Operation Manual

eyc-tech FUM06

Ultrasonic flow Transmitter

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I. Security considerations

Please read this Specification carefully, prior to use of this, and keep the manual properly, for timely reference.

Solemn Statement：

This product can not be used for any explosion-proof area.

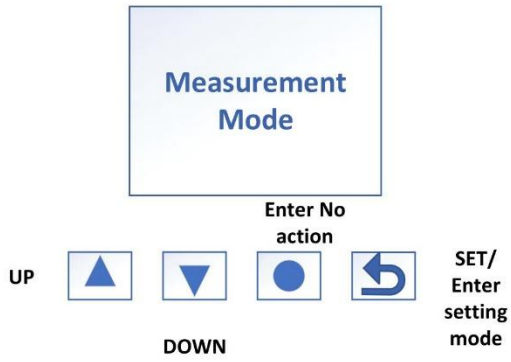
Do not use this product in a situation where human life may be affected.

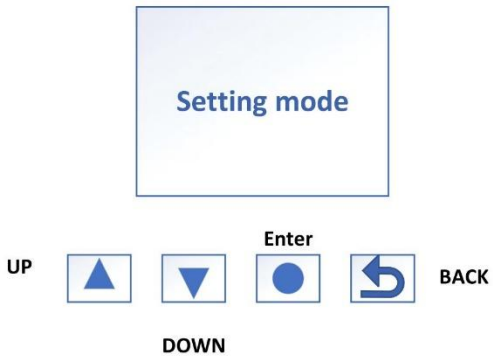
eyc-tech will not bear any responsibility for the results produced by the operators！

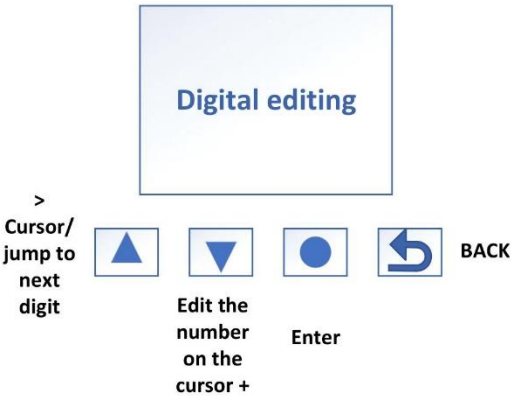
Warning!

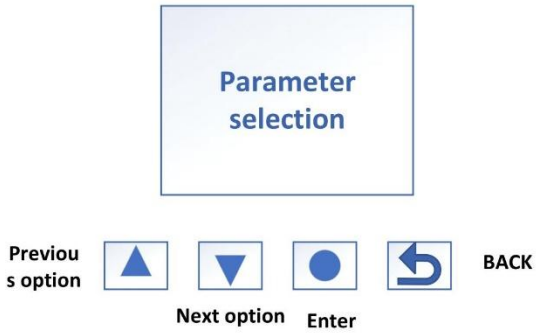
- Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.
- This product must be operated under the operating conditions specified in manual to prevent equipment damages.
- Please using the product under the ordinary pressure, or it will influence safe problem.
- This product must be operated under the operating condition specified in this manual to prevent equipment damages.
- This product must be operated under the normally atmospheric condition to prevent equipment damages.
- To prevent products damage, always disconnect the power supply from the product before performing any wiring and installation.
- All wiring must comply with local codes of indoor wiring and electrical installation rules.
- Please use crimp type terminal.
- To prevent personal injury, do not touch the moving part of product in operation.
- It may cause high humidity atmosphere during the product was breakdown. Please take safety strategy.

