User Manual

Liquid Flow Meter

Clamp-on Style

Model: LIC

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Notices and Warnings

Notices

Please **read all of this manual** before you install, operate or maintain this product. Pay attention to notes, warnings and instructions. The manufacturer cannot be held liable for any damage which occurs as a result of noncompliance with this manual.

Do not tamper with device. Should the device be tampered with in any manner other than a procedure which is described and specified in this manual, the warranty is cancelled and the manufacturer is exempt from liability.

The product is designed exclusively for the described application. Use of this product in conditions not specified in this manual or, contrary to the instructions provided by the manufacturer, is considered improper handling / use of the product and will void your warranty. The manufacturer will not be held liable for any damages resulting from improper use of the product.

This manual should be read carefully by relevant personnel and the end user**.** This manual should be kept with the product and be made available as needed. **Once you install or use the product, you accept that you have read, understood and complied with this manual**.

CAA Sensors endeavours to make the content of this manual correct, but is not responsible for omissions or errors and the consequences caused. In case of any doubts or questions regarding this manual or the product, please contact CAA Sensors.

Warnings

Ignoring the warnings can lead to serious injury and/or cause damage!

When handling, operating or carrying out maintenance on this product, personnel must employ safe working practices and observe all local health & safety requirements and regulations.

Improper operation or maintenance of this product could be dangerous and result in an accident causing damage to machinery or injury or death.

The manufacturer cannot anticipate every possible circumstance which may represent a potential hazard. The warnings in this manual cover the most common potential hazards and are therefore not all-inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended by the manufacturer they must ensure that the product will not be damaged or made unsafe and that there is no risk to persons or property.

NEVER CHANGE ORIGINAL COMPONENTS WITH ALTERNATIVES.

Electrical Safety

Any contact with energised parts of the product, may lead to an electrical shock which can lead to serious injuries or even death. The user shall take all measures necessary to protect against electrical shock.

Follow regulations for electrical installations.

The system must be disconnected from any power supply during maintenance work.

Any electrical work on the system is only allowed by authorised qualified personal.

Storage and transportation

- Make sure that the transportation temperature of the sensor is between -10°C to 60°C (14°F to 140°F).
- Please make sure that the storage temperature of the sensor is between -10°C to 50°C (14°F to 122°F) and the humidity is <90%, no condensation. Avoid direct UV and solar radiation during storage.

Cleaning

If you need to clean the sensor it is recommended to use a clean, dry cloth. For stubborn marks, use distilled water or isopropyl alcohol only.

Disposal

Electronic devices are recyclable material and do not belong in the household waste. The product, accessories and its packing material must be disposed according to local statutory requirements.

Introduction

Ultrasonic Flow Meters

Intended use

CAA Sensors' flow meters are suitable for use in manufacturing, industrial and base building environments providing the sensor's specifications are met. This includes:

- The liquid does not contain particles or bubbles.
- Minimum pressure (back pressure) is 0.3Mpa
- The pipe is full of liquid
- Sensor is used on stainless steel, carbon steel, copper or plastic pipes between DN6 – DN100
- The flow velocity is between 0.1 to 5 m/s (0.3 to 16 ft/s)
- Liquid temperature is between 0 to +50°C (32 to +122°F)
- Power supply is between: 18 to 30 vDC
- The flow meter is **not** used in explosive areas.

Refer to the *Specifications* section (next page) for full requirements.

Note: This flow meter is **not** suitable for use as a trade meter or for the purpose of proof of measurement.

The flow meter measures:

- Real-time flow,
- Accumulated flow,
- Flow velocity and
- Pipe Temperature.

Ultrasonic Flow Meters

CAA Sensor's clamp-on ultrasonic flow meter is specially designed for small to medium sized pipe diameters. Fast and easy to install in less than three (3) minutes without needing to penetrate the pipework.

The ultrasonic flow meter sends multiple signals per second which provides accurate flow rate measurements in full pipes. When the ultrasonic signal is transmitted and received through flowing liquid, there will be different upstream and downstream values, which can be used to calculate flow and velocity.

With no moving parts and no pressure loss the flow meter provides long lasting performance. These flow meters are incredibly durable and made for most industrial environments.

