Thank you for purchasing your liquid meter.

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Recalibrate your flow meter every year.
Annual calibration is required to ensure the continued certainty of readings and to extend the Limited Lifetime Warranty. Fill out the Service Request Form at alicat.com/service, or contact us directly.

Serial #: ___________________________ Next Calibration: ___________________________

This device comes with a NIST traceable calibration certificate.

This device conforms to the European Union’s Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2011/65/EU.

This device complies with the requirements of the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU and carries the CE Marking accordingly.

This device complies with the requirements of the European Union’s Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC
Using Laminar Liquid Flow Devices

THE DEVICE IS CONFIGURED FOR ONE TYPE OF LIQUID, AND MUST USE ONLY THAT LIQUID TO FUNCTION PROPERLY. By default, liquid devices are configured only for use with pure water, such as distilled, de-ionized, Type I (Ultrapure), Type II, and Type III. If the device was specifically engineered for use with a different liquid, any other liquid will produce incorrect readings. Contact support (page 2) with any questions.

Ensure minimal contaminants or liquid variations. For water devices, **DO NOT** use tap water or water with any biological components, minerals, or oils. Any of these substances will affect the viscosity of the liquid, creating flow measurement inaccuracies. More importantly, these impurities will quickly build up in the laminar flow zone, cause corrosion, and degrade the measurement accuracy of the device.
Serial Communication

Establishing Communication
Polling Mode
Streaming Mode
Taring
Collecting Flow Data
Quick Command Guide

Troubleshooting

Maintenance
Cleaning
Recalibration

Engineering Units
Flow Units
Totalizer Units
True Mass Units
Time Units
Temperature Units
Pressure Units

Pinouts
8-Pin Mini-DIN (Default)
Locking Industrial Connector Pinout
9-pin D-Sub Connector Pinouts
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Additional Information for
CSA and ATEX Approved Devices
Limited Lifetime Warranty
Introduction

Your new flow meter has a variety of innovative features:

- **1000 readings per second** ensures high resolution data.
- **Monitor pressure and temperature** during flow measurement. View internal stream gauge pressure and temperature.
- **Backlit display with adjustable contrast** is easy to read in direct sunlight. In dimly lit areas, press the bottom-center logo to turn on the backlight (see page 8).
- **Log data to your PC.** Talk to the flow meter over a serial data connection to capture all flow data, for logging and analysis purposes (see page 23).

This manual covers the following instruments:

- Liquid flow meters
- Portable liquid flow meters
- Flow meters for aggressive liquids
- Portable flow meters for aggressive liquids
- Devices labeled as approved for CSA Class 1 Div 2 and ATEX Class 1 Zone 2 hazardous environments. See page 38 for Special Conditions regarding the use of CSA/ATEX labeled devices.
Getting Started
Getting to Know Your Liquid Flow Meter

Connectors and Buttons
The drawings below represent a typical configuration of a standard liquid flow meter, and a standard battery-powered liquid flow meter. Your flow meter’s appearance and connections may differ.
The Flow Meter Display
The figure below identifies the various features of the flow meter display. Press the button behind the Alicat logo to toggle the backlight on and off.

Live data is measured 1000 times per second and typically displayed 10 times per second on the device LCD screen.

Engineering units are used by the meter in its serial communications and calculations. These can be different from button units, which are the units being displayed. These are individually configurable.

1. Highlights pressure in the center of the meter. Push a second time to choose the pressure parameter (if available), or to select pressure engineering units (page 13).

2. Highlights temperature. Push a second time to select temperature engineering units (page 13).

3. TARE FLOW tare the flow rate (see page 17).

4. Highlights volumetric flow rate. Push a second time to select volumetric flow rate engineering units (page 13).

5. TOTAL/MENU Accesses the optional flow totalizer (page 14). MENU enters the Menu system (page 17).

7. Toggles the backlight. See more display options on page 22.

Status Messages
ADC Analog-digital converter error
LCK Front display is locked
OVR Totalizer rolled over to zero
POV Pressure over range of device
TMF Totalizer missed out of range flow
TOV Temperature over range of device
VOV Volumetric flow over range of device
Mounting

All liquid meters have mounting holes for convenient attachment to flat panels. No straight runs of pipe are required upstream or downstream. Meters are position insensitive and can be mounted in any orientation.

- For applications that may continuously introduce occasional air bubbles to the flow stream upstream of the device, the device may be mounted upside down to prevent the bubbles from becoming trapped in the differential pressure sensor ports. Tare the device after changing its position or orientation.

- If the device has been installed upside down, avoid using the bleed screws as liquid may leak into the electronics housing causing permanent damage that is not covered under warranty!

Process Ports

Your flow meter has been shipped with plastic plugs fitted into its ports. To lessen the chance of contaminating the flow stream, do not remove these plugs until you are ready to install the device.

Standard liquid flow meters have female inlet and outlet ports. Welded VCR® and other specialty fittings may have male connections.

- If you are using a fitting that does not have a face seal, use thread-sealing Teflon tape to prevent leakage around the port threads, but do not wrap the first two threads. This will minimize the possibility of getting tape into the flow stream and clogging the laminar flow elements (LFE).

- If you are using a fitting that has a face seal, there is no need to apply Teflon tape to the threads.

- When changing fittings, carefully clean the port threads.

**Warning:** Do not use pipe dopes or sealants on the process connections, as these compounds can cause permanent damage to the meter should they get into the flow stream.

Filters

When pressure drop is not an issue, use in-line sintered filters to prevent large particulates from entering the flow meter. Suggested maximum particulate sizes are as follows:

- ≤100 ccm flow range: **20 microns**
- >100 ccm flow range: **40 microns**

- Avoiding long runs of small-diameter tubing upstream or downstream of the device will reduce liquid hammer.
Operating Pressure

Maximum operating line pressure is **100 PSIG**. If the line pressure is higher than 100 PSIG, use a pressure regulator upstream to reduce the pressure. Maximum proof pressure is 200 PSIG; above this pressure the device may be permanently damaged. Although the meter’s operation is unidirectional, reversing the flow direction will inflict no damage as long as the maximum specified limits are not exceeded.

CAUTION! Exceeding the maximum specified line pressure may cause permanent damage to the solid-state differential pressure transducer.

Optimizing Pressure

Smooth and consistent source pressure is highly preferable, as fluctuations in pressure may cause readings to jump. A volume partially filled with air placed between the pressure source and flow meter will often help dampen oscillations in feed pressure.

Bleed Ports

Liquid flow meters include bleed ports (8-32 Nylon tapped screw) on the front for the removal of air bubbles. Bleed both of the ports as follows:

A small amount of liquid will leak from the device during this procedure. Take necessary precautions to prevent damage to anything nearby.

