



DRIFT / FAN

AIRFLOW METERING SYSTEMS

MODEL:

ACCP-120V-100FC

ACCP-24V-100FC

ACCF-120V-BS-100FC

ACCF-24V-BS-100FC

TECHNICAL INFORMATION V5.01





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Instruction Manual

Accutron Plus

General Information

The Manual

Refer to this manual for proper installation, operation and maintenance of the Accutron Plus Instrument.

Special attention must be paid to warnings and notices highlighted from the rest of the text by gray boxes.

Warning: means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

Note: means important information about the actual product or that part of the operating manual.

- 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, or maintenance.
- For further information or to resolve issues not covered in the manual, consult your Accutron representative.
- The contents of the manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The Sales contact contains the entire obligation of Accutron Instruments. The warranty contained in the contract between the parties is the sole warranty of Accutron Instruments Inc.

IMPORTANT: All specifications are subject to change without notice. Please ensure that any safety-related information is confirmed with a qualified Accutron Instruments representative.



Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

This device/system 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.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

Information About Your System

When you first open your Accutron Plus/FN unit, be sure to record the following. If you need to contact Customer Service, this information will help give you better service.

Model Number (found behind door): _____

Serial Number (found behind door): _____

Code version (found on startup): _____

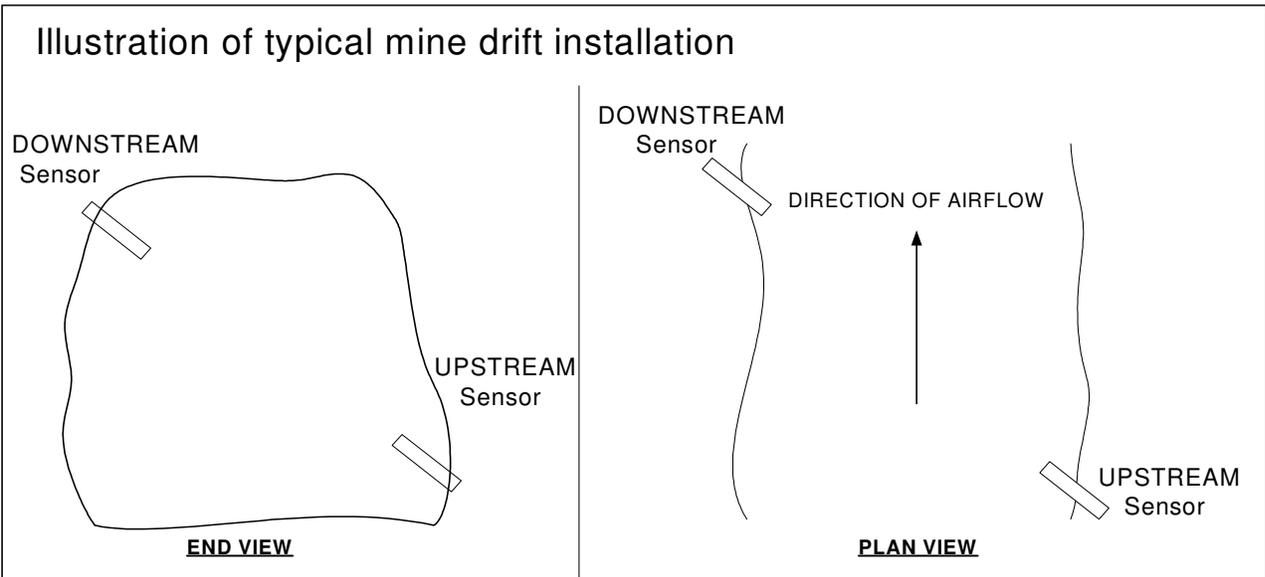


Section 2

Introduction

The Accutron airflow sensors are compact and reliable instruments, especially designed for measuring airflows in mine environments. The Accutron Plus is for airflow measurements in mine drifts and tunnels whereas the Accutron F is for measuring the flow output of large mine fans. Each system consists of an Indicating Transmitter, cabling and two “ultrasonic sensor” assemblies.

In use, the ultrasonic sensor assemblies are installed in the tunnel diagonally (one further upstream than the other) with an “imaginary line” between them intersecting the airflow at a typical angle of between 30 to 60 degrees.



