

User Manual

Flow Meter –
Thermal Mass
(Insertion)

Model: FLT



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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.**

Compressed Air Alliance 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 Compressed Air Alliance.



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.



Compressed Air Safety

Any contact with quickly escaping air or bursting parts of the compressed air system can lead to serious injuries or even death.

Do not exceed the maximum permitted pressure .

Only use pressure rated installation materials and parts .

Avoid getting hit by escaping air or bursting parts.

The system must be pressure less during maintenance work.



Electrical Safety

Any contact with energized 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 authorized 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.

Please note: contamination on the sensor tip will affect calibration and accuracy of the sensor. Removal of the contamination may not fix the issue.

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



About Flow Meters

Intended use

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

- Sensor is used in inert gases, eg air, oxygen, nitrogen, carbon dioxide

- Sensor is used in clean, dry gas

- Gas flow rate is between: 0.1 to 250 Nm/s (0.3 to 820 ft/sec)

- Gas pressure is between: 0 to 50 bar (725 psi)

- Gas temperature is between -40°C to +150°C (-40°F to +302°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.

The thermal mass flow meter measures standard flow, mass flow, consumption and temperature .

Thermal Mass Flow Meters

Thermal Mass flow sensors are perfectly suited for measuring clean, dry compressed air and inert gases. The streamlined sensor tip is designed to ensure minimal impact on gas flow while maintaining accuracy over a wide flow range.

Compressed Air Alliance's thermal mass flow meter measures standard flow, mass flow, consumption and temperature. It has full digital signal processing instead of traditional analog bridge design, making the flow meter more accurate and able to measure across a wider range.

Thermal mass flow meters are widely used in industrial processes, chemical, petrochemical, power engineering, etc. They are suitable for temporary or permanent installations.

Our thermal mass flow meters are available as insertion style or inline style.

insertion type sensors which are easy to install under pressure through a 1/2" ball valve.

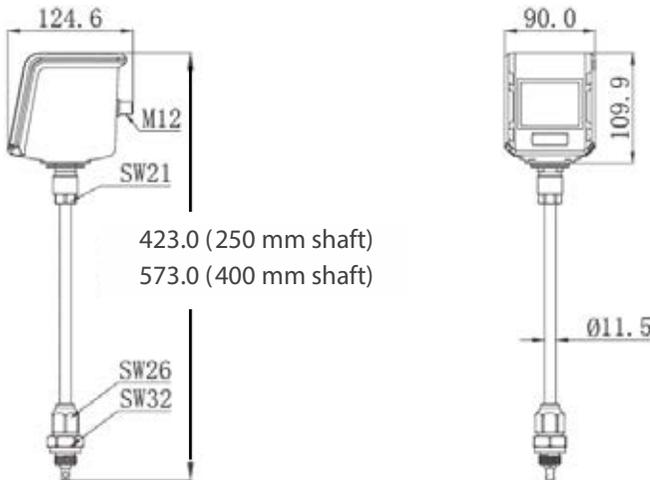
inline type sensors are more suited to permanent installations or where shutting down the system to calibrate the sensor is not an issue.

Specifications

| Thermal Mass Flow Meter - Insertion | | |
|-------------------------------------|---|-------------------|
| Technology | Thermal mass, Insertion design | |
| Application | Manufacturing and Industry | |
| Gases | Air, Argon, Carbon Dioxide, Helium, Hydrogen, Natural Gas, Nitrogen, Nitrous Oxide, Oxygen | |
| Gas Quality | Clean and dry gas | |
| Accuracy | ±(1.5% reading + 0.3% full scale) <i>Accuracy is affected by the installation location, on-site conditions and contaminants such as oil, high humidity or other impurities</i> | |
| Measurement Ranges | | |
| Flow Measurement | 0.1 to 250 Nm/sec | 0.3 to 820 ft/sec |
| Pressure Measurement | 0 to 50 bar (725 psi) (installation device required for over 16 bar / 232psi) | |
| Gas Temperature Measurement | -40°C to +150°C | 40°F to +302°F |
| Outputs | | |
| Output | Analog: 4 to 20mA (4 -wire, Isolated) / Pulse output Digital: RS485 Modbus / RTU | |
| Output Signals | Flow, mass flow, consumption and temperature | |
| Power | | |
| Power Supply | 18 to 30V DC / 5W@24V | |
| Electrical Connection | 2 x 5 pin M12, female | |
| EMC | According to IEC 61326 -1 | |
| Display & Data Logger | | |
| Display | 2.8" LCD with touch panel | |
| Data Logger | 10,000,000 samples | |

| Thermal Mass Flow Meter - Insertion | | |
|-------------------------------------|---|-----------------|
| Sampling Rate | > 20 samples / second | |
| Other Information | | |
| Bi-directional | No | |
| Pipe Size | DN20 to DN600 | |
| Shaft Lengths | 250 mm or 400 mm | 9.8" or 15.7" |
| Weight | FLT1 (shaft length = 250 mm or 9.8") 0.75 kg FLT2 (shaft length = 400 mm or 15.7") 0.90 kg | |
| Process Connection | ISO G1/2" thread | |
| Ambient Temperature | -30°C to +70°C | -22°F to +172°F |
| Installation Type | Permanent or temporary installation | |
| Calibration Frequency | Every 2 years <i>provided the sensor is not exposed to relative humidity above 85%</i> | |
| Warranty Period | 12 Months | |
| Reference Conditions | 20°C, 1bar(a), ISO1217 (Programmable) | |

Dimensions (mm)



Flow Range

| Pipe Size | | Flow Range (Nm ³ /h) | | Flow Range (cfm) | |
|-----------|-------------|---------------------------------|----------|------------------|----------|
| DN | ID (inches) | Min Flow | Max Flow | Min Flow | Max Flow |
| 20 | 0.75" | 0.1 | 282 | 0.1 | 166 |
| 25 | 1" | 0.2 | 441 | 0.1 | 259 |
| 32 | 1.25" | 0.3 | 723 | 0.2 | 425 |
| 40 | 1.5 | 0.5 | 1,131 | 0.3 | 665 |
| 50 | 2" | 0.7 | 1,767 | 0.4 | 1,040 |
| 65 | 2.5" | 1.2 | 2,986 | 0.7 | 1,757 |
| 80 | 3" | 1.8 | 4,523 | 1.1 | 2,661 |
| 100 | 4" | 2.8 | 7,068 | 1.6 | 4,158 |
| 125 | 5" | 4.4 | 11,044 | 2.6 | 6,498 |
| 150 | 6" | 6.4 | 15,904 | 3.8 | 9,357 |
| 200 | 8" | 11.3 | 28,274 | 6.6 | 16,635 |
| 250 | 10" | 17.7 | 44,178 | 10.4 | 25,991 |

Compressed Air Alliance App

Flow Meter App - View data and edit settings on your phone

The Compressed Air Alliance App allows you to view data and check / update settings on your phone.