1. With the meter installed and line pressure applied, gently loosen the upstream bleed port screw 1 or 2 turns, or until liquid begins to leak from the threads. **Do not remove the screw.**
2. Gently tapping the flow body (screwdriver handles work well) will bump air bubbles out, though it may not be visible or audible.
3. Gently tighten the screw until the leakage stops, taking care not to crush the nylon tip.

If your device is mounted in an inverted position, avoid using the bleed screws as liquid may leak and cause permanent damage.

\[\frac{5}{64}\] 8-32 Nylon-tipped hex bleed screw

Loosen to bleed liquid, but do not remove
Power and Signal Connections

Power can be supplied to your meter through either the power jack or the multi-pin connector on top of your device.

* Meter power jacks require a 9–24 Vdc power supply with a 2.1 mm female positive center plug capable of supplying at least 40 mA, with an additional 40 mA for a color display. 4–20 mA analog signal outputs require at least 12 Vdc and 80 mA, and 0–10 Vdc outputs require at least 12 Vdc.

Standard 8-Pin Mini-DIN Pinout

For 6-pin locking industrial connector, M12, DB9, and DB15 pinouts, see page 33 or visit alicat.com/pinouts.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Cable Color</th>
<th>Function</th>
</tr>
</thead>
</table>
| 1   | Black       | Not connected
    |             | Optional: 4–20 mA primary output signal |
| 2   | Brown       | Static 5.12 Vdc
    |             | Optional: Secondary analog output
    |             | (4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc) or basic alarm |
| 3   | Red         | Serial RS-232RX input signal
    |             | Optional: RS-485 A |
| 4   | Orange      | Remote tare (ground to tare) |
| 5   | Yellow      | Serial RS-232TX output signal
    |             | Optional: RS-485 B |
| 6   | Green       | 0–5 Vdc
    |             | Optional: 1–5 Vdc or 0–10 Vdc) output signal |
| 7   | Blue        | Power in (as described above) |
| 8   | Purple      | Ground (common for power, digital communications, analog signals, and alarms) |

*Caution:* Do not connect power to pins 1 through 6, as permanent damage can occur. It is common to mistake Pin 2 (5.12 Vdc Output) as the standard 0–5 Vdc analog output signal. Pin 2 is normally a constant 5.12 Vdc that reflects the system bus voltage.
RS-232 or RS-485 Digital Signals
To use the RS-232 or RS-485 digital signal, connect the Output Signal (Pin 5), the Input Signal (Pin 3), and Ground (Pin 8) to your serial port as shown below. See page 23 for details on how to use the data connection to issue commands.

DB9 to 8-Pin Mini-DIN Connection for RS-232 or RS-485 Signals

<table>
<thead>
<tr>
<th>9-Pin Serial Connection</th>
<th>8-Pin Mini-DIN Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin</td>
<td>Function</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Transmit</td>
</tr>
<tr>
<td>2</td>
<td>Receive</td>
</tr>
</tbody>
</table>

Analog Signals

Primary Analog Output Signal
Most devices include a primary analog output signal, which is linear over its entire range. For ranges that start at 0 Vdc, a zero-flow condition is indicated at approximately 0.010 Vdc. Full scale flow is indicated by the top of the range: 5 Vdc for 0–5 Vdc, 20 mA for 4–20 mA signals, and so on.

Using Ground to Tare
You can tare your liquid flow meter remotely by momentarily grounding Pin 4, as shown below. When the switch is closed, the device will tare, and resume operation once the switch has been released. You can also tare with the front controls (page 17) or serial commands (page 25).

DB9 and other pinouts can be found on page 33.
Engineering Units
The flow meter’s units of measurement are handled in two ways:

**Button engineering units** are the units of measurement shown on the front display. At right, they are PSIG (pressure), °C (temperature), and CCM (flow rate).

**Device engineering units** are the units of measurement used for calculation and sent through a serial data connection. These may be different from the displayed button engineering units, if the user so chooses.

Selecting Engineering Units
If a parameter is already highlighted in the center of the screen, pressing that measurement’s button again will bring up a menu to modify either the button engineering units or the device engineering units.

If the device and button engineering units are the same (below left) when entering the Engineering Units menu, it will offer to change button engineering units or device engineering units. Device engineering units can also be set in the Basic Configuration menu (page 19).

If the device and button engineering units are different (below right) when entering the menu, it will offer to change the button engineering units (Set button eng units), or to change the button units to match the device engineering units (Show device units).
Option: Collecting Totalized Flow Data

Your liquid flow meter may have been purchased with a flow totalizer. It displays the total amount of volume that has flowed through the instrument since its last reset, like a gasoline pump. You can access the totalizer screen by pressing **TOTAL/MENU** on the Main Display.

**Totalizer (Optional)**

1. **TOTAL/TIMER** toggles totalized flow and elapsed time as the parameter highlighted in the center.
2. **VPEAK** displays the maximum flow rate since the last reset. Press to select engineering units.
3. Displays live flow rate. Press to select engineering units.
4. **RESET** clears all totalized data and immediately resets the timer to 0 while totalization continues.
5. **TOTAL/MENU** enters the menu system (page 17). Then, press **MAIN** to exit to the Main Display of live data.

- The main display shows either time since reset, or totalized flow.
- **VAVG**: Optionally shows the live average flow rate since the last reset, just above the main display.

**Totalizer Rollover Functions**

The totalizer is configured to report up to 7 digits. By default, the placement of the decimal is the same as the live flow rate, but can be configured at the time of order for the following behaviors.

- **Rollover (default)**: Totalizer resumes counting from 0 as soon as the maximum count has been reached.
- **Freeze**: Totalizer stops counting at max count, until it is reset manually.
- **Error (default)**: Displays **OVR** when maximum count has been reached; compatible with Rollover and Freeze.

The elapsed time counter has a maximum value of 9999:59:59 (h:m:s) (416 days, 16 hours). If flow is still being totalized at that point, the timer freezes, regardless of the behavior chosen above for the totalized flow readings.
Option: Charging Your Portable Flow Meter

Portable meters’ batteries are partially charged before shipping. When fully charged, and with the backlight set to 10, typical battery life is 18 hours with a monochrome display, or 8 hours with a TFT color display. Dimming the backlight will increase battery life.

When the battery indicator is completely empty, about 15 minutes of battery life remains.

Charge the liquid flow meter using the supplied USB cable (micro-B to type A) or a similar cable. You may charge the liquid flow meter using any USB outlet on a computer or portable power supply, but charging will be fastest (approximately 3.5 hours) when connected to the supplied 2.0A power supply.

The red indicator LED on top of the device lights up red to indicate that the unit is charging. The red LED turns off when the battery is charged.

