User Manual

Flow Meter - Pitot Tube

Models:
FLP10000x
FLP20000x
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Notices

Please read this user manual in full and carefully observe the notes and instructions before and during installation, operation and maintenance. The manufacturer cannot be held liable for any damage which occurs as a result of non-observance or noncompliance with this user manual.

Should the device be tampered with in any manner other than a procedure which is described in this manual, the warranty is cancelled and the manufacturer is exempt from liability.

The device is designed exclusively for the described application.

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

Compressed Air Alliance endeavors to make the content of this manual correct and well stated, but is not responsible for omissions or errors and the consequences caused thereby.

⚠️ 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 tight installation material.
- Avoid getting hit by escaping air or bursting parts.
- The system must be pressure-less during maintenance work.

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.

- Consider all 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.

Using the Flow Meter

- Do not use this product in explosive areas.
- Please observe national regulations before/during installation and operation.
- Any operation exceeding these parameters can lead to malfunctions and may lead to damage on the instrument or the system.
- Do not exceed or go below the permitted storage and operation temperature and pressure.

Calibration and Maintenance

The product must be installed properly and frequently calibrated (at least every 2 years), otherwise it may lead to the wrong measurement values, which can lead to wrong results.

Storage and transportation

- Transportation temperature of the sensor is between -10 °C ... 60 °C.
- Storage temperature of the sensor is between -10 °C ... 50 °C and the humidity is <90%, no condensation. Avoid direct UV and solar radiation during storage.
About Flow Meters

Flow meters are very popular for measuring compressed air systems. Depending on where they are installed, flow meters can tell you the compressor output, system consumption, peaks and troughs as well as average usage. When used well, flow monitoring can help keep your system under control and highlight any unusual activity in your system.

Flow meters types have different applications, typically based on the location or desired measurement. In compressed air systems it is important to avoid creating pressure drops or restrictions that will decrease system performance and increase operating costs. Examples of flow meters that cause pressure drops are differential pressure plate, vortex and venturi meters.

Benefits of monitoring flow include:

- Improve system efficiency
- Reduce system maintenance
- Reduce operating and energy costs
- Increase system understanding and operation
- Identify changes in system performance
- Identify non-productive air demand and leakage
- Identify peak and average demand

Pitot Tube Flow Meters

Pitot tube flow meters are ideally suited to wet, dirty and high velocity gases. The extremely sensitive differential pressure measurement allows this sensor to be used over a wide flow range. The patented anti condensation technology enables the sensor to be used under saturated conditions and ensures the sensor will perform stable accurate measurements for years to come.

Pitot tube flow sensor measure the upstream dynamic pressure and downstream static pressure. The pressure differential is a measure of the velocity and flow rate.

Thanks to the online auto-calibration technology, high reliability, long-term measurement and accuracy can be guaranteed.

Pitot flow meters are widely used in industrial processes, chemical, petrochemical, power engineering, etc.

Pitot Tube flow meters are ideal for both temporary or permanent installations.

Key Features of Pitot Tube Flow Meters

- Insertion type sensor
- Ideal for wet and dirty gases
- Flow range of 5-300 Nm/s
  
  Note: below minimum velocity flow meter reading will be zero
- Patented anti condensation technology
- Integrated pressure and temperature sensor
- Online auto-calibration function to compensate for temperature and pressure change
- Easy to insert and remove through 1/2” valve, even when under pressure
- Two output types as standard -
  o Digital - Modbus RTU and
  o Analog – 4…20 mA + Pulse
- Two shaft length options -
  o 250 mm or
  o 400 mm
- Suitable for pipes from DN25-DN300 provided minimum velocity (> 1L/minute) is maintained
- Vibration proof
- Low pressure drop
- 2.8” ultra-wide viewing angle LCD touch screen
- Data logging with up to 10,000,000 recording points
## Specifications

