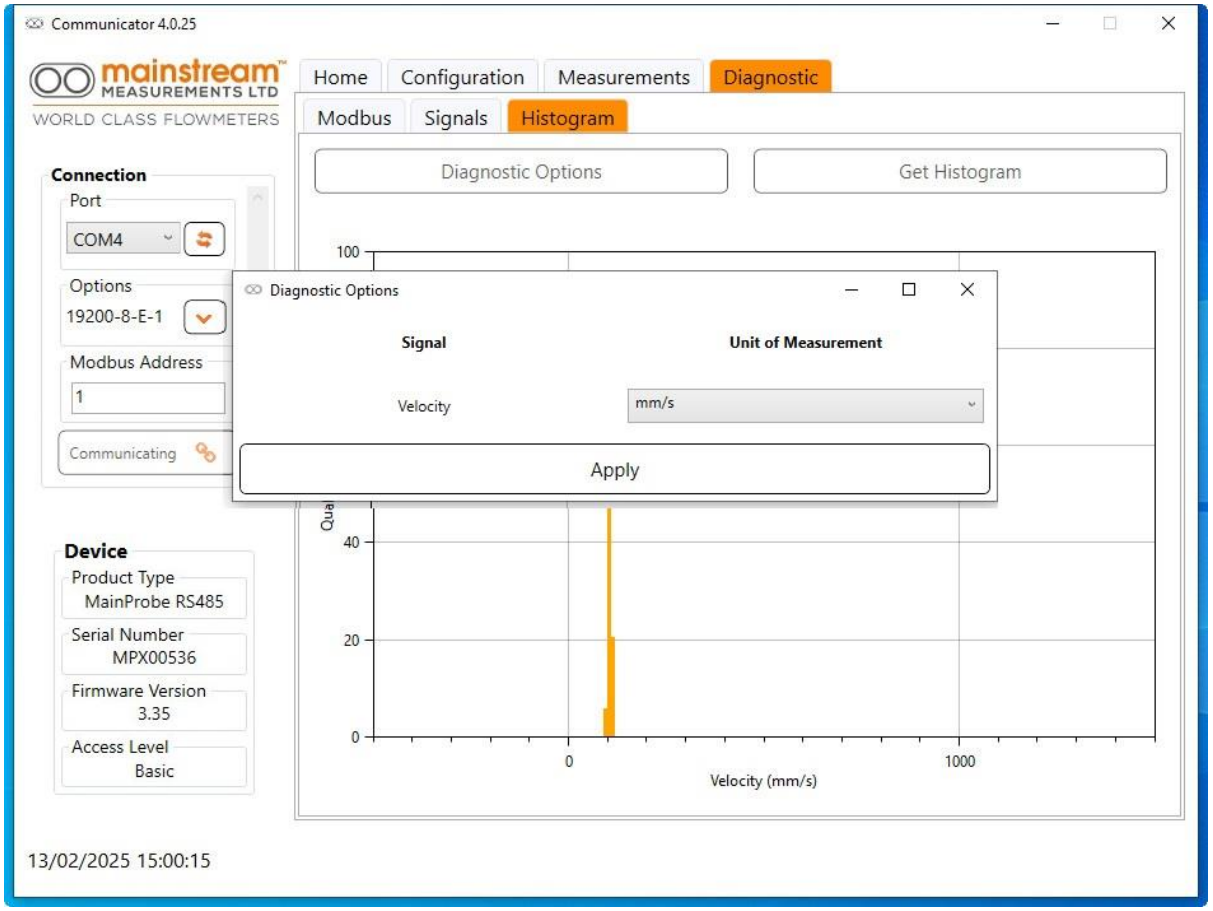
7.3. Histogram

7.3.1. Diagnostic Options



In the Diagnostic Options you can select the Unit of Measurement that will be used in the chart. Click **Apply** button.

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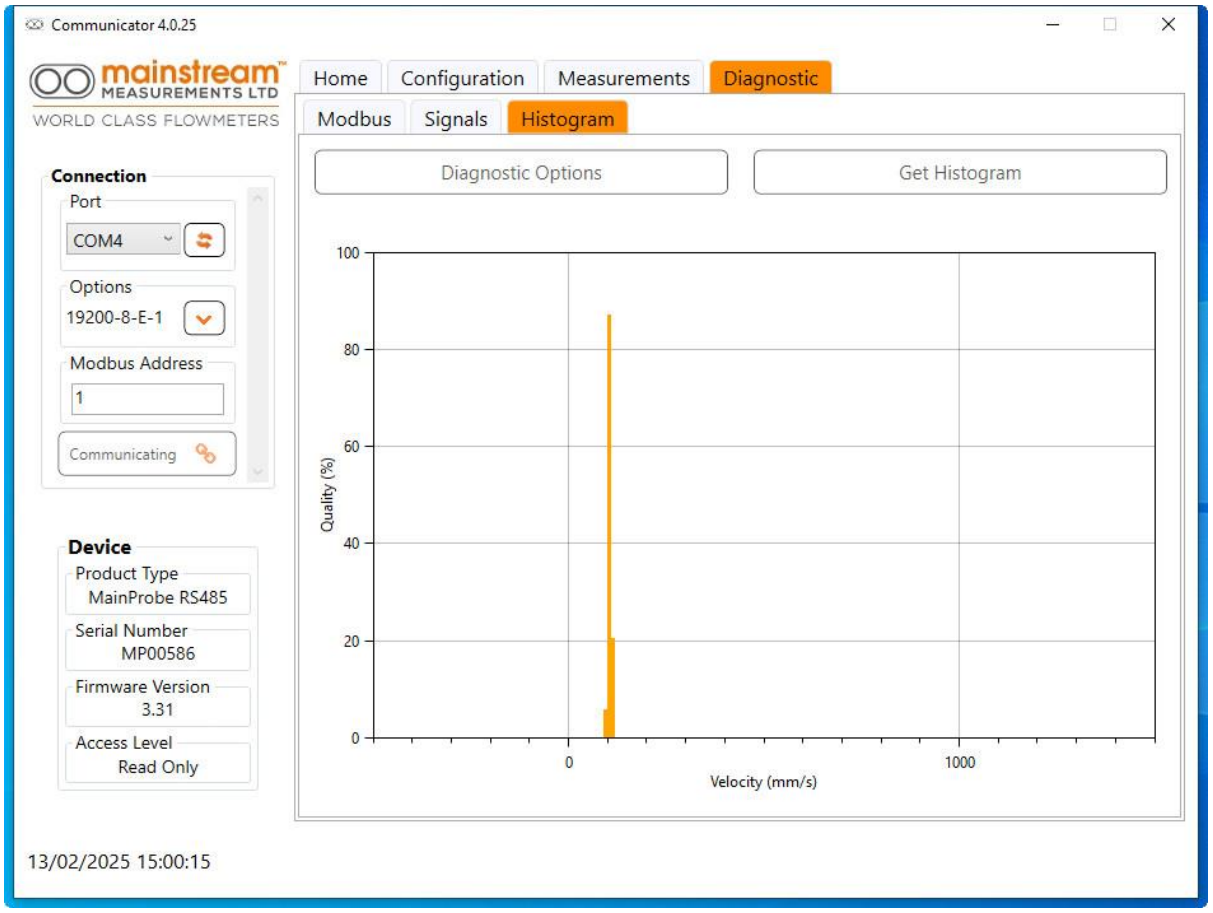
7.3.2. Get Histogram



To display or refresh the Histogram chart use the **Get Histogram** button.

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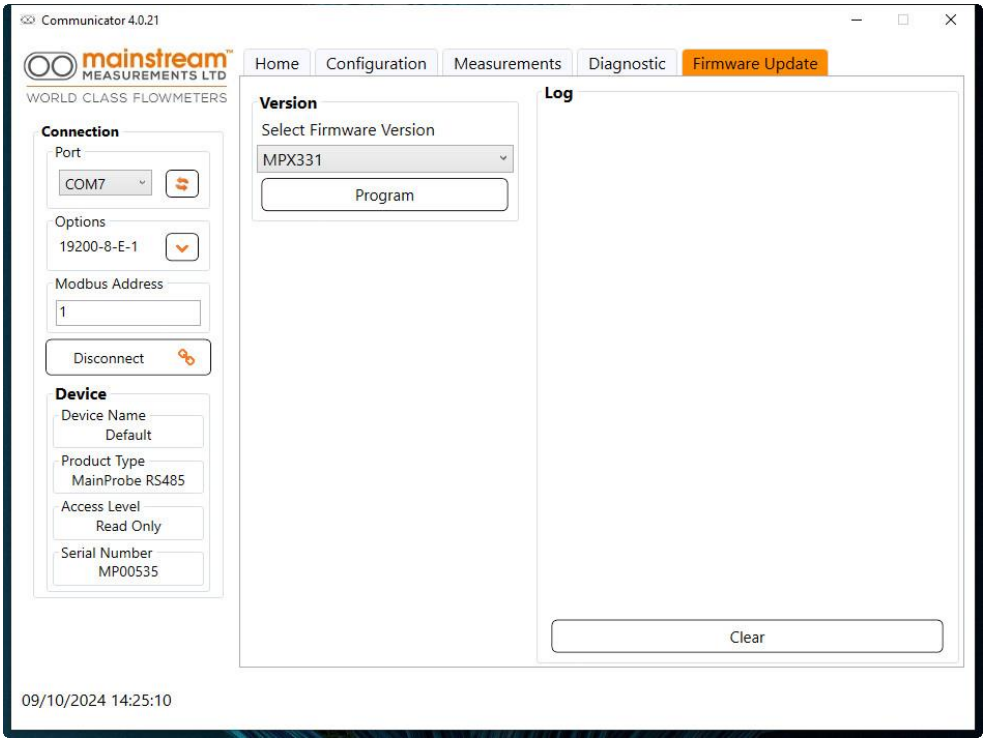
8. FIRMWARE UPDATE



MainProbe/MainProbeX firmware upgrades are supplied in the form of .bin files.

Copy the .bin file to Binaries folder in the location where the communicator is installed.

For example:

C:\Program Files\Mainstream Measurements\Mainstream Communicator v4.0.21\Resources\Binaries.

(The .bin file will not be displayed on drop list if Communicator is running when copying new firmware. In this case, restart Messenger.)

Start the MainProbe Communicator, connect to the MainProbe/MainProbeX

Go to Firmware Update window.

Select required Firmware Version from drop list.

Press **Program** button to start update process.

The update progress will may take several minutes and will be displayed on the left side of the screen in the **Log** window.

At the end of the upgrade MainProbe/MainProbeX restart.

WARNING: Do not disconnect the power supply from the MainProbe/MainProbeX during the upgrade process. This can damage the MainProbe/MainProbeX system.

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