Your flow meter may be used while it is charging. If the battery has been fully depleted, you may need to charge the flow meter for a full minute before the device can be turned on.

![Charging Indicator]

**Warning:** The safe charging temperature range is 0–45°C (32–113°F). If internal sensors detect temperatures outside of this range, the battery will not charge.
Option: Color TFT Display

Multi-Color Display Indicators

- **GREEN**: Parameter labels and adjustments associated with the button directly above or below the label are presented in green.
- **WHITE**: Parameters operating under normal conditions.
- **RED**: Parameters with values exceeding 128% of the device’s specifications.
- **YELLOW**: Menu items that are ready to be selected appear in yellow. This color replaces the symbol (>) in selections on monochrome display.

![A TFT screen under normal conditions](image)

Press the bottom-central button to turn off the color display backlight, located below the row of three buttons under the screen. The flow meter remains in operation while the backlight is off.

**LCD Contrast**

LCD contrast is ranged from 0 to 11 on color displays, with 11 indicating the greatest contrast. See page 22.

**Specifications for Instruments with Color Displays**

Color displays will require an additional 40 mA when using a 24 Vdc power supply. All other specifications from your device’s specification sheet remain in effect.
Navigation & Customization

Main Menu
The Main Menu system is accessed by pressing the **MENU** button from the Main Display (page 8).

- **ABOUT** (page 18), **TARES** (see below), **BASIC CONFIG** (page 19), and **ADV SETUP** (page 20) enter their respective menus.
- **MAIN** exits to the Main Display (page 8).

Taring Your Flow Meter
Taring ensures that your liquid flow meter is providing the most accurate measurements possible, by giving it a good zero reference.

How to Tare
1. Ensure that nothing is flowing through the device.
2. **MENU** → **TARE** → **TARE FLOW**. Flow tares should occur at the expected process pressure, as long as there is no flow.
3. **MENU** → **TARE** → **TARE PRESS**. Gauge pressure tares must be done with the meter open to atmosphere.

When to Tare
- Before every new flow measurement cycle
- After significant changes in temperature or pressure
- After dropping or bumping the flow meter
- After installing the meter in a different orientation
Device Information

Menu ➔ About

- **DEVICE INFO** displays serial number, firmware revision, and calibration information.
- **DEVICE STATE** displays diagnostic information for troubleshooting (see below).
- **MFG INFO** displays contact information.
- **BACK** returns to the main menu (page 17).
- **MAIN** exits to the Main Display (page 8).

Menu ➔ About ➔ **Device State**

**Diagnostic Information**

The **DEVICE STATE** screen displays live values for the internal device registers. Many of these values can help support engineers diagnose operational issues over the phone. On the **DEVICE STATE** screen, **PAGE** displays the next page of register values.
Basic Configuration Menu

Engineering Units
Changing device engineering units alters both the display and the serial data frame. First, choose the parameter whose unit you want to change, then select your desired engineering unit, and lastly confirm the change. If your meter has been configured with a flow totalizer, this screen will also include units for totalized volumetric flow, plus elapsed time.
Advanced Setup

Menu ➔ Advanced Setup

• **SENSOR SETUP** (see below), **COMM SETUP** (page 21), and **DISP SETUP** (page 22) enter their respective menus.

• **BACK** returns to the top-level main menu (page 17).

• **MAIN** exits to the Main Display (page 8).

Menu ➔ Advanced Setup ➔ **Sensor Setup**

• **DISPLAY AS ZERO** defines a flow rate under which values are displayed as 0. The maximum zero band is 6.38%.
  **Example:** A 10-LPM meter with a 0.25% zero band would display 0 LPM for all readings below 0.025 LPM.

• **NUM OF DIGITS** sets the number of digits of flow readings to display on-screen, and in the serial data frame. Older devices typically had one less significant digit, and newer devices can be set to match.

• **BACK** returns to the advanced setup menu.

• **AVERAGING** adjusts the time constants of the geometric running averages for flow and pressure. These are changed independently via **PRESS AVG** and **FLOW AVG** in the Averaging Menu. Values roughly correspond to the time constant (in ms) of the averaged values. Higher numbers have a greater smoothing effect on fluctuating readings (255 ms max).

• **MAIN** exits to Main Display (page 8).
Configuring Serial Communications

Menu → Advanced Setup → Comm Setup

Unit ID
The unit ID is the identifier that a computer uses to distinguish your flow meter from other devices when it is connected to a network. Using the unit ID letters A–Z, you can connect up to 26 devices to a computer at the same time via a single COM port. This is called polling mode (page 24). Unit ID changes take effect when you select SET.

If you select @ as the Unit ID, the flow meter enters streaming mode when you exit the menu (page 24).

✓ NOTE: Devices equipped with Modbus RTU will also have a Modbus ID that can be set separately from the unit ID.

Baud Rate
Baud rate is the speed at which digital devices transfer information. The flow meter has a default baud rate of 19200 baud (bits per second). Baud rate changes take effect once you press SET. The computer, device, and software must all have the same baud rate.
Display Setup

Menu → Advanced Setup → Disp Setup

The options in the Display Setup Menu adjust the contrast of the display and enable screen rotation.

- **LCD CONTRAST** sets the contrast level of the display, ranging from 0–31 on monochrome displays, and 0–11 on color displays. Press reset to revert to the default contrast level.

- **POWER UP -DARK-** or **-LIT-** toggles whether the back light of the unit will be on or off when the device powers on. This is not available on color displays.

- **ROTATE DISP** displays a sub-menu to change the screen orientation, by rotating it 180°.

- **BACK** returns to the Advanced Setup menu (page 20).

- **MAIN** exits to the Main Display (page 8).
Serial Communication

Connecting your device to a computer allows you to log the data that it generates. The flow meter communicates digitally through its communications connector and cable using a real or virtual COM port on your computer. This section of the manual shows you how to operate the flow meter using ASCII commands.

Establishing Communication

After connecting your flow meter using a communications cable, you will need to establish serial communications through a real or virtual COM port on your computer or programmable logic computer (PLC).

- If you have connected your device to a serial port, note its COM port number. This can be found in Windows® Device Manager.
- If you have used a USB cable to connect your device to your computer, the computer in most cases will recognize your device as a virtual COM port. If it does not, download the appropriate USB device driver at alicat.com/drivers and note the COM port number as found in Windows® Device Manager.

The meter will be configured with the following settings:

- **Baud**: 19200 (default; others can be used if the computer, its software and the meter are all set to the same rate)
- **Data bits**: 8
- **Parity**: none
- **Stop bits**: 1
- **Flow control**: none

Serial Terminal Application

Alicat’s Serial Terminal is a preconfigured program for serial communications that functions much like the older Windows® HyperTerminal.