### Technical Data

<table>
<thead>
<tr>
<th>Pitot Tube - Insertion</th>
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</thead>
<tbody>
<tr>
<td>Technology</td>
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<tr>
<td>Gases</td>
</tr>
<tr>
<td>Gas Quality</td>
</tr>
<tr>
<td>Accuracy¹</td>
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<tr>
<td>Measurement Ranges</td>
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<tr>
<td>Flow Measurement Range</td>
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<tr>
<td>Pressure Measurement Range</td>
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<tr>
<td>Gas Temperature Range</td>
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<tr>
<td>Outputs</td>
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<tr>
<td>Output</td>
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<td>Output signals</td>
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<tr>
<td>Power</td>
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<tr>
<td>Power Supply</td>
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<tr>
<td>Anti Condensate Power Up</td>
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<tr>
<td>EMC</td>
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<td>Display and Data Logging</td>
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<tr>
<td>Display</td>
</tr>
<tr>
<td>Data Logger</td>
</tr>
<tr>
<td>Other Information</td>
</tr>
<tr>
<td>Pipe Size</td>
</tr>
<tr>
<td>Shaft Lengths</td>
</tr>
<tr>
<td>Electrical Connection</td>
</tr>
<tr>
<td>Process Connection</td>
</tr>
<tr>
<td>Ambient Temperature Range</td>
</tr>
<tr>
<td>Installation Type</td>
</tr>
<tr>
<td>Calibration Frequency²</td>
</tr>
</tbody>
</table>
Pitot Tube - Insertion

Warranty Period

12 Months

Reference Conditions

20°, 1 bar(a), ISO 1217 (Programmable)

1 The accuracy of the sensor is affected by on-site conditions. Contaminants such as oil, high humidity or other impurities can affect the calibration and accuracy of the sensor.

2 Flow meters require calibration every 2 years (provided the sensor is not exposed to relative humidity above 85%). Compressed Air Alliance can arrange calibration for you.

Flow Range

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Flow Range (Nm³/h)</th>
<th>Flow Range (cfm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min Flow</td>
<td>Max Flow</td>
</tr>
<tr>
<td>Inches DN ID (mm)</td>
<td>Flow Range (Nm³/h)</td>
<td>Flow Range (cfm)</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>1.25</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>1.5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>2.25</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>8</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>10</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>12</td>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>
Flow Meter Pack

Each flow meter pack comes with:

- 1 x Pitot Tube Flow Meter – Insertion style, configured for your gas type.

Instruction manual

Available on the Compressed Air Alliance website:
www.compressedairalliance.com/products

Optional Accessories

The following accessories are available for the flow meter. Talk to your local dealer or Compressed Air Alliance or pricing and other accessories.

M12 connectors – Male, female and Y-type

Data Cables

Data Acquisition and Analysis software
Installation – Mechanical

Notes

Before installing the sensor, make sure it is rated for your system (refer to the “Specifications” section above). We suggest purging the pipeline before installation to prevent impurities from damaging the flow meter or blocking the pressure pipe.

**WARNINGS**

- Incorrect installation can damage the sensor or cause it to work incorrectly.
- You need to maintain a minimum flow velocity of 5 Nm/s (17 ft/sec) for the pitot tube to work correctly. Below this minimum velocity, the flow meter reading will be zero.

Close attention should be paid to the installation location and contamination levels to ensure accuracy is maintained. The sensor is for indoor use only. If installed in an outdoor installation, the sensor must be protected from sun and rain.

- Always observe the direction of flow when installing the sensor. The direction is indicated on the housing.
- Do not exceed the maximum operation temperature at the sensors tip.
- Avoid condensation on the sensor element as this will affect the accuracy enormously.
- Do not disassemble the product.
- Always use a spanner to mount the product properly.

**Step 1 – Find a suitable section of horizontal pipe**

The sensor **must** be installed:

- on a horizontal pipe
- upright, at 90° (±15°) to the pipe (ie vertically),
- away from bends, edges, seams, changes in pipe size and other obstructions (see Step 2 below),
- after the first filter or water separator (ie the sensor can **not** be installed directly on the outlet of the compressor)

Make sure the insertion location has enough room above the pipe to install the sensor. If installing the sensor outdoor, protection from sun and rain is necessary.