Ultrasonic pulses are sent back and forth between the transducers across the tunnel, traveling through the air current. Let “ T_{A-B} ” be the time taken for the signal to travel from Transducer **A** to Transducer **B**, and “ T_{B-A} ” be the time taken for the pulse to travel from Transducer **B** to **A**. The control unit accurately measures the time-of-flight for each direction. The difference between the measured times ($T_{A-B} - T_{B-A}$) is directly proportional to the airflow. In the case of no moving air, then T_{A-B} equals T_{B-A} and there is no time difference because there is no airflow.

Inherently, the Accutron Plus first internally computes the average velocity of the air in Meters/Sec. Then, to obtain air volumes, the area of the drift is entered in (during programming), along with your selection of measurement units. The system then



displays air volumes in the units selected. Common units used in mining applications are KCFM and M**3/S, other units may also be displayed (Meters/ sec, Feet / Min)

After installation in the drift, measurements are made (area, baseline distance, Face-to-face distance, etc). Then, using the handheld programmer, these parameters are entered into the unit, along with the selection of Display Units, 4-20 output characteristics, etc. These parameters are retained in non-volatile Flash memory in the Accutron. Whenever the Accutron starts up, this information is automatically reloaded .The handheld programmer is easy to use, and much more convenient than using a laptop computer.

Note One of the important features of the Accutron is the ability to measure bi-directional airflows. A negative sign at the far left hand side of the 8-digit display indicates this. Also, the 4-20 split mode can be used to pass this information to a PLC.

-	5	8	.	7	K	C	F	M
---	---	---	---	---	---	---	---	---

The system can easily measure airflows in excess of 1,000,000 cfm with a precision better than any other conventional methods. In addition, since the system is able to sample across the entire tunnel (along the imaginary line between the sensors), readings are more representative than “single point” measurements using hot-wire sensors, for example. The Accutron thus takes into account the fact that there is a “distribution profile” for the air in the tunnel, making it superior to other types of measurement methods for fixed installations.

Choosing a Location

The best location to install the instrument is in a straight section of tunnel that is at least 3 tunnel widths long. In such a section, the airflow distribution will be well behaved with a maximum airflow in the center and minimum airflow on the sides. We should try to avoid locations where the airflow is concentrated in one of the corners.

The imaginary line between the Accutron Sensors works like a “virtual pitot tube” and all flow measurements occur along this line. In practice, best results are realized when this “imaginary line” passes through the center of the tunnel, slicing through the airflow distribution profile in a representative way.



It is also a good idea to carry out and record a 9-point manual airflow survey to verify the airflow distribution and identify it as a suitable location.

The Accutron relies on the imaginary line between the 2 sensors intersecting the airflow distribution such that:

1. The airflow distribution is well behaved, meaning that the airflow velocity contours should be symmetrically distributed about the center of the tunnel and that the imaginary line between the two sensors passes through the center as shown in **figure A**.

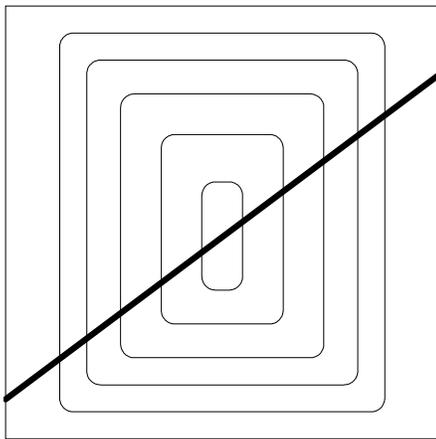


Figure A

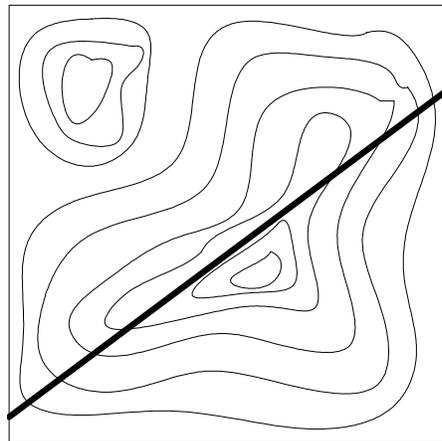


Figure B

2. In **Figure B**, the flow contours are not symmetrically distributed and there will be a discrepancy between the actual total airflow in the tunnel and what the instrument reads.

Note: Sometimes there are cases when we need to measure the airflow in a less-ideal location. In this case, we may need to manually adjust the **calibration correction** factor to give accurate flow readings. In this case, the instrument would be calibrated against a handheld anemometer (such as hot-wire) type.