This feature is great for viewing flow readings when your flow meter is installed in high locations.

Contact Compressed Air Alliance or your local dealer for more information.



Flow MeterPack

Each flow meter pack comes with:

- ✓ 1 x Thermal Mass Flow Meter – Insertion style, configured for your gas type .
- ✓ 1 x O -Ring
- ✓ 1 x Adjustment tool (used to align flow meter correctly)
- ✓ 1 x USB C to USB A adapter (used to download data to a USB)
- ✓ **Connector Options** - 2 x M12 female connectors or 2 x 5 meter data cables with M12 connector on one end
- ✓ Calibration Certificate

Flow Meter Pack



Flow Meter



O-Ring



USB C to USB A adapter



Adjustment tool

Connector Options



2 x M12 female connectors

OR



2 x 5 meter cable with M12 connector on one end

Installation



Installation Overview

Mechanical Installation

Step 1 – Find a suitable section of pipe

The sensor must be installed vertically or horizontally, in clean, dry gas

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

Do **NOT** install the sensor in wet gas or upside down

Step 2 – Install connection point, eg ball valve or nipple

Step 3 – Fit flow meter

Step 4 – Align sensor with direction of gas flow

Electrical Installation

Step 5 – Wire the sensor for 24vDC power and communication

Sensor Configuration

Step 6 – Set sensor settings:

Inner Pipe Diameter

Unit of Measurement

Communication settings (RS485 or Analog)

Optional – Confirm other sensor settings

Step 7 (optional) – Connect the sensor to your SCADA or energy management system

Tools and Equipment needed for installation

(not included with Flow Meter Pack)



Wrench /
Spanner



Screw Driver



Ball Valve
(optional)



Thread Tape /
Sealant

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 gas contamination levels to ensure accuracy is maintained.

The flow meter is **not** bidirectional. When installing and using the flow meter, please pay attention to the direction of gas flow and the alignment of the sensor. The direction is indicated on the housing.

Avoid condensation on the sensor element as this will affect the accuracy enormously.

The sensor is for indoor use only. If installed in an outdoor installation, the sensor must be protected from sun and rain.

Only use pressure rated materials and parts when installing and maintaining the product.

Do not disassemble the product.

Please follow local and national regulations before/during installation and operation.

This product must be installed properly and calibrated regularly, otherwise it may lead to inaccurate measurements.

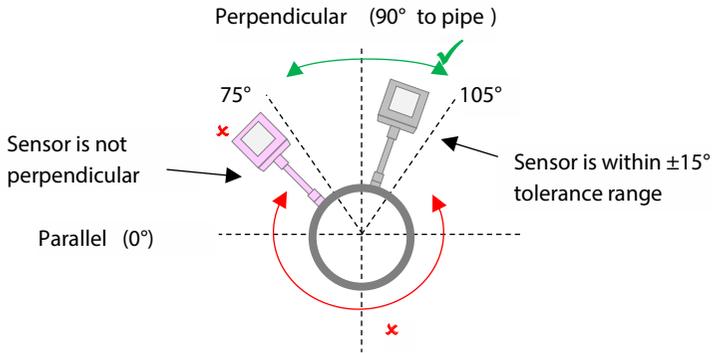
Step 1 – Find a suitable section of pipe

The sensor **must** be installed:

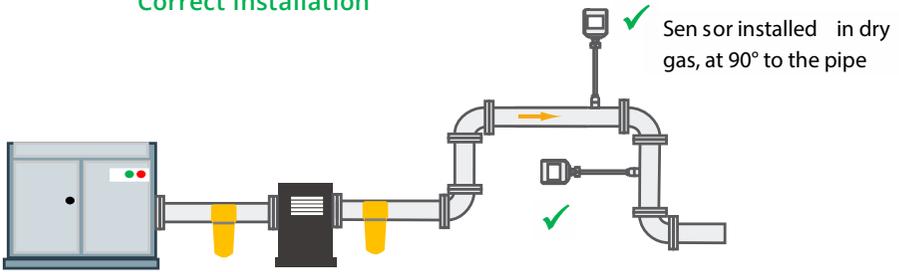
- ✓ at 90° to the pipe , +/- 15° (ie within 75° to 105°).
- ✓ vertically or horizontally,
- ✓ away from bends, edges, seams, changes in pipe size and other obstructions,
- ✓ in dry gas (g as humidity should be less than 80% relative humidity (RH)).
- ✓ in clean gas (the sensor should be installed after filters and dryers)

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

Install 90° (perpendicular) to pipe



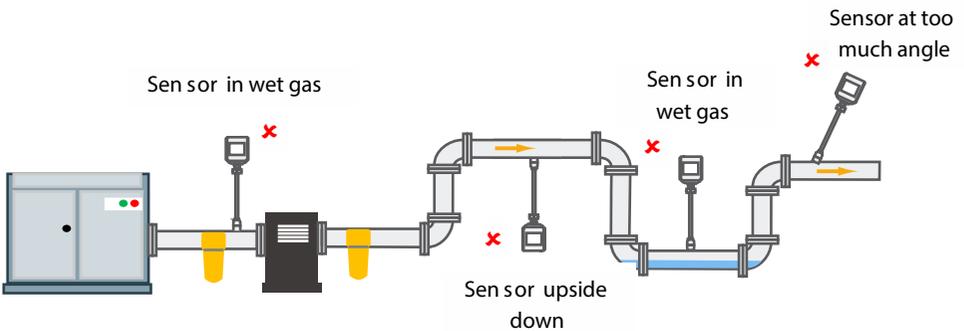
Correct Installation



Incorrect Installation

Do **NOT** install the sensor in wet gas

Do **NOT** install the sensor upside down or at an angle. This can result in water accumulating in the shaft or head of the sensor. This can damage the sensor and void the warranty.



Choose insertion location, away from obstacles

To achieve and maintain the accuracy stated in the specifications, the sensor must be inserted away from bends, edges, seams, curve, changes in pipe size, control valves, etc.

For best results, choose a long, absolutely straight section of pipe that is free of obstructions.

Pipe obstructions (eg bends, edges, seams, curves, changes in pipe size, control valves, etc) change the velocity of compressed air / gasses and/or create turbulence near the obstruction. Placing the sensor too close to the obstruction will result in inaccurate readings.

Notes

Pay attention to the distance between the sensor's inlet and outlet sections and points of turbulence (eg bends, valves, etc).