Download Serial Terminal for free at alicat.com/drivers. Once downloaded, simply run SerialTerminal.exe. Enter the COM port number to which your device is connected and the baud rate of the flow meter. The default baud rate is 19200, but this is adjustable by entering the SERIAL COMM menu on your flow meter: **MENU → ADV SETUP → COMM SETUP → BAUD** (page 21).
Note: In what follows, ← indicates an ASCII carriage return (decimal 13, hexadecimal D). Serial commands are not case-sensitive.

Polling Mode
Meters are shipped in polling mode with a unit ID of A, unless requested otherwise. Each poll returns one line of data. To poll, simply enter its unit ID.

Poll the device:  [unit ID]←
Example:  a← (polls unit A)

You can change the unit ID of a polling device by typing:

Change the unit ID:  [current unit ID]==[desired unit ID]←
Example:  a@@=b← (changes unit A to unit B)

The front panel menu can also be used to change the unit ID: MENU → ADV SETUP → COMM SETUP → UNIT ID (page 21). Valid IDs are letters A–Z. Up to 26 devices may be connected at a time, as long as each unit ID is unique.

Streaming Mode
In streaming mode, your device continuously and automatically sends a line of live data at regular intervals. Only one unit on a COM port may be in streaming mode at a time.

Note: Streaming mode cannot be used with the Serial Terminal application. It is compatible with many terminal programs such as PuTTY or HyperTerminal®.

To put your flow meter into streaming mode, type:

Begin streaming:  [unit ID]==[desired unit ID]←
Example:  A@@=a← (begins streaming unit A)

This is equivalent to changing the unit ID to “@”. To take the flow meter out of streaming mode, assign it a unit ID by typing:

Stop streaming:  @@= [desired unit ID]←
Example:  @@=a← (stops and assigns unit ID of A)

When sending a command in streaming mode, the flow of data will not stop while the user is typing. This may make the commands you type unreadable. If the device does not receive a valid command, it will ignore it. If in doubt, simply hit ← and start again.

The default streaming interval is 50 ms, but this can be increased by changing Register 91 while the device is in polling mode:

Set streaming interval:  [unit ID]w91= [time in milliseconds]←
Example:  aw91=500← (streams new data every 500 ms)
Taring
Taring flow sets the zero flow reading and must be done when no flow is passing through the flow meter:

Tare flow: [unit ID]v
   Example: av (sets flow reading to zero)

Taring pressure aligns the internal gauge pressure sensor with the current barometric pressure, and must be done with the flow meter open to atmosphere:

Tare gauge pressure: [unit ID]p
   Example: ap

Collecting Flow Data
Collect live flow data by typing the [unit ID] command or by setting your flow meter to streaming. Each line of data for live flow measurements appears in the format below, but Unit ID is not present in streaming mode.

A +14.70 +24.5782 +02.004

Single spaces separate each parameter, and each value is displayed in the chosen device engineering units, which may differ from the engineering units visible on the flow meter display (see page 13). You can query the engineering units of the serial data frame by typing:

Query live data info: [unit ID]??d
   Example: a??d* (returns the data frame descriptions)

Additional columns, including status messages (page 8), may be present after the volumetric flow begins.
Quick Command Guide

Note: Serial commands are not case-sensitive.
In these examples, the unit ID of the flow meter is a.

Change unit ID: [current unit ID]@=[desired unit ID]
   Tare flow: av
   Tare pressure: apc (optional)
Poll the live data frame: a
Begin streaming data: [unit ID]@=@
Stop streaming data: @@=[desired unit ID]
Set streaming interval: aw91=[number of milliseconds]
   Query live data info: a??d*
   Manufacturer info: a??m*
   Firmware version: a??m9
Lock the front display: al
Unlock front display: au

Additional information can be found on our online Serial Primer document, at:

Alicat.com/drivers

If you have need of more advanced serial communication commands, please contact support (page 2).
Troubleshooting

If you run into trouble with your device’s installation or operation, please get in touch with us by phone, chat, or email (see page 2). You’ll also find help on our website alicat.com and in the pages that follow.

General Use

**Issue:** My meter does not turn on or has trouble staying on.  
**Action:** Check power and ground connections. Please reference the technical specifications to assure you have the proper power for your model.  
Portable flow meters run on a rechargeable battery, but you can also connect to a wall outlet or computer using a micro-USB cable. If the battery has been fully depleted, it may take a minute or so to acquire enough charge to turn back on. If your flow meter will not power on after being plugged in for at least 5 minutes, contact support (page 2).

**Issue:** The buttons do not work, and the screen shows LCK.  
**Action:** The flow meter buttons were locked out via a serial command. Press and hold all four outer buttons to unlock the interface.

**Issue:** I can’t read the display easily.  
**Action:** During the day, you can increase the visibility of the display by increasing the contrast (MENU → ADV SETUP → DISP SETUP → LCD CONTRAST). If you are working under low-light conditions, push the logo button located below the display to turn on the backlight (see page 8).

**Issue:** The analog output signal indicates values lower than what appears on my instrument’s display.  
**Action:** Analog signal voltage degrades over long distances. You can minimize this effect by using wires with a heavier gauge, especially in the ground wire.

**Issue:** How often do I need to calibrate my liquid meter?  
**Action:** Annual recalibrations are recommended. Check your flow meter’s last calibration date by selecting MENU → ABOUT → DEVICE INFO. If it is time to recalibrate, request a recalibration at alicat.com/service or get in touch with support (see page 2).
Issue: I dropped my meter. Is it OK? Do I need to recalibrate?
Action: If it turns on and appears to respond normally, then it is probably OK. It may or may not need a recalibration. Give it a tare, and compare it against a known-good flow standard. If it checks out, keep using it, but tell us about the drop at your next annual recalibration so we can check it out for you.

Issue: How can I see temperature, pressure, or flow in different units?
Action: From the main menu, select BASIC CONFIG → DEVICE UNITS. From this menu, you can adjust temperature, pressure, or flow units. For more information, see page 13.

Flow Readings

Issue: The live flow readings won’t settle down.
Action: The flow meter is very fast, so it can detect subtle variations in flow that may go unnoticed by your other flow devices. This sensitivity can help detect problems with pumps or flow controllers. You can lessen this sensitivity by increasing the flow averaging press MENU → ADV SETUP → SENSOR SETUP → FLOW AVG. See page 20. This may also be the result of air bubbles, which can be fixed by using the bleed ports (see page 10).

Issue: My flow readings are negative.
Action: Under conditions of no flow, a negative flow reading can indicate a poor tare. Ensure that the flow meter has no flow passing through it, and select TARE FLOW from the Main Display to give it a fresh tare (page 17).