Specifications

Medium	
Liquid Medium	Clean liquids that don't contain particles / impurities or bubbles • Industrial and domestic water • Sea water • Heating and cooling water • Diesel oil • Alcohol • Other liquids available on request

Measurement Range		
Measurement Principal	Ultrasonic	
Flow Range	0.1m/s to 5m/s	0.328ft/s to 16ft/s
Min Flow Velocity	0.1m/s (0.328 ft/s)	
Liquid Temperature	0°C to +50°C	32°F to +122°F
Units of Measure	m^3/h (default), LPM, ml/min, GPM, LPH	

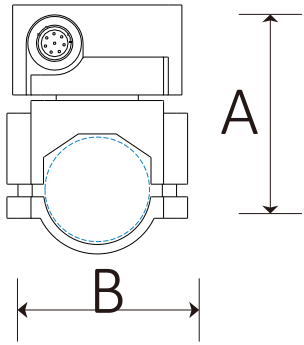
Accuracy	
Measurement Accuracy	±2.0% (±0.3m/s ~ 5.0m/s)
Repeatability	0.80%
Response Time	50ms

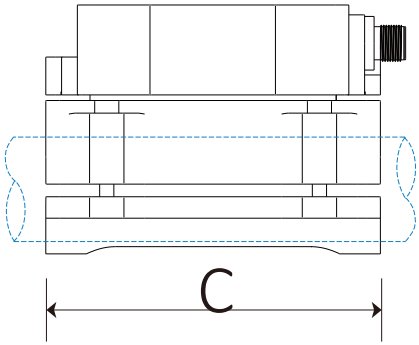
Power Supply	
Power Requirement	24VDC@3W

Display and Data Logging	
Display	In-built 2.4" LCD (320 x 240 IPS)

Output		
Outputs	4-20 mA (max load is 600Ω)	Modbus RTU (RS485)
Alarm	OCT upper and lower limit alarm output, pulse output, relay	
Connection	M12	
Working Environment		
Viscosity	< 300CST (mm²/s)	
Impurities in the liquid	< 4%	
Flow Stability	Flow must be stable	
Min Pressure (back pressure)	0.3Mpa (43psi)	
Ambient Temperature	-10°C to +50°C	14°F to +122°F
Relative Humidity	0-95% relative humidity, without condensation	
Other		
Pipe Diameters	DN6 -DN100	1/8” to 4”
Pipe Materials	Stainless steel, carbon steel, copper, plastic **Note**: steel pipes DN32 and below should have a pipe wall ≤ 2 mm	
Mechanical Connection	Clamp-on	
IP Rating	IP54	
Casing	Aluminium alloy	
Cable Length	2m (6.6 ft)	
Warranty	12 months	

Dimensions (mm)





Diameter	DN	Inch	Diameter Range (mm)	A (mm)	B (mm)	C (mm)
Φ9.53	DN6	1/8"	9 -12	83	52	106
Φ12.7	DN8	1/4"	12-15	83	52	106
Φ15	DN10	3/8"	15-18	83	52	106
Φ20	DN15	1/2"	18-21	89	52	106
Φ25	DN20	3/4"	21-28	90	52	106
Φ32	DN25	1"	28-36	94	58	106
Φ40	DN32	1-1/4"	36-44	104	68	106
Φ50	DN40	1-1/2"	44-52	113	78	106
Φ63	DN50	2"	52-66	132	91	130
Φ75	DN65	2-1/2"	66-80	142	105	136
Φ90	DN80	3"	80-95	157	119	150
Φ110	DN100	4"	100-115	180	143	174

Flow Range

Diameter	DN	Inch	Diameter Range (mm)	Min (m^3/h)	Max (m^3/h)	Min (L/min)	Max (L/min)
Φ9.53	DN6	1/8"	9 -12	0.02	0.7	0.4	12
Φ12.7	DN8	1/4"	12-15	0.05	1.7	0.9	28
Φ15	DN10	3/8"	15-18	0.09	3.0	1.5	49
Φ20	DN15	1/2"	18-21	0.06	3.2	1.1	53
Φ25	DN20	3/4"	21-28	0.11	5.7	1.9	94
Φ32	DN25	1"	28-36	0.18	8.8	2.9	147
Φ40	DN32	1-1/4"	36-44	0.29	14	4.8	241
Φ50	DN40	1-1/2"	44-52	0.45	23	7.5	377
Φ63	DN50	2"	52-66	0.71	35	12	589
Φ75	DN65	2-1/2"	66-80	1.2	60	20	995
Φ90	DN80	3"	80-95	1.8	90	30	1508
Φ110	DN100	4"	100-115	2.8	141	47	2356

Flow Meter Pack

Each flow meter pack comes with:

1 x Main unit

1 x Upper bracket

1 x Lower Bracket

1 x M12 cable

2 x Coupling pads

Main Unit

Lower and Upper Brackets

Coupling pads

M12 cable

Installation

Installation Overview

Mechanical Installation

Step 1 – Find a suitable section of pipe

- The pipe must be filled with fluid
- The sensor must be installed away from bends, edges, seams, changes in pipe size and other obstructions

Step 2 – Fit flow meter

Electrical Installation

Step 3 – Wire the sensor for 24vDC power and communication

Sensor Configuration

Step 4 – Set sensor settings:

- Pipe OD and wall thickness
- Pipe material
- Fluid type
- Low flow cut and Set Zero

Step 5 (optional) – Connect the sensor to your SCADA or energy management system

Tools and Equipment needed for installation

(not included with Flow Meter Pack)

Screw Driver

Installation – Mechanical

WARNING! Incorrect installation can damage the sensor or cause it to work incorrectly.