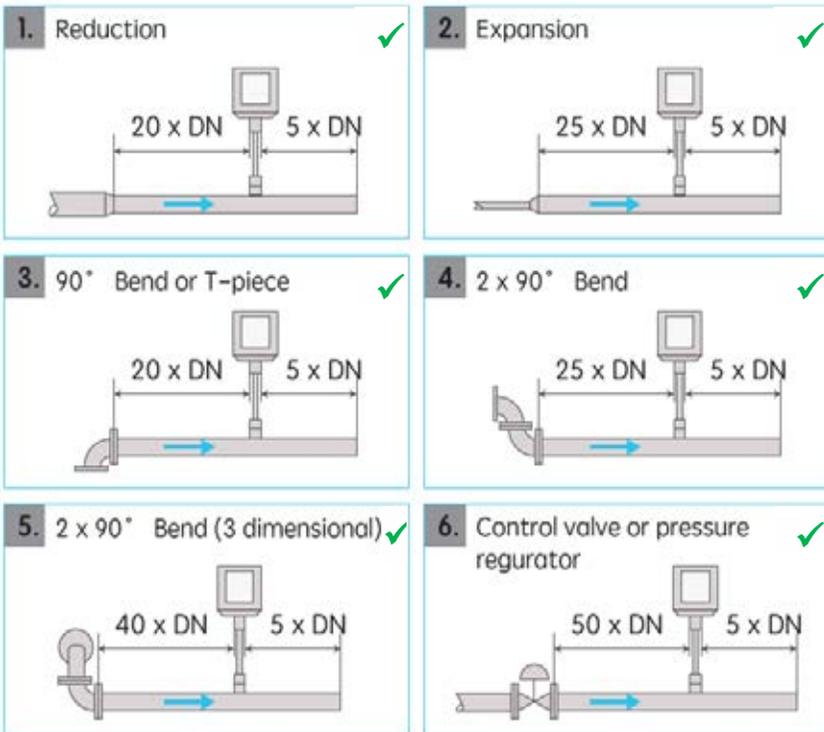
Make sure that the insertion location has enough straight pipe on either side of the sensor, as shown in the diagrams below.

Obstructions can cause counter-flow turbulence as well as turbulence in the direction of the flow. Turbulence will reduce the accuracy of flow readings and result in inaccurate data.

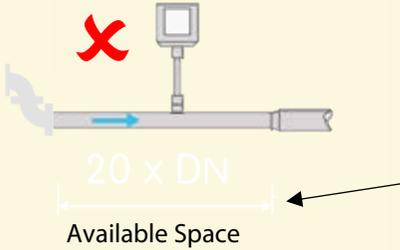
Correct Installation

The diagram below shows the **minimum** allowable distance between the sensor and any bends, changes in pipe size or other obstructions. Distances are shown in multiples of pipe diameters (DNs). For best results, choose a long, absolutely straight, section of pipe that is free of obstructions.

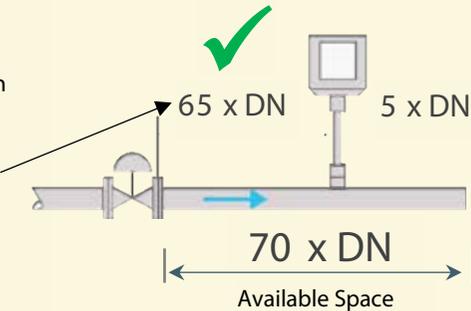
DN = Pipe Diameter



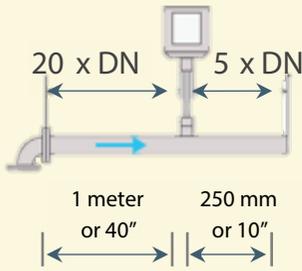
Examples



To install a flow meter near 2 x 90° bends, you need at least 30 DN of space (25 DN on the inlet side + 5 DN on the outlet side, see diagram 4 on previous page)
 Only 20 DN is available .
 Therefore the sensor should **not** be installed in this location



To install a flow meter near a control valve or pressure regulator, you need at least 5 5 DN (50 DN on inlet side and 5 DN on outlet side, see diagram 6 on previous page)
 This section of pipe has 65 DN on the inlet side and 5 DN on the outlet side
 Therefore the sensor **can** be installed in this location



A flow sensor will be installed on a section of pipe, just after a bend (as shown in the diagram on the left). The pipe has a DN of 50 (ie, it's a 2 inch or 50 mm pipe).

Therefore the sensor must be installed:

Inlet side: 20 x DN from the bend
 = 20 x 2" = 40" or
 = 20 x 50mm = 1,000mm = 1 meter

Outlet side: 5 x DN from any other obstruction
 = 5 x 2" = 10" or
 = 5 x 50mm = 250mm

Mini mum spacing on inlet and outlet sides for DN 50

Step 2 – Install connection point

To install the sensor, you need a connection point on the pipe, eg a ball valve or a nozzle or nipple. The thread must be G 1/2".

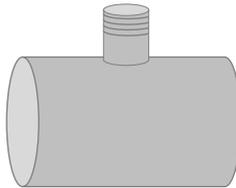
Use of a ball valve is optional - You do not need to use a valve to install the sensor. However, using a valve will make removing the sensor easier (eg when you need to remove the sensor for calibration).

If installing a ball valve, you can use a hot tap drill and clamp to create a connection point on pressurized or unpressurized pipes. See the Compressed Air Alliance website for information on hot tap drills and clamps.



Ball Valve

OR



Welded nipple on pipe

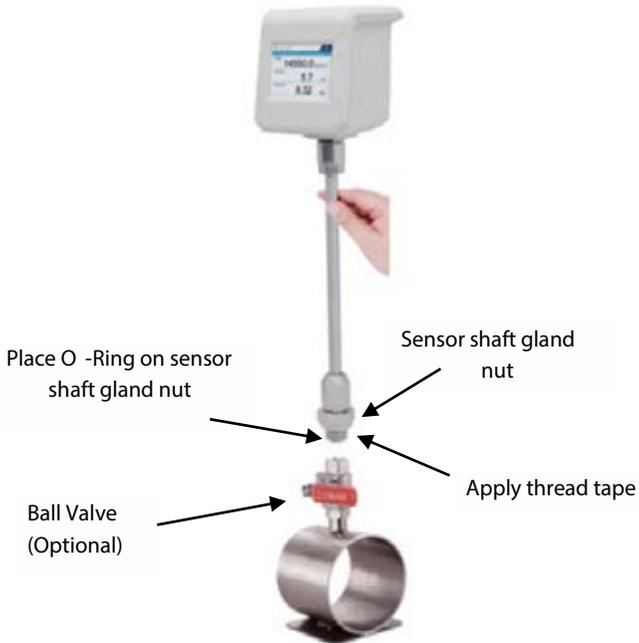
Step 3 - Fit Flow meter

Place O -Ring on sensor shaft gland nut.

Wrap thread tape / sealant tape around sensor thread. Do not let tape enter pipe.

Screw the sensor into the connection point.

If using a ball valve, open the valve.