**Installing the Pitot Tube Flow Meter on the compressor outlet**

- **✓ Non-Condensing gases** - The pitot tube can be installed on the outlet of compressors
- **✗ Condensing gases** - The pitot tube can **not** be installed directly on the outlet of compressors. If you want to install the pitot tube near the outlet of a compressor, a water separator or filter is required to reduce the condensed liquid in the gas.
Install vertically to pipe

The sensor must be installed upright, at 90° +/- 15° (ie within 75° to 105° of vertical). Installing the sensor at an angle can result in water accumulating in the shaft or head of the sensor. This can damage the sensor and void the warranty.

Correct Installation

Sensor installed after first filter or water separator

Sensor installed vertically on horizontal

Sensor is within ±15° of vertical

Sensor is not vertical

Horizontal (0°)

Vertical (90°)

75°

105°
Incorrect Installation

Do **NOT** install the sensor on a vertical pipe, upside down or at an angle, as shown below. Do **NOT** let water get into the shaft or head of the sensor as this can damage the sensor or result in incorrect readings.

Step 2 - Choose insertion location, away from obstacles

To achieve and maintain the accuracy stated in the technical data, the sensor must be inserted vertically, on a straight horizontal pipe section away from bends, edges, seams, curve, changes in pipe size, control valves, etc. The sensor can **not** be installed directly on the outlet of the compressor.

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

Pipe obstructions (eg bends, edges, seams, curve, 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.

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

**WARNING!** Inaccurate measurement may occur if the sensor is installed incorrectly

- Pay careful attention to the distance between the sensor's inlet and outlet sections and points of turbulence (eg bends, valves, etc)
- Obstructions can cause counter-flow turbulence as well as turbulence in the direction of the flow.
- The sensor is for indoor use only. If installed in an outdoor installation, the sensor must be protected from sun and rain.
The figure below shows the **minimum** distances (in multiples of pipe diameters (DNs)) that the sensor must be installed away from bends, changes in pipe size and other obstructions. In general:

- The inlet side of the sensor must be at least 20 to 50 times the pipe diameter away from the obstruction (depending on the type of obstruction – see figure below).
- The outlet side of the sensor must be at least 5 times the pipe diameter away from the obstruction.

**Correct Installation**

1. **Reduction**  
   - 20 x DN  
   - 5 x DN

2. **Expansion**  
   - 25 x DN  
   - 5 x DN

3. **90° Bend or T-piece**  
   - 20 x DN  
   - 5 x DN

4. **2 x 90° Bend**  
   - 25 x DN  
   - 5 x DN

5. **2 x 90° Bend (3 dimensional)**  
   - 40 x DN  
   - 5 x DN

6. **Control valve or pressure regulator**  
   - 50 x DN  
   - 5 x DN

**Incorrect Installation**

- Need at least 30 DN (25 DN on the inlet side + 5 DN on the outlet side, see picture 4 above)
- Only 20 DN is available.
- Therefore the sensor should not be installed in this location

- Need at least 50 DN on the inlet side (see picture 6 above)
- Only 25 DN is available
- Therefore the sensor should not be installed in this location

**DN = Pipe Diameter**
Examples

Example 1 – Installation near a bend

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

Using the reference diagrams on page 11, the sensor installation is similar to diagram 3 (90° Bend or T-piece). Therefore, the sensor must be installed:

- on a straight section of pipe
- the Inlet side of the sensor must be at least 20 x DN away from the bend.
- the outlet side of the sensor must be at least 5 x DN away from any other obstruction.

For pipe with DN 50 (2“ or 50 mm pipe), the sensor must be installed:

- Inlet side: 20 x 2“ = 40” (imperial) or 20 x 50 mm = 1,000 mm = 1 meter (metric) away from the bend.
- Outlet side: 5 x 2“ = 10” (imperial) or 5 x 50 mm = 250 mm (metric) from any other obstruction.

Example 2 – Installation near an S-Bend and a Control Valve

A flow sensor will be installed on a section of pipe near an s-bend (2 x 90° bends) and a control valve (see diagram on the right). The pipe has a DN of 50 (ie, it’s a 2 inch or 50 mm pipe).

