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ALICAT SCIENTIFIC

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# OPERATING MANUAL

## FOR PRESSURE GAUGES

Models P · PB · PS · PBS

**Thank you for purchasing your pressure gauge.**

If you have any questions, or if something is not working as expected, please contact us. We are eager to help you in any way possible.

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## Recalibrate your mass flow meter every year.

Annual calibration is necessary to ensure the accuracy of readings, and extend the Limited Lifetime Warranty. Fill out the Service Request Form at alicat.com/service, or contact us directly when it is time for recalibration.

For devices ordered with CSA, ATEX, ISO 17025, or other certifications, please visit alicat.com/certifications. For information about our limited lifetime warranty, visit alicat.com/warranty.

Serial #:_____

Next Calibration: _____

NIST This device comes with a NIST-traceable calibration certificate.

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

CE 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

DOC-MANUAL-P Rev 2, 2021.05.26

# Introduction

Your new pressure gauge has a variety of innovative features:

- **1000 readings per second** guarantees high resolution data, page 8.
- **Backlit display with adjustable contrast** is easy to read even in direct sunlight. In dimly lit areas, press the logo to turn on the backlight, page 13.
- **Connection to a computer** for control and data logging to capture all pressure data for logging and analysis, page 14.

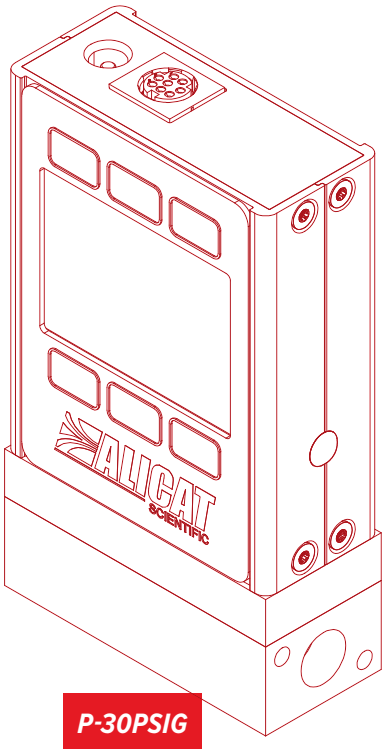
## This manual covers the following instruments:

- **P-Series:** pressure gauges
- **PB-Series:** portable pressure gauges
- **PS-Series:** pressure gauges for aggressive fluids
- **PBS-Series:** portable pressure gauges for aggressive fluids

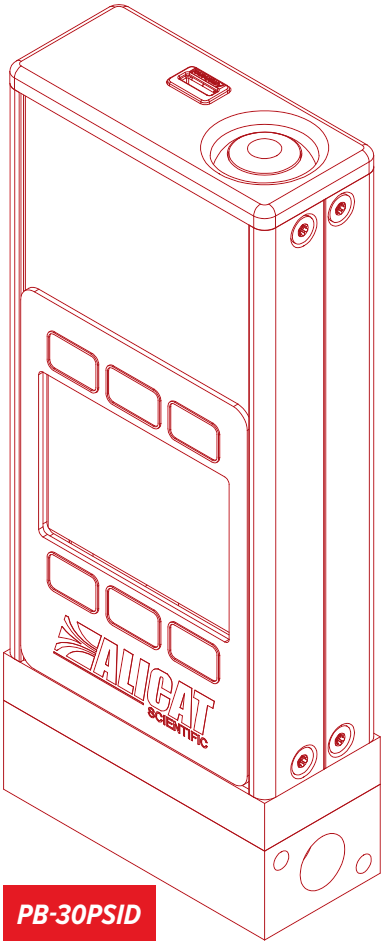
**For support or questions regarding the use or operation of this device, please contact us using the information on page 2.**

Alicat offers countless combinations of device sizes, accessories, connections, and configurations. These custom solutions are offered to meet a variety of application challenges brought forth by users pushing the boundaries of our standard offerings.

If you have an idea for a new process or a challenging application, contact Alicat for specialized engineering and application support.




*P-30PSIG*




*PB-30PSID*

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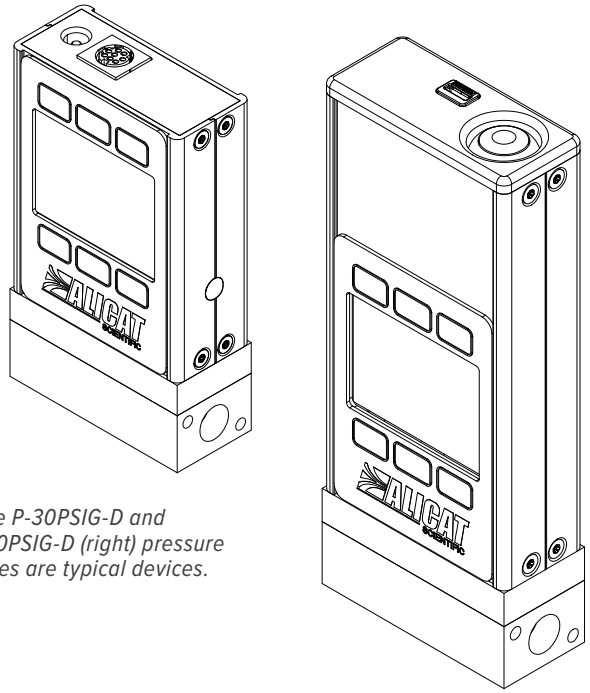
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# Quick Start Guide

## Setup

- **Connect your pressure gauge.**
  - **Absolute and gauge pressure devices** may be connected into your system with the flow going in either direction for ease of viewing the display. These units are shipped with a plug for dead-end applications. This plug should be removed for flow through applications with a 3⁄16″ hex wrench.
  - **Differential pressure devices** have two ports for connection to the points in the system where the differential pressure is to be measured. The upstream port is for the higher pressure and the downstream port is for the lower pressure. In these devices, the differential pressure ports have no flow, and are not connected to the flow path.
- **Choose your engineering units.** You can choose the measurement units by selecting `MAIN MENU` → `SETUP` → `Sensor` → `Engineering Units`, see page 11 for more details.