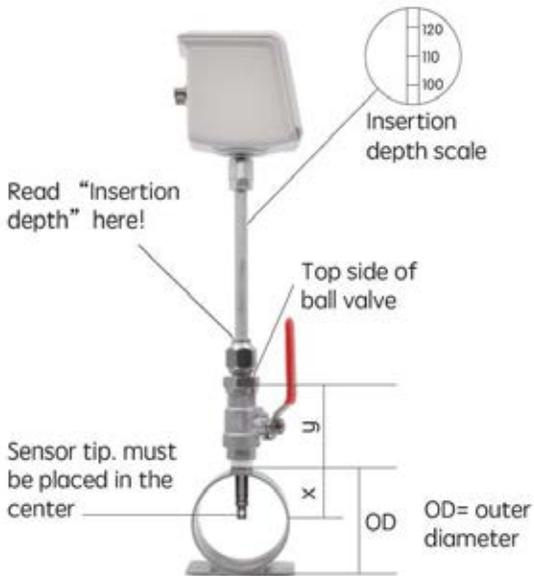


Use the depth scale on the sensor shaft to place the tip of the sensor in the middle of the pipe.

Once the tip is in the centre of the pipe, tighten the gland nut to hold the sensor in place.

$$\text{The Insertion Depth} = x + y = \frac{OD}{2} + y.$$

Where OD = outer diameter of pipe and Y = ball valve height.



Example

A flow meter is being installed in a copper tube with a DN of 100. This equates to an outer diameter (OD) of 100 mm. The ball valve is 87 mm high.

The Insertion Depth = $OD/2 + y$ where y = height of the ball valve.

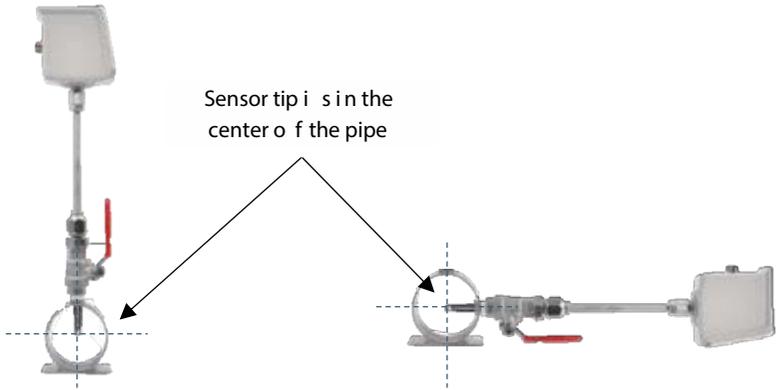
Therefore, the Insertion Depth = $100 \text{ mm} / 2 + 87 \text{ mm} = 50 \text{ mm} + 87 \text{ mm} = 137 \text{ mm}.$

Push in sensor until Insertion Depth = 137 mm



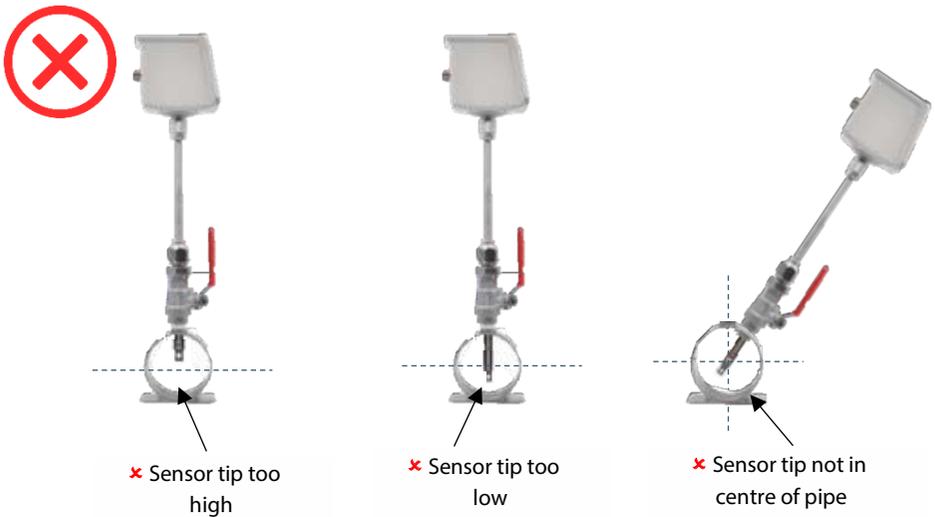
Correct Installation

The sensor tip must be in the center of the pipe / tube.



Incorrect Installation

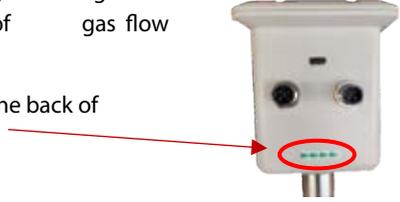
Note: Inaccurate measurement may occur if the sensor is installed incorrectly.



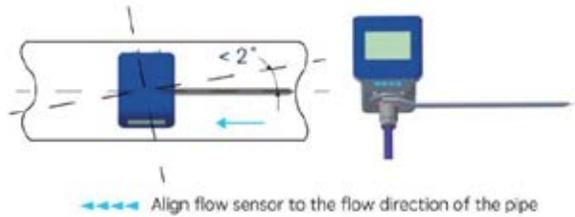
Step 4 – Align sensor with the direction of flow

The flow meter is **not** bidirectional. When installing and using the flow meter, please pay attention to the direction of gas flow and the alignment of the sensor.

The direction of flow is marked by 4 green arrows on the back of the sensor and underneath the sensor.

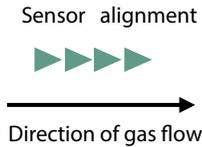


Use the alignment tool to align the sensor with the pipe. Ensure the arrows on the sensor match the direction of flow.



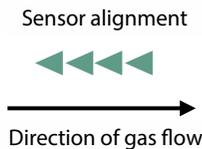
Correct Installation

The sensor is aligned in the same direction as the gas flow.



Incorrect Installation

The sensor is aligned in the opposite direction to the gas flow.



Installation Electrical



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

Note s:

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 5 - Wire the sensor for 24vDC power and communication

The flow sensor has two x 5 pin M12 connector plugs - "A" and "B". Cables are connected to the sensor through the M12 connector plugs.