II. Operation Form

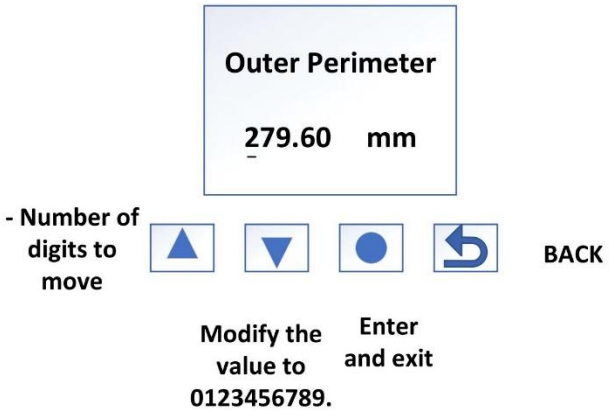




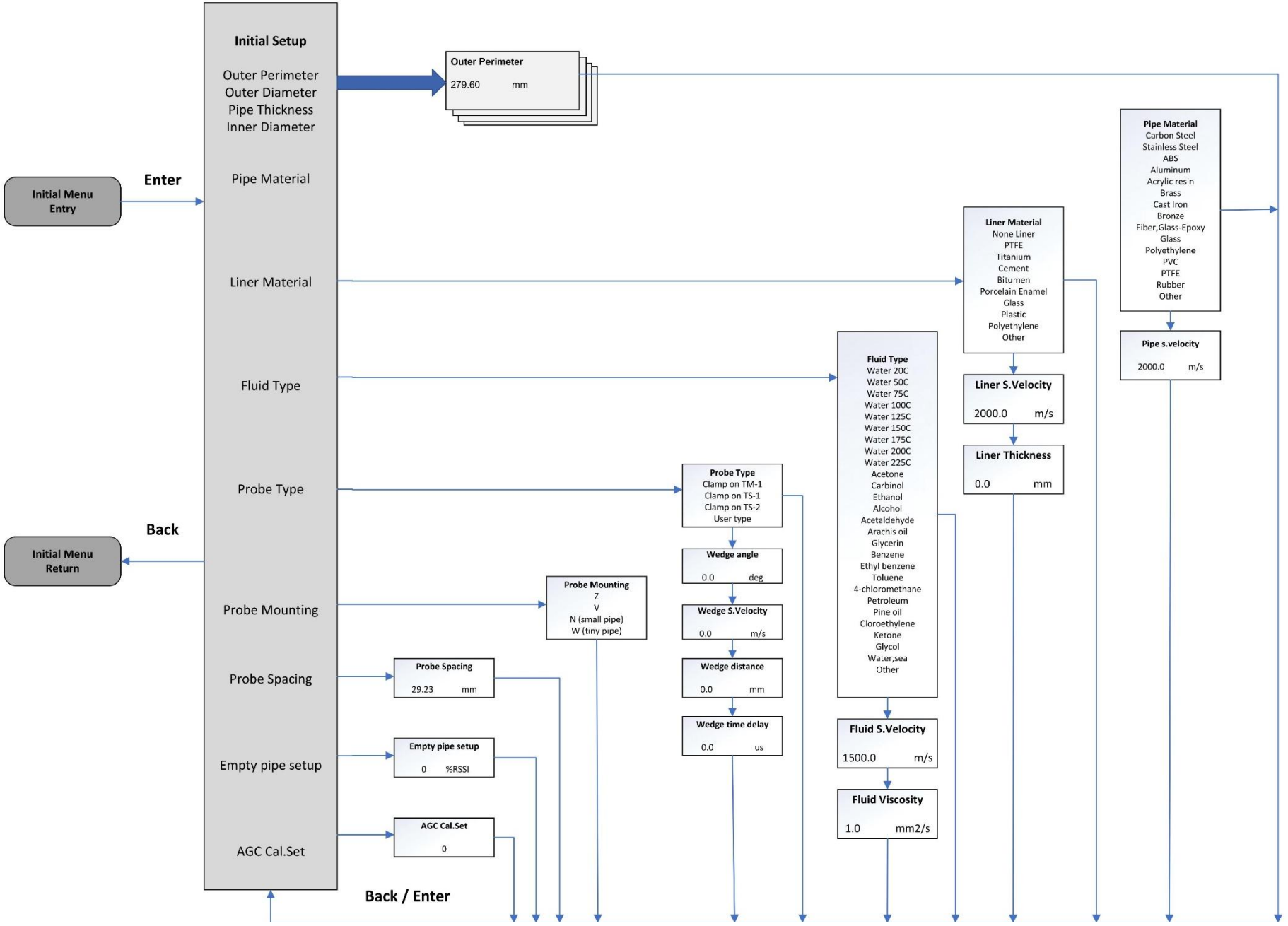


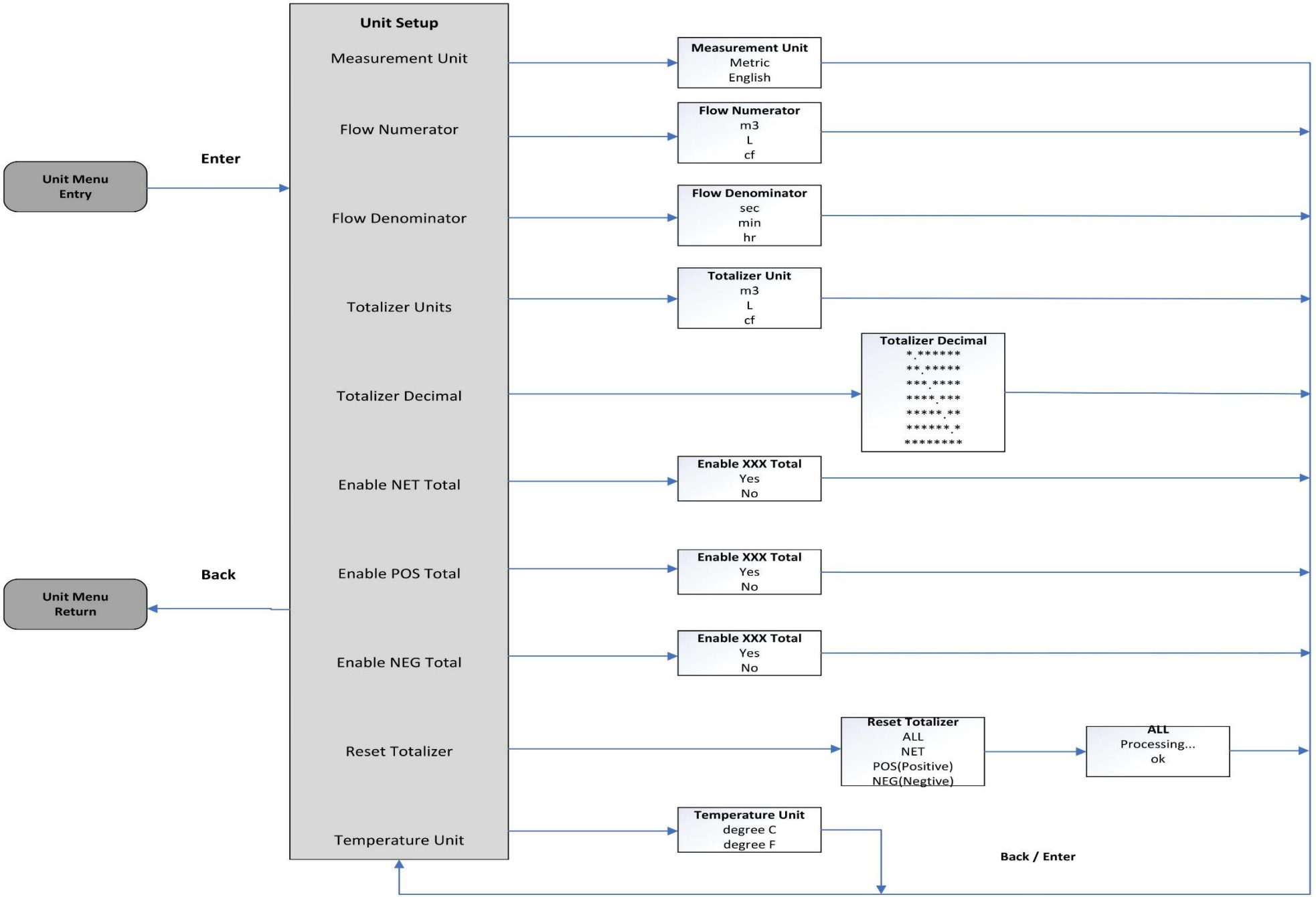


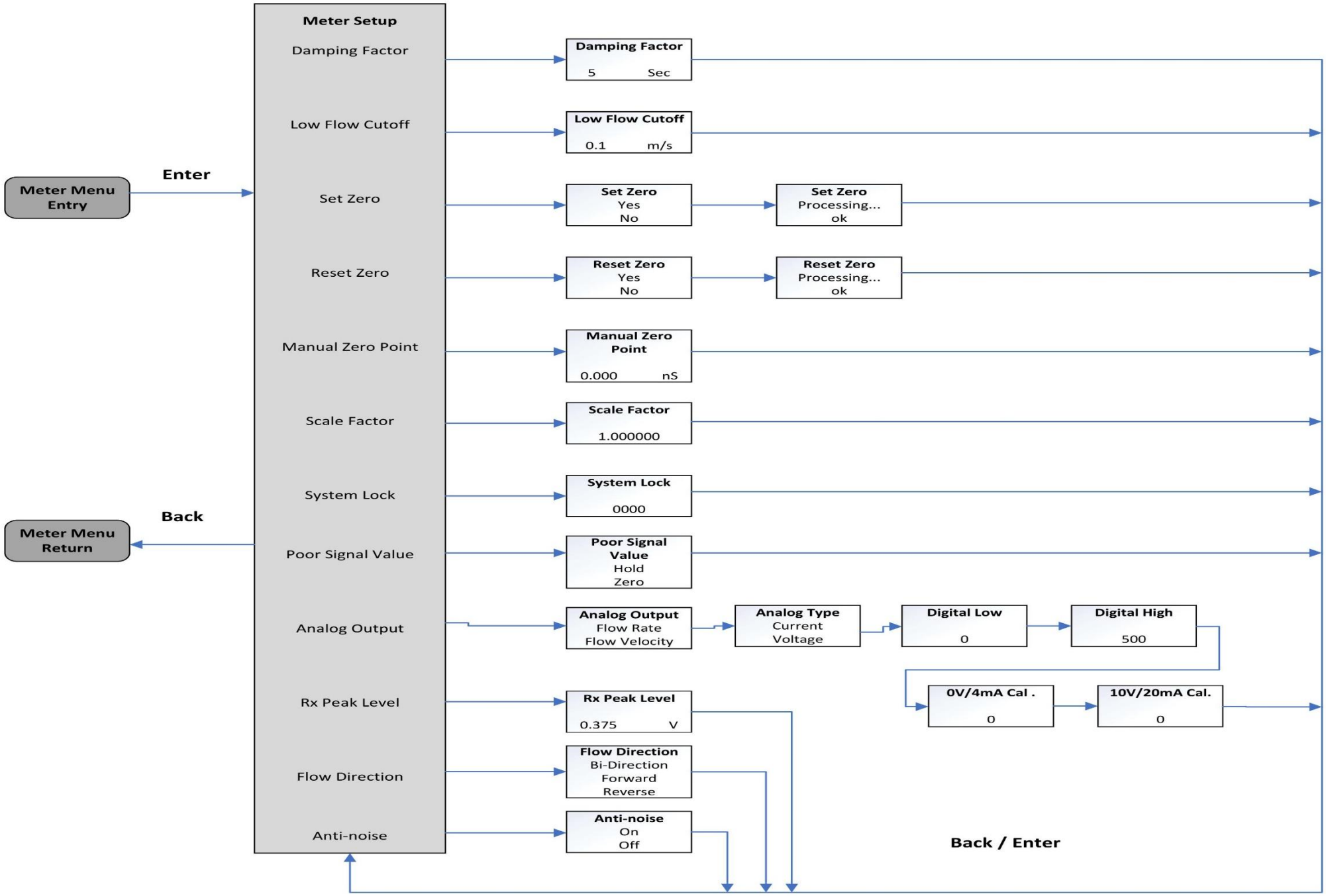
Example of instruction: Digital editing



Ultrasonic flow Transmitter




Unit Setup
Measurement Unit
Flow Numerator
Flow Denominator
Totalizer Units
Totalizer Decimal
Enable NET Total
Enable POS Total
Enable NEG Total
Reset Totalizer
Temperature Unit
Enter
Unit Menu Entry
Back
Unit Menu Return
Measurement Unit
Metric
English
Flow Numerator
m3
L
cf
Flow Denominator
sec
min
hr
Totalizer Unit
m3
L
cf
Totalizer Decimal
*.******
.***
.*
****.***
*****.**
******.*
****
Enable XXX Total
Yes
No
Enable XXX Total
Yes
No
Enable XXX Total
Yes
No
Reset Totalizer
ALL
NET
POS(Positive)
NEG(Negtive)
ALL
Processing...
ok
Temperature Unit
degree C
degree F
Back / Enter

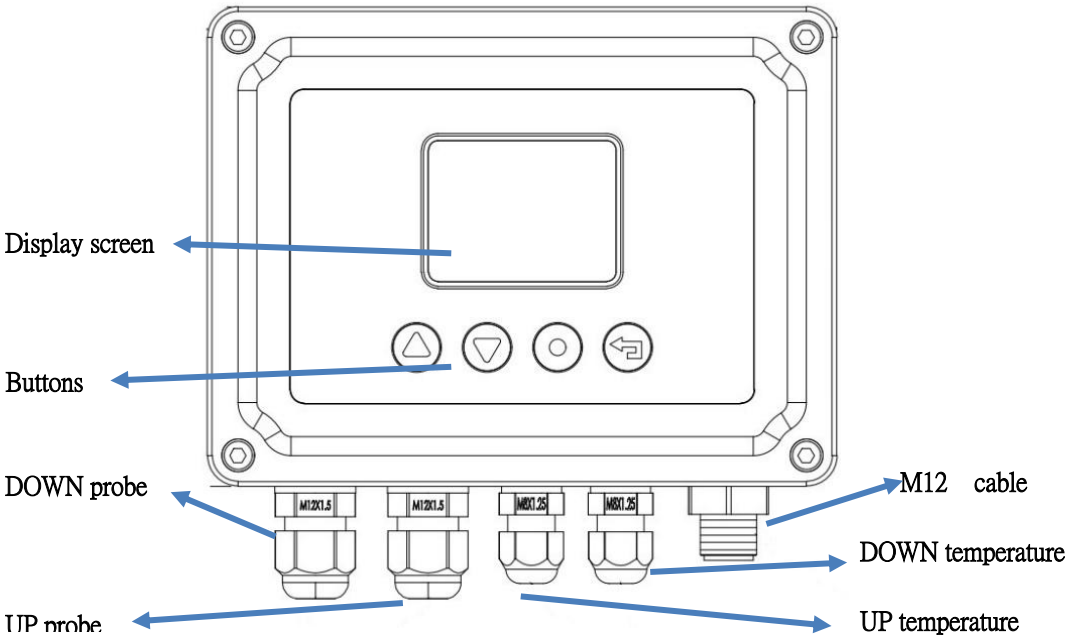

Meter Setup
Damping Factor
Low Flow Cutoff
Set Zero
Reset Zero
Manual Zero Point
Scale Factor
System Lock
Poor Signal Value
Analog Output
Rx Peak Level
Flow Direction
Anti-noise
Enter
Meter Menu Entry
Back
Meter Menu Return
Damping Factor
5 Sec
Low Flow Cutoff
0.1 m/s
Set Zero
Yes
No
Set Zero
Processing...
ok
Reset Zero
Yes
No
Reset Zero
Processing...
ok
Manual Zero Point
0.000 nS
Scale Factor
1.000000
System Lock
0000
Poor Signal Value
Hold
Zero
Analog Output
Flow Rate
Flow Velocity
Analog Type
Current
Voltage
Digital Low
0
Digital High
500
0V/4mA Cal .
0
10V/20mA Cal.
0
Rx Peak Level
0.375 V
Flow Direction
Bi-Direction
Forward
Reverse
Anti-noise
On
Off
Back / Enter