Using the reference diagrams on page 11, the sensor installation is a combination of diagram 4 (2 x 90° Bends) and diagram 6 (Control Valve). Since the sensor is adjacent to the control valve, we will use those dimensions. The sensor must be installed:

- on a straight section of pipe
- the Inlet side of the sensor must be at least 50 x DN away from the control valve.
- the outlet side of the sensor must be at least 5 x DN away from any other obstruction.

For pipe with DN 50 (2“ or 50 mm pipe), the sensor must be installed:

- Inlet side: 50 x 2“ = 100” (imperial) or 50 x 50 mm = 2,500 mm = 2.5 meter (metric) away from the control valve.
- Outlet side: 5 x 2“ = 10” (imperial) or 5 x 50 mm = 250 mm (metric) from any other obstruction.
A flow sensor will be installed on a section of pipe between a bend and an expansion joint (as shown in the diagram on the right). This section of pipe is 1 meter long. The pipe has a DN of 50 (ie, it's a 2 inch or 50 mm pipe) and is being expanded to an 80 DN pipe (ie a 3" pipe).

Using the reference diagrams on page 11, the sensor installation is similar to diagram 3. Therefore, the sensor must be installed:

- on a straight section of pipe
- the Inlet side of the sensor must be at least 20 x DN away from the bend.
- the outlet side of the sensor must be at least 5 x DN away from the expansion joint.

For pipe with DN 50 (2" or 50 mm pipe), the sensor must be installed:

- Inlet side: 20 x 2" = 40" (imperial) or 20 x 50 mm = 1,000 mm = 1 meter (metric) away from the bend.
- Outlet side: 5 x 2" = 10" (imperial) or 5 x 50 mm = 250 mm (metric) from any other obstruction.

Therefore, the total length of pipe needs to be at least 50" long (40" on the inlet side + 10" on the outlet side) or 1.25m long (1 meter on the inlet side + 0.25 meters of the outlet side).

⚠️ Since the pipe is only 1 meter long, and you need at least 1.25m of pipe to install the sensor, you can not install the sensor at this location. If you do, you may end up with inaccurate data.
Step 3 – Install the socket and ball valve

To install the sensor, you need a ball valve or a nozzle with the following specifications:

- The inner thread must be G 1/2"
- The diameter of the hole must be ≥ 13mm, otherwise the shaft can not be inserted into the pipe.

Step 4 – Insert sensor and align tip with the centre of the pipe

Place O-Ring on sensor shaft gland nut.

Screw the sensor into the valve then open the valve.
Step 5 – Align tip with the centre of the pipe

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.

The Insertion Depth = \( x + y = \frac{OD}{2} + y \).

\( OD \) = outer diameter of pipe
\( Y \) = ball valve height.

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.

- Sensor tip too high
- Sensor tip too low
- Sensor tip not in centre of pipe

Example

**Example – Finding the centre of the pipe / tube**

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

The Insertion Depth = \( \frac{OD}{2} + y \) where \( y \) = height of the ball valve.

Therefore, the Insertion Depth = 100mm / 2 + 87mm = 137mm.

Push the sensor shaft into the cooper tube until the “Insertion Depth” reads 137mm at the top of the ball valve.

Push in sensor until Insertion Depth = 137mm
Step 6 – 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 air 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.

**Correct Installation**

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

![Sensor alignment](image)

**Incorrect Installation**

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

![Sensor alignment](image)

Use the alignment tool to align the sensor with the pipe. Ensure the arrows on the sensor match the direction of flow.
Installation – Electrical (Wiring)

The flow sensor is equipped with two M12 connector plugs - “A” and “B”. Cables are connected to the sensor through the M12 connector plugs.

Do not screw the M12 connector using force. Otherwise, it may damage the connection pins.