Connector **A** is used for power and Modbus

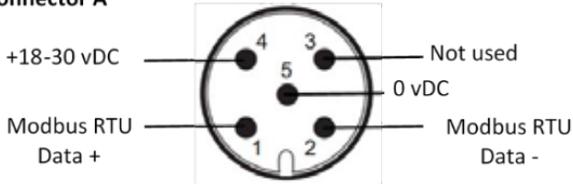
Connector **B** is used for 4 -20mA and pulse



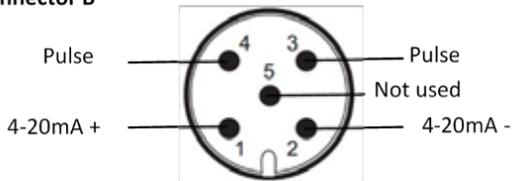
If you ordered a cable with the sensor, the cables will be coloured coded as shown in the table below.

| Connector A (Power & Modbus) | | Cable Colour | Connector B (Pulse & Analogue) | |
|-------------------------------|---------------------------|--------------|--------------------------------|----------------|
| Pin 1 | RS845, Data + (A) | Brown | Pin 1 | 4-20mA + |
| Pin 2 | RS845, Data - (B) | White | Pin 2 | 4-20mA - |
| Pin 3 | N/A - Not Used | Blue | Pin 3 | Pulse |
| Pin 4 | +18-30 vDC | Black | Pin 4 | Pulse |
| Pin 5 | 0 vDC (Ground for Modbus) | Grey | Pin 5 | N/A - Not Used |

Connector A



Connector B



Configuring the Flow Meter

Step 6 - Set sensor settings

You must configure the flow meter to make sure it is reading accurately.

You **must** set the (inner) pipe diameter.

You should check / adjust the gas type, units of measure, communication settings (4 -20mA and/or Modbus) and screen rotation.

Mandatory Configuration - Pipe Diameter



Pipe diameter refers to Inner Pipe diameter. **Not** the outer diameter.

To set the inner pipe diameter :

Go to **Settings** (⚙️) > **Pipe Diameter**.

If the **lock screen symbol** is present (on the bottom left of the screen), press the symbol, hold and drag it to the right of the screen. The screen is set to lock after 60 seconds.

Press the diameter size, in millimeters (mm)

Enter new **inner diameter** of the pipe

Press **OK**

Press the arrow (↩️) save your settings and return to the previous screen.



Optional configuration

We recommend you check the following settings on the flow meter. See the next section - "Using the Display" for instructions on checking / updating settings.

Gas type

Unit of Measurement

Communication settings (RS485 or Analog)

Screen Rotation

Using the Flow Meter



Operating the Flow Meter

 **WARNING!** Make sure the sensor is installed and wired correctly before powering up the sensor. Only use 24vDC to power the sensor .

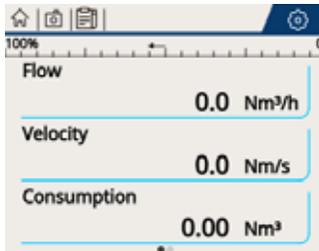
Turning On

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

On powering up:

The Compressed Air Alliance logo will appear on the screen.

After a few seconds, you will see flow meter home screen. The flow meter is now ready to configure (see next page) .

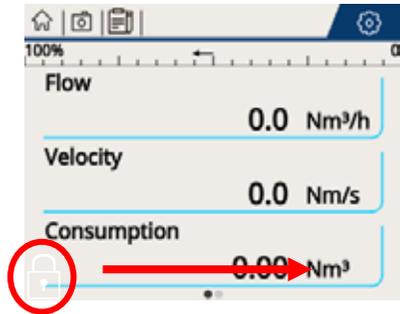


Flow Meter home screen. The sensor is ready to configure

Using the Display



Unlock the screen



The flow meter has a touch screen interface.

1. Menu options
2. Settings
3. Data / Measurement Readings
4. Locked screen icon

The screen is set to automatically lock after 60 seconds.

If the **lock screen symbol** is present, press the symbol, hold and drag it to the right of the screen.

You can change the timing for the lock screen in the “Screen Settings” menu (Settings > System Settings > Screen Settings)

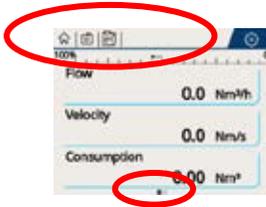
To navigate the interface:

scroll up and down ( and ) to see other options

scroll left and right ( and ) to see other screens

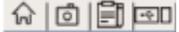
Press an item to access that feature

Home Screen



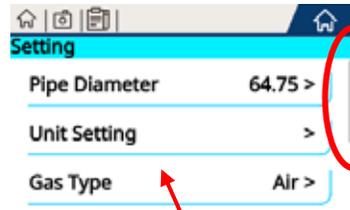
Scroll left or right to see other screens

The home screen has two pages, as shown by the two dots (..) at the bottom of the screen. Move the screen left or right to move between screens.

When you press the **Menu icon** () a pop up screen appears. Press:

- ✓ The **Home icon** () to return to the home screen
- ✓ The **Camera icon** () to take a screen shot of that screen
 - To access screen shots, go to the Settings Menu () System Setting.
- ✓ The **Notepad icon** () to access the Data Logging information
- ✓ If you have a USB drive installed, press the **USB icon** () to safely remove the USB.

Settings Menu



Click on an item to view / change settings

Press the **settings icon** () in the top right corner of the screen to access the settings screen.

In the Settings Menu you can change / set up:

- ✓ Pipe diameter
- ✓ Units of measurement
- ✓ Gas type
- ✓ Data logging
- ✓ RS485 settings
- ✓ Analog output
- ✓ Screen shots
- ✓ Normalisation and
- ✓ System settings.

Menu Options

| Menu | Sub Menus | Options / Comments | | |
|--|------------------|--|-------------------------|--------|
| Pipe Diameter | - | Set inner pipe diameter. This must be set when you install the flow meter Pipe diameter refers to inner Pipe diameter. Not the outer diameter | | |
| Unit Settings | Flow Unit | m ³ /h | l/min | Kg/h |
| | | m ³ /min | l/s | Kg/min |
| | | m ³ /s | cfm | Kg/s |
| | Velocity Unit | m/s | ft/s | |
| | Consumption Unit | m ³ | ft ³ | kg |
| | Temperature Unit | °C | °F | |
| Gas Type | - | Air | Natural Gas | |
| | | Argon (Ar) | Nitrogen (N2) | |
| | | Carbon dioxide (CO2) | Nitrous oxide (N2O) | |
| | | Helium (He) | Oxygen (O2) | |
| | | Hydrogen (H2) | | |
| <p>Note: The flow meter is calibrated in air. If you select another gas type, the flow meter will automatically adjust its readings to match the gas selected. If you require calibration in real gas, contact Compressed Air Alliance or your local dealer</p> | | | | |
| Data Logging | Logging | Set, start / Stop data logging | | |
| | History | Download data as a CSV file Delete records | | |
| RS485 Settings | Device Address | <u>Options</u> | <u>Default Settings</u> | |
| | | 1 to 247 | 1 | |
| | Baud Rate | 1200 | 9600 | |
| | | 2400 | | |
| | | 4800 | | |
| | | 9600 | | |