Issue: My flow readings jump to 0 when flow rates are low.
Action: Your flow instrument is equipped with a programmable zero band that is preset at the factory. Reduce your deadband threshold by selecting MENU → ADV SETUP → SENSOR SETUP → DISPLAY AS ZERO. Note: The zero band threshold has no effect upon the serial data.

Issue: Does the meter work if it is laying down? Will it be accurate?
Action: Yes, but it should be tared after changing their orientation. See page 17 for more on how to tare your device.

Issue: Can I put the meter on top of a vibrating device? Will it be accurate?
Action: Yes, and yes! The flow meter is internally compensated for any changes in orientation, including rapid vibrations. Noise will increase if the flow meter is vibrating.
Issue: My meter does not agree with another meter I have in line.
Action: Liquid flow meters can normally be compared against one another provided there are no leaks between the two meters. One common cause of inaccuracy, inconsistency, or unusual readings is air bubbles trapped in one or both of the legs of the differential pressure sensor. Bleed the ports (see page 10) to remove this possibility. Another possibility is that the liquid has some contaminant or additive, such as antifreeze, that affects the viscosity of the liquid. A third possibility is an improper tare error (see page 17).

Issue: My flow readings won’t change when flow changes.
Action: If your flow readings won’t change regardless of actual flow, check that the tare pin hasn’t been accidentally grounded (page 12). If not, your flow sensor may be damaged. Please contact support (page 2) to troubleshoot.

Serial Communications

Issue: I can’t communicate to the meter when it is connected to my computer.
Action: 1. Make sure the baud rate and other serial settings such as the COM port number is the same one your meter is using (see page 21).
2. Check the flow meter unit ID (also page 23).
3. Check the pinout (see page 33 or alicat.com/pinouts).
4. Make sure the COM number matches the one your software is using to connect to the flow meter (page 23).

Still experiencing issues?

Issue: None of the above helped.
Action: See page 2 for contact information, or visit alicat.com/support.
Maintenance

Cleaning
This device requires minimal maintenance. If necessary, the outside of the device can be cleaned with a soft dry cloth. Avoid excess moisture or solvents.

The primary cause of damage and/or long-term inaccuracy in these devices is contamination and/or corrosion damage. Liquid should be filtered for particulates or biological materials that may grow in the device. When removing these units from the line for any extended period of time, make an effort to remove all of the liquid from the device, as deposits of calcium or other soluble minerals can affect the accuracy of the device.

If you suspect that debris or other foreign material has entered your device, do not take apart the flow body to clean it, as this will negate its NIST-traceable calibration. Please contact us for cleaning.

Recalibration
The recommended period for recalibration is once every year. A label located on the back of the device lists the most recent calibration date. This date is also stored inside your flow meter and is visible by selecting MENU → ABOUT → DEVICE INFO.

When it is time for your flow meter’s annual recalibration, contact us (see page 2) with your serial number.

Replacement Accessories
Accessories are available through support (see page 2), or visiting our website at alicat.com/accessories.

For repair, recalibration, or recycling of this product contact us (see page 2).

Technical Specifications and Dimensional Drawings
Please visit alicat.com/specs to find complete operating specifications and dimensional drawings.
## Engineering Units

### Flow Units

<table>
<thead>
<tr>
<th>Label</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>µL/m</td>
<td>microliter per minute*</td>
</tr>
<tr>
<td>mL/s</td>
<td>milliliter per second</td>
</tr>
<tr>
<td>mL/m</td>
<td>milliliter per minute</td>
</tr>
<tr>
<td>mL/h</td>
<td>milliliter per hour</td>
</tr>
<tr>
<td>L/s</td>
<td>liter per second</td>
</tr>
<tr>
<td>LPM</td>
<td>liter per minute</td>
</tr>
<tr>
<td>L/h</td>
<td>liter per hour</td>
</tr>
<tr>
<td>US GPM</td>
<td>US gallon per minute</td>
</tr>
<tr>
<td>US GPH</td>
<td>US gallon per hour</td>
</tr>
<tr>
<td>CCS</td>
<td>cubic centimeter per second</td>
</tr>
<tr>
<td>CCM</td>
<td>cubic centimeter per minute</td>
</tr>
<tr>
<td>cm³/h</td>
<td>cubic centimeter per hour*</td>
</tr>
<tr>
<td>m³/m</td>
<td>cubic meter per minute*</td>
</tr>
<tr>
<td>m³/h</td>
<td>cubic meter per hour*</td>
</tr>
<tr>
<td>m³/d</td>
<td>cubic meter per day*</td>
</tr>
<tr>
<td>in³/m</td>
<td>cubic inch per minute*</td>
</tr>
<tr>
<td>CFM</td>
<td>cubic foot per minute</td>
</tr>
<tr>
<td>CFH</td>
<td>cubic foot per hour</td>
</tr>
<tr>
<td>CFD</td>
<td>cubic foot per day</td>
</tr>
<tr>
<td>count</td>
<td>setpoint count, 0–64000</td>
</tr>
<tr>
<td>%</td>
<td>percent of full scale</td>
</tr>
</tbody>
</table>

### Totalizer Units

<table>
<thead>
<tr>
<th>Label</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>µL</td>
<td>microliter</td>
</tr>
<tr>
<td>mL</td>
<td>milliliter</td>
</tr>
<tr>
<td>L</td>
<td>liter</td>
</tr>
<tr>
<td>US GAL</td>
<td>US gallon</td>
</tr>
<tr>
<td>cm³</td>
<td>cubic centimeter*</td>
</tr>
<tr>
<td>m³</td>
<td>cubic meter*</td>
</tr>
<tr>
<td>in³</td>
<td>cubic inch*</td>
</tr>
<tr>
<td>ft³</td>
<td>cubic foot*</td>
</tr>
<tr>
<td>µP</td>
<td>micropoise, a measure of viscosity*</td>
</tr>
</tbody>
</table>

### True Mass Units

<table>
<thead>
<tr>
<th>Label</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/s</td>
<td>milligram per second</td>
</tr>
<tr>
<td>mg/m</td>
<td>milligram per minute</td>
</tr>
<tr>
<td>g/s</td>
<td>gram per second</td>
</tr>
<tr>
<td>g/m</td>
<td>gram per minute</td>
</tr>
<tr>
<td>g/h</td>
<td>gram per hour</td>
</tr>
<tr>
<td>kg/m</td>
<td>kilogram per minute</td>
</tr>
<tr>
<td>kg/h</td>
<td>kilogram per hour</td>
</tr>
<tr>
<td>oz/s</td>
<td>ounce per second</td>
</tr>
<tr>
<td>oz/m</td>
<td>ounce per minute</td>
</tr>
<tr>
<td>lb/m</td>
<td>pound per minute</td>
</tr>
<tr>
<td>lb/h</td>
<td>pound per hour</td>
</tr>
</tbody>
</table>