<table>
<thead>
<tr>
<th>Connector A (Modbus)</th>
<th>Connector B (Pulse &amp; Analogue)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1: RS85, Data + (A)</td>
<td>Pin 1: 4-20mA +</td>
</tr>
<tr>
<td>Pin 2: RS85, Data - (B)</td>
<td>Pin 2: 4-20mA -</td>
</tr>
<tr>
<td>Pin 3: N/A - Not Used</td>
<td>Pin 3: Pulse</td>
</tr>
<tr>
<td>Pin 4: +18-30 vDC</td>
<td>Pin 4: Pulse</td>
</tr>
<tr>
<td>Pin 5: 0 vDC (Ground for Modbus)</td>
<td>Pin 5: N/A - Not Used</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Pin</th>
<th>Pin 1</th>
<th>Pin 2</th>
<th>Pin 3</th>
<th>Pin 4</th>
<th>Pin 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Colour</td>
<td>Brown</td>
<td>White</td>
<td>Blue</td>
<td>Black</td>
<td>Grey</td>
</tr>
</tbody>
</table>
Operating Instructions

Interface

The flow meter has a touch screen interface.

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

To navigate the interface:

- scroll up and down to see other options
- scroll left and right to see other screens
- Press an item to access that feature

Unlock the screen

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 Setting)

Home Screen

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

Menu Options

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
- The Notepad icon ( ) to access the Data Logging information

If you have a micro USB installed, press the USB icon ( ) to safely remove the USB.
## Menu Structure

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<th>Main Menu</th>
<th>Sub Menu 1</th>
<th>Sub Menu 2</th>
<th>Sub Menu 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Notepad   | • Set up Data logging  
                          • Start or stop logging |            |            |
| Eject Micro USB |            |            |            |

### Pipe diameter
- Flow
- Velocity

### Units of measurement
- Consumption
- Pressure
- Temperature

### Gas type
- Logging
- Set up Data logging
- Start or stop logging

### Logging
- History
- Download Data
- Delete Data

### Screen Shot
- Export Pictures
- Delete Picture

### Normalisation

### Settings

#### RS485 Settings
- Baud Rate
- Parity
- Stop Bits
- Response Delay
- Device Address

#### Analog Output
- 4-20mA Channel
- 4-20mA Scaling
- Pulse Out Mode
- Cubic Meter / Pulse

#### System Settings
- Screen Settings
- Screen Rotation
- Screen Brightness
- Screen Lock
- Language Setting
- System Information
- System Update

#### Advanced Settings
Settings Menu

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

- Move the page up and down to see other settings.
- Press an item to access that setting.

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 systems settings.

1. Screen name
2. Screen options. Press an item to access that setting.
3. Scroll bar

Setting Up the Flow Meter

⚠️ Before you use the flow meter, you must set:

- Inner Pipe Diameter
- Unit of Measurement
- Gas Type
- Communication settings (RS485 or Analog)

Inner Pipe Diameter

To change the Pipe Diameter, go to Settings (       ) > Pipe Diameter.

To change the Inner Pipe Diameter:

- Press the diameter size, in millimeters (mm)
- Enter new diameter for the inner pipe
- Press OK

Press the arrow (         ) to return to the previous screen.

⚠️ Pipe diameter in the settings menu refers to Inner Pipe diameter. Not the outer diameter.
Unit of Measurement

To change the Unit of Measurements, go to Settings ( ) > Unit Setting.

You can change the units of measurement for Flow, velocity, consumption and temperature.

To change the units of measurement:
- Select the desired unit of measure
- Press the arrow ( ) to save your setting and return to the previous screen.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>Nm³/h, Nm³/min, Nm³/s</td>
</tr>
<tr>
<td></td>
<td>NL/min, NL/s, Ncfm</td>
</tr>
<tr>
<td></td>
<td>Kg/h, Kg/min, Kg/s</td>
</tr>
<tr>
<td>Velocity</td>
<td>Nm/s, Nft/s</td>
</tr>
<tr>
<td>Consumption</td>
<td>m³, ft³, kg</td>
</tr>
<tr>
<td>Pressure</td>
<td>Pa, hPa, kPa, Mpa</td>
</tr>
<tr>
<td></td>
<td>mbar, Bar, PSI</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C, °F</td>
</tr>
</tbody>
</table>

Gas Type

To change the Gas type, go to Settings ( ) > Gas Type.