| Menu | Sub Menus | Options / Comments | |
|---------------|-------------------------|--|-------------------------------------|
| | | 14400 19200 38400 56000 57600 115200 | |
| | Parity | None Odd Even | None |
| | Stop Bits | 1 2 | 1 |
| | Response Delay | 0 to 999 ms | 0 |
| Analog output | 4-20mA Channel | <u>Options</u> Flow Velocity Pressure Temperature Normal Flow Normal Velocity | <u>Default Settings</u> Velocity |
| | 4-20mA Scaling - Low | ±0 to ±9999999.99 | 0.00 Nm/s |
| | 4-20mA Scaling - High | ±0 to ±9999999.99 | 250.00 Nm/s |
| | Cubic Meter / Pulse | 1m ³ /Pulse 5m ³ /Pulse 10m ³ /Pulse | 1m ³ /Pulse |
| Screen Shot | | View and download screenshots | |
| Normalisation | Temperature Pressure | <p>The Normalization screen lets you change the reference conditions of the flow meter. The Flow Meter will readjust its calculations to suit the new normalization valves.</p> <p>The normalization setting should only be changed if the flow meter is installed under</p> | |

| Menu | Sub Menus | Options / Comments |
|-----------------|--------------------|--|
| | | <p>conditions that differ from the standard calibration (20°C, 1 bar, 0% relative humidity).</p> <p>Default Values: Flow Unit Prefix: Normal Temperature = 20°C Pressure = 100.00kPa</p> |
| System Settings | Screen Settings | <p>View / change :</p> <ul style="list-style-type: none"> Screen rotation – rotate the screen by 90 degrees Screen brightness Timing for screen lock – The screen is set to automatically lock after 60 seconds |
| | Language Setting | Change language – English or Chinese |
| | System information | <p>Boot Count: Number of times the sensor has been disconnected and reconnected to power</p> <p>Sensor Information: Serial Number, hardware version and software version</p> <p>Display Information: Serial Number, hardware version and software version</p> |
| | System Update | <p>Update the firmware .</p> <p>If a new version of the firmware is released, your local dealer will send the software to you.</p> <p>To update the firmware:</p> <ul style="list-style-type: none"> Copy the firmware to a USB Plug the USB drive into the back of the sensor On the Flow Sensor’s touch screen, go to the Settings Menu > System Setting > System Update Follow the prompts |

| Menu | Sub Menus | Options / Comments |
|-------------------|-----------|---|
| Advanced Settings | | <p>These settings are password protected. They should not be changed as they will affect the flow meter readings and accuracy.</p> <p>Advanced settings let you change:</p> <ul style="list-style-type: none"> Velocity Offset Ratio Consumption Cut Off Velocity <ul style="list-style-type: none"> ○ This is the minimum velocity the flow meter can detect. If the flow is less than the cut off velocity, the flow meter will read '0'. The flow meter is not calibrated for velocities less than 0.1 m/s. Velocity Filter Grade Change Password |

Data Logging



You can record data to a USB drive and download data as a CSV file. The USB C connection is on the back of the flow meter head.

Alternatively, you can connect the flow meter to Compressed Air Alliance's GEMS system (a cloud based compressed air and energy management system) or your own SCADA.

How much data will the flow meter record?

The flow meter will record a maximum of 10,000,000 samples.

Example: Recording flow, consumption and temperature at 1 second increments will record three (3) samples (flow, consumption, temperature) per second. Therefore $3 \text{ samples} \times 60 \text{ seconds} = 180 \text{ samples per minute}$. $180 \text{ samples/min} \times 60 \text{ minutes} = 10,800 \text{ samples per hour}$. $10,800 \text{ samples/hour} \times 24 \text{ hours} = 259,200 \text{ per day}$. So $10,000,000 / 259,200 \text{ samples per day} = 38 \text{ days of data recording}$.

Example: Recording only one measurement (eg flow) will record one (1) sample. If you record flow at 10 second increments you can record: $1 \text{ sample} \times 6 = 6 \text{ samples per min} \times 60 \text{ min} = 360 \text{ samples / hour} \times 24 \text{ hours} = 8,640 \text{ samples per day} \times 365 \text{ days per year} = 3,153,600 \text{ per year}$.

How can I download data from the flow meter?

To download data, you need to connect a USB drive to the flow meter and export the data as a CSV file. Alternatively, you can connect the flow meter to Compressed Air Alliance's DAS system (a cloud based compressed air and energy management system) or your own SCADA.

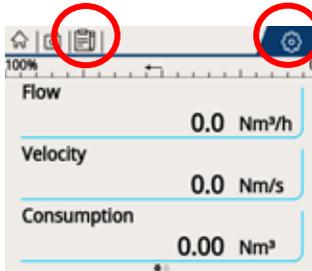
If the flow meter losses power, will the data logger restart automatically?

No. If you lose power to the flow meter, you must manually restart the data logging function. You can do this via the flow meter screen or the Compressed Air Alliance App (see below).

How do I access the data logger?

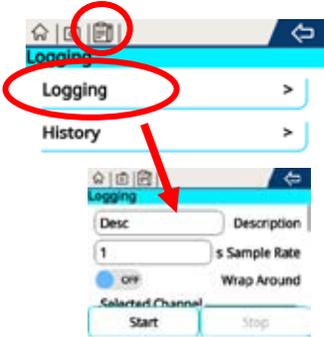
To set up data logging, view data logging history and start or stop data logging go to the “Logging” menu. You can access the data logging menu via:

- ✓ Notebook icon ( in the top left of the screen, or
- ✓ Via the Settings menu ( in the top right of the screen (Settings > Logging).



Before you remove the USB drive, press the USB icon on the top left of the screen to safely remove the USB.

Set up Data Logging



To set up data logging:

Enter a Descriptive Name for the record

Enter the sample rate, in seconds

Turn on / off “Wrap Around”

- If you turn **on** “Wrap Around” the data will write over old records when the memory card is full
- If you turn **off** “Wrap Around”, the data will stop recording when the memory card is full

Select which channels you want to log. You can select one or more from the list below:

- Flow, velocity, consumption and/or temperature

Enter the system date and time

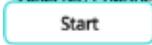
If you want the data logging to start at a specific time, enter the START date and time

If you want the data logging to stop at a specific time, enter the STOP date and time

Press the arrow () save settings and return to the previous screen

Start / Stop Logging

Press the Notebook icon () the top left of the screen

To start data logging (without changing any of the settings) press Start icon 

To stop data logging (without changing any of the settings), press the Stop icon 

When data logging is active, the pencil on the notebook icon () will move.

Download Data

To download data as a CSV file

Press the History option.

Select the data to download

Insert a USB drive into the back of the flow sensor

Press Export

Press the arrow () save settings and return to the previous screen

Delete Data

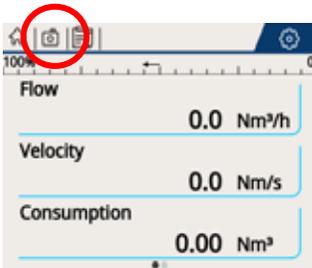
To delete historical data records

Press the History option.

Select the data to delete and click delete

Screen Shot

You can take a screen shot of any screen by pressing the camera icon () on the top left of the screen.