※Key Pad Operation Mode

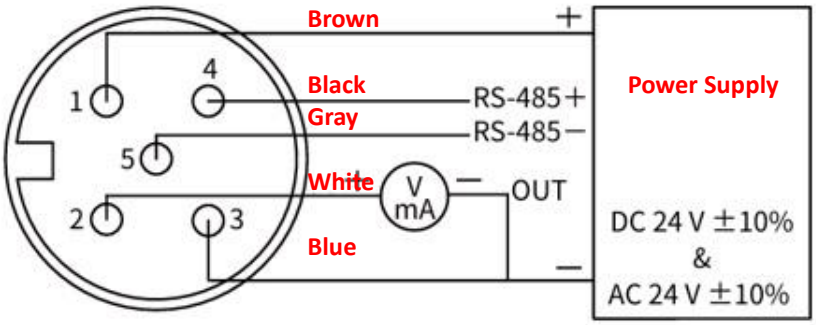
Key operation	FUM06 status			
	Measurement mode	Setting mode	Digital editing	Parameter selection
Press UP	Previous page	Previous option	Move the cursor to the next digit	Previous option
Press DOWN	Next Page	Next option	Edit cursor on number +	Next option
Press OK	No function	Enter options	Enter	Enter
Press SET/BACK	Enter settings	BACK	BACK	BACK

UP DOWN OK SET/BACK

III. Appearance Description



IV. Connection Diagram

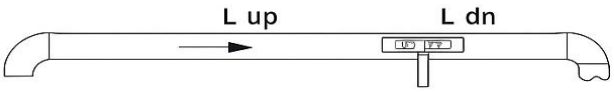
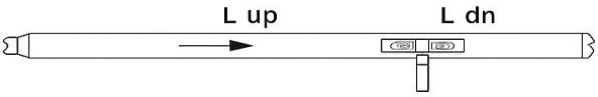
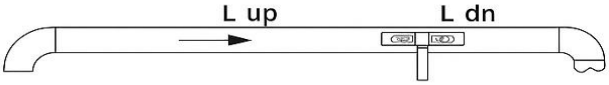
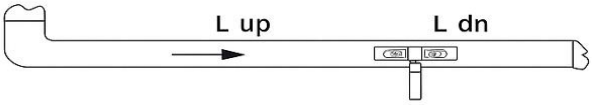
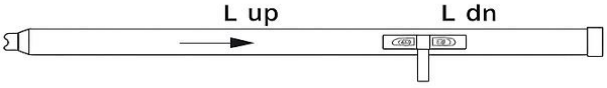
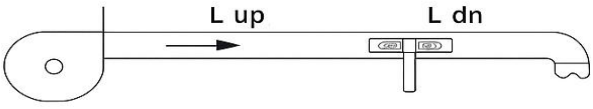


*Please make sure the product and the device which connect with RS-485 are on common ground, avoid damaged product.

V. Installation

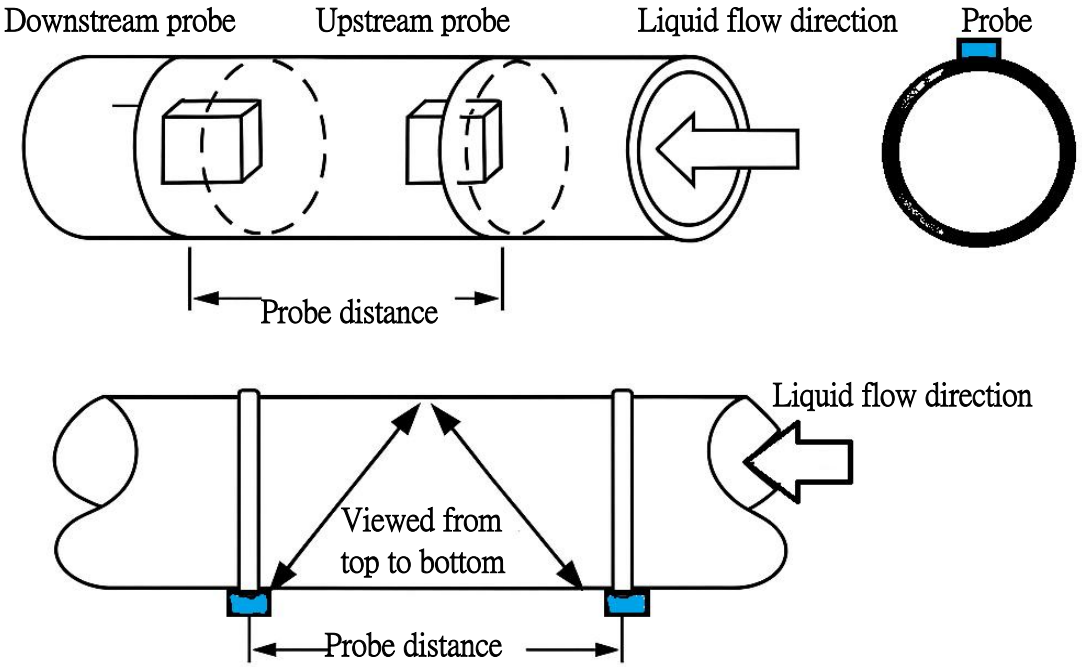
1. Pipeline installation position

When the liquid flows in the pipe, it will be disturbed by obstacles, bends, etc. To ensure the measurement accuracy of the flow, the installation position should try to avoid the position where the flow field is chaotic. The following table shows the common pipeline configurations in various application sites, as well as the recommended installation positions of the corresponding upstream and downstream probes. When installing on site, try to select the corresponding conditions according to the actual situation:

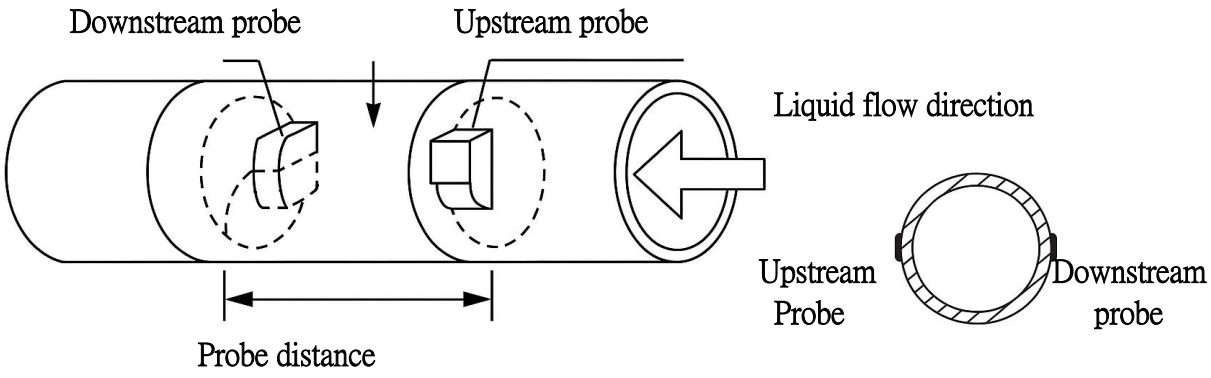
PROBE AND PIPING CONFIGUIRATION	Upstream (D) / Diameter (D)	Downstream Diameter (D)
A 	10D	5D
B 	10D	5D
C 	12D	5D
D 	12D	5D
E 	20D	5D
G 	30D	5D

2. Probe installation method

V-type: Generally speaking, this installation method is used for pipes with a diameter of 50~300mm. Two probes are located on the same side of the pipe. The ultrasonic wave bounces once in the pipe, forming a V shape, hence the name. Since the probes are on the same side, it is easier to measure the probe distance, and because the ultrasonic wave only undergoes one reflection, the balance point of the signal strength is achieved.



Z Type: Generally used in pipes with a diameter of more than 300mm. The ultrasonic signal is not reflected and therefore has a stronger intensity, avoiding the situation where the signal is too weak and distorted. However, because the probes are on different diagonal sides of the pipe, it is more difficult to measure the probe distance.



N type: Generally used for pipes less than 50mm, the probes are on different diagonal sides of the pipe, so it is more difficult to measure the probe distance. Ultrasonic waves are reflected twice to reach three paths, which can extend the flight time and improve the measurement accuracy of small pipes. In practical applications, unless the V method cannot adjust the ideal signal state, this method is not recommended.

W type: Generally used for pipes less than 50mm, ultrasonic waves are reflected three times to reach four paths, which can extend the flight time and improve the measurement accuracy of small pipes. Compared with the N method, although the probes are on the same side, it is easier to measure the probe distance, but like the N method, in practical applications, unless the V method cannot adjust the ideal signal state, this method is not recommended.

	Range	Installation
Pipe diameter	>300mm	Z type
Pipe diameter	50 ~ 300mm	V type
Pipe diameter	< 50mm	N type
Pipe diameter	< 50mm	W type

3. Signal confirmation

1. RSSI (signal strength)

There are two sets of RSSI values on the instrument screen, representing the signal strength received by the upstream and downstream probes, ranging from 0 to 100%. It is recommended to be above 50% to maintain normal operation of the system. If the RSSI is found to be too low or unstable, please refer to the following adjustment methods:

a. Try to fine-tune the distance between the probes.

b. Change the probe installation position.

c. Check whether there is too thick rust, paint and other substances on the outer wall of the hall. Try to scrape it smooth and evenly apply more coupling agent.

d. The signals sent by the two probes may not be in the same straight line. Try to move the probe

slowly until there is a better RSSI value, and check whether the probe distance is correct.

e. After doing any of the above actions, be sure to check again whether the probe distance deviates too much. Excessive deviation will cause errors in the flow measurement results.

f. Check the setting value in Meter > Rx Peak Level in the settings. If the RSSI is always low due to factors such as the installed pipe diameter is large, the wire is pulled far away, etc., you can try to adjust this setting value. Please refer to the subsequent instructions for relevant setting precautions.