To change the gas type:
- Select the desired gas type
  - You might need to scroll up or down to see all options
- Press the arrow ( ) to save your setting and return to the previous screen.

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.

You can select from the following gas types:
- Air,
- Argon (Ar),
- Carbon Dioxide (CO2),
- Helium (He),
- Hydrogen (H2),
- Nitrogen (N2),
- Nitrous oxide (N2O),
- Oxygen (O2)
Communication Settings

RS485 Setting

- Baud Rate: 9600
- Parity: None
- Stop Bits: 1
- Response Delay: 0

To change the Modbus settings, go to Settings ( ) > RS485 Setting.

Here you can set / change the:
- Baud Rate
- Parity
- Stop Bits
- Response Delay
- Device Address

Scroll up or down to see all options.

To change the RS485 settings:
- Press the setting you want to change
- Select the desired setting,
  - You might need to scroll up or down to see all options
- Press the arrow ( ) to save settings and return to the previous screen

Default Modbus settings are:
- Baud Rate: 9600
- Parity: None
- Stop Bit: 1
- Response Delay: 0
- Device Address: 1

For more Modbus settings, refer to the next page.

Analog Output

- 4-20mA Channel: 0–300
- Pulse Out Mode: 1
- Cubic Meter/Pulse: 1

To change the Analog (4-20mA) settings, go to Settings ( ) > Analog Output.

Here you can set / change:
- Which measurement is transmitted via the analog channel
  - Only one measurement can be transmitted via the analog setting
- The scaling
- The pulse out mode
  - Choose from Actual Consumption or Normalised Consumption
- Cubic meter / Pulse

To change the 4-20mA Channel:
- Press 4-20mA Channel
- Select Flow, Velocity, Pressure or Temperature
- Press the arrow ( ) to save settings and return to the previous screen

To change the Scaling:
- Press 4-20mA Scaling
- Set the Low number
- Set the High number
- Press Set
- Press the arrow ( ) to save settings and return to the previous screen
To change the Cubic Meter / Pulse (Consumption):

- Press Cubic Meter / Pulse
- Set number of cubic meters per pulse
- Press the arrow (     ) to save settings and return to the previous screen

Default Modbus Settings

Settings can be changed to suit system requirements

<table>
<thead>
<tr>
<th>Holding Register Address</th>
<th>Data Type</th>
<th>Byte Length</th>
<th>Description</th>
<th>Unit</th>
<th>Read / Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>FLOAT</td>
<td>4</td>
<td>Flow</td>
<td>m³/min, m³/hr, CFM</td>
<td>Read</td>
</tr>
<tr>
<td>2</td>
<td>FLOAT</td>
<td>4</td>
<td>Velocity</td>
<td>m/sec or f/sec</td>
<td>Read</td>
</tr>
<tr>
<td>8</td>
<td>FLOAT</td>
<td>4</td>
<td>Temperature</td>
<td>°C or °F</td>
<td>Read</td>
</tr>
<tr>
<td>10</td>
<td>FLOAT</td>
<td>4</td>
<td>Pressure</td>
<td>Pa, bar, PSI</td>
<td>Read</td>
</tr>
<tr>
<td>24</td>
<td>UNSIGNED INTEGER</td>
<td>4</td>
<td>Consumption/Totaliser</td>
<td>m³ or CF</td>
<td>Read</td>
</tr>
<tr>
<td>41</td>
<td>FLOAT</td>
<td>4</td>
<td>Atmosphere Pressure</td>
<td>kPa</td>
<td>Read/Write</td>
</tr>
</tbody>
</table>

Default Modbus RTU (RS485) Settings

<table>
<thead>
<tr>
<th>Address</th>
<th>Baud Rate</th>
<th>Frame / Parity / Stop Bit</th>
<th>Response Time</th>
<th>Response Delay</th>
<th>Frame Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9600</td>
<td>8 / N / 1</td>
<td>1 Sec</td>
<td>0 Milliseconds</td>
<td>7 Characters</td>
</tr>
</tbody>
</table>