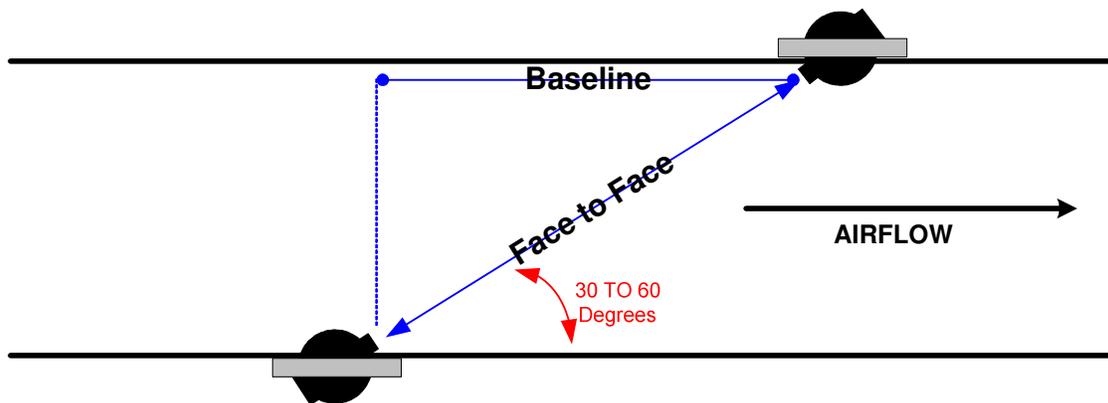
Mounting the Display

When planning to mount the control unit, you must take into consideration the availability of the power source and the 4-20 output signal, i.e. PLC connection. Often, the control box is mounted on the wall in a switch room with extended sensor cable lengths (100ft standard).

Mounting the Sensors

When planning a mounting location for the wall mount sensors, we recommend mounting one near the ceiling of the tunnel or duct and the other located near the bottom of the tunnel downstream from the first on the opposite side.

Once the brackets are installed, thread the sensors onto the mounts and point them at each other using the pan/tilt adjustment on the bracket.



Connecting the Sensor Cables

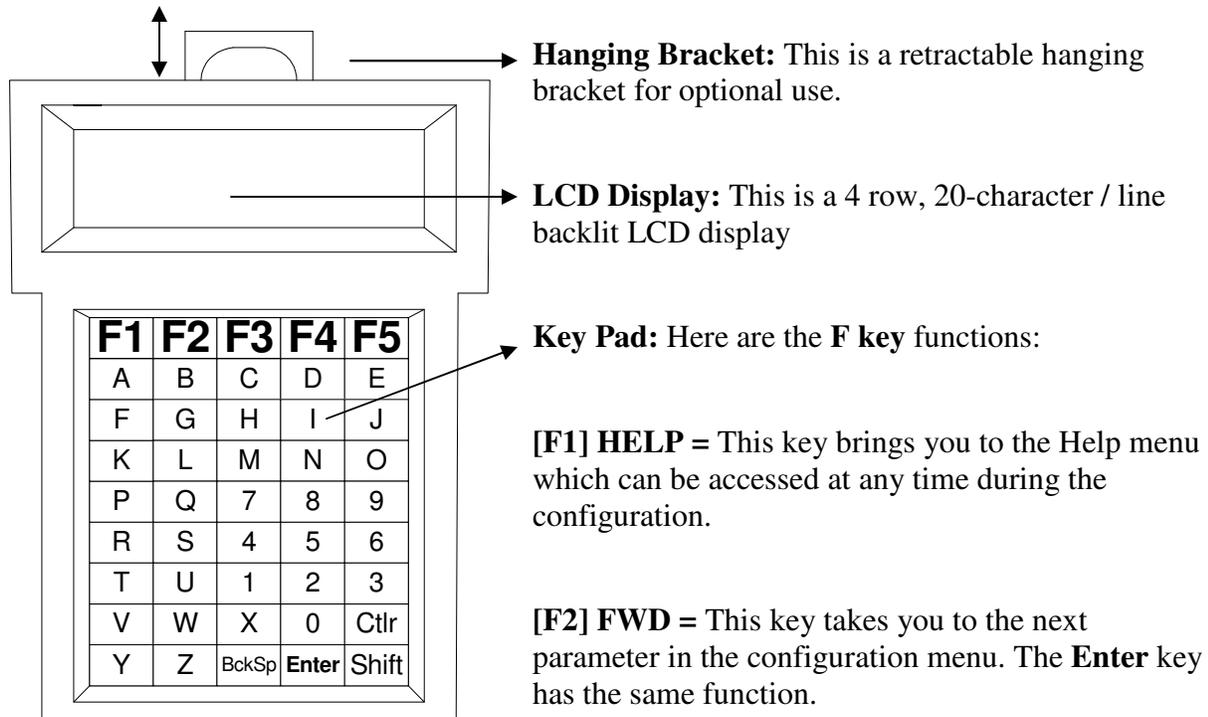
A common mistake made is not properly installing the sensor cables. These must be threaded all the way to ensure proper functionality.