2. Q value

The Q value represents the quality of the received signal and can be regarded as an indicator of the signal-to-noise ratio (SNR). The value is displayed in the lower right corner of the display interface. The value is between 0~100%, and under normal circumstances, it is mostly >60%. The higher the Q value, the better the signal quality and the more reliable the measured value. If the Q value is less than 10%, it cannot be measured. You can try the following methods:

a. Sometimes the RSSI value is high, but the Q value may be poor due to slight errors in the distance and angle of the probe. Try to adjust the distance and angle of the probe slightly.

b. For uneven pipe walls, try to grind the pipe wall flat and confirm whether the probe is close to the outer pipe wall.

c. The coupling agent is not evenly coated, re-coat and adjust.

d. If the inner wall of the pipe is in poor condition due to impurities, dirt, etc., it is recommended to change the measurement position.

e. Interference from electromagnetic waves from peripheral equipment, change the position or strengthen the shielding.

f. The fluid flow field is chaotic, try to change the installation position.

g. For pipelines with larger diameters, try to change to the Z method to set up the probe.

VI. RS-485 and Modbus

FDM06-L integrates a RS-485 interface for digital communication as an option feature. Based on Modbus protocol makes the general convenience on PLC, HMI and PC connection. For Modbus protocol information please download the file from website. Besides the PLC, HMI application, the user software provide the device setting and data logging function, it also can free download from website.

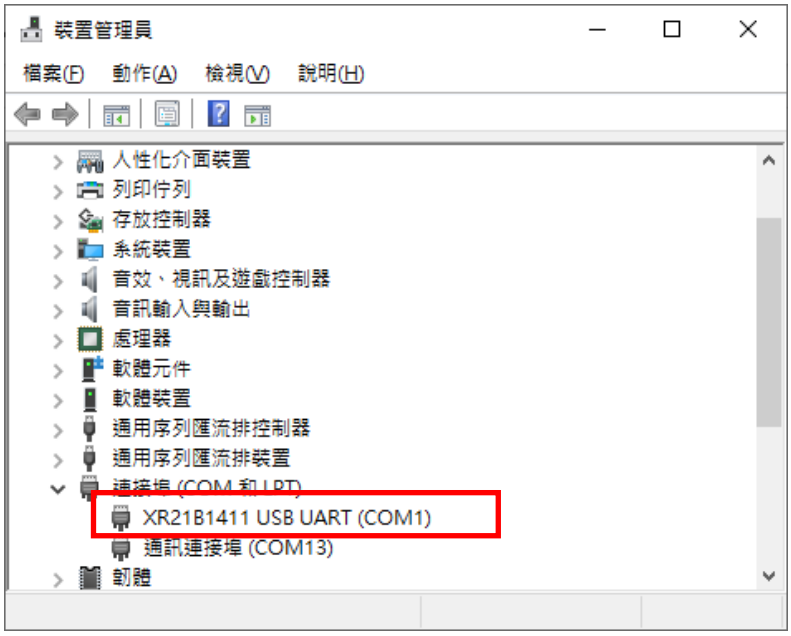
Technical Data：

(1) Max. network size：32 transmitters
(2) Communication：with COM-Port (serial interface) of PC
(3) Max. network expansion：1200m (3937ft) total length at 9600 baud
(4) Transmission rate：9600, 19200, 38400, 57600, 115200 Baud
(5) Parity：None, Even, Odd
(6) Data length：8 bit
(7) Stop bit：1 or 2 bit
(8) Factory default Station address = 1, Data format= 9600, N81

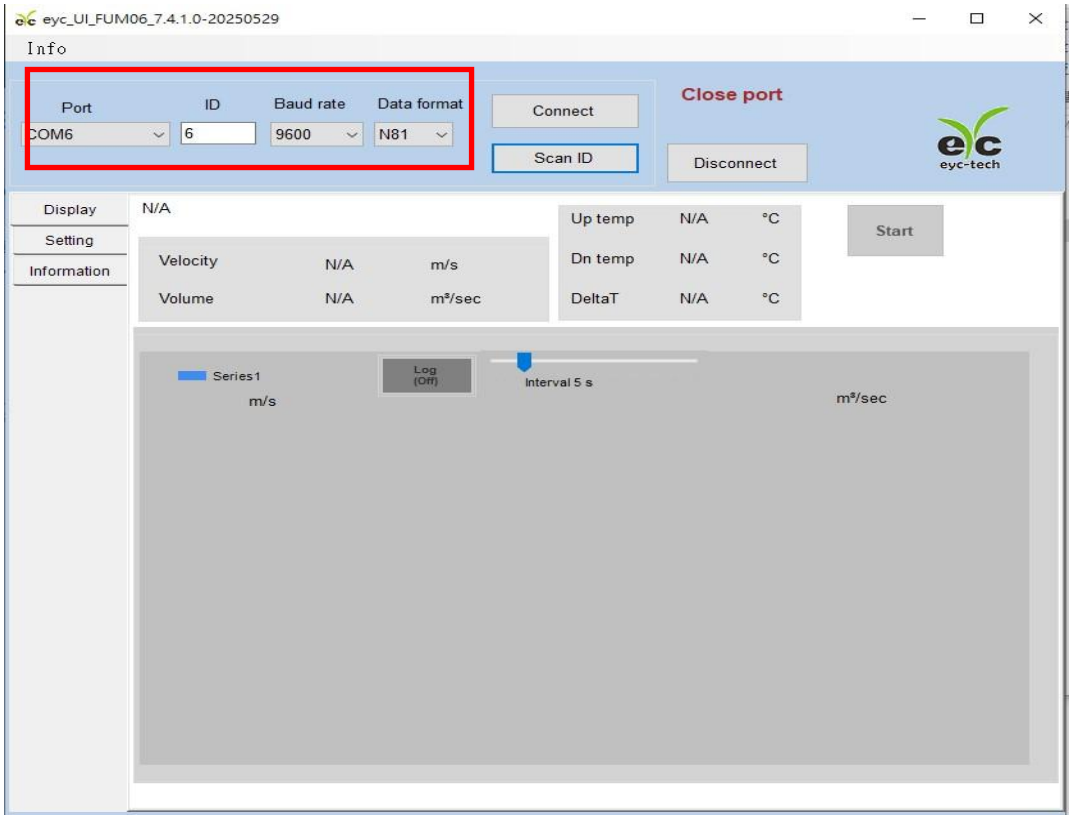
VII. Software and configuration step

User may download the configuration software on eyc-tech web site. Please decompress the application prior to execute it. Operating System requirements：above Windows 10. Hardware connection：Connect the FUM06 to PC through USB to RS-485 or RS-232 to RS-485 converter

1. Check the COM port number from Device Manager in Computer Management. e.g. COM1 in illustration

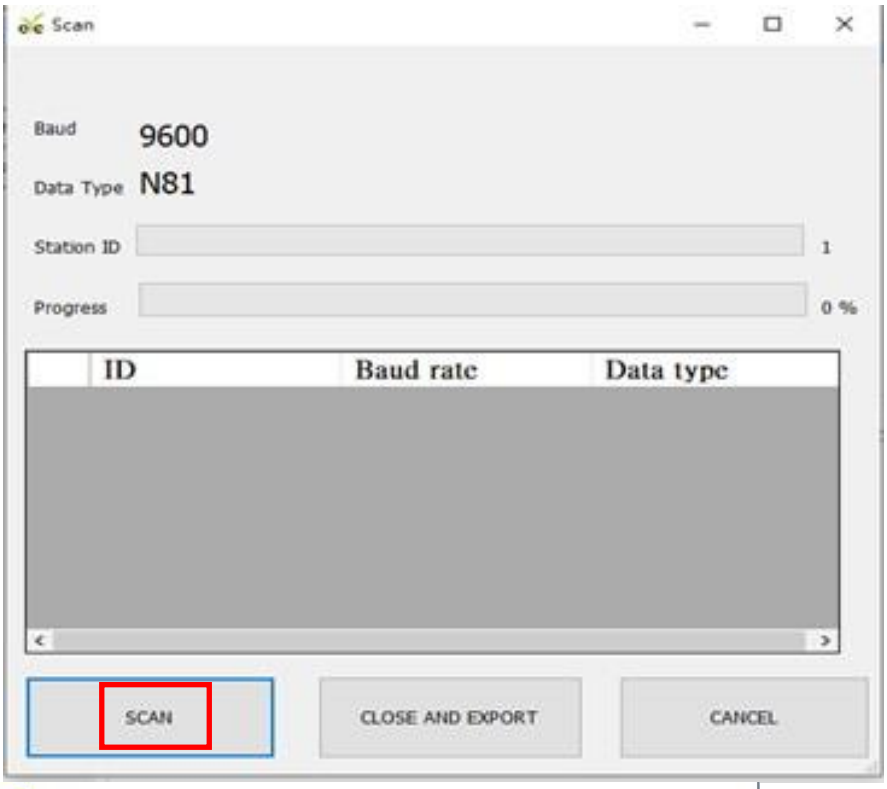


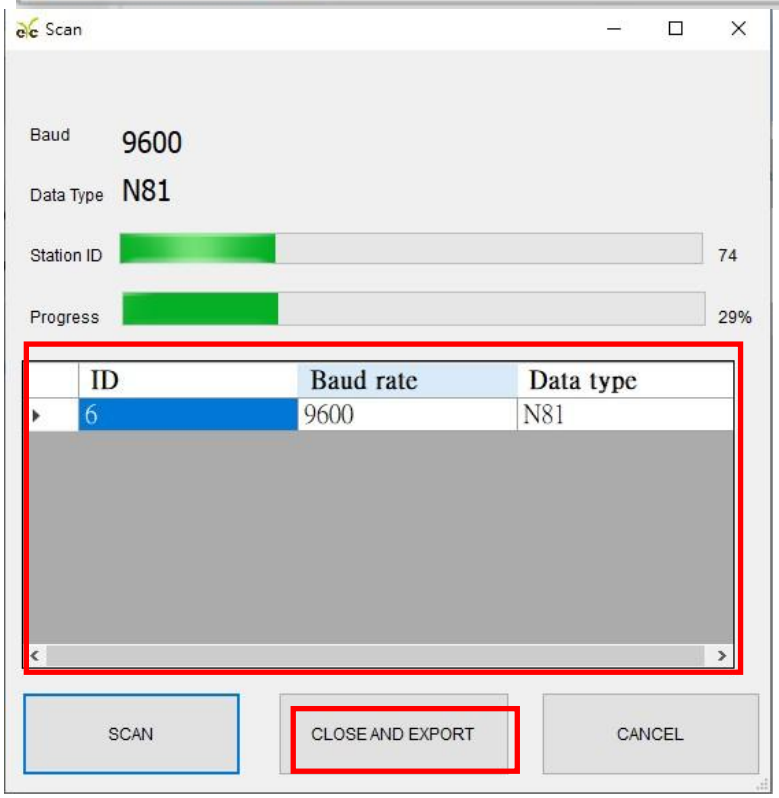
2. Open FUM06 UI, then set COM port, Baud rate and data format, and then press Scan ID.