Notes

- Before installing the sensor, make sure it is rated for your system (refer to the “Specifications” section).
  - Use of the product outside specified ranges or operating parameters can lead to malfunctions and may damage the product or system.
- Do not use this product in explosive areas.
- Pay attention to the installation location and liquid contamination levels to ensure accuracy is maintained.
- When installing and using the flow meter, please pay attention to the direction of liquid flow and the alignment of the sensor. The direction is indicated on the housing.
- The sensor is for indoor use only. If installed in an outdoor installation, the sensor must be protected from sun and rain.
- Do not disassemble the product.
- Please follow local and national regulations before/during installation and operation.
- The product must be installed properly and calibrated regularly, otherwise it may lead to inaccurate measurements.

Step 1 – Find a suitable section of pipe

The sensor **must** be installed

- ✓ On a section of straight pipe that is filled with liquid
- ✓ On a clean section pipe (ie no rust, paint or stains)
- ✓ Vertically or horizontally on the pipe
    - If installing horizontally, try to install the sensor on the low level of the pipeline or at the bottom of a U-shaped pipeline. This will ensure the pipe is filled with fluid
- ✓ away from bends, edges, seams, changes in pipe size and other obstructions,
    - Allow at least 10x OD of straight pipe upstream of the sensor and 5x OD of straight pipe downstream of the sensor.

Make sure the installation location has enough room around the pipe to install the sensor.

Do **NOT** install the flow meter:

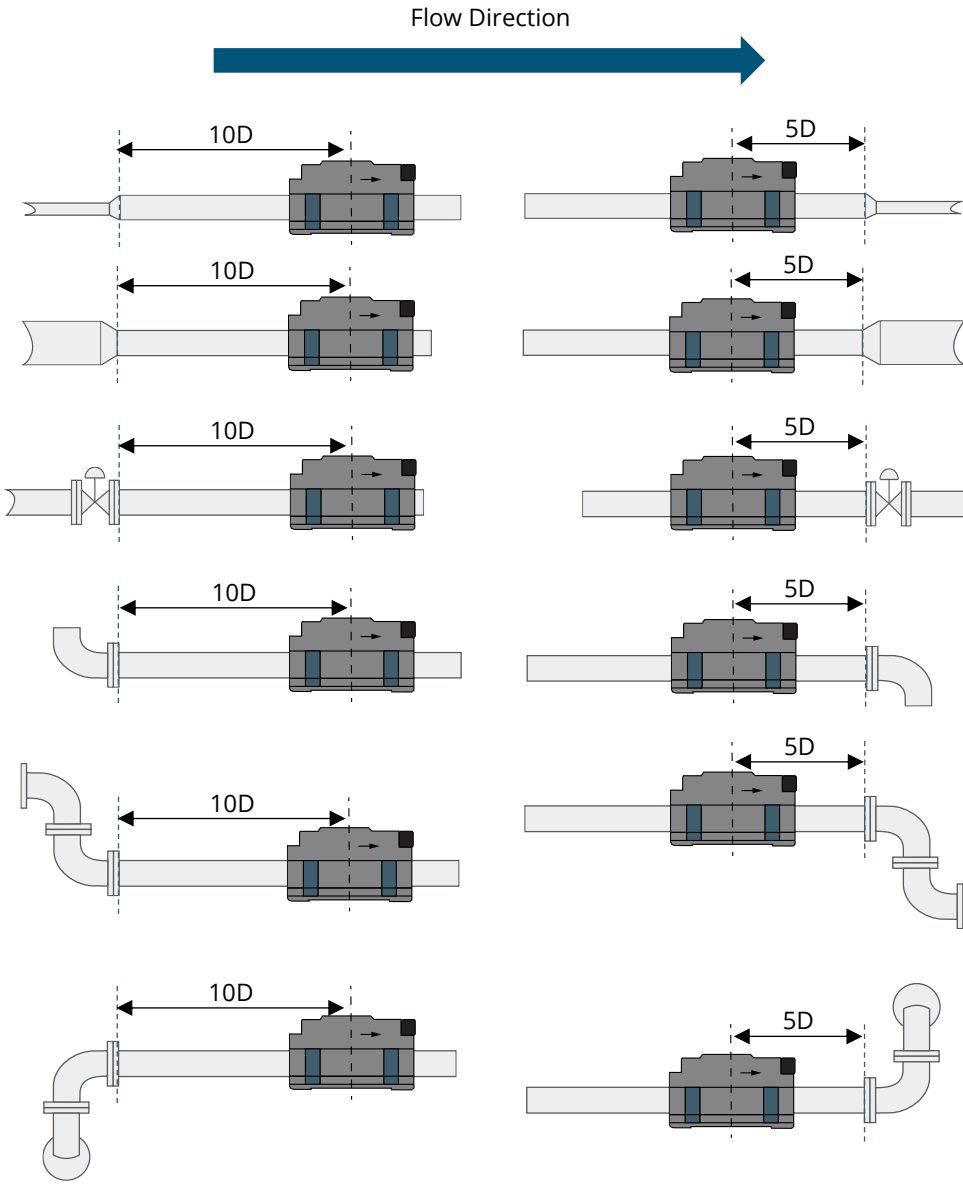
- **x** Under water
- **x** Downstream of a **control valve** as the control valve will affect fluid flow. Instead, install the flow meter before (upstream of) the control valve
- **x** Downstream of a **pump**, the pump can produce bubbles or turbulence. Instead install the flow meter before (upstream of) the pump
- **x** Near an **open outlet** as this will cause unstable flows. Instead, install the flow far away from open outlets.
- **x** On pipes with steel wire or glass fiber as liners as these liners affect sound wave transmission.