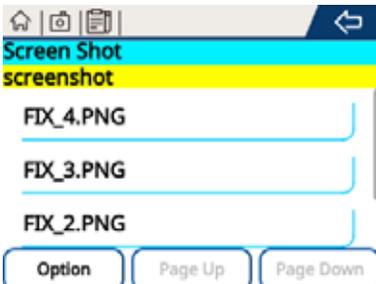
To access the screen shots, go to the Settings Menu () > Screen Shots.

Here you can:

- ✓ View the picture
- ✓ Export the picture to a micro USB
- ✓ Delete pictures

View a picture

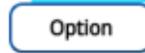
Press the picture name to view the picture.



Delete Pictures

To delete pictures:

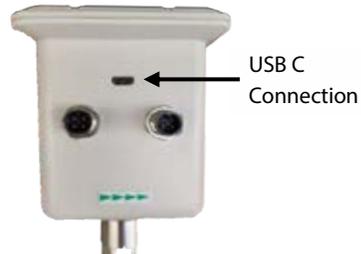
Press the Option icon



Select the images you want to delete

Press the Delete icon

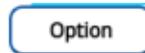
Export / Download Pictures



To export pictures:

Insert a USB C into the back of the flow sensor

Press the Option icon



Select the images you want to download

Press the Export icon

Modbus Registers

Default Modbus Communication settings

Modbus settings can be changed to suit system requirements

| Default Modbus RTU (RS485) Settings | | | | | |
|-------------------------------------|-----------|---------------------------|---------------|----------------|---------------|
| Address | Baud Rate | Frame / Parity / Stop Bit | Response Time | Response Delay | Frame Spacing |
| 1 | 9600 | 8 / N / 1 | 1 Sec | 0 Milliseconds | 7 Characters |

Holding Register Definition

Logical channels, data and related holding registers

- Modbus read command: 0x03
- Modbus write command: 0x06 for single register, 0x10 for multiple register
- Coil registers write command: 0x05

Process Data Format: supports two data types: IEEE 754 float data and unsigned int data.

Byte Order = Little Endian Byte Swap.

- 32bit: CD AB
- 64 Bit: GH EF CD AB

Modbus Registers

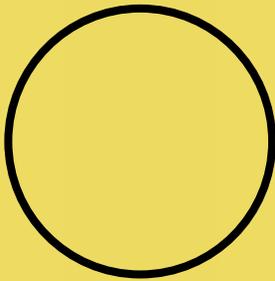
| Holding Register | Data Type | Byte Length | Description | Comments | Read / Write |
|---------------------|-----------|-------------|----------------------|--------------------------|--------------|
| Process Data | | | | | |
| 0 | FLOAT L | 4 | Standard Flow | | Read |
| 2 | FLOAT L | 4 | Standard Velocity | | Read |
| 4 | DOUBLE L | 8 | Standard Consumption | Write "0" to clear value | Read / Write |

| Holding Register | Data Type | Byte Length | Description | Comments | Read / Write |
|------------------|---------------|-------------|--|---|--------------|
| 8 | FLOAT L | 4 | Temperature | | Read |
| 22 | UNSIGNED LONG | 4 | Standard Consumption (4 byte value type) | Write "0" to clear value | Read / Write |
| 26 | UNSIGNED INT | 2 | Gas Type | 0: Air (Default) 1: Oxygen (O2) 2: Nitrogen (N2) 3: Hydrogen (H2) 4: Carbon Monoxide (CO) 5: Carbon Dioxide (CO2) 6: Sulfur Hexafluoride (SF6) 7: Argon (Ar) 8: Helium (He) 9: Nitrous Oxide (N2O) 10: Methane (CH4) 11: Ethan (C2H6) 12: Propane (C3H8) 13: Butane (C4H19) | Read / Write |
| 27 | UNSIGNED INT | 2 | Flow Unit | 0: m ³ /h (Nm ³ /h) 1: m ³ /min (Nm ³ /min) (default) 2: m ³ /s (Nm ³ /s) 3: l/min (NI/min) 4: l/s (NI/s) 5: cfm (Ncfm) 6: kg/h 7: kg/min 8: kg/s | Read / Write |
| 28 | UNSIGNED INT | 2 | Velocity Unit | 0: m/s (Nm/s) (Default) 1: ft/s (Nft/s) | Read / Write |
| 29 | UNSIGNED INT | 2 | Consumption Unit | 0: m ³ (Nm ³) (default) 1: ft ³ (Nft ³) 2: kg | Read / Write |
| 30 | UNSIGNED INT | 2 | Temperature Unit | 0: °C (default) 1: °F | Read / Write |

| Holding Register | Data Type | Byte Length | Description | Comments | Read / Write |
|---|--------------|-------------|---|---|--------------|
| 32 | FLOAT L | 4 | Pipe Inner Diameter | Measured in millimeters | Read / Write |
| 34 | FLOAT L | 4 | Normal Temperature | Measured in °C Default = 20°C | Read / Write |
| 36 | FLOAT L | 4 | Normal Pressure | Measured in kPa Default = 100kPa | Read / Write |
| 38 | UNSIGNED INT | 2 | Filter Grade | 1 to 255 Default = 5 | Read / Write |
| 39 | FLOAT L | 4 | Flow Factor | Value must be > 0 Default = 1 | Read / Write |
| <p>Flow factor is used to compensate the flow value. Flow shown on Sensor 's Display = Measured Flow x Flow Factor Example: Measured flow = 50 Nm³/min. Flow Factor = 0.8. Then the flow shown on the sensor 's display = 50 x 0.8 = 40 Nm³/min</p> | | | | | |
| 70 | FLOAT L | 2 | Velocity Cutoff | Value must be > 0 Default = 0.1 m/s | Read / Write |
| 101 | UNSIGNED INT | 2 | Software Version | | Read |
| 102 | UNSIGNED INT | 2 | Hardware Version | | Read |
| 103 | DOUBLE L | 8 | Serial Number | | Read |
| Modbus Communication | | | | | |
| <p>Note: The Modbus Communication settings will take effect after writing a "1" to the holding register address 50. Then the Modbus master must change communication settings accordingly in order to communicate with the slave.</p> | | | | | |
| 50 | UNSIGNED INT | 2 | Restart device Write "1" to restart device | | Write |
| 51 | UNSIGNED INT | 2 | Device address | 1-247 Default = 1 | Read / Write |
| 52 | UNSIGNED INT | 2 | Baud Rate (bps) | 12 = 1200 bps 24 = 2400 bps 48 = 4800 bps | Read / Write |

| Holding Register | Data Type | Byte Length | Description | Comments | Read / Write |
|----------------------------|--------------|-------------|------------------------------|--|--------------|
| | | | | 96 = 9600 bps (default) 144 = 14400 bps 192 = 19200 bps 384 = 38400 bps 560 = 56000 bps 576 = 57600 bps 1152 = 115200 bps | |
| 53 | UNSIGNED INT | 2 | Parity | 0 = None (default) 1 = Odd 2 = Even | Read / Write |
| 54 | UNSIGNED INT | 2 | Stop Bit | 1 = 1 bit (default) 2 = 2 bit | Read / Write |
| 55 | UNSIGNED INT | 2 | Response Time Out | 0 - 255 ms 1ms/step Default = 0m/s | Read / Write |
| Coil Register Table | | | | | |
| 0 | UNSIGNED INT | 2 | Restart Modbus Communication | Read: Always 0 Write: 0x0000 = Do Nothing Write: 0xff00 = Restart | Read / Write |