3. Scan RS-485 connection

Press SCAN to start scanning ID. After scanning, the ID/Baud rate/and Data type will be listed.

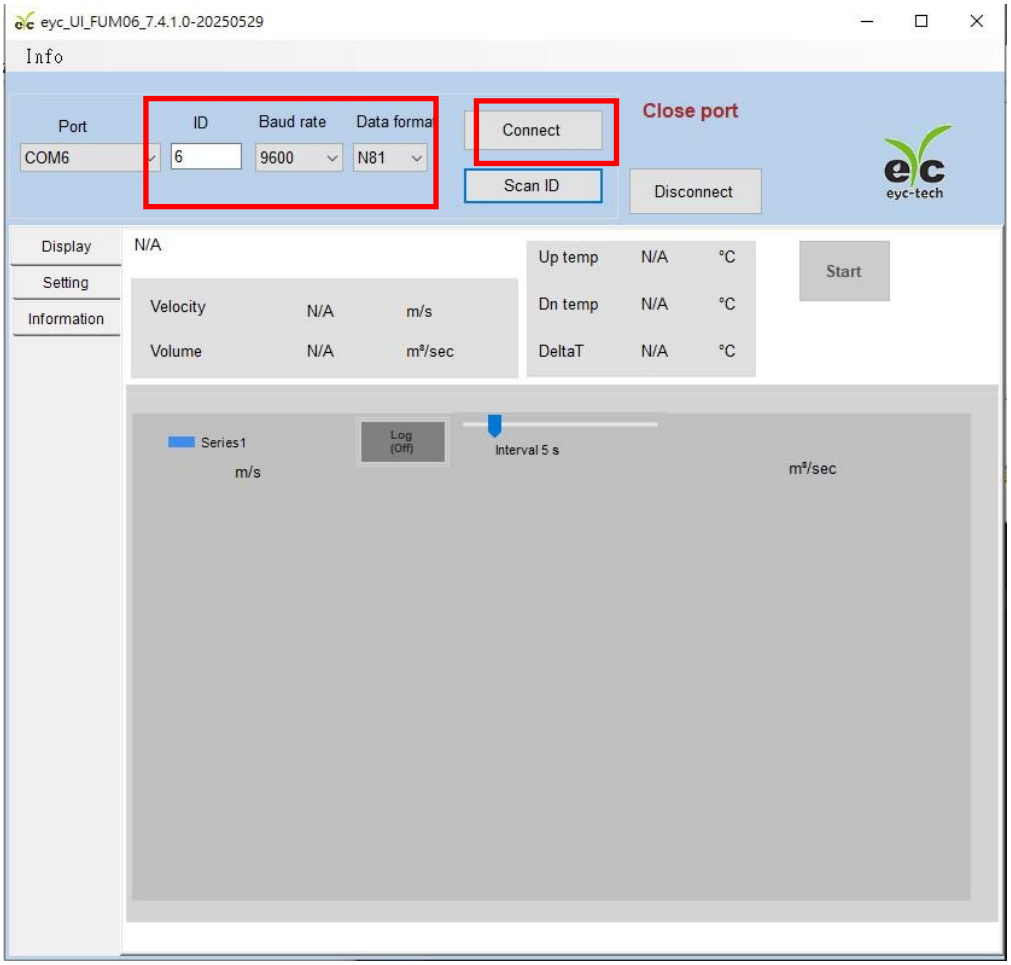




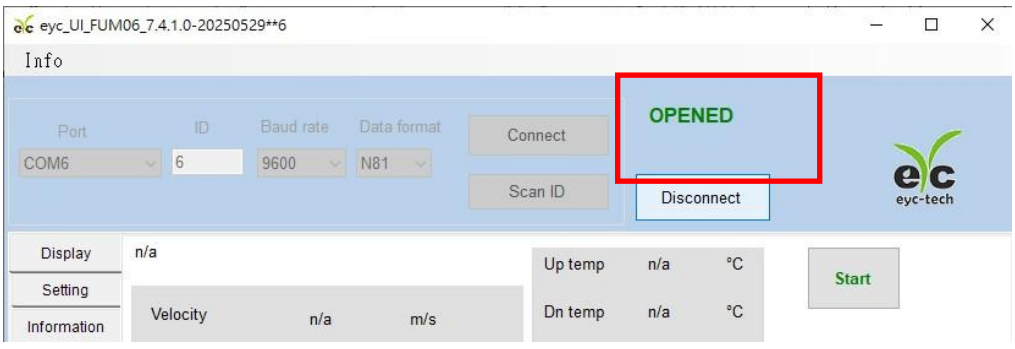
Select the station ID from the device list and press "CLOSE AND EXPORT" to select the connection direction.

4. Connect

Enter the ID you just selected and press Connect .



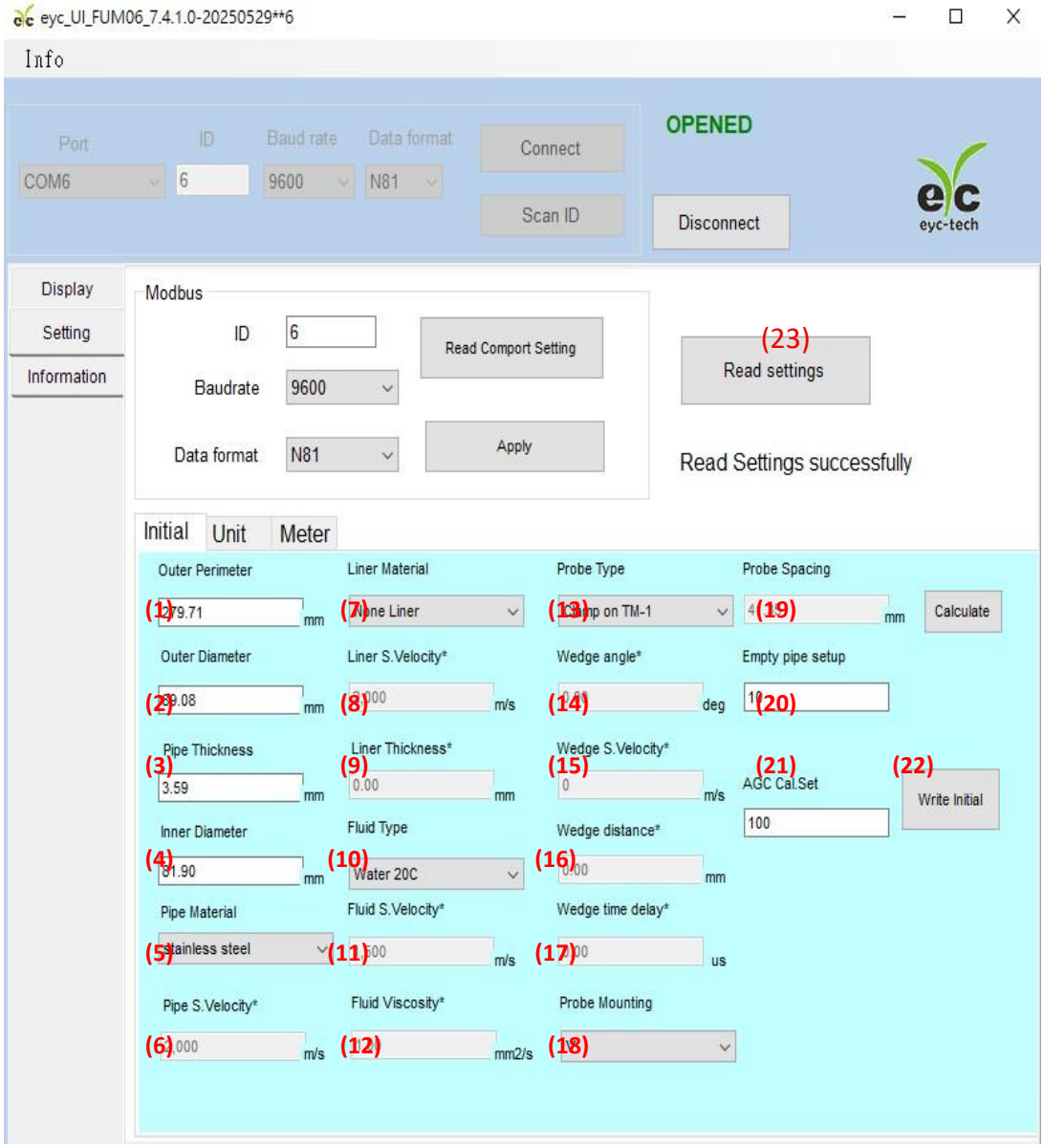
If the connection is successful, the word OPENED will appear.