Installation Tips

- If the pipe vibrates, add a bracket to fix the pipeline. Vibrations may cause instability in the measurement.

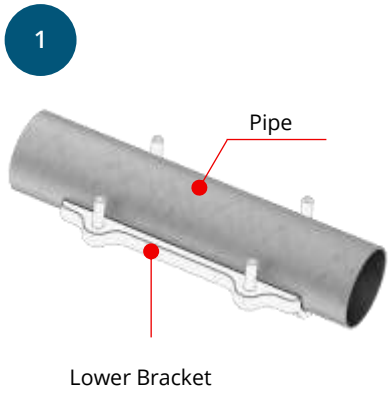
Choose insertion location, away from obstacles

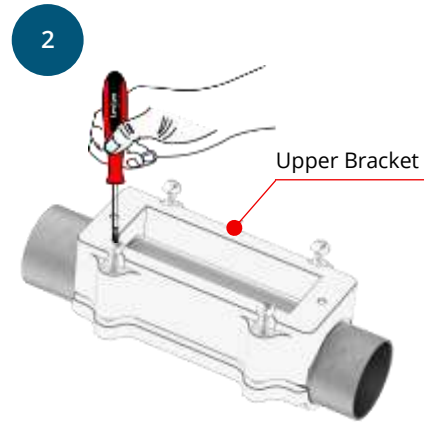
From the centre of the flow meter, allow at least 10x OD of straight pipe upstream of the sensor and 5x OD of straight pipe downstream of the sensor.

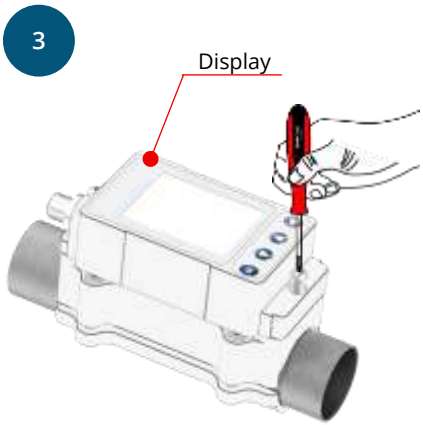


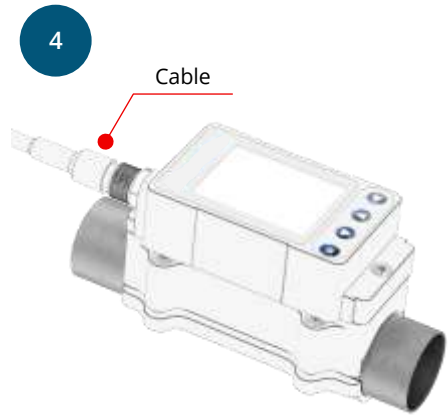
Step 2 - Fit Flow meter

1. Clean the pipe - Remove paint, stains, oil, grease, rust etc.
   Position lower bracket on pipe.
2. Place top bracket on pipe. Magnets will hold the brackets in place. Use the mounting screws to connect the top and bottom brackets together. Ensure that the brackets are snug but **DO NOT** over-tighten.
3. Place the display (main unit) over the upper bracket. Use the mounting screws to connect the display and top bracket together. **DO NOT** over-tighten
4. Connect the cable