### Time Units

<table>
<thead>
<tr>
<th>Label</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>h:m:s</td>
<td>hours:minutes:seconds</td>
</tr>
<tr>
<td>ms</td>
<td>milliseconds</td>
</tr>
<tr>
<td>s</td>
<td>seconds</td>
</tr>
<tr>
<td>m</td>
<td>minutes</td>
</tr>
<tr>
<td>hour</td>
<td>hours</td>
</tr>
<tr>
<td>day</td>
<td>days</td>
</tr>
</tbody>
</table>

### Temperature Units

<table>
<thead>
<tr>
<th>Label</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>degrees Celsius</td>
</tr>
<tr>
<td>°F</td>
<td>degrees Fahrenheit</td>
</tr>
<tr>
<td>K</td>
<td>Kelvin</td>
</tr>
<tr>
<td>°R</td>
<td>degrees Rankine</td>
</tr>
</tbody>
</table>
## Pressure Units

<table>
<thead>
<tr>
<th>Label</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PaG</td>
<td>pascal</td>
</tr>
<tr>
<td>hPaG</td>
<td>hectopascal</td>
</tr>
<tr>
<td>kPaG</td>
<td>kilopascal</td>
</tr>
<tr>
<td>MPaG</td>
<td>megapascal</td>
</tr>
<tr>
<td>mbarG</td>
<td>millibar</td>
</tr>
<tr>
<td>barG</td>
<td>bar</td>
</tr>
<tr>
<td>g/cm²G</td>
<td>gram force per square centimeter*</td>
</tr>
<tr>
<td>kg/cm²G</td>
<td>kilogram force per square centimeter**†</td>
</tr>
<tr>
<td>PSIG</td>
<td>pound force per square inch</td>
</tr>
<tr>
<td>PSFG</td>
<td>pound force per square foot</td>
</tr>
<tr>
<td>mTorrG</td>
<td>millitorr</td>
</tr>
<tr>
<td>torrG</td>
<td>torr</td>
</tr>
<tr>
<td>mmHgG</td>
<td>millimeter of mercury at 0°C</td>
</tr>
<tr>
<td>inHgG</td>
<td>inch of mercury at 0°C</td>
</tr>
<tr>
<td>mmH₂OOG</td>
<td>millimeter of water at 4°C (NIST conventional)*</td>
</tr>
<tr>
<td>mmH₂OG</td>
<td>millimeter of water at 60°C*</td>
</tr>
<tr>
<td>cmH₂OOG</td>
<td>centimeter of water at 4°C (NIST conventional)*</td>
</tr>
<tr>
<td>cmH₂OG</td>
<td>centimeter of water at 60°C*</td>
</tr>
<tr>
<td>inH₂OOG</td>
<td>inch of water at 4°C (NIST conventional)*†</td>
</tr>
<tr>
<td>inH₂OG</td>
<td>inch of water at 60°C*</td>
</tr>
<tr>
<td>atm</td>
<td>atmosphere</td>
</tr>
<tr>
<td>count</td>
<td>setpoint count, 0–64000</td>
</tr>
<tr>
<td>%</td>
<td>percent of full scale</td>
</tr>
</tbody>
</table>

† Displayed as kg/cmG

* Instances of $\mu$ are displayed as a lower-case $u$; superscript and subscript numerals are displayed as lining (normal) numerals.

** Note: Not all units are available on all devices **
Pinouts

Check the calibration data sheet and pinout for your device. Individual pinouts available at alicat.com/pinout.

See page 11 for additional important information about connecting your device to a computer for serial commands.

8-Pin Mini-DIN (Default)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Cable Color</th>
<th>Function</th>
</tr>
</thead>
</table>
| 1   | Black       | Not connected  
*Optional: 4–20 mA primary output signal* |
| 2   | Brown       | Static 5.12 Vdc  
*Optional: Secondary analog output (4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc) or basic alarm* |
| 3   | Red         | Serial RS-232RX input signal  
*Optional: RS-485 A* |
| 4   | Orange      | Remote tare (ground to tare) |
| 5   | Yellow      | Serial RS-232TX output signal  
*Optional: RS-485 B* |
| 6   | Green       | 0–5 Vdc  
*Optional: 1–5 Vdc or 0–10 Vdc) output signal* |
| 7   | Blue        | Power in (as described above) |
| 8   | Purple      | Ground (common for power, digital communications, analog signals, and alarms) |

⚠️ **Caution:** Do not connect power to pins 1 through 6, as permanent damage can occur. It is common to mistake Pin 2 (labeled 5.12 Vdc Output) as the standard 0–5 Vdc analog output signal. Pin 2 is normally a constant 5.12 Vdc that reflects the system bus voltage.
Locking Industrial Connector Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power In (+)</td>
</tr>
<tr>
<td>2</td>
<td>RS-232TX / RS-485 B</td>
</tr>
<tr>
<td>3</td>
<td>RS-232RX / RS-485 A</td>
</tr>
<tr>
<td>4</td>
<td>Remote Tare (ground to tare)</td>
</tr>
<tr>
<td>5</td>
<td>Ground (common for power, communications, and signals)</td>
</tr>
<tr>
<td>6</td>
<td>Signal Out (Voltage or Current as ordered)</td>
</tr>
</tbody>
</table>

The availability of different output signals depend on the options ordered.
# 9-pin D-Sub Connector Pinouts