5. Set measurement parameters

I. On the Setting tab, select the initial page to view the currently set parameters

(1) Pipe circumference (2) Pipe outer diameter (3) Pipe wall thickness (4) Pipe inner diameter (5) Pipe material (6) *Pipe sound velocity, (can only be used when the pipe material is Other) (7) Lining material (8) *Liner sound velocity, (can only be used when the lining material is Other) (9) *Liner thickness, (can only be used when the lining material is Other) (10) Fluid type (11) *Fluid sound velocity, (can only be used when the fluid type is Other) (12) *Fluid viscosity, (can only be used when the fluid type is Other) (13) Probe model (14) *Wedge waveguide angle, (can only be used when the probe model is User type) (15) *Wedge waveguide sound velocity, (can only be used when the probe model is User type) (16) *Wedge waveguide distance, (can only be used when the probe model is User type) (17) *Wedge waveguide delay time, (18) Probe installation method (19) Probe installation distance (Calculate automatically calculated based on pipe diameter, etc.) (20) Empty pipe setting (21) AGC calibration setting (22) Write initial page modification (23) Read all initial/Unit/Meter page settings



Note: [1] (5) You need to set the (6) parameter only when Pipe Material is selected as other

[2] (7) You need to set the (8) (9) parameter only when Liner Material is selected as other

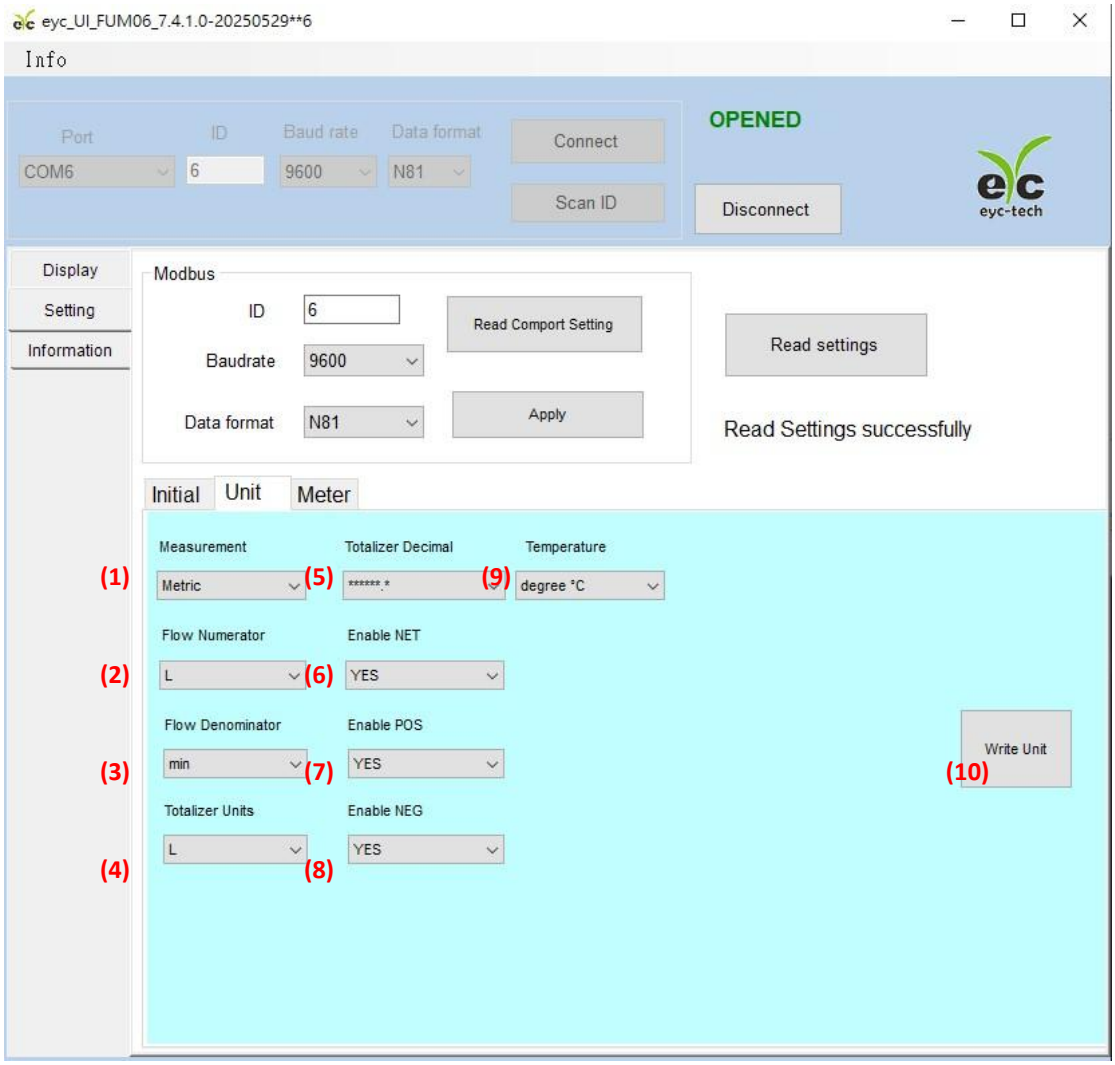
[3] (9) You need to set the (11) (12) parameter only when Fluid Type is selected as other

[4] (13) You need to set the (14) (15) (16) (17) parameter only when Probe Type is selected as user type

[5] (19) Probe Spacing If the distance is negative, adjust (17) Probe Mounting N type or W type

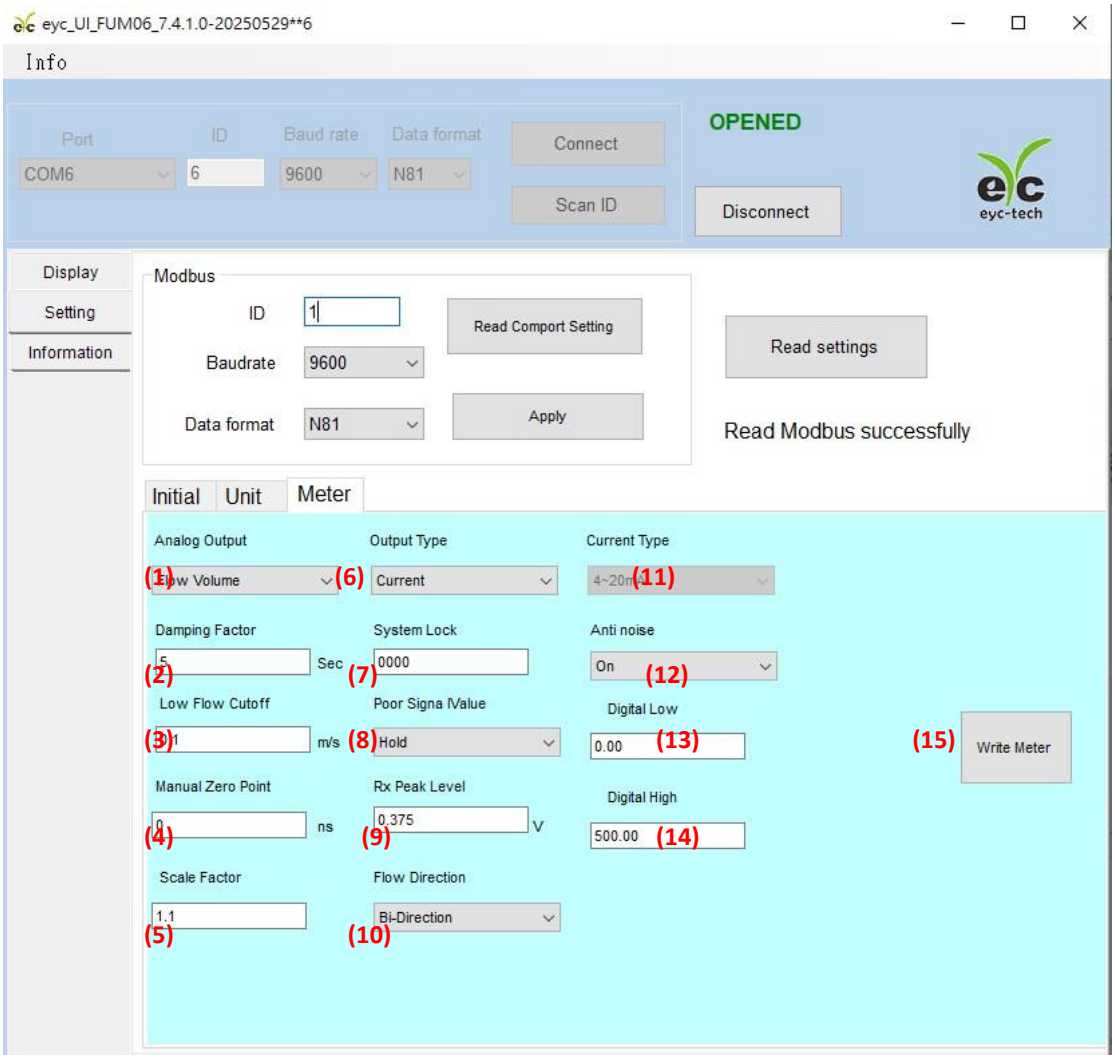
II. Select the Unit page to view the currently set parameters

(1) Measurement unit [Metric/Imperial] (2) Flow rate display unit [m3/L/cf] (3) Flow rate numerator unit (time) (4) Cumulative flow rate display unit [m3/L/cf] (5) Cumulative flow rate display digits (6) Net cumulative flow switch (7) Positive cumulative flow switch (8) Negative cumulative flow switch (9) Temperature unit [°C/°F] (10) Write to the Unit page to modify