Installation – Electrical

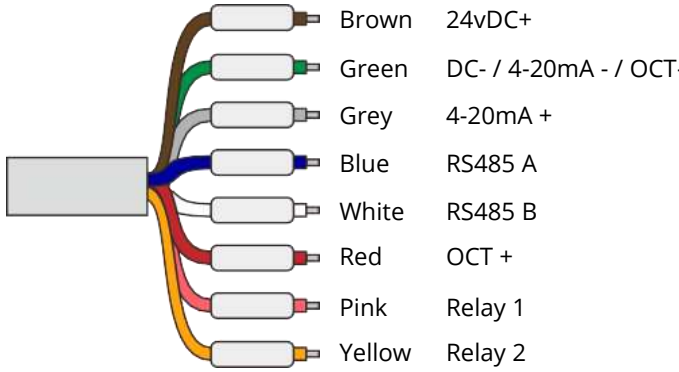
WARNING! Incorrect wiring can damage the sensor or cause it to work incorrectly.

Notes:

- Do **not** screw the M12 connector using force, otherwise it may damage the connection pins.
- Always check the M12 connectors to make sure they are wired correctly.
- Follow all local and national safety requirements and regulations for electrical installations.
- The system must be disconnected from any power supply during installation and maintenance work.
- Any electrical work on the system is only allowed by authorised and qualified personal.

Step 3 – Wire the Sensor for Power and Communication

The flow sensor has one x 8 pin M12 connector plug



Connection	Cable Colour
24vDC+	Brown
DC- / 4-20mA - / OCT-	Green
4-20mA +	Grey
RS485 A	Blue
RS485 B	White
OCT +	Red
Relay 1	Pink
Relay 2	Yellow

OCT Wiring:

To select OCT output, you need to connect a 5-10k pull-up resistor at the OCT+ end. At the Vcc and Com end, add a 5-24VCD power supply.

Configuring the Sensor

Step 4 - Configure the Flow Meter

You must configure the flow meter to make sure it is reading accurately. You **must** set the following items.

Setting	Menu Location
Pipe OD (outer diameter)	Measure Parameter
Pipe wall thickness	Measure Parameter
Pipe material (eg copper, steel, PVC)	Measure Parameter
Type of liquid (eg water, sea water, oil).	Measure Parameter
Flow cut off rate • Flows below this value will not be recorded. • Default = 0.05m/s • For thick walled stainless steel pipes, please change the low flow cut off rate to 0.10 ~ 0.15 m/s	Calibration
Set Zero • Before performing this step, ensure that the medium inside the pipe is in a static state. Do **not** perform this function if liquid is flowing. ○ If the flow meter reading on the home screen does not show 0, please check installation • This step is required for both initial installation and relocation installation	Calibration

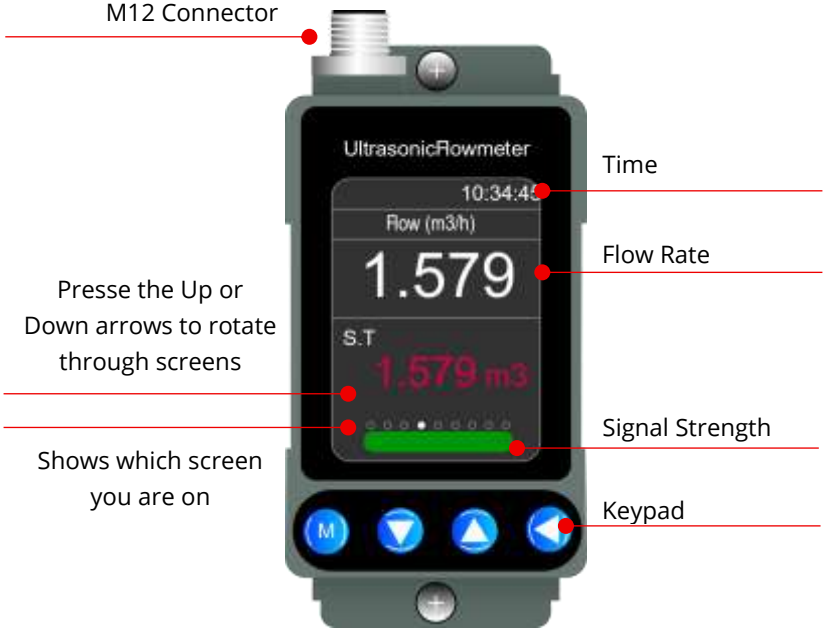
Optional configuration

We recommend you check the following settings on the flow meter: (i) units of measurement, (ii) Nnumber of digits displayed, (iii) communication settings (RS485 or 4-20mA), (iv) screen rotation, (v) date and time, (vi) set OCT output or alarm relay.

Using the Flow Meter

Operating the Flow Meter

Connect the flow meter to 24vDC power. The sensor will start powering up automatically. There is no on/off switch on the sensor.