## Common 9-pin D-Sub Pinouts

<table>
<thead>
<tr>
<th>Pin</th>
<th>DB9 (Female)</th>
<th>DB9A / DB9K</th>
<th>DB9R</th>
<th>DB9T</th>
<th>DB9U</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Current Out</td>
<td>NC</td>
<td>TX or B</td>
<td>TX or B</td>
<td>RX or A</td>
</tr>
<tr>
<td>2</td>
<td>Analog Out 2</td>
<td>Analog Out</td>
<td>Analog Out</td>
<td>Analog Out</td>
<td>Analog Out</td>
</tr>
<tr>
<td>3</td>
<td>RX or A</td>
<td>Power In</td>
<td>Analog In</td>
<td>Power In</td>
<td>Power In</td>
</tr>
<tr>
<td>4</td>
<td>Analog In</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>5</td>
<td>TX or B</td>
<td>TX or B</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>6</td>
<td>Analog Out</td>
<td>Analog In</td>
<td>RX or A</td>
<td>Analog In</td>
<td>Analog In</td>
</tr>
<tr>
<td>7</td>
<td>Power In</td>
<td>Ground</td>
<td>Power In</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>Ground</td>
<td>RX or A</td>
<td>Ground</td>
<td>RX or A</td>
<td>TX or B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>DB9B</th>
<th>DB9G</th>
<th>DB9H</th>
<th>DB9I</th>
<th>DB9N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analog Out 2</td>
<td>RX or A</td>
<td>TX or B</td>
<td>NC</td>
<td>Power In</td>
</tr>
<tr>
<td>2</td>
<td>Analog Out</td>
<td>Analog Out</td>
<td>Analog Out</td>
<td>Analog Out</td>
<td>Analog In</td>
</tr>
<tr>
<td>3</td>
<td>Power In</td>
<td>Ground</td>
<td>Analog In</td>
<td>Power In</td>
<td>Analog Out</td>
</tr>
<tr>
<td>4</td>
<td>Ground</td>
<td>Power In</td>
<td>RX or A</td>
<td>Ground</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
<td>Ground</td>
<td>Analog Out 2</td>
<td>NC</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>Analog In</td>
<td>TX or B</td>
<td>NC</td>
<td>Analog In</td>
<td>Ground</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
<td>Analog In</td>
<td>Power In</td>
<td>Ground</td>
<td>RX or A</td>
</tr>
<tr>
<td>8</td>
<td>TX or B</td>
<td>Current Out</td>
<td>Ground</td>
<td>RX or A</td>
<td>TX or B</td>
</tr>
<tr>
<td>9</td>
<td>RX or A</td>
<td>Ground</td>
<td>Ground</td>
<td>TX or B</td>
<td>NC</td>
</tr>
</tbody>
</table>

### Key of Terms:

- **Current Out**: Not Connected
- **Analog In**: Remote tare function for meters
- **Analog Out**: 0–5 Vdc Output Signal (1–5, 0–10 Vdc optional)
- **Analog Out 2**: 5.12 Vdc or Optional Secondary Analog Output
- **TX or B**: Serial RS-232TX or RS-485 B
- **RX or A**: Serial RS-232RX or RS-485 A
- **NC**: Not Connected
- **Power In (+Vdc)**: Common for power, digital communications, analog signals, alarms
- **Ground**: Common for power, digital communications, analog signals, alarms
M12 Connector Pinouts
If your device ordered with an M12 connection, please be sure to reference the following pin-out diagram.

![M12 Connector Diagram](image)

Common M12 Pinouts

<table>
<thead>
<tr>
<th>Pin</th>
<th>M12</th>
<th>M12MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0–5 Vdc output signal&lt;br&gt;Optional: 1–5 or 0–10 Vdc</td>
<td>Not connected&lt;br&gt;Optional: 4–20 mA primary output signal</td>
</tr>
<tr>
<td>2</td>
<td>Power in</td>
<td>Static 5.12 Vdc&lt;br&gt;Optional: Secondary analog output (4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc) or basic alarm</td>
</tr>
<tr>
<td>3</td>
<td>Serial RS-232 RX signal&lt;br&gt;Optional: RS-485 A</td>
<td>Serial RS-232 RX signal&lt;br&gt;Optional: RS-485 A</td>
</tr>
<tr>
<td>4</td>
<td>Remote tare (ground to tare)</td>
<td>Remote tare (ground to tare)</td>
</tr>
<tr>
<td>5</td>
<td>Serial RS-232 TX signal&lt;br&gt;Optional: RS-485 B</td>
<td>Serial RS-232 TX signal&lt;br&gt;Optional: RS-485 B</td>
</tr>
<tr>
<td>6</td>
<td>Static 5.12 Vdc&lt;br&gt;Optional: Secondary analog output (4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc) or basic alarm</td>
<td>0–5 Vdc Output Signal&lt;br&gt;Optional: 1–5 or 0–10 Vdc</td>
</tr>
<tr>
<td>7</td>
<td>Ground (common for power, digital communications, analog signals, and alarms)</td>
<td>Power in</td>
</tr>
<tr>
<td>8</td>
<td>Inactive&lt;br&gt;Optionally 4–20 mA primary output signal</td>
<td>Ground (common for power, digital communications, analog signals, and alarms)</td>
</tr>
</tbody>
</table>

---

Due to variance in cable manufacturing, please identify proper wiring/pins via continuity check & color when using blunt cut multi-strand cables.
15-pin D-Sub Connector Pinouts
If your instrument was ordered with a DB15 connection, be sure to check the calibration label on the device or the calibration data sheet and reference the appropriate pinout diagram.

Common 15-pin D-Sub Pinouts

<table>
<thead>
<tr>
<th>Pin</th>
<th>DB15</th>
<th>DB15A</th>
<th>DB15B</th>
<th>DB15H</th>
<th>DB15K</th>
<th>DB15O</th>
<th>DB15S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
<td>NC</td>
<td>NC</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>Analog out</td>
<td>Analog out</td>
<td>Analog out</td>
<td>RX or A</td>
<td>Analog out</td>
<td>NC</td>
<td>Analog out</td>
</tr>
<tr>
<td>3</td>
<td>Ground</td>
<td>Analog in</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>Ground</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>Analog out</td>
</tr>
<tr>
<td>5</td>
<td>Power in</td>
<td>Ground</td>
<td>Power in</td>
<td>Ground</td>
<td>Ground</td>
<td>Power in</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>Ground</td>
<td>NC</td>
<td>Analog out</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>Power in</td>
<td>NC</td>
<td>Ground</td>
<td>Power in</td>
<td>Analog in</td>
<td>NC</td>
</tr>
<tr>
<td>8</td>
<td>Analog in</td>
<td>TX or B</td>
<td>Analog in</td>
<td>NC</td>
<td>Analog in</td>
<td>NC5</td>
<td>Analog in</td>
</tr>
<tr>
<td>9</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
<td>NC</td>
<td>Analog out 2</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>10</td>
<td>Ground</td>
<td>NC</td>
<td>Ground</td>
<td>Analog out 2</td>
<td>NC</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>11</td>
<td>Analog out 2</td>
<td>NC</td>
<td>Analog out 2</td>
<td>Power in</td>
<td>Ground</td>
<td>Analog out 2</td>
<td>Analog out 2</td>
</tr>
<tr>
<td>12</td>
<td>NC</td>
<td>Analog out 2</td>
<td>NC</td>
<td>Ground</td>
<td>Ground</td>
<td>NC</td>
<td>RX or A</td>
</tr>
<tr>
<td>13</td>
<td>RX or A</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>RX or A</td>
<td>NC</td>
<td>Power in</td>
</tr>
<tr>
<td>14</td>
<td>Ground</td>
<td>NC</td>
<td>RX or A</td>
<td>Analog in</td>
<td>TX or B</td>
<td>RX or A</td>
<td>TX or B</td>
</tr>
<tr>
<td>15</td>
<td>TX or B</td>
<td>RX or A</td>
<td>TX or B</td>
<td>TX or B</td>
<td>Ground</td>
<td>TX or B</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Due to variance in cable manufacturing, please identify proper wiring/pins via continuity check & color when using blunt cut multi-strand cables.