Communication Configuration

<table>
<thead>
<tr>
<th>Holding Register</th>
<th>Address</th>
<th>Byte Length</th>
<th>Description</th>
<th>Default</th>
<th>Read / Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>50</td>
<td>2</td>
<td>Restart device</td>
<td></td>
<td>Write</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Write “1” to restart device</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>51</td>
<td>2</td>
<td>Device address (1-247)</td>
<td>1</td>
<td>Read/Write</td>
</tr>
<tr>
<td>53</td>
<td>52</td>
<td>2</td>
<td>Baud Rate</td>
<td>9600</td>
<td>Read/Write</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 = 1200 bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 = 2400 bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>48 = 4800 bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>96 = 9600 bps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>144 = 14400 bps</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|   |   |   | 192 = 19200 bps  
384 = 38400 bps  
560 = 56000 bps  
576 = 57600 bps  
1152 = 115200 bps |
|---|---|---|---|
| 54 | 53 | 2 | Parity  
0 = None  
1 = Odd  
2 = Even |
| 55 | 54 | 2 | Stop Bit  
1 = 1 bit  
2 = 2 bit |
| 56 | 55 | 2 | Response Time Out  
0 – 255 mm  
1 ms / step  
Value range: 0 - 255 |
|   |   |   | 0 (None)  
1 bit  
0 | Read/Write  
Read/Write  
Read/Write |
Data Logging

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

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

Set up Data Logging

To set up data logging:

- Enter a Descriptive Name for the data
- 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, temperature, pressure, normalised flow, normalised velocity, normalised consumption, density
- 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 (          ) to save settings and return to the previous screen

Start / Stop Logging

- Press the Notebook icon (        ) on 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

- Press the History option.
- Select the data to download
- Insert a micro USB into the back of the flow sensor
- Press Export
- Press the arrow (          ) to save settings and return to the previous screen

The Data will download as a CSV file.

Delete Data

To delete historical data records

- Press the History option.
- Select the data to delete
- Press Delete
- Press the arrow (          ) to save settings and return to the previous screen
System Settings

Under System Settings, you can:

- Change Screen Settings:
  - Screen rotation
  - Screen brightness
  - Timing for screen lock
- Change the Language
  - Chinese
  - English
- View system information
- Update the Flow Meter's firmware

To access the screen settings, go to the Settings Menu ( ) > System Setting > Screen Setting.

**Rotate the screen 90 degrees**

- To rotate the screen 90 degrees, press the rotate button.
- Keep pressing to rotate to 180 degrees, 270 degrees and 360 degrees.

**Change Screen Brightness**

- To change the screen brightness, drag the bar left or right

**Change Screen Timeout**

The screen is set to automatically lock after 60 seconds.

- To change the timing, move the dial up or down.
- You can set the screen to never lock.

Press the arrow ( ) to save settings and return to the previous screen.
System Settings > Language Setting

To access the language settings, go to the Settings Menu ( ) > System Setting > Language Setting.

To change the language:

- Select the desired language
- Press the arrow ( ) to save settings and return to the previous screen

System Settings > System Information

This screen displays information about the sensor and its firmware.

- **Serial Number** = Short serial number of the unit. The full serial number is on the label on top of the sensor
- **Hardware Version** and **Software Version** for both the sensor technology and the display unit.

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

System Settings > System Update

Firmware updates are generally not required.

If a new version of the firmware is released, your local dealer will send the software to you on a micro USB.

To update the firmware:

- Plug the micro USB 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
Other Settings

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 Micro USB into the back of the flow sensor
- Press the Option icon
- Select the images you want to download
- Press the Export icon

Normalization

Normalization is only used if the flow meter is installed under conditions that differ from the standard calibration.

To access the Normalization settings, go to the Settings Menu ( ) > Normalization.

It is not recommended to change these settings. Only experienced users should change these settings.

Press the arrow ( ) to return to the previous screen.