Keypad	
M	Go to Menu / Go to previous screen
▼	Scroll down / Select digits (0-9)
▲	Scroll up / Move to next digit
◀	Enter / Confirm

Signal Strength
Green = Best Signal
Grey = Worst Signal

Menu Options

Menu		Options
0	Measure Parameter	• Set up flow meter for your system, eg set pipe size, pipe material, liquid type
1	System Setting	• Select units of measure • Select the number of digits displayed • Set the date and time • Rotate the screen display • Change the screen brightness • Create a password and lock the display
2	Calibration	• Change the scale factor • Set the low flow cut off value • Do a linear correction
3	Output Setting	• Modbus RS485 Settings • 4-20mA Settings • Set Alarm values • Select OCT and Relay options • Calibrate the 4-20mA current loop
4	Historical Data	• View historical data in table format
5	Manual Totalizer	• Run a separate, manual totalizer
6	System Information	• View serial number, number of times the sensor has be powered on and total run time
7	Language	• Choose Language – English or Chinese

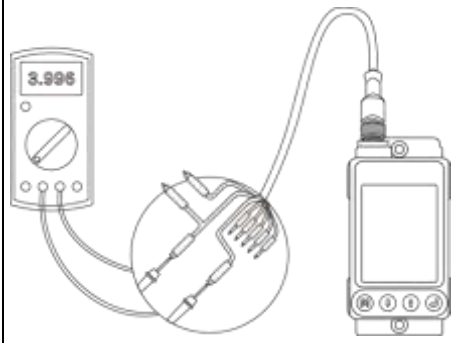
Full Menu

Menu	Sub Menus	Options / Comments
Measure Parameter	Pipe OD	Enter Pipe outer diameter (OD) in mm
	Pipe THK	Enter pipe wall thickness in mm
	Material	• PVC • Carbon Steel • Steel • Copper • PVDF • PFA • PTFE • PU • Aluminium
	Fluid	• Water • Sea Water • Oil • Other • If you select “Other”, you must enter the fluid sound velocity
	Negative Flow	• On • Off (**default**)
System Setting	System Unit	• Metric • English
	Flow Unit	• m3/h • LPM • GPM • mL/min • LPH
	Total Unit	• m3

Menu	Sub Menus	Options / Comments
		• L • GAL • mL
	Total Reset	Reset the total Flow
	Time Set	Set the date and time

	System Lock	• Unlocked (**default**)
		• Locked
		  ○ Locking the system will prevent modifications to the settings
		  ○ You must chose a **password**

	Damping	010 (**default**) When the displayed flow values changes significantly, DAMPING can be set to adjust the measurement response speed of the flow meter. DAMPING is measured in seconds.
	Display Direction	• Normal (**deault**) • 90 degrees • 180 degrees • 270 degrees
	Back Light	Change the screen brightness from 5% to 100%
	Display Format	Set the number of digits displayed • x0.001 (ie 3 digits) • x0.01 (ie 2 digits) • x0.1 (ie 1 digit) • x1 (ie no digits)
Calibration	Scale Factor	1.00 (**default**)

Menu	Sub Menus	Options / Comments
		Scale factor refers to the ratio between “actual value” and “reading value”. For example, when the measurement is 2.00, the display shows 1.98.
	4-20mA Calibrate	The 4-20mA current loop was calibrated before delivery. You can check the 4mA or 20mA, readings with an ammeter. If it exceeds the allowable tolerance, you can recalibrate the current loop. **How to recalibrate:** • Note: The number in the 4-20mA Calibrate menu has no meaning, it is only used for internal recording purposes. • Go to the home screen of the display. • Use the up and down keys to check the displayed value against the ammeter (multimeter). The following is a schematic diagram of the connection: 
	Set Zero	You can reset the zero point. **Notes**

Menu	Sub Menus	Options / Comments
		• Before performing this step, ensure that the medium inside the pipe is in a static state. Do **not** perform this function if liquid is flowing. • Do **not** do a zero reset when SQ is 0 or less than 50. • When doing a reset, **do not touch any buttons** during the reset process. Once the reset is complete it will automatically return to the main menu • After the reset, if the flow rate (on the main screen) is not 0 then the reset was unsuccessful. Check installation and wiring are correct then try the reset again.
	Lowflow cut	0.050 m/s (**default**) Flow rates less than this value will not be measured. Flow rate cutoff it is designed to prevent false measurements when the pump stops working and liquid is still flowing in the pipe at a low speed. **Stainless steel** pipes (SS304 or SS316) with a wall thickness of more than 2mm will receive false signals due to interference of pipe wall signals. In this situation, it is recommended to set the low flow cut off rate at **0.10m/s to 0.15m/s**
	Manual zero	Manually resetting zero should be done by **experienced operators**.
	Hi AGC	High-gain switches are generally not required

Menu	Sub Menus	Options / Comments
	RTD Calibration	Recalibrate the temperature Sensor (PT1000)
	Linear Correction	Linear correction switch • on to measure negative flow and account for accumulation • off to prevent measurement errors caused by media backflow and other conditions. Scale Factor: • Sometimes there is a small deviation between the flow model and the actual measured value. In order to make the true performance of the measured value, the flow data can be corrected by the calibrated value. Up to 16 corrections can be made according to the flow rate.