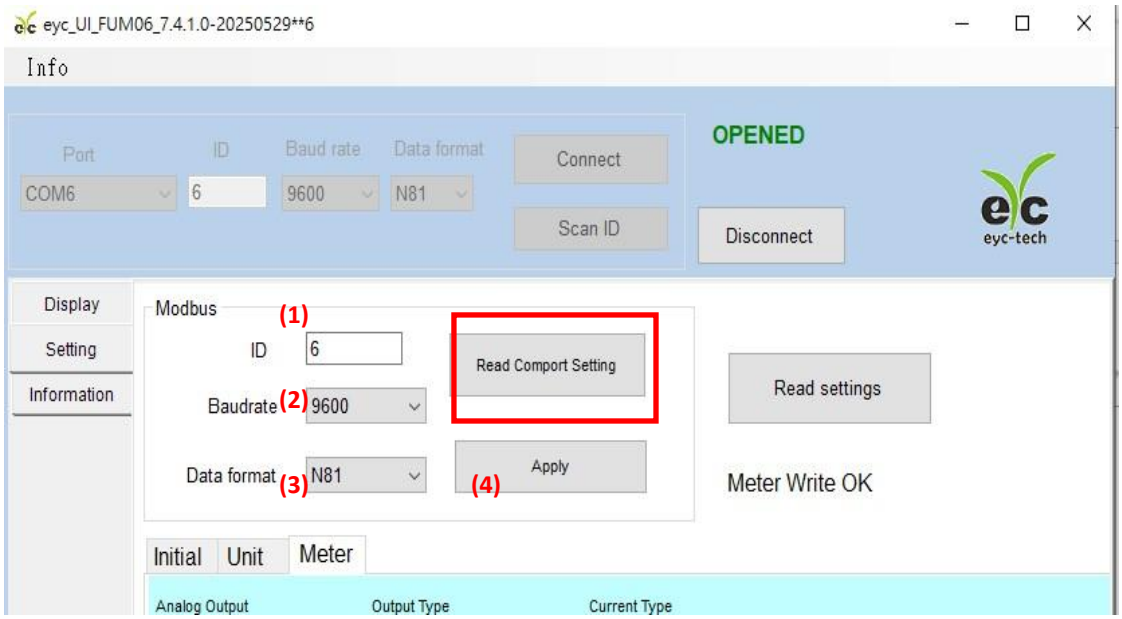
III. Select the Meter page to view the currently set parameters

(1) Analog output [flow rate/flow rate] (2) Damping coefficient (3) Low flow cut-off point (4) Manual zero setting (5) Correction factor [k value] (6) Analog output type [voltage 0~10V/current 4~20.mA] (7) System lock (8) Weak signal replacement value (9) Temperature unit (10) Fluid flow direction setting (11) Current output type (12) Anti-noise setting (13) Analog range low point (14) Analog range high point (15) Write to Meter page to modify



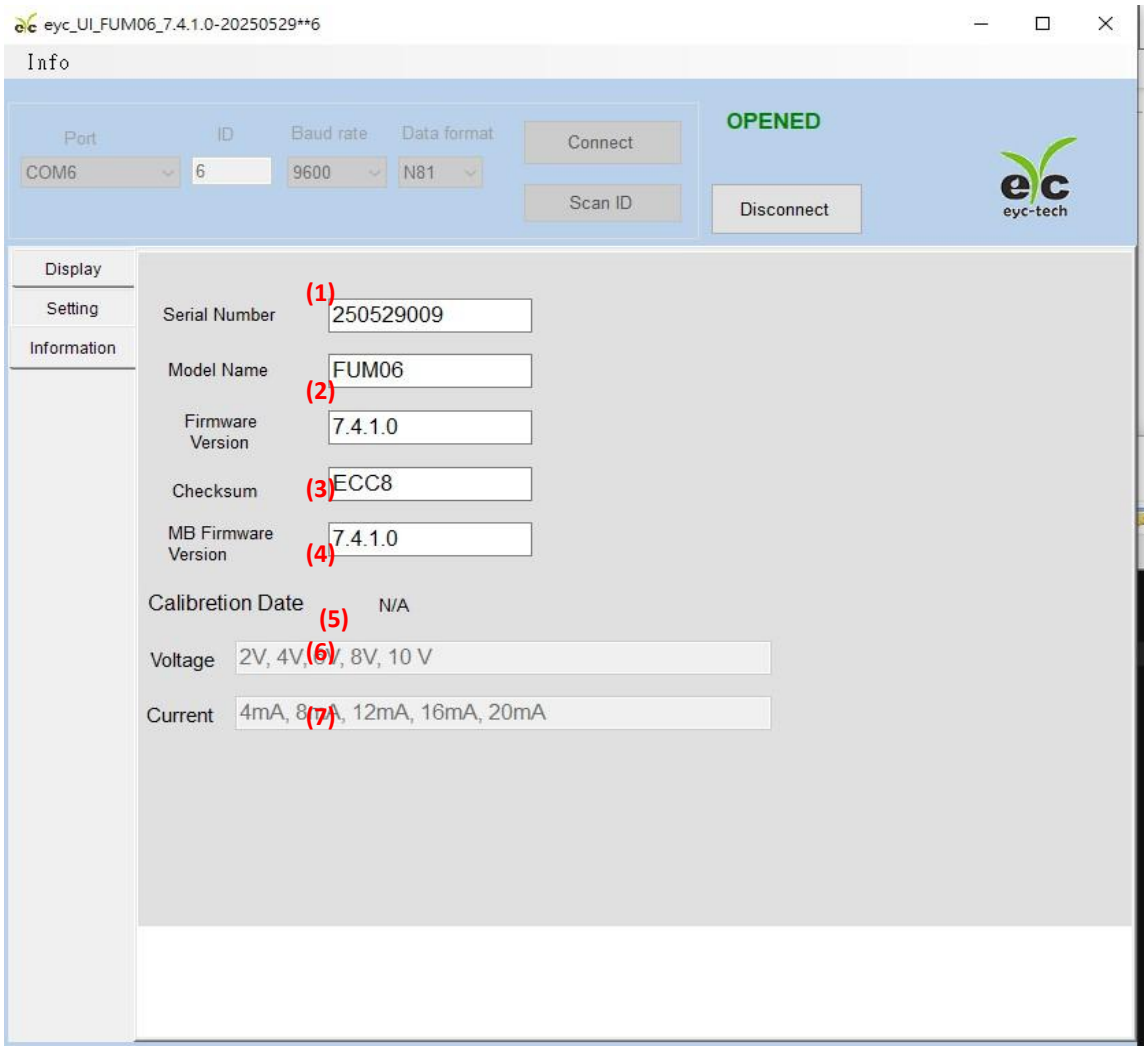
IV. View the currently set parameters on the Modbus page

Press Read comport setting to read the current settings. You can modify (1) ID (station number), (2) Baudrate, (3) data format; (4) Apply to write Modbus settings.


eyc_UI_FUM06_7.4.1.0-20250529**6
Info
Port
ID
Baud rate
Data format
COM6
6
9600
N81
Connect
Scan ID
OPENED
Disconnect
eyc-tech
Display
Setting
Information
Modbus
(1)
ID
6
Read Comport Setting
Baudrate
(2)
9600
Data format
(3)
N81
Apply
(4)
Read settings
Meter Write OK
Initial
Unit
Meter
Analog Output
Output Type
Current Type

6. Device Information

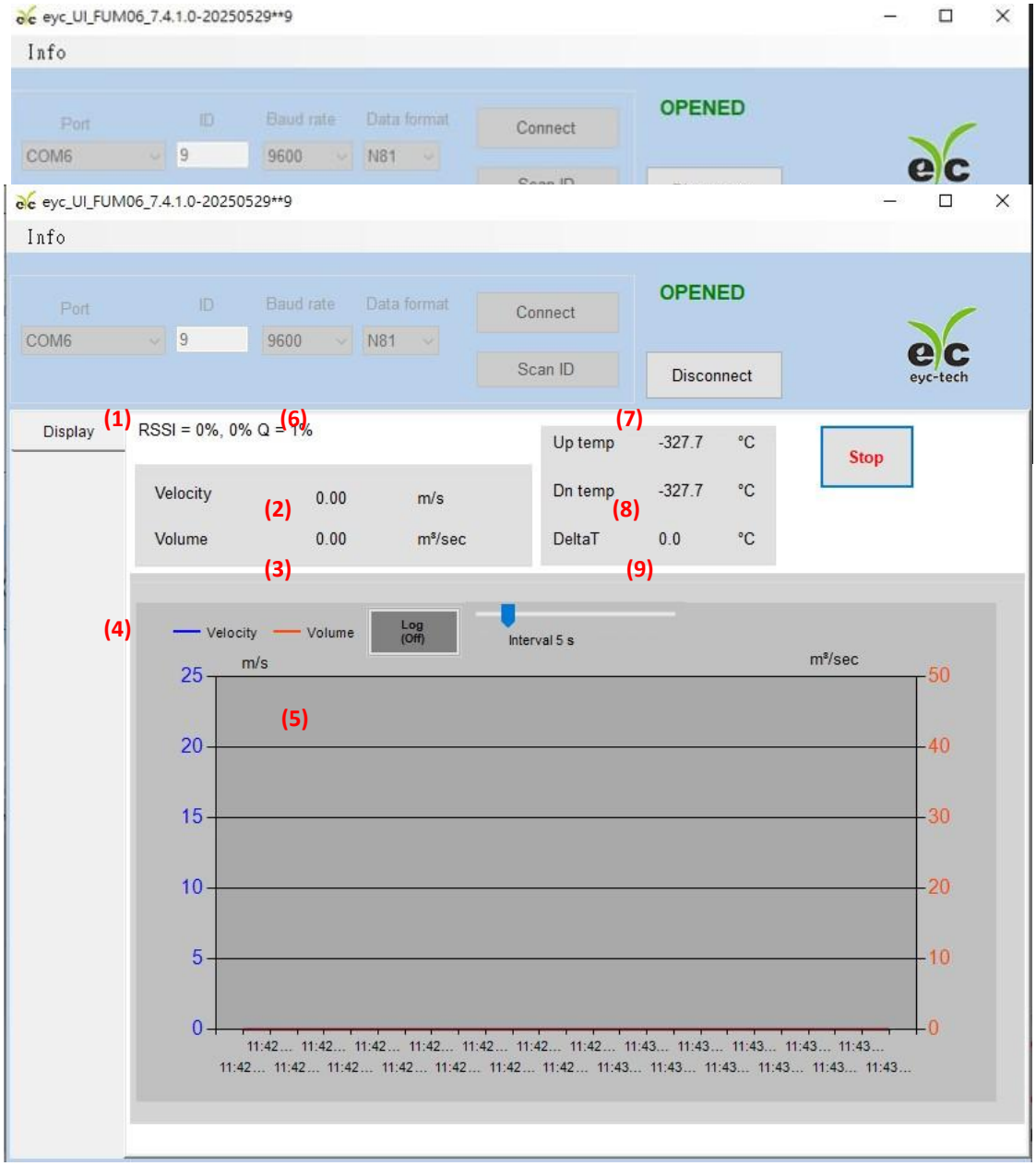
   Click the Information tab to get the device information, including the following information.(1) Device serial number (2) Product name (3) Firmware version (4) Mainboard firmware version (5) Analog output calibration date (6) Voltage calibration



   (7) Current calibration

7. Data display and recording

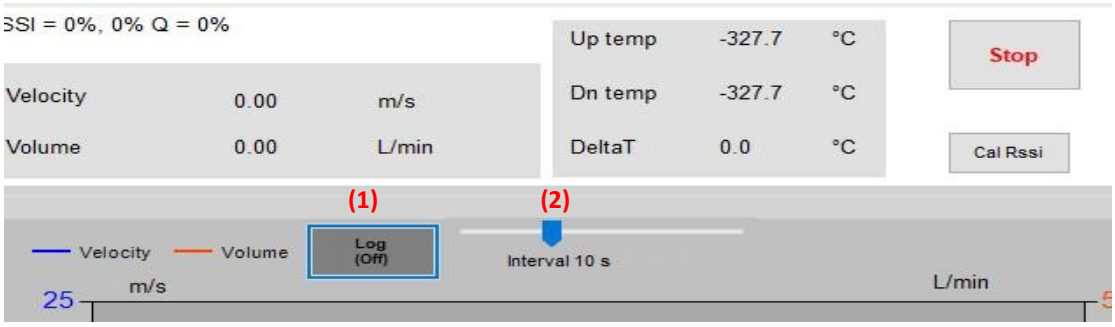
On the Display tab, press start to start reading measurement data.



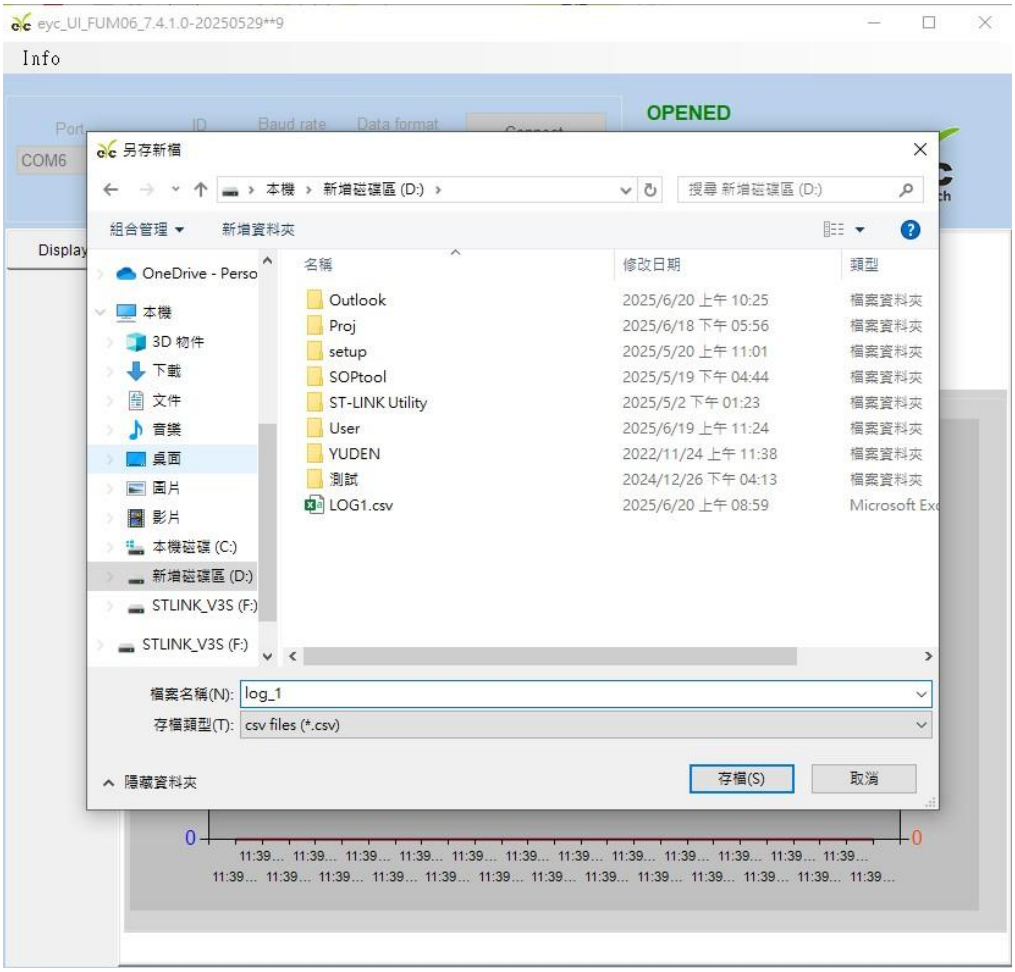
(1) RSSI upstream/downstream strength, (2) flow rate (3) flow rate (4) flow rate/flow rate corresponding curve (5) chart (6) signal quality Q (normally > 60%, the higher the Q value, the better the signal quality) (7) upstream temperature (8) downstream temperature (9) upstream minus downstream temperature difference

※Export/record measurement data

a. Record measurement data: (1) Automatic data storage Log (On/Off) (2) Data recording interval seconds.


SSI = 0%, 0% Q = 0%
Velocity 0.00 m/s
Volume 0.00 L/min
Up temp -327.7 °C
Dn temp -327.7 °C
DeltaT 0.0 °C
Stop
Cal Rssi
(1)
(2)
Velocity
Volume
Log (Off)
Interval 10 s
m/s
L/min
25

b. Data storage path

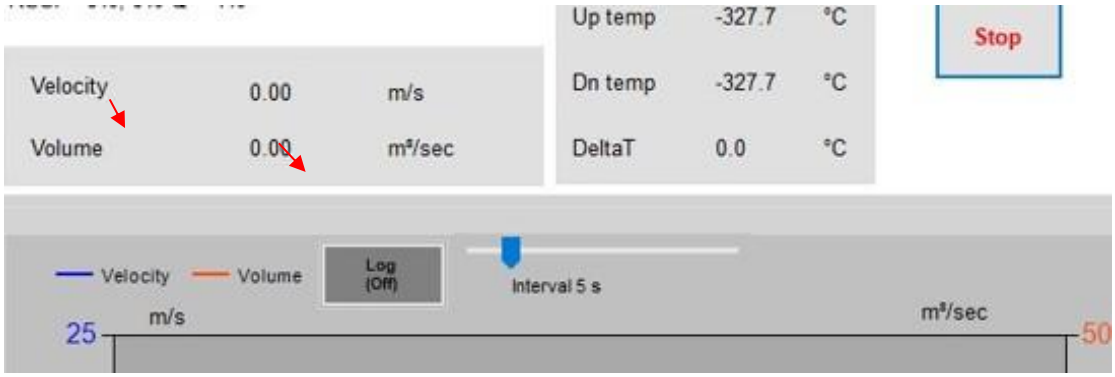


Note: If the specified path and file name are the same, the original file will be overwritten.

c. Start recording measurement data Log (On)

d. End recording of measurement data:

Click Log(On) again, the button will return to Log(Off) and the recorded data will be saved in the specified path and file name.



VIII. Inspection and maintenance

1. Maintenance
   The machine has been inspected and the accuracy has been adjusted correctly before leaving the factory, so it does not need to be readjusted at the installation site. Please perform maintenance according to the following points:
   (1) Regular inspection
   Determine the maintenance cycle according to the dust content and dirt condition in the air, and perform regular inspections to confirm the accuracy.
2. Inspection and handling of abnormal conditions:
   If an abnormality occurs during operation, please perform inspection according to the table below and take necessary measures.

	Error Type	**reason**	**How to deal with it**
Bit 0	Time of flight measurement timeout	1. Initial setting error 2. Probe not connected or poorly installed	1. Recheck initial settings 2. Check probe installation
Bit 1	No signal	1. Probe not installed or poorly installed 2. Coupling agent dried 3. Too much dirt in the pipe 4. Pipe lining exists but not set	1. Check probe installation 2. Reapply coupling agent 3. Clean pipeline 4. Check initial settings
Bit 2	Temperature sensor	1. Sensor short circuit	1. Check wiring

	short circuit	2. Instrument failure	2. Contact manufacturer
Bit 3	Temperature sensor open circuit	1. Sensor not installed 2. Sensor open circuit 3. Instrument failure	1. Check wiring 2. Check wiring 3. Contact manufacturer
Bit 4	Empty pipe	1. Probe not connected or poorly installed 2. No fluid in the pipe	1. Check probe installation 2. Confirm the fluid condition in the pipe
Bit 5	Poor signal quality	1. Probe installed incorrectly 2. Too much dirt in the pipe 3. Bubbles in the pipe 4. Fluid flow field chaos	1. Check probe installation 2. Clean pipeline 3. Install the probe on the side or change the installation position 4. Change the installation position
Bit 6	Incorrect initial value setting	1. Wrong initial value setting	1. Recheck initial value settings

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