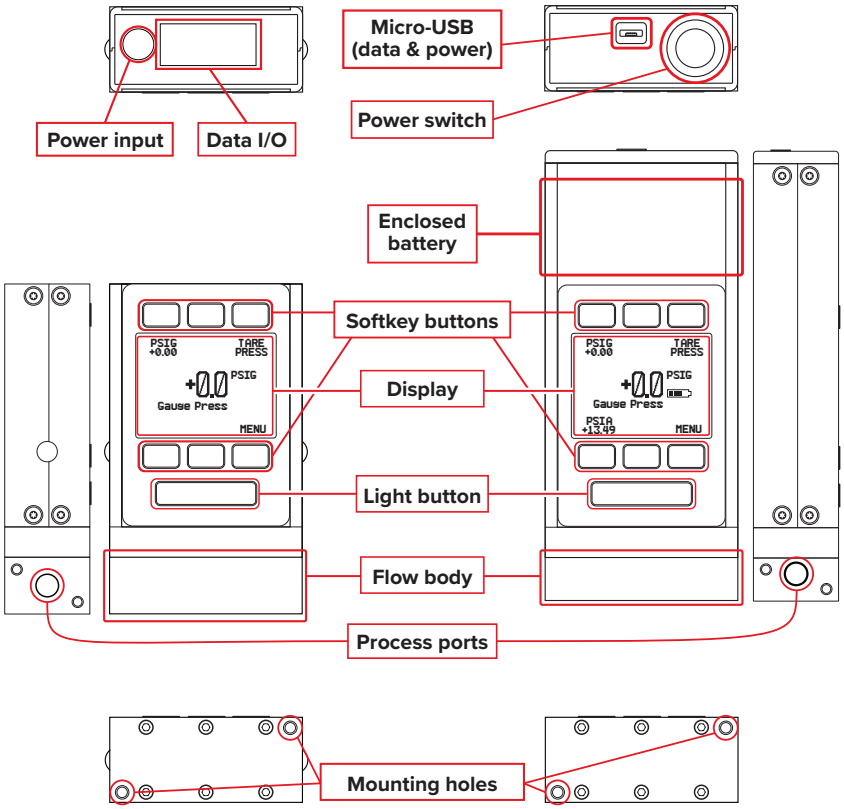
*These P-30PSIG-D and PB-30PSIG-D (right) pressure gauges are typical devices.*

## Operation: Pressure Verification

**Monitor live pressure readings.** Readings are updated and displayed on your device in real time. See page 8.

## Connectors and Buttons

The drawing to the right represents a typical configuration of a standard pressure gauge. **Your pressure gauge's appearance and connections may differ.**




## Backlight

The monochrome display comes equipped with a backlight. **To toggle the backlight power, press the logo on the front of your device.**

For optional color TFT displays, pressing this button will turn off the display to conserve power. See page 9.

## Maintenance and Care

- Pressure gauges do not require cleaning when flowing clean gases. Read more on page 18.
- Calibrate your device annually. To schedule a calibration, please contact support (page 2).

# Getting Started

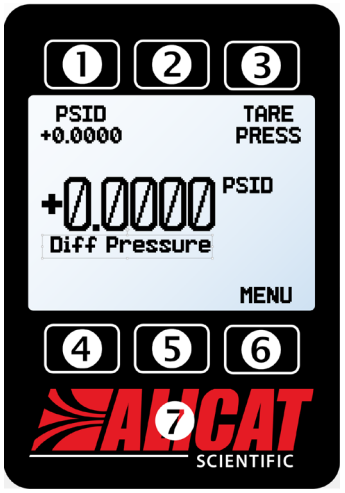
## Getting to Know Your Pressure Gauge

### The Pressure Gauge Display

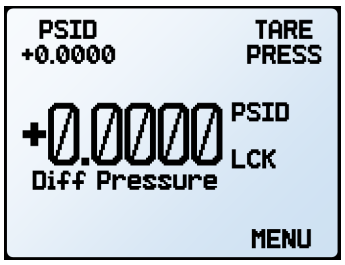
The figure below identifies the various features of the pressure gauge display.

1. Highlights **pressure** in the center of the device.
3. **Tares the pressure** (typically unavailable for absolute pressure devices) (page 15).
6. Enters the **main menu** system (page 8).
7. Toggles the **backlight** (additional display options are on page 13).

**Note:** *Buttons 2, 4, and 5 have no function on the main display for pressure gauges.*




*The **main Display**. Note the button behind the logo, which toggles the device backlight.*




*The **Main Display** with PSID.*

### Status Messages

Status messages are shown to the right of the main readout number. In the example to the right the **LCK** message shows that the front display is locked. Requires a picture to be made.

**ADC** Analog-digital converter error

**LCK** Front display is locked

**POV** Pressure over range of device

## Mounting

Pressure gauges do not require straight runs of pipe upstream or downstream. All pressure gauges can be mounted in any position, including upside-down. Corrosive-resistant pressure gauges use media-isolated sensors that must be tared after changing orientation.



*A default NPT female connection.*

## Filters

When pressure drop is not a concern, use in-line sintered filters to prevent large particulates from entering the pressure gauge. Suggested maximum particulate size for pressure gauges is **40 microns**.

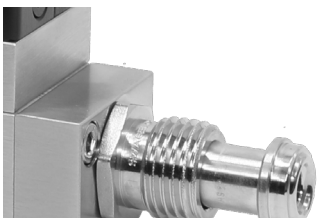
## Device Ports

Your pressure gauge has been shipped with plastic and/or stainless-steel plugs fitted into its ports. To decrease the chance of contaminating the flow stream, do not remove these plugs until you are ready to install the device.

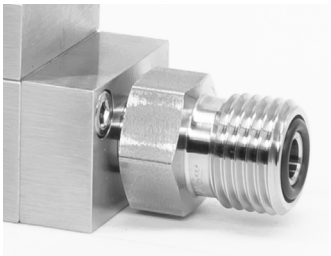
Standard pressure gauges have female inlet and outlet ports. VCR®-compatible and other specialty fittings may have male connections.

- 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.
- Face seal fittings do not need Teflon tape applied to the threads.

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



*A male VCR®-compatible connection.*



*A male VCO®-compatible connection.*

# Connecting Your Pressure Gauge

**Warning:** *Using the pressure gauge above the maximum specified common mode or burst pressure will result in permanent damage to the internal pressure sensors.*

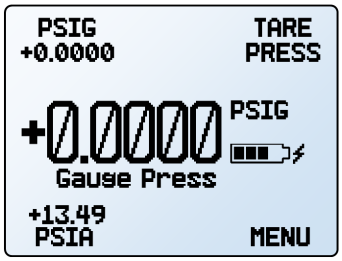
| Range | Burst Pressure | Maximum Allowed Common Mode Pressure *(Differential Pressure Only)* |
|---|---|---|
| 0.07-100 PSI | 3x full scale | 200 PSIG *(750 PSIG for anti-corrosive gauges)* |
| 500 PSI | 1.5x full scale | 750 PSIG |
| 1000-3000 PSI | 1.5x full scale | N/A |

# Option: Charging Your Portable Pressure Gauge

Portable gauges' batteries are partially charged before shipping. 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 displays it is completely empty, about 15 minutes of battery life remain.

Charge the pressure gauge using the supplied USB cable (micro-B to type A) or a similar cable. Any USB outlet will charge the battery, but charging will be fastest (approximately 3.5 hours) when connected to the supplied 2.0 A power supply. The red indicator LED on top of the device indicates that the unit is charging, and turns off when the battery is charged.

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



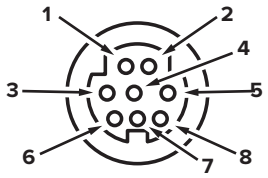

*The **main display** with battery information and an active charging indicator (the lightning bolt).*

**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.*

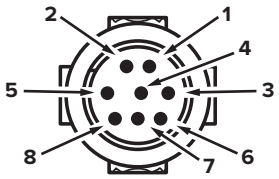
# Power and Signal Connections

Power can be supplied through the power jack or the multi-pin connector on top.

## Standard 8-Pin Mini-DIN Pinout




Female Connector: Device




Male Connector: Cable

| Pin | Cable color | Function |
|---|---|---|
| 1 | Black | Not Connected *Optional: 4–20 mA primary output signal* |
| 2 | Brown | Static 5.12 Vdc by default. *Optional: Secondary analog output (4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc) or basic alarm* |
| 3 | Red | Serial RS-232 RX / RS-485(–) input signal (receive) |
| 4 | Orange | Remote tare (ground to tare) |
| 5 | Yellow | Serial RS-232 TX / RS-485(+) output signal (send) |
| 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) |

*The above pinout is applicable to all devices with the Mini-DIN connector. The availability of different output signals depends on the options ordered. Optional configurations are noted on the unit's calibration sheet.*




*A typical differential pressure gauge with an 8-pin Mini-DIN connector, showing the **Main Display**.*

**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.*

**Note:** *Power requirements may vary. Reference the specification sheet at alicat.com/specs for power requirements.*

More pinout configurations are listed starting on page 20.

## 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-pressure condition is indicated at approximately 0.010 Vdc. Full scale pressure is indicated by the top of the range: 5 Vdc for 0–5 Vdc, 20 mA for 4–20 mA signals, and so on.

### Option: Secondary Analog Output Signal

The default 8-pin Mini-DIN connector places the secondary analog output on pin 2 for both voltage and current signals. The secondary analog signal may differ from its primary output signal. The calibration sheet shipped with the device shows which output signals were ordered.

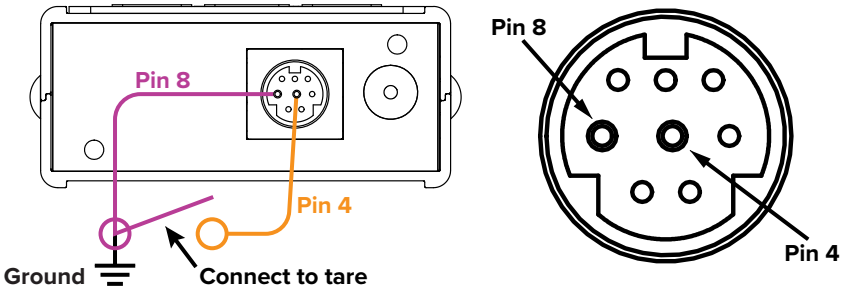
### Option: 4–20 mA Current Output Signal

If your controller has a 4–20 mA current primary or secondary output signal, your pressure gauge will require 15–30 Vdc power.

**Caution:** *Do not connect 4–20 mA devices to "loop powered" systems, as this will damage portions of the circuitry beyond repair and void the warranty. If you must interface with existing loop powered systems, always use a signal isolator and a separate power supply.*

### Using Ground to Tare

You can tare your pressure gauge remotely by momentarily grounding pin 4. When the switch is closed, the device will tare. Operation will resume when the switch is released. You can also tare with the front controls (page 9) or serial commands (page 15).



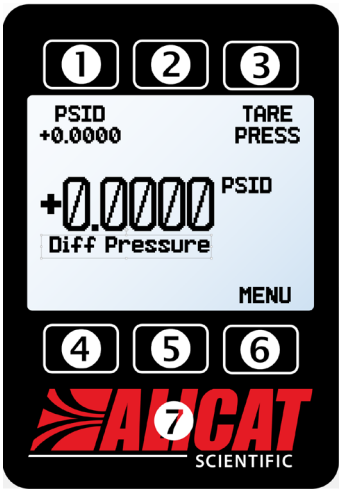
# Displaying Live Data

## Main Display

The Main Display has three primary functions:

- Displaying live pressure data
- Taring the pressure (below)
- Accessing the **main menu** (MENU)

Live data is measured 1000 times per second and the LCD display is updated 10 times per second. The button next to the measurement(s) highlights their values in the center.




*The **Main Display**. Note the button behind the logo, which toggles the device backlight.*

## Taring Your Pressure Gauge

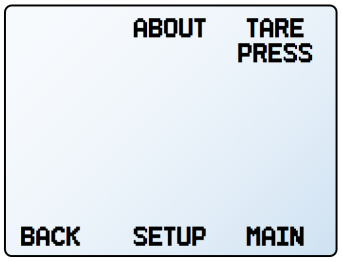
**MENU → TARE FLOW** *or* **TARES**

Taring is an important practice that ensures your pressure gauge is providing its most accurate measurements. This function gives the pressure gauge a zero reference for pressure measurements.

### How to Tare

**MENU → TARES → TARE PRESS**

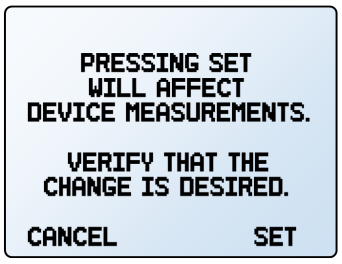
1. Tare pressure gauges with the device open to atmosphere with no flow.
2. Absolute pressure devices can be tared if purchased with the optional internal barometer, and then opened to atmosphere with no flow.
3. Differential pressure devices require zero differential pressure between the P1 and P2 ports. They must be either open to atmosphere on both ports, or connected to the same pressure source.




*Tare the device by selecting **TARE PRESS** from the **main menu**.*

### When to Tare

- Before every new pressure measurement cycle
- After significant changes in temperature or pressure
- After dropping or bumping the pressure gauge
- After installing the gauge in a different orientation




*The **tare confirmation screen**.*

## Option: Color TFT Display

Instruments ordered with a color display are functionally the same as standard backlit monochrome instruments. The color enables additional on-screen information.

### Multi-Color Display Indicators

- **GREEN**: Parameter labels and adjustments associated with the button directly above or below the label are presented in green.
- **WHITE**: The color of each parameter will be displayed in white when the device is operating within device specifications.
- **RED**: The color of a parameter will be displayed in red when its value exceeds 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.



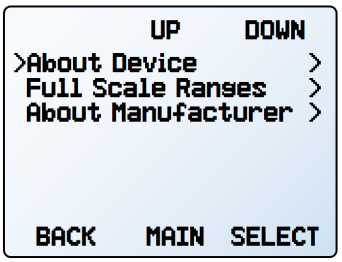

*A TFT color screen.*

**Note:** *Press the logo to turn off the color display backlight. The pressure gauge remains in operation while the backlight is off.*

**Note:** *Color displays will require an additional 40 mA when using a 12 Vdc power supply. All other device specifications from your device's specification sheet remain in effect.*

# Device Information

The **ABOUT menu** (**MENU** → **ABOUT**) contains useful information for setup, configuration, and troubleshooting.



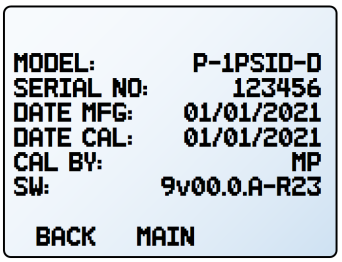

*The **about menu**.*

## Basic Device Information

**ABOUT** → **About Device**

This includes information on the following:

- **MODEL**: Device model
- **SERIAL NO**: Serial number
- **DATE MFG**: Manufacturing date
- **DATE CAL**: The most-recent calibration date
- **CAL BY**: Initials of the person who calibrated the device
- **SW**: The firmware version
- **Display SW** (color displays only): The firmware version of the display

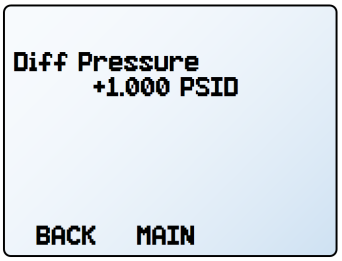



*The **about device screen**.*

## Device Full Scale Ranges

**ABOUT** → **Full Scale Ranges**

This displays the maximum calibrated range of available flow and pressure readings. Most will include only one type of pressure. Devices equipped with an optional barometer will also show absolute, gauge, and barometric pressures.




*The **full scale ranges screen**.*

## Manufacturer Information

**ABOUT** → **About Manufacturer**

**About Manufacturer** usually includes:

- Manufacturer name
- Web address
- Phone number
- Fax number

# Setup

## Sensor Setup

**MENU → SETUP → Sensor**

### Choosing Engineering Units

**SETUP → Sensor → Engineering Units**

Changing device engineering units alters both the display and the data frame. Choose the parameter whose unit you want to change, and then select your desired engineering unit, confirming the change on the last screen. Engineering units are listed on page 19.

### Pressure Averaging

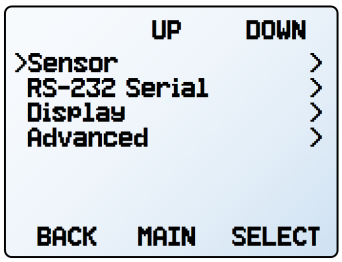
**SETUP → Sensor → Pressure Averaging**

Averaging the pressure over a longer time may be useful in smoothing fluctuating readings. This menu changes the time constant of the geometric running average for pressure. This is changed via **PRESS AVG** in the **averaging menu**, which also displays the current settings. Values roughly correspond to the time constant (in milliseconds) of the averaged values. Higher numbers generate a greater smoothing effect, to a maximum of 255 ms.

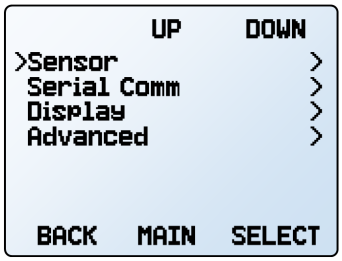
### Zero Band

**SETUP → Sensor → Zero Band**

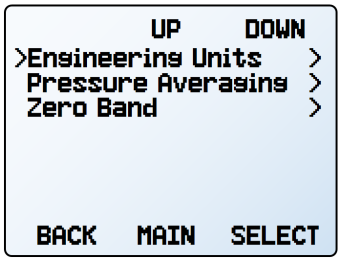
The zero band threshold is an amount of pressure under which pressure values are displayed as 0. The maximum zero band is 6.38%. For example, a 20 PSIG gauge with a zero band value of 0.25% would display all readings below 0.05 PSIG as 0 PSIG.



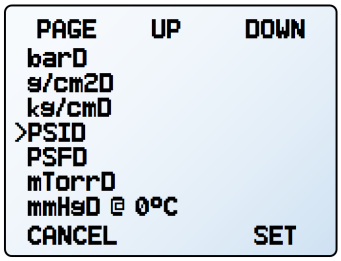

*The **setup menu**.*



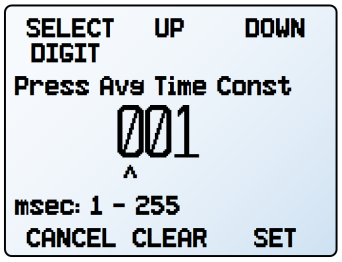

*The **setup menu** on portable devices.*




*The **sensor setup** menu.*




*Engineering unit options (page 19 for a listing).*



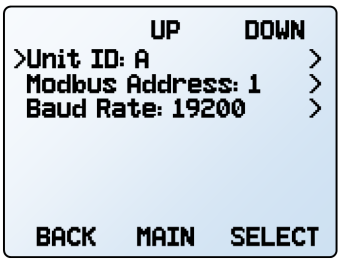

*The pressure averaging menu selection screen.*

# Configuring Serial Communications

**MENU → SETUP → RS-232 Serial *or* RS-485 Serial *or* Serial Comm**

You can operate the pressure gauge remotely via its data connection for easy streaming and logging of all data. Before connecting the device to a computer, ensure that it is ready to communicate with your PC by checking the options in this menu.

**Note:** *Portable devices will have a Serial Comm menu option, instead of RS-232 Serial or RS-485 Serial.*



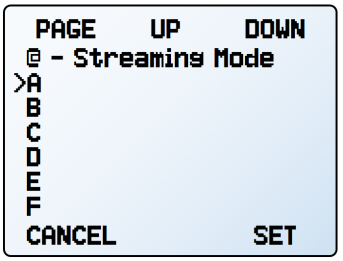

*The **serial communication menu**.*

For more on how to issue commands from a computer, see page 14.

## Unit ID

**SETUP → RS-232 Serial *or* RS-485 Serial *or* Serial Comm → Unit ID**

The unit ID is the identifier that a computer uses to distinguish your device from other, similar 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 14). Unit ID changes take effect when you select **SET**.



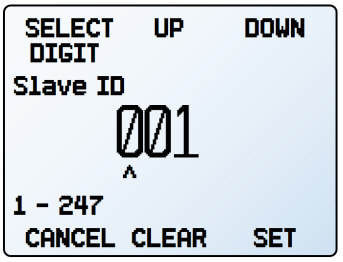

*Choosing a unit ID, or streaming.*

If you select "**@**" as the Unit ID, the pressure gauge will enter **streaming mode** when you exit the menu (page 15).

## Modbus RTU Address

**SETUP → RS-232 Serial *or* RS-485 Serial *or* Serial Comm → Modbus Address**

The Modbus address is the identifier that a computer or programmable logic computer (PLC) uses to distinguish your device from other devices when connected to a Modbus network. Values of 1–247 are available for use.

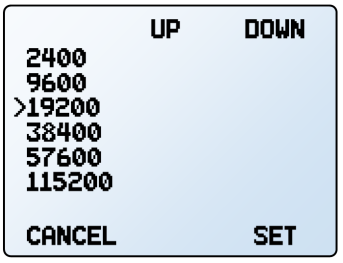



*The **Modbus address menu**.*

## Baud Rate

**SETUP → RS-232 Serial *or* RS-485 Serial *or* Serial Comm → Baud Rate**

Baud rate is the speed at which digital devices transfer information. The device has a default baud rate of 19200 baud (bits per second). If your computer or software uses a different baud rate, you must change the device's baud rate in the **BAUD menu** to ensure they match. Alternatively, you can change your computer's baud rate in Windows® Device Manager. Baud rate changes take effect once you press **SET**, but you may need to restart the software for it to recognize the change.

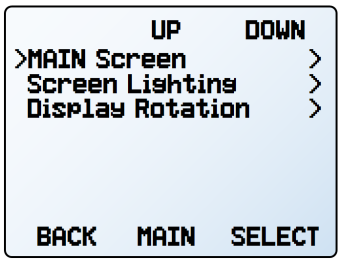



*Baud rate options.*

# Display Setup

**MENU → SETUP → Display**

The options in the **display setup menu** adjust the contrast/brightness of the display and enable screen rotation.

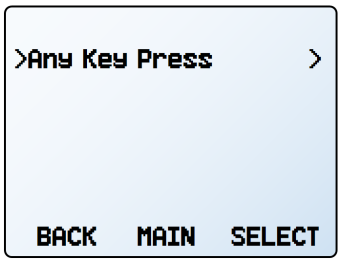



*The **display setup menu**.*

## Main Screen Options

**SETUP → Display → MAIN Screen**

- **Any Key Press** changes what happens when any of the parameter buttons on the **main display** (page 8) are pressed (absolute pressure, for example). By default, these buttons highlight their measurement in the center of the display. If this option is set to **Show Actions Menu**, an option to change that parameter's engineering units will be shown, as well as an option to highlight the parameter.
- **Top Left Key Value** and **Bot Left Key Value** will show if the device has an optional barometer installed. This option configures which type of pressure (barometric, gauge, absolute) is displayed.



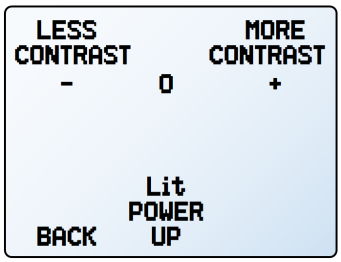

*The options for pressing buttons on the **main display**.*

## Screen Lighting

**SETUP → Display → Screen Lighting**

The options and wording in the **screen lighting menu** will vary for monochrome versus color displays.

- On monochrome displays, press **LESS CONTRAST** or **MORE CONTRAST** to adjust the contrast levels and move the contrast indicator left or right. **POWER UP Lit** or **Dark** toggles whether the backlight of the unit will be on when the device powers on.
- On color displays, press **DIMMER** or **BRIGHTER** to adjust the brightness level and move the brightness indicator left or right.




*The **LCD contrast menu**.*

## Display Rotation

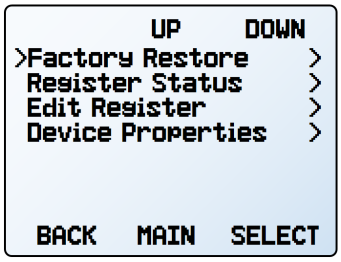
**SETUP → Display → Display Rotation**

The device has the option of inverting (flipping) the screen upside-down, as configured in this menu.

# Advanced Setup

**MENU → SETUP → Advanced**

The **advanced setup menu** contains settings and detailed information that are useful when troubleshooting with customer support.




*The **advanced setup menu**.*

### Factory Restore

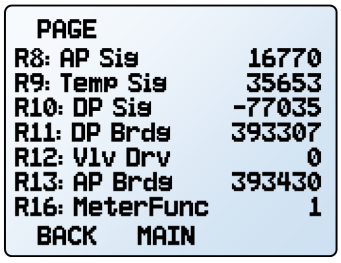
**SETUP → Advanced → Factory Restore**

This will immediately take you to a confirmation screen. When troubleshooting, an applications engineer may recommend doing a **Factory Restore**. If something is not acting as expected, please contact an applications engineer prior to doing a **Factory Restore**.

### Register Status

**SETUP → Advanced → Register Status**

The **Register Status** screen displays live values for the internal device registers. Many of these values can help an applications engineer diagnose operational issues over the phone. Some register values clearly distinguish between hardware and operational problems, which speeds up the troubleshooting process.




*The register status list.*

### Edit Register and Device Properties

**SETUP → Advanced → Edit Register**
**SETUP → Advanced → Device Properties**

**Warning:** *Editing these settings may cause the device to become inoperable. Do not modify them without working with customer support.*

# Serial Communication

Connecting your device to a computer allows you to log the data that it generates. The device 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 device using ASCII commands.

## Modbus RTU Communication

For details on Modbus commands, please visit alicat.com/manuals for the Modbus operating bulletin.

## Establishing Communication

After connecting your device 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 device will be configured with the following settings:

- **Baud:** 19200 (default; others can be used if the computer, its software, and the device 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, functioning 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 device. The default baud rate is 19200, but this is adjustable by entering the **`RS-232 Serial`** menu on your device (page 12).



**Note:** *In what follows, ↵ indicates an ASCII carriage return (decimal 13, hexadecimal D). For many devices, this is the same as pressing the Enter key. Serial commands are not case-sensitive.*

### Polling Mode

Devices 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)

You can also do this via the device's front panel menu (page 12). 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 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.

To put your device into streaming mode, type:

**Begin streaming:** [unit ID]@=@↵
**Example:** A@=@↵ (Begins streaming unit A)

This is equivalent to changing the unit ID to "@". To take the device 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 0.5 s)

# Taring

Taring pressure ensures that the gauge or differential pressure sensor reads zero. Taring an absolute pressure sensor requires a barometer and aligns the absolute pressure sensor with the external barometric pressure. For an accurate tare, a gauge or absolute pressure sensor must be open to atmosphere, while both ports of a differential sensor must be connected to the same pressure source (which may be atmosphere).

**Tare pressure:** [unit ID]p↵
**Example:** ap↵

To tare an absolute pressure device configured with an internal barometer use this command:

**Tare pressure:** [unit ID]pc↵
**Example:** apc↵

Absolute pressure devices will return a **?** if the device is not configured with an internal barometer:

# Collecting Data

Collect live data by typing the [unit ID]↵ command or by setting your device to streaming. Each line of data for live measurements includes the pressure reading, but Unit ID is not present in streaming mode.

**Example:**

```
A   20.00
ID  Pressure
```

Single spaces separate each parameter, and each value is displayed in the chosen device engineering units. 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 codes (page 6), may be present after the last number. The unit ID appears in the data frame only when the device is in polling mode.

# Quick Command Guide

Serial commands are not case-sensitive.

| | |
|---|---|
| **Change unit ID:** | [current unit ID]@=[desired unit ID]↵ |
| **Tare gauge or differential pressure:** | [unit ID]p↵ |
| **Tare absolute pressure:** | [unit ID]pc↵ (requires optional barometer) |
| **Poll the live data frame:** | [unit ID]↵ |
| **Begin streaming data:** | [unit ID]@=@↵ |
| **Stop streaming data:** | @@=[desired unit ID]↵ |
| **Set streaming interval:** | [unit ID]w91=[number of milliseconds]↵ |
| **Query live data info:** | [unit ID]??d*↵ |
| **Manufacturer info:** | [unit ID]??m*↵ |
| **Firmware version:** | [unit ID]??m9↵ |
| **Lock the front display:** | [unit ID]l↵ |
| **Unlock front display:** | [unit ID]u↵ |

*If you require more advanced serial communication commands, please download the serial primer at alicat.com/drivers.*

# Troubleshooting

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

## General Use

**Issue:** ***My device 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 devices 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 device 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 device 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 or brightness (page 13). For monochrome displays under low-light conditions, push the logo button located below the display to turn on the backlight (page 13).

**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 device?***
**Action:** Annual recalibrations are recommended. Check your device's last calibration date by selecting **MENU → ABOUT → About Device**. If it is time to recalibrate, request a recalibration at alicat.com/service or get in touch with support (page 2).

**Issue:** ***I dropped my device. 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 pressure standard you know is accurate. 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 pressure in different units?***
**Action:** From the main menu, select **SETUP → Sensor → Engineering Units**. From this menu, you can adjust pressure units (page 11).

## Pressure Readings

**Issue:** ***The live pressure readings won't settle down.***
**Action:** The device is very fast, so it can detect subtle variations in pressure that may go unnoticed by your other devices. This sensitivity can help detect problems with pumps or other devices. You can lessen this sensitivity by increasing the averaging (page 11).

**Issue:** ***My pressure readings are negative.***
**Action:** Under conditions open to atmosphere, a negative pressure reading can indicate a poor tare. Ensure that the device is open to atmosphere and select **TARE PRESS** from the main display to give it a fresh tare (page 9).

**Issue:** ***My pressure readings jump to zero when pressure is low.***
**Action:** Your device is equipped with a programmable zero band that is preset at the factory. Reduce your deadband threshold by selecting **SETUP → Sensor → Zero Band** (page 11).

**Issue:** ***Does the device work if it is laying down? Will it be accurate?***
**Action:** Yes, but it should be tared after changing its orientation. See page 9 for more on how to tare your device.

**Issue:** ***Can I put the device on top of a vibrating device? Will it be accurate?***
**Action:** Yes, and yes! The pressure gauge is internally compensated for any changes in orientation, including rapid vibrations. Noise will increase if the device is vibrating.

**Issue:** *My pressure gauge disagrees with another device I have in line.*
**Action:** Pressure devices can normally be compared against one another provided there are no leaks between the two devices. Another possibility is an improper tare error (page 9).

**Issue:** *My pressure readings won't change when pressure changes.*
**Action:** If your pressure readings won't change regardless of actual pressure, check that the tare pin hasn't been accidentally grounded (page 8). If not, your pressure sensor may be damaged. Please contact support (page 2) to troubleshoot.

## Serial Communications

**Issue:** *I can't communicate to the device when it is connected to my PC.*
**Action:** **1.** Make sure the baud rate your software and COM port required is the one your pressure gauge is using (**MENU** → **SETUP** → **RS-232 Serial** *or* **RS-485 Serial** → **Baud Rate**).
**2.** Check the unit ID (**MENU** → **SETUP** → **RS-232 Serial** *or* **RS-485 Serial** → **Unit ID**) to make sure you are addressing it properly with your serial commands.
**3.** Check the pinout (common pinouts are listed starting at page 20).
**4.** Make sure the COM number matches the one your software is using to connect to the pressure gauge.
**5.** On the external serial communications device (computer, PLC, *etc.*), be sure that the flow control (handshaking) settings are set as on page 14.

**Still experiencing issues? Please contact support. See "Contact Information" on page 2.**

# 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 causes of damage and/or long-term inaccuracy in these devices are contamination and/or corrosion damage. Fluid should be filtered for particulates or biological materials that may grow in the device.

## 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 device and is visible by selecting **MENU** → **ABOUT** → **About Device**.

When it is time for your device's annual recalibration, contact support (page 2) with your device's serial number and your contact information.

# Reference Information

## Engineering Units

### Pressure Units

| Absolute or Barometric | Gauge | Differential | Notes |
|---|---|---|---|
| PaA | PaG | PaD | Pascal |
| hPaA | hPaG | hPaD | Hectopascal |
| kPaA | kPaG | kPaD | Kilopascal |
| MPaA | MPaG | MPaD | Megapascal |
| mbarA | mbarG | mbarD | Millibar |
| barA | barG | barD | Bar |
| g/cm²A | g/cm²G | g/cm²D | Gram force per square centimeter† |
| kg/cm$^2$A | kg/cm$^2$G | kg/cm$^2$D | Kilogram force per square centimeter* |
| PSIA | PSIG | PSID | Pound force per square inch |
| PSFA | PSFG | PSFD | Pound force per square foot |
| mTorrA | mTorrG | mTorrD | Millitorr |
| torrA | torrG | torrD | Torr |
| mmHgA | mmHgG | mmHgD | Millimeter of mercury at 0°C |
| inHgA | inHgG | inHgD | Inch of mercury at 0°C |
| mm$H_2O$A | mm$H_2O$G | mm$H_2O$D | Millimeter of water at 4°C (NIST conventional)† |
| mm$H_2O$A | mm$H_2O$G | mm$H_2O$D | Millimeter of water at 60°C† |
| cm$H_2O$A | cm$H_2O$G | cm$H_2O$D | Centimeter of water at 4°C (NIST conventional)† |
| cm$H_2O$A | cm$H_2O$G | cm$H_2O$D | Centimeter of water at 60°C† |
| in$H_2O$A | in$H_2O$G | in$H_2O$D | Inch of water at 4°C (NIST conventional)† |
| in$H_2O$A | in$H_2O$G | in$H_2O$D | Inch of water at 60°C† |
| atm | | | Atmosphere |
| m asl | | | Meter above sea level |
| ft asl | | | Foot above sea level |
| V | | | Volt |
| count | count | count | Setpoint count, 0–64000 |
| % | % | % | Percent of full scale |

### Time Units

| Label | Notes |
|---|---|
| ms | Milliseconds |
| s | Seconds |
| m | Minutes |
| hour | Hours |
| day | Days |

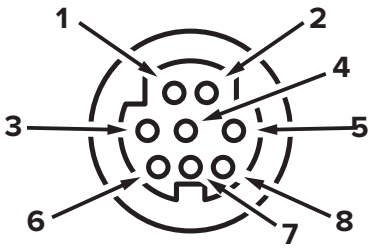
* *Displayed as kg/cmA, kg/cmG, and kg/cmD.*

† *Superscript and subscript numerals are displayed as lining (normal) numerals.*

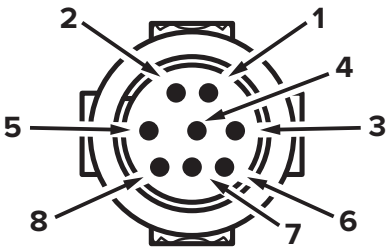
# Pinouts

**Check the calibration data sheet and pinout for your device.**
See page 9 for additional important information about connecting your device to a computer for serial commands. Individual pinouts available at alicat.com/pinout.

## 8-Pin Mini-DIN (Default)



Female Connector: Device

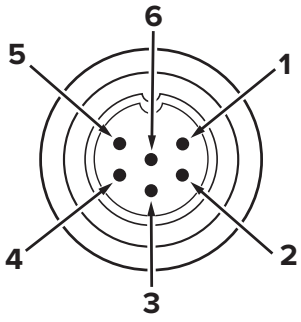


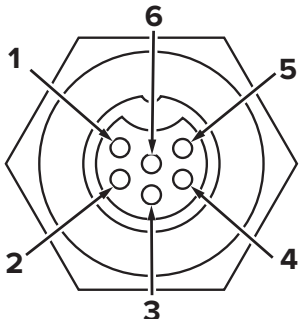
Male Connector: Cable

| Pin | Cable Color | Function |
|---|---|---|
| 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 Analog Out *Optional: 1–5 Vdc or 0–10 Vdc output signal* |
| 7 | Blue | Power In |
| 8 | Purple | Ground (common for power, digital communications, analog signals, and alarms) |

**Warning:** *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.*

## Locking Industrial Connector Pinout

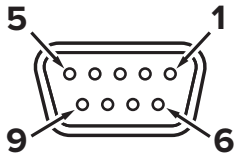


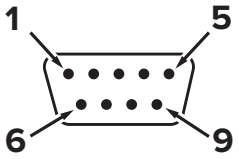

| Pin | Function |
|---|---|
| 1 | Power In (+) |
| 2 | RS-232TX / RS-485 B |
| 3 | RS-232RX / RS-485 A |
| 4 | Remote tare (ground to tare) |
| 5 | Ground (common for power, communications, and signals) |
| 6 | Analog Out (voltage or current as ordered) |

**Note:** *The availability of different output signals depend on the options ordered.*

## 9-Pin D-Sub Connector Common Pinouts



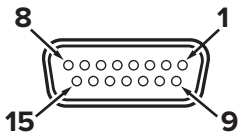
Female Connector



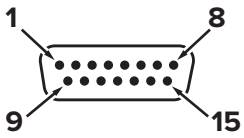
Male Connector

| Pin | DB9 (F) DB9M (M) | DB9A and DB9K | DB9R | DB9T | DB9U | DB9B | DB9G | DB9H | DB9I | DB9N |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Current Out | NC | TX or B | TX or B | RX or A | Analog Out 2 | RX or A | TX or B | NC | Power In |
| 2 | Analog Out 2 | Analog Out | Analog Out | Analog Out | Analog Out | Analog Out | Analog Out | Analog Out | Analog Out | Analog In |
| 3 | RX or A | Power In | Analog In | Power In | Power In | Power In | Ground | Analog In | Power In | Analog Out |
| 4 | Analog In | Ground | Ground | Ground | Ground | Ground | Power In | RX or A | Ground | NC |
| 5 | TX or B | TX or B | NC | NC | NC | Ground | Ground | Analog Out 2 | NC | Ground |
| 6 | Analog Out | Analog In | RX or A | Analog In | Analog In | Analog In | TX or B | NC | Analog In | Ground |
| 7 | Power In | Ground | Power In | Ground | Ground | Ground | Analog In | Power In | Ground | RX or A |
| 8 | Ground | Ground | Ground | Ground | Ground | TX or B | Current Out | Ground | RX or A | TX or B |
| 9 | Ground | RX or A | Ground | RX or A | TX or B | RX or A | Ground | Ground | TX or B | NC5 |

## 15-Pin D-Sub Connector Common Pinouts



Female Connector: Cable



Male Connector: Device

| Pin | DB15 | DB15A | DB15B | DB15H | DB15K | DB15O | DB15S |
|---|---|---|---|---|---|---|---|
| 1 | Ground | Ground | Ground | NC | NC | Ground | Ground |
| 2 | Analog Out | Analog Out | Analog Out | RX or A | Analog Out | NC | Analog Out |
| 3 | Ground | Analog In | NC | NC | NC | NC | NC |
| 4 | NC | Ground | NC | NC | NC | Analog Out | NC |
| 5 | Power In | Ground | Power In | Ground | Ground | Power In | Ground |
| 6 | NC | Ground | NC | Analog Out | NC | NC | NC |
| 7 | NC | Power In | NC | Ground | Power In | Analog In | NC |
| 8 | Analog In | TX or B | Analog In | NC | Analog In | NC5 | Analog In |
| 9 | Ground | Ground | Ground | NC | Analog Out 2 | Ground | Ground |
| 10 | Ground | NC | Ground | Analog Out 2 | NC | Ground | Ground |
| 11 | Analog Out 2 | NC | Analog Out 2 | Power In | Ground | Analog Out 2 | Analog Out 2 |
| 12 | NC | Analog Out 2 | NC | Ground | Ground | NC | RX or A |
| 13 | RX or A | NC | NC | NC | RX or A | NC | Power In |
| 14 | Ground | NC | RX or A | Analog In | TX or B | RX or A | TX or B |
| 15 | TX or B | RX or A | TX or B | TX or B | Ground | TX or B | Ground |

### Key of Terms:

**Analog In**
Remote tare (ground to tare)

**Analog Out**
0–5 Vdc output signal (1–5, 0–10 Vdc optional)

**Analog Out 2**
5.12 Vdc or optional secondary analog output

**Current Out**
Not connected

**NC**
Not connected

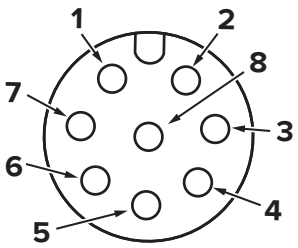
**Power In**
(+Vdc)

**RX or A**
Serial RS-232RX or RS-485 A

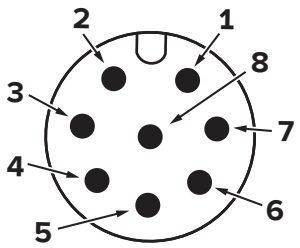
**TX or B**
Serial RS-232TX or RS-485 B

**Ground**
Common for power, digital communications, analog signals, alarms

## M12 Connector Common Pinouts




Female Connector: Cable




Male Connector: Device

| Pin | M12 | M12MD |
|---|---|---|
| 1 | 0–5 Vdc Output Signal<br>*Optional: 1–5 or 0–10 Vdc* | Not Connected<br>*Optional: 4–20 mA primary output signal* |
| 2 | Power In | Static 5.12 Vdc *Optional: secondary analog output (4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc) or basic alarm* |
| 3 | Serial RS-232 RX signal *Optional: RS-485 A* | Serial RS-232 RX Signal *Optional: RS-485 A* |
| 4 | Remote tare (ground to tare) | Remote tare (ground to tare) |
| 5 | Serial RS-232 TX signal<br>*Optional: RS-485 B* | Serial RS-232 TX Signal<br>*Optional: RS-485 B* |
| 6 | Static 5.12 Vdc *Optional: secondary analog output (4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc) or basic alarm* | 0–5 Vdc Output Signal<br>*Optional: 1–5 or 0–10 Vdc* |
| 7 | Ground (common for power, digital communications, analog signals, and alarms) | Power in |
| 8 | Inactive<br>*Optional: 4–20 mA primary output signal* | Ground (common for power, digital communications, analog signals, and alarms) |


PSID
+0.0000
TARE
PRESS
+0.0000
PSID
Diff Pressure
MENU
ALICAT
SCIENTIFIC

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