Output Setting	RS485 setup	• Network address:
		  ○ 1-249
		• RS485 Baudrate:
		  ○ 2400, 4800, 9600, 19200
		  ○ The data length is 8.
		• RS485 Parity:
		  ○ None, Even, Odd
		• RS485 Stopbit:
		  ○ 1bit or 2bits
		
		Default = address 1, 9600, 8N1

	4-20mA setting	• Set the 4mA and 20mA values • Model = select the data output:

Menu	Sub Menus	Options / Comments
		○ 4-20mA vs flow (**default**) (ie output flow data) ○ 20-4-20mA vs flow ○ 4-20mA vs Vel (ie output velocity data) ○ 4-20mA vs Energy (ie output energy data)
	Alarm value	• **Note**: The alarm will only work when using OCT hardware or the relay output signal • Set a low and/or high alarm based on flow rates. ○ The low alarm will trigger when the measurement flow is less than the low alarm value ○ The high alarm will trigger when the measurement flow is greater than the high alarm value
	OCT output	Select which of the following options you want for the OCT output: • Total Pulse: the pulse equivalent range can be set (0.01L~100m3), and the corresponding pulse number will be output when the set totalize is measured. • Alarm output. • No Signal. • Frequency output. • Batch Control. **Note**: To select OCT output, you need to connect a 5-10k pull-up resistor at the OCT+ end. At the Vcc and Com end, add a 5-24VCD power supply

Menu	Sub Menus	Options / Comments
	Relay output	Select which of the following options you want for the Relay output: • Total Pulse: the pulse equivalent range can be set (0.01L~100m3), and the corresponding pulse number will be output when the set totalize is measured. • Alarm output. • No Signal. • Frequency output. • Batch Control.
	OCT multiplier	Select pulse output multiplier. Note: Please note that when outputting cumulative pulses, the maximum number of pulses output per second cannot be greater than 40.
	Frequency rage	• Change the low and high frequency (Hz): Range = 0-9999 • The frequencies are related to the 4mA and 20mA inputs.
	FO flow range	• Change the low and high flow range (m3/h) • The frequencies are related to the 4mA and 20mA inputs.
	Batch Control	• Batch Total: set up flow rate value of batch control. • Key Input: manual switch control (switch can also be controlled by RS485.) • B.T: batch control displays the flow rate value in real time.
Historical Data	By Hour	

Menu	Sub Menus	Options / Comments
	By Day	View total flow rate for any day in the last 64 days, any month in last 64 months and any year in the last 10 years
	By Month	
	By Year	
	ON/OFF Time	
Manual Totalizer	-	Manual totalizer is a separate totalizer. it can be used for flow measurement and calculation, and also for manual calibration. • Press the enter button to start to totalizer • Press the enter stop the totalizer.
System Information	-	View • Serial Number • Number of times the sensor has been powered on • Total run time of sensor
Language	-	Choose from • English • Chinese
Energy Setting	-	NA - Not accessible / not used
Extern model	-	NA - Not accessible / not used

Modbus Registers

Modbus Registers

Default Modbus Communication settings

Address	Baud Rate	Frame	Parity	Stop bit
1	9600	8	None	1

MODBUS Protocol

Function code: Hex Format

- Read: 0x03
- Write: 0x06

The host sends out the frame format of the read register information:

Slave	Operation Function	Register Header Address	Register Number	Check code
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x01~0xF9	0x03	0x0000~0xFFFF	0x0000~0x7D	CRC checkcode

Data frame format from the slave

Slave	Operation Function	Register Header Address	Register Number	Check code
1 byte	1 byte	1 byte	N*x2 byte	2 byte
0x01~0xF9	0x03	2xN*	N*x2 data	CRC check code

N*=Number of data registers.

The CRC check code of this instrument is obtained by CRC-16-IBM (polynomial X16 + X15 + X2 + 1, mask word 0xA001) cyclic redundancy algorithm, the low byte of the check code is first, and the high byte is after.

Modbus Registers – Read Only

The MODBUS register contains a read-only register (read with 0x03 function code) and a single write register (write with 0x06 function code).

Data Type:

- 16 bits int—Represents a short integer
- 32 bits int—Represents a long integer
- 32 bits real—Represents a floating point number
- String—Represents a string, BCD-Represents a decimal number

Register Address	Register	Data Type	Number of Registers	Description	Comments
0000	40001	32 bits real	2	Flow velocity-low byte	Read only Unit: m/s
0001	40002			Flow velocity-high byte	
0002	40003	32 bits real	2	Instantaneous flow rate low byte	Read only
0003	40004			Instantaneous flow rate high byte	
0004	40005	32 bits real	2	Flow totalizer low byte	Read only
0005	40006			Flow totalizer high byte	
0006	40007	32 bits int.	2	Flow totalizer integer Low byte	Read only
0007	40008			Flow totalizer integer high byte	
0008	40009	32 bits real	2	Flow totalizer decimal-low byte	Read only
0009	40010			Flow totalizer decimal-low byte	
000A	40011	32 bits int.	2	Today totalizer integer-low byte	Read only

Register Address	Register	Data Type	Number of Registers	Description	Comments
000B	40012			Today totalizer integer high byte	
000C	40013	32 bits real	2	Today totalizer decimal-low byte	Read only
000D	40014			Today totalizer decimal-high byte	
000E	40015	32 bits real	2	Monthly totalizer-low byte	Read only
000F	40016			Monthly totalizer-low byte	
0010	40017	32 bits real	2	Yearly totalizer low byte	Read only
0011	40018			Yearly totalizer-high byte	
0012	40019	32 bits real	2	4-20mA output value low byte	Read only
0013	40020			4-20mA output value high byte	
0014	40021	32 bits int.	2	Running time low byte	Read only Unit : s
0015	40022			Running time high byte	
0016	40023	String	4	Meter Serial Number Character 1,2	Read only
0017	40024			Meter Serial Number Character 3,4	
0018	40025			Meter Serial Number Character 5,6	
0019	40026			Meter Serial Number Character 7,8	
001A	40027		3	Date and Time	Read only Year, month, day, hour,
001B	40028				
001C	40029				

Register Address	Register	Data Type	Number of Registers	Description	Comments
					minute, second
001D	40030	16 bits int	1	Signal Quality Q	Read only
001E	40031	16 bits int	1	Running Status	Read only
001F	40032	16 bits int		Meter Address (1-249)	Read only
0020	40033	16 bits int		Communication baud rate	Read only
0021	40034	String		Flow velocity unit	Read only m/s or f/s
0022	40035				Read only
0023	40036	String		Instantaneous flow rate unit	Read only
0024	40037				Read only
0025	40038	String		Flow totalizer unit	Read only

Modbus Registers – Read / Write

The MODBUS register contains a read-only register (read with 0x03 function code) and a single write register (write with 0x06 function code).

When changing the address or communication baud rate of the sensor, the sensor will work at the new address or communication baud rate immediately after the sensor returns a response at the original address or communication baud rate.

Data Type:

- 16 bits int—Represents a short integer

Register Address	Register	Data Type	Number of Registers	Description	Comments
1003	44100	16 bits int.	1	Meter Address	Read / Write Range = 1-249
1004	44101	16 bits int.	1	Communication baud rate	Read / Write 0 =2400 1 = 4800 2 = 9600 3= 19200
1005	44102	16 bits int	1	Instantaneous flow rate unit	Read / Write 0 = 0x30 (m3/h) 1 = 0x31 (LPM) 2 = 0x32 (GPM)
1006	44103	16 bits int	1	Flow totalizer unit	Read / Write 0 = 0x30 (m3) 1 = 0x31 (L) 2 = 0x32 (GAL)

Trouble Shooting

Warranty

CAA Sensors provides a 12-month warranty for all sensors. The warranty covers materials and workmanship under the stated operating conditions from the date of delivery. Please report any findings immediately and within the warranty time.

If faults occur during the warranty period CAA Sensors will repair or replace the defective unit, without charge for repair labour and material costs but there is a charge for other services such as labour to remove or reinstall the instrument, transport and packing. Warranty repairs do not extend the period of warranty.

The following damage is excluded from this warranty:

- Improper use and non-adherence to the user manual.
- Use of unsuitable accessories.
- External influences (e.g. damage caused by vibration, damage during transportation, excess heat or moisture).

The warranty is cancelled when one of the following situations occurs:

- The user opens the measurement instrument without a direct request written in this manual.
- Repairs or modifications are undertaken by third parties or unauthorised persons.
- The serial number has been changed, damaged or removed.

Other claims, especially damage occurring on the outside of the instrument (e.g. dents, marks), are not included unless responsibility is legally binding.

Calibration

The sensor is calibrated before delivery. The calibration date is printed on the certificate which is shipped with the sensor.

Flow Meters require calibration to remain accurate. The frequency of calibration depends greatly on the level of contamination within your system.

For more information, contact CAA Sensors:

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