Key of Terms:

- **Current Out**: Not Connected
- **Analog In**: Remote tare function for meters
- **Analog Out**: 0–5 Vdc Output Signal (1–5, 0–10 Vdc optional)
- **Analog Out 2**: 5.12 Vdc or Optional Secondary Analog Output
- **TX or B**: Serial RS-232TX or RS-485 B
- **RX or A**: Serial RS-232RX or RS-485 A
- **NC**: Not Connected
- **Power In (+Vdc)**: Common for power, digital communications, analog signals, and alarms
- **Ground**: Common for power, digital communications, analog signals, and alarms
Additional Information for CSA and ATEX Approved Devices

![CE Ex II 3 G CSA logo]

Ex ec IIC T4 Gc  
Sira 19ATEX4045X  
Class I, Division 2, Group A, B, C and D, T4  
24 Vdc, 0.800A maximum • \( T_{\text{amb}} \) −40°C to +60°C

Ex ec IIC T4 Gc  
Class 1, Zone 2 AEx ec IIC T4 Gc  
CSA 08CA2009485X

CSA and ATEX approved devices are equipped with a 6-pin locking industrial connector, but may be ordered with a different locking connector. Please see the pinouts (starting page 33) for your device’s power and signal connections.

CSA certifies the use of this product for general use as well as use in hazardous locations as defined by Class 1 Division 2 Group A, B, C, and D, T4. The examination certificate was issued by the CSA in accordance with accepted practices and procedures. This confirms compliance with the European ATEX Directive or Group II Category 3G equipment.

ATEX certification is indicated by the product label, and not by the statements in this, or any accompanying documentation. To comply with CSA and ATEX certification, devices have special required conditions to stay in compliance:

- When equipment is properly labeled, it is suitable in Class I, Division 2, Group A, B, C, and D, T4.
- Equipment is only certified for use in ambient temperatures from −40°C to +60°C.
- Electrical Rating 24 Vdc, 0.800A max.
- Instruments shall be powered by a CSA certified, UL listed, Class II external power supply suitable for the application.
- Instruments shall be housed in an enclosure with a minimum IP54 rating or location providing equivalent protection.
- Instrument’s final approval shall be provided by the local authority having jurisdiction.

WARNINGS:

EXPLOSION HAZARD – DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.
Limited Lifetime Warranty

**Notice:** Alicat Scientific, Inc. reserves the right to make any changes and improvements to the products described in this manual at any time and without notice. This manual is copyrighted. This document may not, in whole or in part, be copied, reproduced, translated, or converted to any electronic medium or machine readable form, for commercial purposes, without prior written consent from the copyright holder.

**Note:** Although we provide assistance on Alicat Scientific products both personally and through our literature, it is the complete responsibility of the user to determine the suitability of any product to their application.

Alicat Scientific, Inc. warrants to the original purchaser (hereinafter referred to as “Buyer”) that instruments manufactured by Alicat Scientific (hereinafter referred to as “Product”) shall be free from defects in materials and workmanship for the life of the Products.

Under this warranty, the Products will be repaired or replaced at manufacturer’s option, without charge for parts or labor when the Product is carried or shipped prepaid to the factory together with proof of purchase.

The foregoing shall constitute the exclusive and sole remedy in lieu of other remedies of the Buyer for any breach by Alicat Scientific of this warranty to the maximum extent permitted by law.

This warranty does not apply to any Product which has not been installed or used in accordance with the Product operation and installation specifications provided to Buyer verbally or in writing by Alicat Scientific for the proper and normal use of the Product.

Buyer agrees hereunder that Alicat reserves the right to void any warranty, written or implied, if upon Alicat’s examination of Product shall disclose to Alicat’s satisfaction that the Product failure was due solely, or in part, to accident, misuse, neglect, abuse, alteration, improper installation, unauthorized repair or improper testing by Buyer or agent of Buyer.

Alicat Scientific shall not be liable under any circumstances for indirect, special, consequential, or incidental damages in connection with, or arising out of, the sale, performance, or use of the Products covered by this warranty.

Alicat Scientific does not recommend, warrant or assume responsibility for the use of the Products in life support applications or systems.

Alicat’s warranties as herein above set forth shall not be enlarged, diminished or affected by, and no obligation or liability shall arise or grow out of Alicat’s rendering of technical advice in connection with Buyer’s order of the Products furnished hereunder.

If Product becomes obsolete, Alicat Scientific, at its own discretion, reserves the right to repair the Product with available replacement parts or upgrade the Product to a current, commercially available version of the original Product. Should upgrading the Product be deemed necessary by Alicat, Buyer hereby agrees to pay an upgrade fee equal to seventy percent of the retail value of the replacement Product. Alicat Scientific hereunder makes no claim that replacement Products will look, function or operate in the same or similar manner as the original product.

When a Product is returned to Alicat Scientific for recalibration this service is considered normal preventative maintenance. Recalibration of Product shall not be treated as a warranty service unless recalibration of Product is required as the result of repairs to Product pursuant to this Warranty. Failure of Buyer to send Product to Alicat Scientific for recalibration on a yearly basis after a period of 36 months from date of manufacture will remove any and all obligations regarding repair or replacement of Product as outlined by this Warranty to Buyer from Alicat Scientific.

This Warranty is in lieu of all other relevant warranties, expressed or implied, including the implied warranty of merchantability and the implied warranty of fitness for a particular purpose, and any warranty against infringement of any patent.

Continued use or possession of Products after expiration of the applicable warranty period stated above shall be conclusive evidence that the warranty is fulfilled to the full satisfaction of Buyer.

Alicat makes no warranty as to experimental, non-standard or developmental Products.

Accessories purchased from Alicat are not covered by this warranty.

The product complies with the requirements of the Low Voltage Directive 2014/35/EU, the EMC Directive 2014/30/EU and the RoHS Directive 2011/65/EU and carries the CE Marking accordingly. Contact the manufacturer for more information.
Main Menu
Accessible from MENU on the Main Display

- **About (page 18)**
  - Device information
  - Manufacturer information
  - Device state
  - Diagnostic Information

- **Tares (page 17)**
  - How and when to tare
  - Tare pressure
  - Tare flow

- **Basic config (page 19)**
  - Device units
    - Volumetric flow
  - Pressure
  - Temperature

- **Advanced setup (page 20)**
  - Sensor setup
    - Display as 0 (zero band)
  - Number of digits
  - Flow and pressure averaging
  - Communication setup
    - Unit ID
    - Baud
  - Display setup
    - LCD contrast
    - Power-up light
  - Display rotation

- **Main display (page 8)**