Trouble Shooting



Trouble Shooting

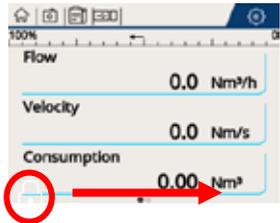
| Problem | Possible Causes | Suggested Action |
|--------------------------------------|--|---|
| Readings are different than expected | Flow meter installed incorrectly, eg upside down, too close to bends | Check installation Is the flow meter at 90° to pipe Is flow meter upside down? Is flow meter too close to bends, obstructions, etc? Is the sensor tip in the centre of the pipe? Do the arrows on the flow meter head match the direction of gas flow? |
| | Flow meter is wired incorrectly | Check Wiring Check wire colours match pins |
| | Flow meter not configured for system | Check / update the following settings: Inner Pipe diameter (not outer diameter) Unit of Measurement Gas Type Communication settings (RS485 or Analog) |
| | Gas is off | Turn gas on. Open isolation valves |
| | Normalization data has changed | Reset normalisation to factory default: Flow Unit Prefix = Normal Temperature = 20°C Pressure = 100 kPa. |
| | Flow meter is due for calibration | Calibrate sensor. Compressed Air Alliance can help with calibration |

| Problem | Possible Causes | Suggested Action |
|---------|-----------------|------------------|
|---------|-----------------|------------------|

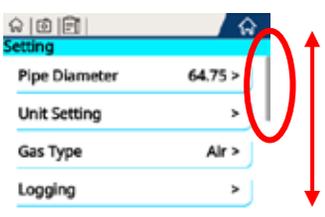
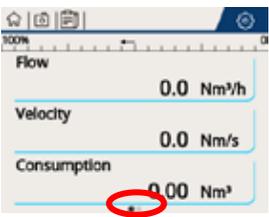
| | | |
|--|--------------------------------------|--|
| | Incorrect flow meter for your system | Check that the sensor's specifications are suitable for your system. |
|--|--------------------------------------|--|

| | | |
|--------------------------------|---|---|
| The touch screen isn't working | You are using hard objects to operate the display, eg fingernails, pens | Use the fleshy part of your finger to touch the screen. The touch screen does not work if you use finger nails or pens. |
|--------------------------------|---|---|

| | | |
|--|------------------|---|
| | Screen is locked | The screen automatically locks when not in use. To unlock the screen, slide the lock symbol () to the right. |
|--|------------------|---|



| | | |
|----------------------------|--|--|
| I can't see all menu items | On some menus, you will need to scroll up and down (or left and right) to see all items. | |
|----------------------------|--|--|



| | | |
|----------------------------|-----------------------------|---|
| I can't access the CAA App | Trying to use App on iPhone | The CAA App only works on Android phones. |
|----------------------------|-----------------------------|---|

| | | |
|--|---------------|--|
| | Update needed | Contact your local distributor or CAA to get the latest version of the CAA App |
|--|---------------|--|

| Problem | Possible Causes | Suggested Action |
|---------|-----------------|------------------|
|---------|-----------------|------------------|

The screen is in the wrong language

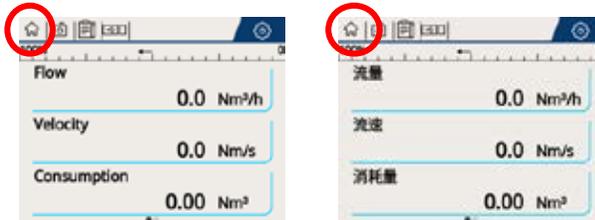
Step 1 - Unlock Screen

Slide the lock symbol () to the right.



Step 2 - Go to the home page.

Click on the Menu icon on the top left of the screen, then click on the home icon. If you are already on the home page, you can skip this step.



Step 3 - Go to Settings

Click on the Settings icon on the top right of the home page.



| Problem | Possible Causes | Suggested Action |
|---------|-----------------|------------------|
|---------|-----------------|------------------|

Step 4 – Go to System Setting

Scroll to the bottom of the settings screen. Press the “System Setting” menu – 2nd menu from bottom



Step 5 – Go to Language Setting

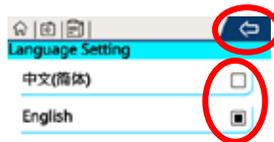
Scroll to the top of the System Settings screen. Press the “Language Setting” menu – 2nd menu from top



Step 6 – Select desired language

Select the desired language

Press the arrow button  to save your selection and return to the previous screen



Default / Factory Settings

To reset the flow meter to factory settings or default settings, you will need to manually adjust the following settings:

| Setting | Default Value / comments | |
|-----------------|---------------------------------------|----------------------|
| Settings | | |
| Pipe Diameter | 64.75 | |
| Unit Setting | Flow Unit | Nm ³ /min |
| | Velocity Unit | Nm/s |
| | Consumption Unit | Nm ³ |
| | Temperature Unit | °C |
| Gas Type | Air | |
| Normalisation | Flow Unit Prefix | Normal |
| | Default Temperature | 20°C |
| | Default Pressure | 100kPA |
| RS485 Setting | Baud Rate | 9600 |
| | Parity | None |
| | Stop Bits | 1 |
| | Response Delay | 0 |
| | Device Address | 1 |
| Analog Setting | 4-20mA Channel | Velocity |
| | 4-20mA Scaling - Low | 0 |
| | 4-20mA Scaling - High | 250 |
| | Cubic Meter/Pulse | 5 |
| System Settings | Screen Setting > Screen Timeout = 60s | |

Warranty

Compressed Air Alliance 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 Compressed Air Alliance 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 (eg 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.

We recommend you calibrate the sensor every 2 years (provided the sensor is not exposed to relative humidity above 80%). Calibration is excluded from the product warranty. For more information, contact your dealer

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Strength

- We export to almost 100 countries.
- We have more than 2000 global customers.
- We can provide a total filtration solution.

- Filter-Online & Nordic Filtration offers a wide selection of filtration products for Domestic and Industrial Application.

- You can buy our products on our websites or by contacting us by phone or e-mail. Information about our products as well as brochures and manuals can be found on our websites:

www.filter-online.com for Domestic Products

nordicfiltration.com for Industrial Products

We distribute many of our products from our stock in Denmark. Some products are shipped from remote stock.



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