Normalization default setting:

- Temperature = 20°C
- Pressure = 100 kPa

Advanced Settings

If you need to access the advanced settings, please contact your local dealer. Alternatively, contact Compressed Air Alliance.
Warranty

Compressed Air Alliance provides a 12-month warranty for all Flow Meters. The warranty covers material and workmanship under the stated operating conditions from the date of delivery. Please report any issues 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 (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. By using insertion style flow meters wherever possible, you can install and remove them without the need for shutting the system down, virtually eliminating any lost production time caused by periodic maintenance.

We recommend you calibrate the sensor every 2 years. The calibration is excluded from the product warranty. For more information, please contact Compressed Air Alliance.

Need help?

Contact your local dealer.

Alternatively, contact Compressed Air Alliance via:

- Phone (Australia): 1300 558 526
- E-mail: sales@compressedairalliance.com
- Website: www.compressedairalliance.com
Technical Support

Questions

I can't see all menu items

The touch screen doesn't work

Help! My sensor is in the wrong language.

My sensor isn't reading correctly

How do I clean the sensor?

I can't see all menu items

On some menus, you will need to scroll up and down to see all items. This is indicated by a scroll bar on the right side of the screen.

The touch screen doesn't work

If the touch screen doesn't work:

1. Clean the screen

2. Make sure the Screen Lock is off.
   - If the lock screen symbol is present, press the symbol, hold and drag it to the right of the screen.

3. Use your finger to touch the screen.
   - The touch screen does not work if you use finger nails or pens.

4. Try pressing harder, or softer
Help! My sensor is in the wrong language.

If you need to change the language:

**Step 1 – Unlock Screen**

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

If the screen lock symbol is not present, skip this step.

**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.

**Step 3 – Go to Settings**

Click on the Settings icon on the top right of the home page.
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.
My sensor isn’t reading correctly

If your sensor is not reading the correct values, follow these steps.

1. Make sure the sensor is suitable for your system. Refer to the “Specifications” section for details.
2. Make sure the sensor is calibrated. Sensors should be calibrated every 2 years. Contact your local dealer or Compressed Air Alliance for calibration.
3. Make sure the sensor tip is free of contamination.
4. Make sure the sensor is installed correctly. Refer to “Installation – Mechanical” for more information. The sensor should be installed vertically to the pipe, away from obstructions. Typical installation errors include:
   - Installing sensor upside down or at an angle
   - Installing sensor too close to bends and other obstructions
   - Sensor tip is not in the center of the pipe, e.g., too low or too high
   - Installing sensor in the opposite direction to the gas flow
   - Installing sensor directly on the outlet of the compressor
   - Gas flow rate too low. Note: below 10 Nm/s the flow meter reading will be zero
5. Make sure the sensor is wired correctly. Refer to “Installation – Electrical (Wiring)” section for more information.
6. Make sure the following sensors settings are correct:
   - Inner Pipe diameter (not outer diameter)
   - Unit of Measurement
   - Gas Type
   - Communication settings (RS485 or Analog)

   Refer to the “Setting Up the Flow Meter” and “Communication Settings” sections for more information.
7. If you have adjusted Normalization or Advance Settings, reset these to factory default.
   - Normalization default setting: Temperature = 20°C and Pressure = 100 kPa.
8. Is your associated equipment compatible with the flow meter?

If you are still having problems, contact your local dealer or Compressed Air Alliance.

How do I clean the sensor?

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.
# Commissioning Report

## About the Sensor

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(eg FLP100001)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installed by</th>
<th>Installed On</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(date)</td>
</tr>
</tbody>
</table>

## Installation

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
<th>Yes</th>
<th>NA</th>
<th>No</th>
<th>Comments</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flow meter installed in correct location and orientation?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Flow meter installed away from obstructions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sensor tip aligned with center of pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sensor aligned with direction of gas flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Electrical wiring checked</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Sensor settings configured for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inner pipe diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- unit of measurement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- gas type and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- communications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Modbus settings checked</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Readings (flow, velocity, consumption &amp; temperature) visible on display</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Inner Pipe Diameter:  
Gas Type:  
Unit of Measurement: