



Accutron Pro

Technical/Operations Manual



PRELIMINARY

V 0.0.4

For more information on our products visit www.accutroninstruments.com

Contact us by email: info@accutroninstruments.com

Or by Phone: 705-682-0814

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The documentation found within this manual is to provide users of our products with technical information pertaining to the installation, maintenance and setup of the product.

It is forbidden to use any Accutron documentation for any other purpose which may be detrimental to the interests of Accutron Instruments INC.

PLEASE NOTE: This Manual is a work in progress and is being revised regularly. It may not accurately reflect the most up-to-date systems. If you require any assistance in configuring your new Accutron Pro Device, please call our technicians at +1-705-628-0814.

The Manual

Refer to this manual for proper installation, operation, setup and maintenance of the Accutron Pro.

Special attention must be followed to warnings and notices highlighted from the rest of the text to ensure it will stand out.

Warning: Failure to oblige with the necessary precautions can result in death, serious injury, and/or considerable damage to the product.

Note: Important information about the product or that part of the manual, helpful hints, and or troubleshooting advice.

- These instructions do not claim to cover all details or variations in equipment, or to provide for every possible contingency that may arise during installation, operation, setup and maintenance.
- For further information or to resolve issues not covered in the manual, consult the Accutron Technical Service Team.
- The contents of the manual shall not become part of or modify any prior or existing agreement, commitment or relationship.
- The warranty contained in the contract between parties is the sole warranty of Accutron Instruments INC.

IMPORTANT: All specifications are subject to change without notice. Ensure your manual is up to date, the version number can be found on the front page of the manual. If you are unsure please consult the Accutron Technical Service Team.

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Introduction

The Accutron Pro is a true IIOT (Industrial Internet of Things) device. This unit offers system builders unprecedented flexibility for instrument cluster interfacing, both to Industrial DCS as well the World Wide Web. The Accutron Pro is designed to be easy to use and intuitive in its application. It provides a host of “most wanted features” in a single stand-alone product.

Unlike previous gateway and webserver combos, the Accutron Pro is all in one, combining a universal multi-protocol gateway (Modbus RTU & TCP, Ethernet IP™, etc), and integrated web-server that can display user settings for PC browsers or Smartphones. It has a fully compliant HTML5 interface.

The Accutron Pro also has advanced traffic logging that can log Ethernet TCP/IP, as well as traffic on its ports. In time of trouble the technician can access the traffic logs, and spot instrument timeouts, and failures leading to rapid diagnosis of technical malfunctions. All this can be done without interrupting the flow of DCS commands, thanks to the multi-threading capability of the Accutron Pro. In fact, many users can access the Accutron Pro simultaneously.

As new protocols and features are added, Accutron Pro firmware may easily be upgraded. This can be done remotely over the network, or locally by a technician. Simply go to our website: www.accutroninstruments.com and download the latest version available. Within seconds you can flash our device underground from your office and you will be up to date with the latest and greatest version of the Accutron Pro.

If you have any suggestions on improvements of this product, please share it with us. We value your input. This product was designed to be user friendly and we are actively looking on how we can improve our products to satisfy our customers.

Section 1: General Information

Safety Guidelines

This device should only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Information about your Accutron Pro

When you first receive your Accutron Pro device, ensure you record the following information shown below. If you need to contact Customer Service, this information will allow us to provide you more efficient service. This information is located under the Lid of the Accutron Pro.

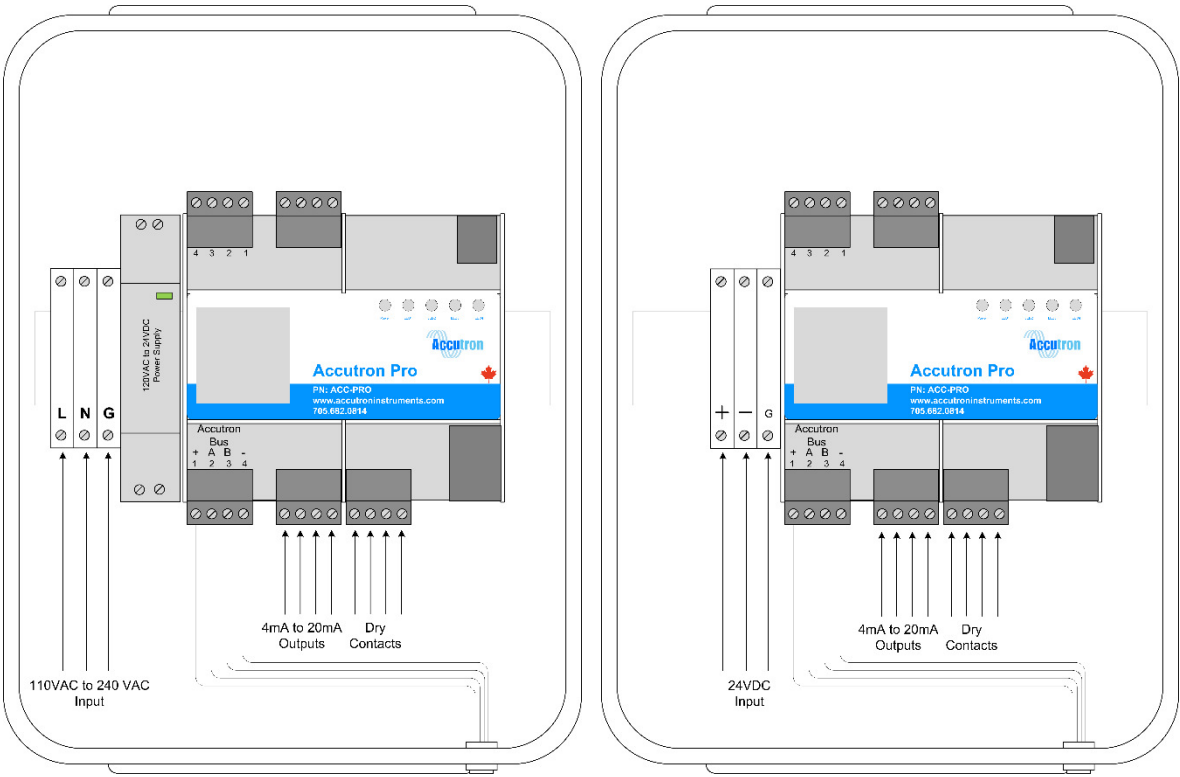
Table: 1.0

Accutron Pro	
Part Number:	
Serial Number:	
MAC Address:	

Section 2: Specifications

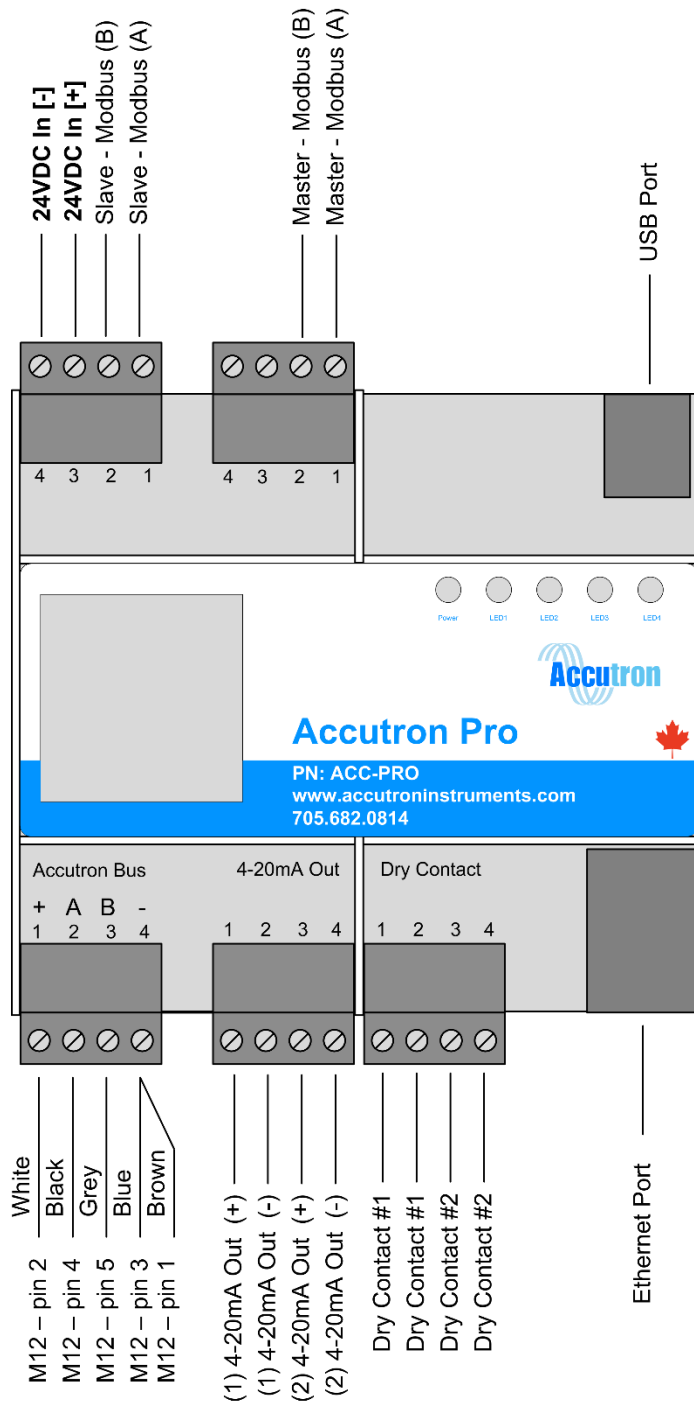
CPU:	ARM® 32bit MCU
Connections:	Pluggable Screw terminal blocks
Input Power:	Terminal blocks: 20 VDC to 48 VDC, 6 watts typical
	PoE: 48V IEEE 802.3af, Mode A & B compatible
Interfaces:	
Ethernet:	Modbus TCP, Ethernet I/P
2x RS-485:	Modbus RTU
Accutron Device Bus:	Airflow sensors, Temperature/humidity sensors, Display
2x 4-20mA outputs:	Non-loop powered (4 wire transmitter)
2x Dry Contacts:	50V AC/DC, 1A Max.
WIFI:	IEEE 802.11 b/g/n, Client Mode (WPA2) and Access point Mode
Enclosure:	Vented
Programming:	Webserver (Network set up via Navigation buttons)
Mounting:	35mm Din rail mounted
Temperature Range:	-40°C to + 80°C
Display:	128 x 128 pixels OLED Color Display
Memory:	2-32GB micro SD card (4GB card included)
Note: Supported web browsers, Firefox v52+, Chrome v57+, Microsoft Edge v80+, Internet Explorer is not supported.	

Section 3: Communication & Power Wiring Diagram



AC Power Input

DC Power Input



4-20mA Notes:

Non-loop powered (4 wire transmitter)

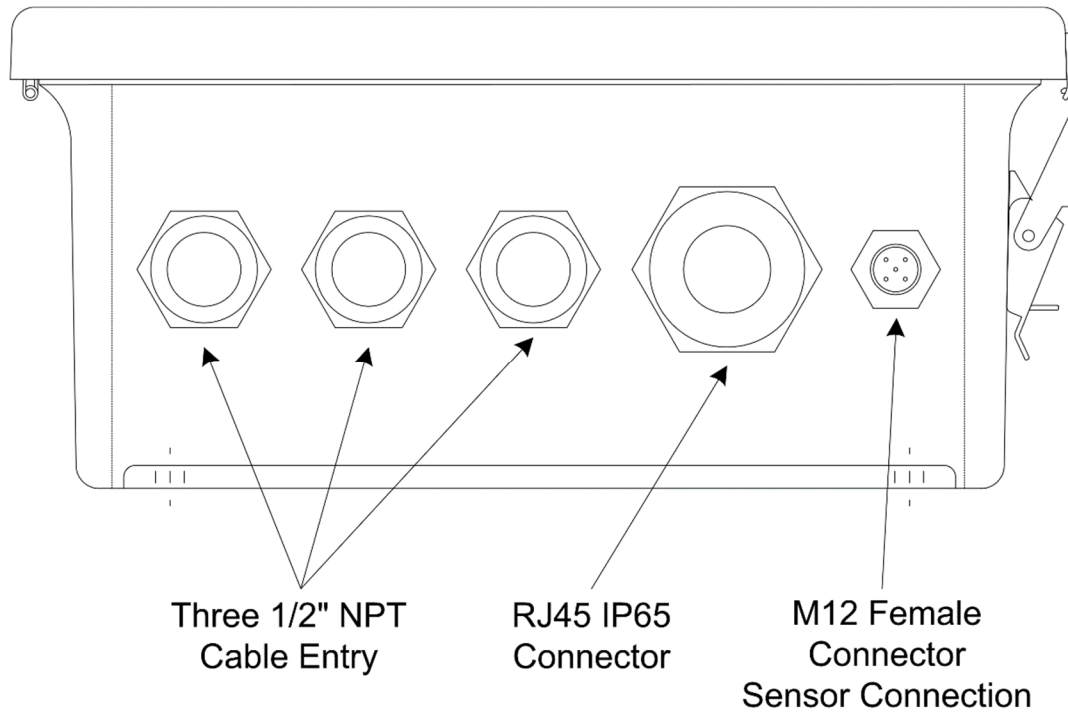
Contact Notes:

Voltage Max: 50V (AC peak or DC)

Current Max: 1A

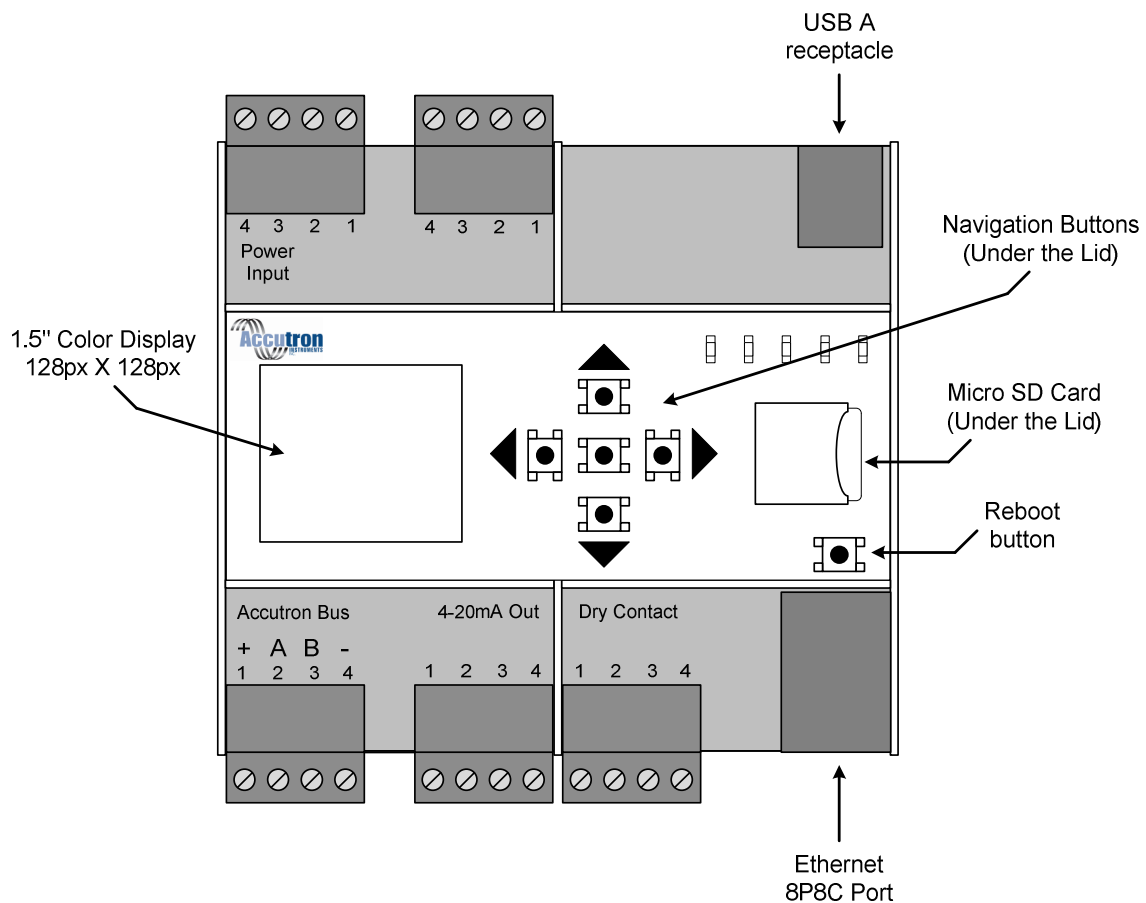
On Resistance: 0.15Ω Typical

Connection Entry Diagram



Bottom View

Section 4: Inside the Enclosure



LED Indicators: Power and 4 user settable LEDs

Micro SD card: The Micro SD card can be inserted and removed from underneath the lid of the enclosure.

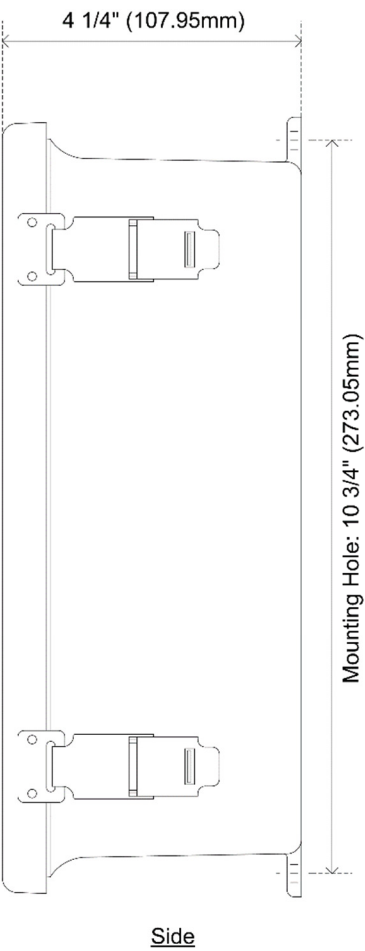
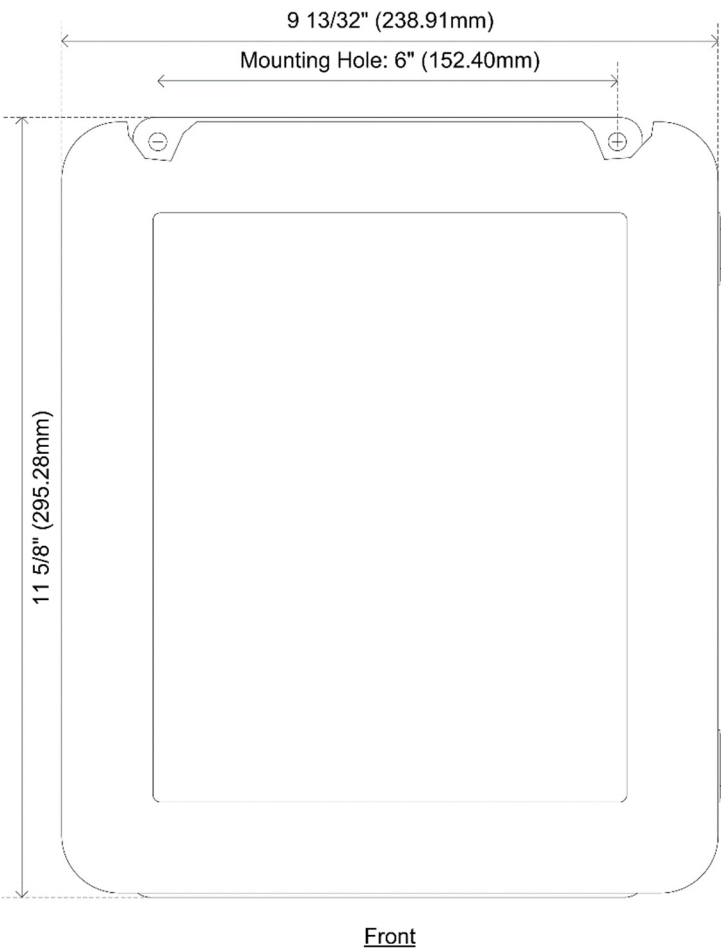
Navigation Buttons: Press and hold the center navigation button to enter the menu.

Color Display:

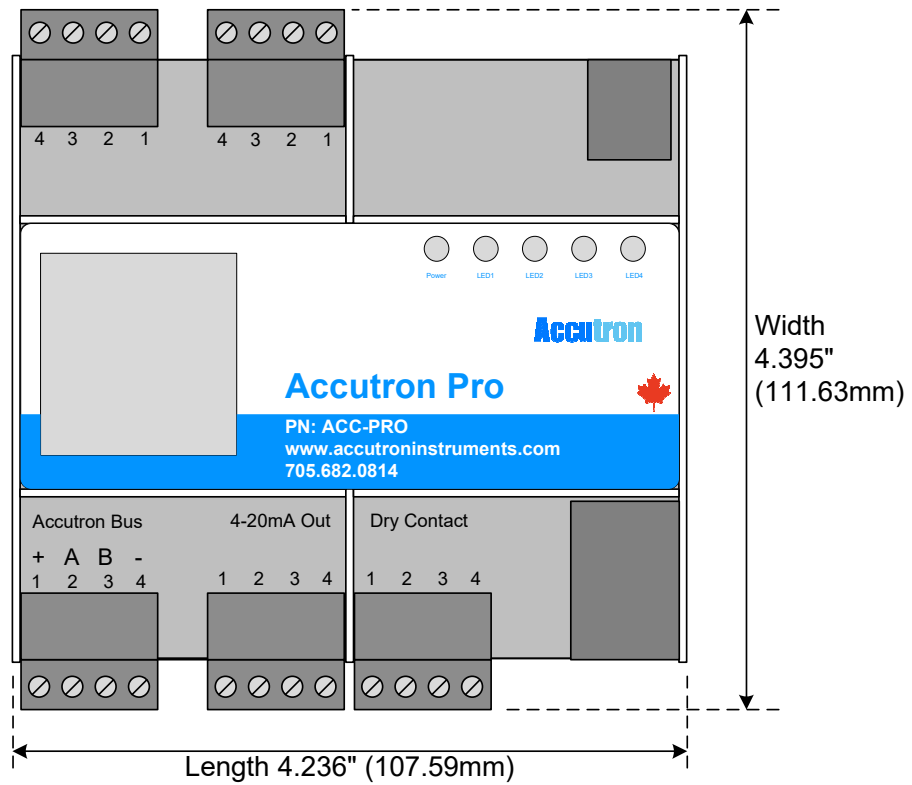
Reboot button: Reboots device. Settings are not lost.

Section 5: Drawings & Dimensions

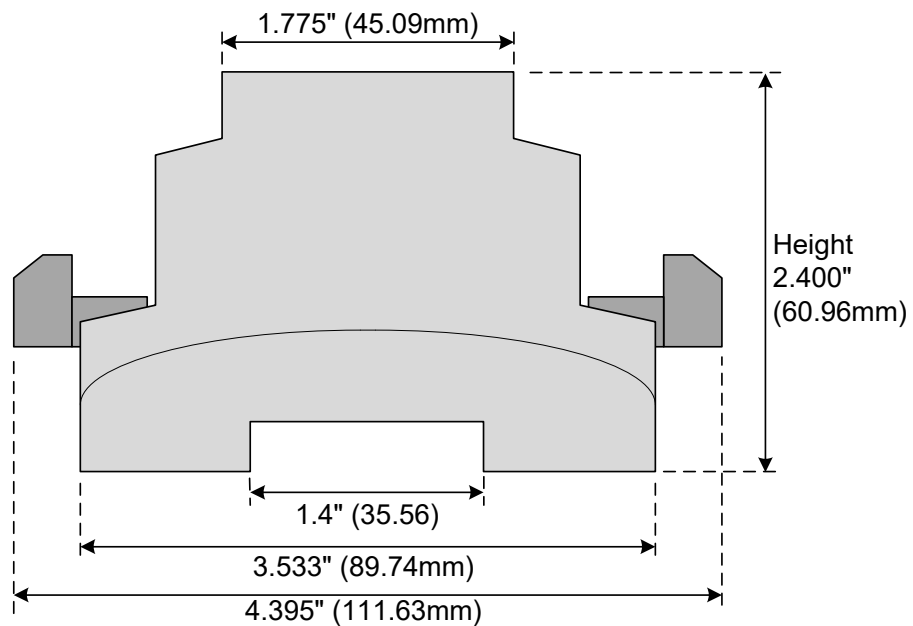
Transmitter Enclosure



Accutron Pro Module

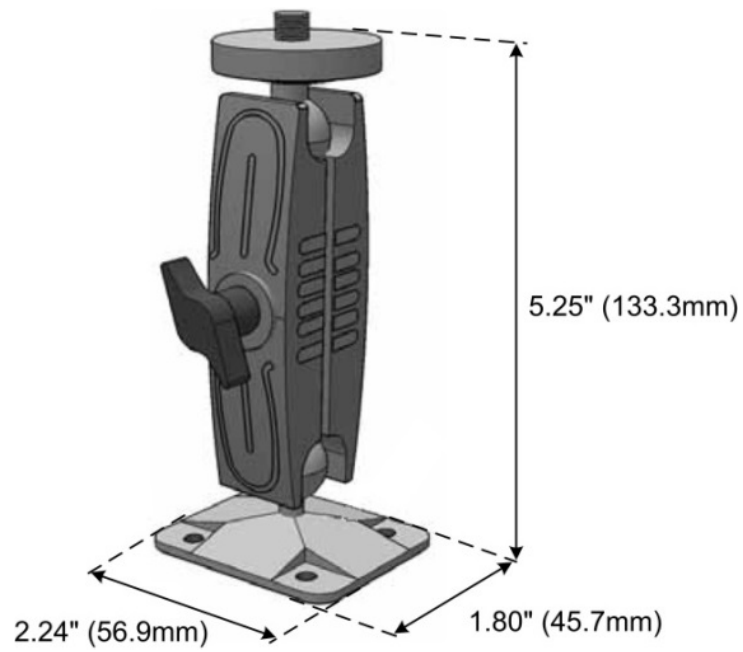


Top View

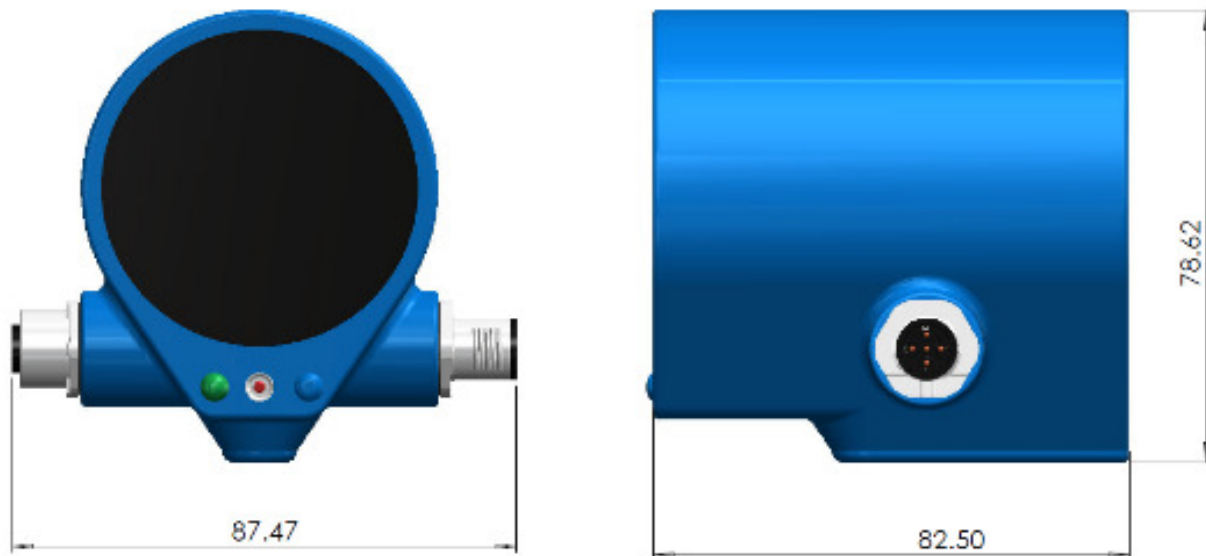


Side View

Drift Sensor Mount



Drift Sensor



Section 6: Installation

Note: The examples below refer to the drift sensors, but the same methods apply for all sensor installations (fans, ducts, tunnels, etc.)

When mounting the transducers to the wall, it is recommended that one be installed near the ceiling of the drift and the other located downstream near the bottom of the drift (figure 7). The distance downstream between the two sensors is called the baseline. It is recommended that the baseline be set such that the face-to-face vector between the two sensors is between 30-60 degrees to the airflow.

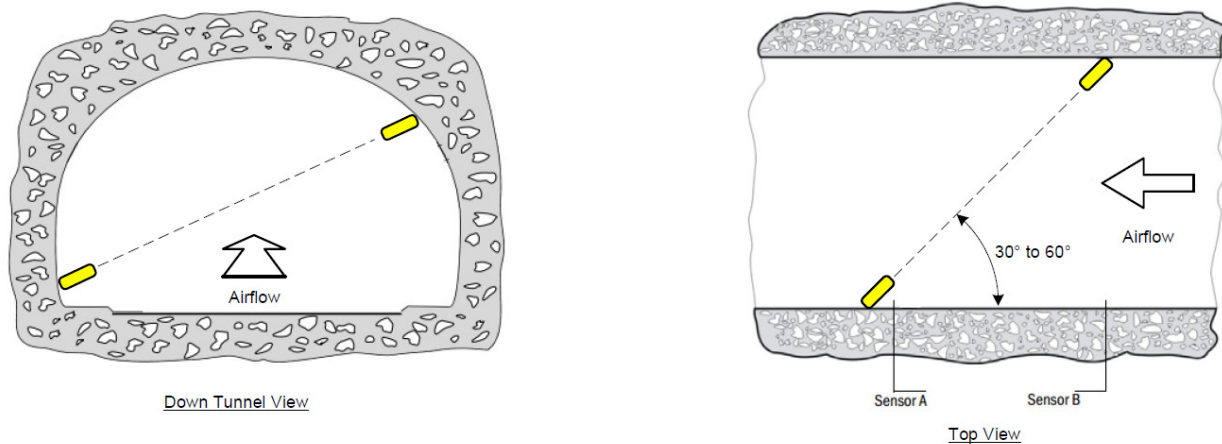


Figure 1: Ideal Sensor Installation

Alternatively, for a less intrusive setup, the sensors can be fitted near the top of the drift (figure 8). This is not recommended as it does not sample a true cross section of the airflow, but this can still provide accurate measurements so long as the drift has generally uniform airflow.

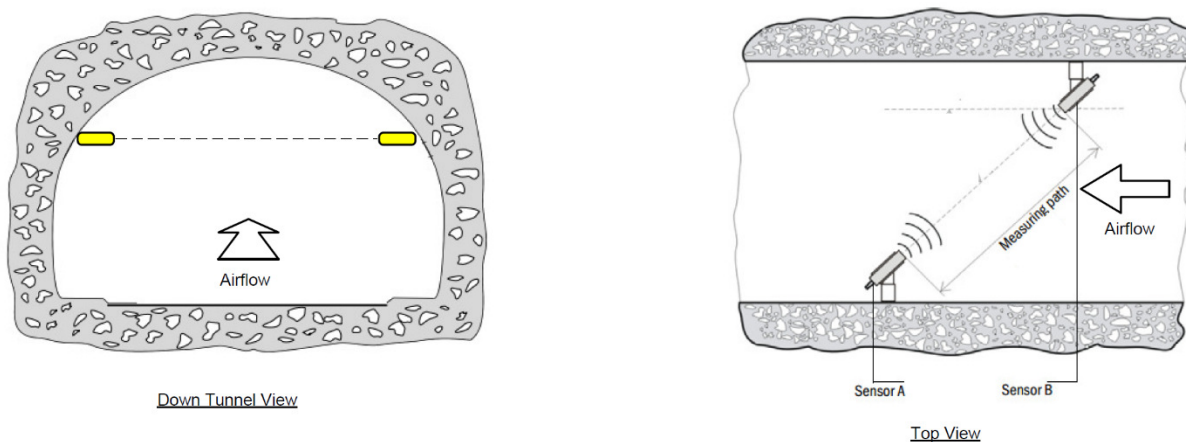


Figure 2: Less Intrusive Sensor Installation

Once the mounts are installed, thread the sensors onto the mounts and point them at each other using pan/tilt adjustment on the mount. Once power is run to the unit these sensors can be aligned properly using the laser alignment found in the configuration menu of the transmitter.

Calculating the Baseline

As previously mentioned, it is recommended the airflow sensors be installed such that the face-to-face vector intersects the direction of flow at an angle between 30 and 60 degrees. This can be achieved by installing the sensors with the proper baseline. The baseline is the separation downstream between the two sensors. See Figures 9-11 for reference.

Calculations

To Find Angle from Baseline and Face to Face:

$$\text{Angle} = \cos^{-1} \frac{\text{Adj}}{\text{Hyp}}$$

$$\text{Angle} = \cos^{-1} \frac{\text{Baseline}}{\text{FF}}$$

To Find Baseline from diameter and desired angle

$$\text{Adj} = \text{opposite} \times \tan (90 - \text{angle})$$

$$\text{Baseline} = \text{dia.} \times \tan (90 - \text{des. angle})$$

Diameter from baseline and face to face

$$b = \sqrt{c^2 - a^2}$$

$$\text{diameter} = \sqrt{\text{FF} - \text{baseline}^2}$$

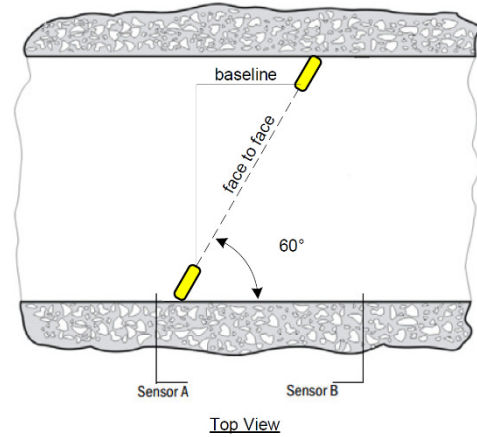


Figure 3: Typical Configuration

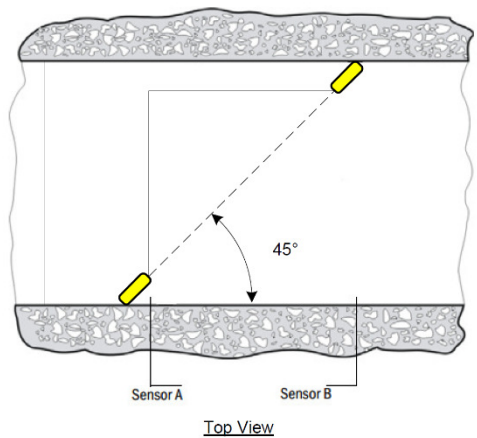


Figure 4: Ideal Configuration

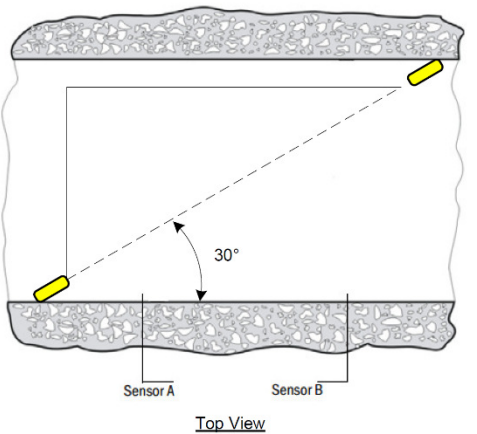


Figure 5: Better in High Velocity Applications

Mounting the Transmitter Box

Note: When mounting the transmitter box avoid mounting near medium/high voltage, as this may result in unwanted noise.

When mounting the transmitter, consider the accessibility of required power (POE, 110-240 VAC, 24VDC.) as well as any output connections such as to PLC.

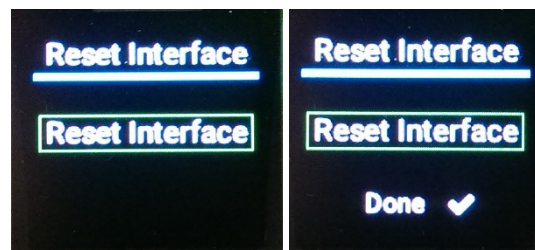
Navigating the Menu

The Accutron Pro will boot up as soon as it receives power. Under the lid, the Pro has a keypad used for navigating the menus. On initial bootup, the Accutron Pro will configure itself with default settings.

The Menu can be accessed by pressing the center button, or the right button on the keypad. Menu items can be accessed by pressing the middle button or the right button where there is a chevron beside the item name. The left button can be pressed any time to return to the previous menu.

Changing IP Settings

After Navigating to the Network menu and making any changes, scroll all the way down to Reset Interface. Enter this menu, then click the center button and wait for the Done check mark to appear. This may take up to 15 seconds. After the check mark appears, click the Reboot button.



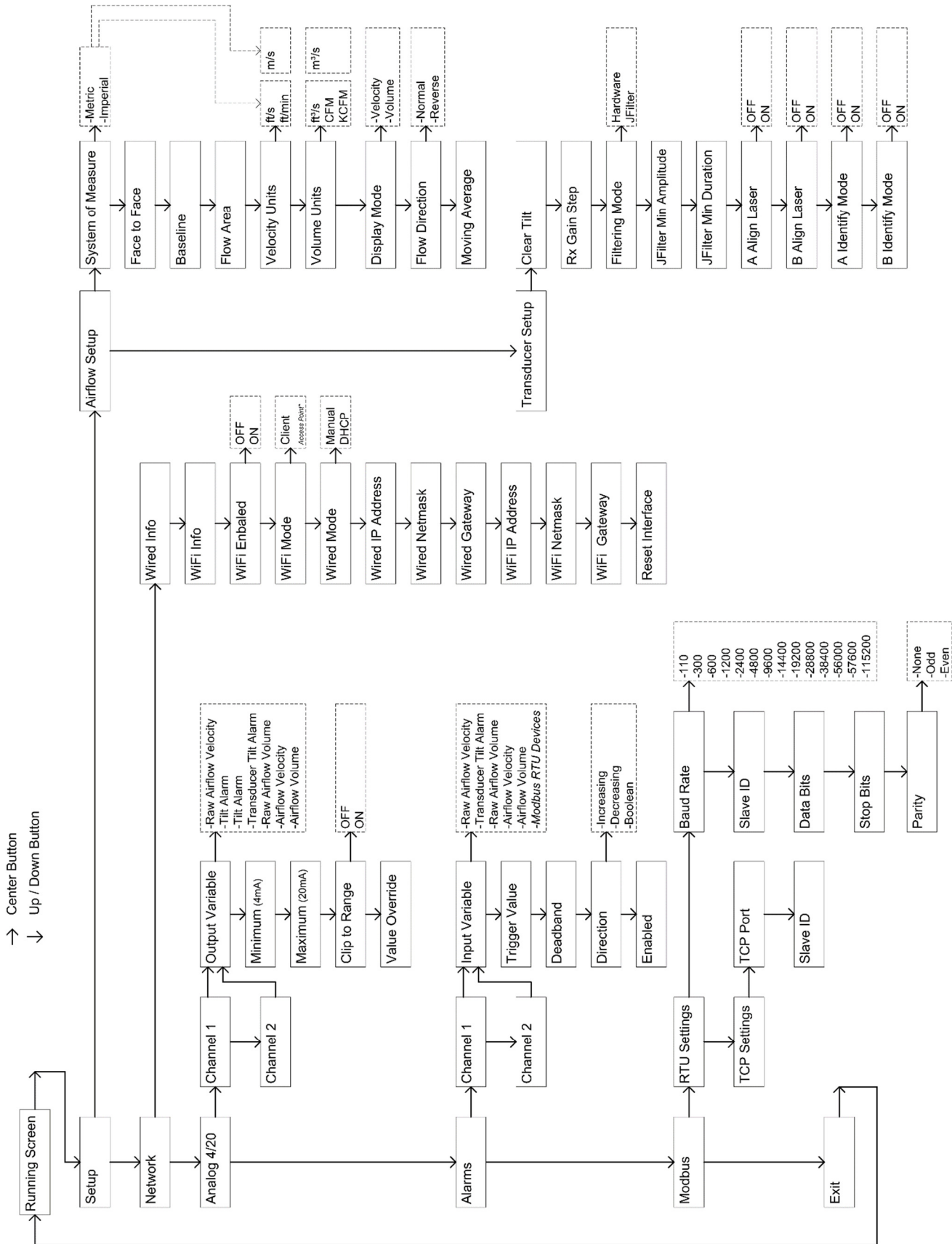
Menu Options

- Setup
 - Airflow Setup
 - System of measurement – Sets the units of measurement for the entire system, and hides irrelevant units in other menus
 - Face to Face – sets the face-to-face distance between the two airflow monitors
 - Baseline – sets the downstream distance of the two airflow monitors
 - Flow Area – specifies the cross-sectional area of the flow for volumetric flow rate output
 - Velocity Units – Specifies the units to display velocity values in. Note that some options may be hidden depending on the system of measurement chosen.
 - Volume Units – Specifies the units to display volume in. Note that some options may be hidden depending on the system of measurement chosen.

- Display Mode – chose to display velocity or volumetric.
- Flow Direction – if the airflow is negative, use this to make it positive
- Moving Average Size – used the smooth out the readings
- Transducer Setup
 - Clear Tilt Alarm – Used to clear system of any tilt alarms.
 - RX Gain Step – 4 recommended, increase as the face to face distance increases.
 - Filtering mode – Change the filtering mode between hardware or JFilter. Unless otherwise specified by an Accutron technician, leave this set on JFilter.
 - JFilter Min Amplitude – 500 to 700 recommended
 - JFilter Min Duration – 0.15 to 0.30 recommended
 - A Align Laser – Toggles alignment laser for transducer A
 - B Align Laser – Toggles alignment laser for transducer B
 - A Identify – Sets transducer A to identify mode. This will cause the LED on the transducer to blink and cycle colors to help identify each transducer.
 - B Identify – Sets transducer B to identify mode. This will cause the LED on the transducer to blink and cycle colors to help identify each transducer.
- Network
 - Wired Info – Displays network information such as MAC address and device IP for wired connections
 - WiFi Info – Displays network information such as MAC address and device IP for wireless connections
 - WiFi Enabled – Enables or disables wireless network capabilities
 - WiFi Mode – Sets device wireless behavior. Leave this set to **Client**
 - Wired Mode – Sets how the wired device IP is configured. Setting this to DHCP will allow the device to automatically set an available IP.
 - Wired IP Address – Sets the IP address of the device when wired to the network
 - Wired Netmask – Sets the netmask address of the device when wired to the network
 - Wired Gateway – Sets the gateway address of the device when wired to the network
 - WiFi IP Address – Sets the IP address of the device when using WiFi
 - WiFi Netmask – Sets the netmask address of the device when using WiFi
 - WiFi Gateway – Sets the gateway address of the device when using WiFi
 - Reset Interface – Resets the network interface. This must be selected after changing any network settings for the changes to take effect.
- Analog
 - Channel 1
 - Output Variable
 - Raw Airflow Volume – value with no averaging
 - Airflow Velocity
 - Airflow Volume
 - Raw Airflow Velocity – value with no averaging

- Tilt Alarm
 - Tilt Alarm
 - Transducer Tilt Alarm
 - Channel A
 - Channel B
 - Minimum (4mA) – Minimum value specified in output to be set at 4 mA
 - Maximum (20mA) - Maximum value specified in output to be set at 20 mA
 - Clip to Range
 - Override Value
- Channel 2
 - Same Options as Channel 1
- Alarms
 - Relay 1
 - Input Variable
 - Raw Airflow Volume
 - Airflow Velocity
 - Airflow Volume
 - Raw Airflow Volume
 - Transducer Tilt Alarm
 - Channel A
 - Channel B
 - Trigger Value
 - Dead Band
 - Direction
 - Increasing
 - Decreasing
 - Boolean
 - Enabled
 - Disabled
 - Enabled
 - Relay 2
 - Same Options as Relay 1
- Modbus
 - RTU Settings – This menu allows you to configure the Modbus RTU settings of your Accutron Pro Device
 - Baud Rate – Allows you to set the Modbus Baud Rate from 110 to 115200
 - Slave ID - Set the Slave ID of the Modbus device
 - Data Bits - Set data bits to 7 or 8
 - Stop Bits – Sets stop butts to 1 or 2
 - Parity – Set parity to None, Even or Odd

- TCP Settings - This menu allows you to configure the Modbus TCP settings of your Accutron Pro Device
 - Slave ID
 - TCP Port
- Exit – Selecting this will return you to the Accutron Pro Home Screen



Section 7: Accutron Pro Web Interface

The Accutron Pro Web Interface allows you to remotely configure and monitor your Accutron device. To access the web server, ensure you are on a device connected to the same network as your Pro, and navigate to the Pro's IP address. The IP Address can be found in Setup>Network>IP Address. The default IP Address is 192.168.1.100.

The Dashboard

When Connecting to the Accutron Pro Web Interface, you will be greeted with the Dashboard screen. Depending on what devices are connected to the Pro, this screen may appear slightly different. The dashboard provides you with an overview of your Accutron Pro device, and displays the variables currently being read, and if there are any errors present. At the top right of the screen there is an envelope icon. This will highlight when there are notifications present and clicking this will expand the menu to show these notifications.

On the left side of the screen below the Accutron logo, there is a navigation bar. This is used to navigate through the Pro Web Interface

Settings

Clicking on the Settings Tab will expand the settings menu. Clicking one of these settings items will then bring you to that page.

Setup

The Instrument Setup page is where your Accutron Pro device can be configured. The same settings which can be accessed on the device using the navigation buttons can also be accessed in the Pro Web Server.

Networking

The Networking Settings page allows you to configure the networks settings for your Accutron Pro, such as the IP address, netmask and gateway. You can also configure Wi-Fi settings and access available Wi-Fi networks on this page.

Analog Output

The Analog Output screen allows you to manage the analog outputs on your Accutron Pro Device. On this page you can set the variable to be output on each Analog Output channel by clicking the blue button labelled "Change" You can also set the minimum and maximum values to be read at 4mA and 20 mA. The units of the values are based on whatever the device was set to in the setup menu. There is an option to "Clip to range". When this is selected (the box is checked) the Pro will output the min and max mA values when the variables are at their min/max or beyond. If the box is not selected (unchecked) then the Pro will output an error signal of 3.5mA when the variables go beyond their set values.

Alarms and Relays

This page appears similar to the Analog Output screen, and allows you to configure the two relay output channels on the Pro. Like the Analog Output, the desired parameter to trigger the relay may be set by clicking the blue “Change” button. The “Trigger When Above/Below” setting allows you to configure if the relay will trigger either above, below, or at your trigger value. The “Trigger Value” setting allows you to set what the trigger value will be. Depending on your set trigger parameter, the units of the trigger value will be based on what the Pro device is set to in previous menus. The “Deadband” setting allows you to set a deadband for your relay trigger value. The “Enabled” check box allows you to easily activate or deactivate the alarm relay. Click the blue “Save” button to save the settings.

Date and Time

This page allows you to configure the date and time settings on your Accutron Pro. This information is used for time stamping data logs.

Modbus Slave

This page is used to configure Modbus RTU & TCP Slave settings. The Modbus Register Map can be found on this page. More details are provided in the section 9 below.

Modbus Master

This page is used to configure the Pro as a Modbus Master. More details are provided in the section 8 below.

Firmware Update

This page allows you to upload firmware updates to either your Pro System or Pro Transducers remotely. Select the firmware update file (Provided from Accutron) and click on the corresponding update button of which device you would like to update.

Section 8: Modbus Master Settings

Click the [Settings](#) button to expand the menu. Click [Modbus Master](#). Here you can configure your devices Modbus RTU Master settings such as baud rate, data pits, stop bits and parity bits.

Setting	Value
Modbus RTU Master Baud Rate	9600
Modbus RTU Master Data Bits	8
Modbus RTU Master Stop Bits	1
Modbus RTU Master Parity Bits	0

[Save](#)

Click [Add New Device](#) to begin adding new Modbus Slave devices. Entry fields will appear for the Modbus address and settings.

Device Description: Name giving to device to

Slave ID: Device Modbus Address

Update Interval: 1000 ms is the recommended minimum

You can control the data you want to poll from the Modbus Device under [Data Points](#)

Description: Describe the register.

Unit: Engineering units (ex mA, °C...) this field can be left blank.

Register: Modbus Register to read. (ex: 40001)

Type: Select the register data type

Multiplier: use this to scale the value

Fill in the fields and click [Save Device](#) to save changes.

Optionally you can load the Modbus template of any Accutron device by clicking load template. Simply fill in the Slave ID and Device Tag then click Save Device.

Section 9: Modbus Slave Settings

Click on [Settings](#) to open the settings menu, and then click [Modbus Slave](#) button to open the Modbus Slave Settings screen.

The screenshot displays the 'Modbus Slave Settings' interface for the Accutron FlowTrax Pro. The left sidebar contains navigation options: Dashboard, Settings (selected), Setup, Networking, Analog Output, Alarms/Relays, Date & Time, Modbus Slave (selected), Modbus Master, and Diagnostics. The main content area is titled 'Modbus Slave Settings' with a breadcrumb trail: Home / Settings / Modbus. It features two side-by-side configuration panels. The 'Modbus RTU Slave Settings' panel contains a table with the following settings: Modbus RTU Baud Rate (9600), Modbus RTU Slave ID (1), Modbus RTU Data Bits (8.0), Modbus RTU Stop Bits (1.0), and Modbus RTU Slave Parity (0). A 'Save' button is located below the table. The 'Modbus TCP Slave Settings' panel contains a table with: Modbus TCP Port (502) and Modbus TCP Slave ID (1), with a 'Save' button below. At the bottom, there is a section for 'Modbus Slave Register Map (RTU & TCP)'.

Here you can configure the Modbus RTU Slave settings and the Modbus TCP Slave settings.

Under the Modbus RTU Slave Settings, you can configure:

- Modbus RTU Baud Rate
- Modbus RTU Slave ID
- Modbus RTU Data Bits
- Modbus RTU Stop Bits
- Modbus RTU Slave Parity

Under Modbus TCP Slave Settings, you can configure:

- Modbus TCP Port: TCP port number, default is 502
- Modbus TCP Slave ID: Slave ID, default is 1.

The [Modbus Slave Register Map \(RTU&TCP\)](#) shows what each register on the Accutron Pro is mapped to.

Modbus Register Map

Base unit mapping

Register	Variable	Type	Size (Bits)	Size (Registers)	Read/Write
40001	Accutron Airflow Transducer Pair/Airflow Velocity	Float32	32	2	Read/Write
40003	Accutron Airflow Transducer Pair/Airflow Volume	Float32	32	2	Read/Write
40005	Accutron Airflow Transducer Pair/Transducer Face-to-Face distance (Calculated)	Float32	32	2	Read
40007	Analog (4-20mA) Output/Analog Channel 1 Output (mA)	Float32	32	2	Read
40009	Analog (4-20mA) Output/Analog Channel 2 Output (mA)	Float32	32	2	Read
40011	Transducer A/Transducer A Time of Flight	Int16	16	1	Read
40012	Transducer B/Transducer B Time of Flight	Int16	16	1	Read
40013	Atom (Self) Device/System Heartbeat Counter	Int16	16	1	Read/Write
40014	Accutron Airflow Transducer Pair/Airflow Velocity x1000	Int16	16	1	Read
40015	Accutron Airflow Transducer Pair/Airflow Volume x1000	Int16	16	1	Read
40016	Accutron Airflow Transducer Pair/Transducer Tilt Alarm	Int16	16	1	Read/Write

Additional Climatrax probe

40100	Accutron Climate Probe Pro 0/Temperature	Float32	32	2	Read
40102	Accutron Climate Probe Pro 0/Relative Humidity	Float32	32	2	Read
40104	Accutron Climate Probe Pro 0/Air Pressure	Float32	32	2	Read
40106	Accutron Climate Probe Pro 0/Wet Bulb	Float32	32	2	Read

System Wiring Diagram