Section 3

Handheld Terminal

The handheld terminal is a universal device, for Accutron products only, that allows the user to configure the unit to the application's parameters. To use this device, insert the connector into the RJ-11 socket, which is located behind the unit's door panel. Make sure the unit is powered and running.



[F3] REV = This key brings you back to the previous parameter in the configuration menu.

[F4] N/A = Currently, this key has no function.

[F5] RUN = This key takes you to the **“Run Options”** menu which can be accessed at any time during the configuration except for during the “Transducer Alignment Testing”. Once you have selected to return to run mode, the eight-digit display will flash the word “UNPLUG”. The device will not run until the handheld controller is unplugged* from the RJ11 socket.

***Note** This is the only way to get the unit back into “Run Mode”



Programming datasheet

Before actually programming the instrument, it is a good idea to work out and write down the parameters first in the following form. The form should also be filed for future reference.

Configuration		Default	Value entered
	Tag		
	Flow units	A	
	Linear units	A	
	Face to face distance	0.0	
	Baseline distance	0.0	
	Cross section area	1.0	
	Air flow direction	A	
	Zero flow cutoff	0.0	
	Instrument full scale	1000.0	
	4-20mA over range	A	
	Obstruction/fault timeout in minutes	100	
	4-20mA mode	A	
	Moving average	25	
Advanced Menu			
	Calibration correction	1.0	
*	Noise filter	0	
*	Wave detection low threshold	20	
*	Wave detection high threshold	80	
*	Dynamic range limiting factor	5	
*	Hysteresis length	50	

Note A * indicates parameters that should be left at default.



Auto Range Feature

The Accutron Plus/FN comes with a unique feature called auto ranging. It is a quick and easy way to install your setup without measuring your face-to-face distance. To use this feature, you must do the following:

1. Make sure that all cables and wires are attached and safely secured.
2. Plug the Accutron Plus/FN for power.
3. To start the auto range function, enter a value of 0 in the face-to-face menu using the handheld. This will force the Accutron Plus/FN to begin auto ranging.
4. Unplug the handheld and restart the system.
5. Upon boot up, the display will read "Accutron", followed by software version.
6. The display will now read "RANGE0-0" while the transducer sensor handshakes with the other. The display will change* depending on the distance.
7. Once the distance has been determined, the display should now be showing the airflow readings.
 - a. If the sensors do not find the distance after 5 minutes, it is possible to manually enter the distance with the handheld. (See quick start section for instructions)

The face-to-face distance may also be entered manually. Simply measure and enter this value in.

***Note** While the unit searches for the point of entry, the display will update the last number with the current millisecond range it is in. "RANGE0-3" indicates 30 milliseconds into the search. Once the first point of entry has been obtained, the second transducer attempts to find its location and the display will read as "RANGE1-3"

Note The auto range feature works best in non-gusty conditions,



Quick start programming

These step-by-step instructions show you how to quickly program the Accutron Plus/FN unit. For more detailed setup...refer to following section.

1. Plug the handheld in and wait for the display to read “TERMINAL”.
2. Hit **Enter** to continue, then select your language by pressing **A**, **B**, or **C**
3. Press **A** for the Configuration menu.
4. Press **Enter** on the handheld until the handheld screen shows “Enter flow units”
5. Press **B** for KCFM.
6. On the next screen, select the unit of measurement you will be working with by pressing **A** or **B**.
7. In the “Enter face to face distance”, enter the measured distance between both sensors. Press **Enter** to continue.
8. In the “baseline distance” menu, the default value is your face-to-face distance. Change it so that it reflects your calculation. (This value cannot be greater than the face-to-face distance). Press **Enter** to continue.
9. Enter your calculated value for the cross section area and hit **Enter**. Default is 1.
10. Press **Enter** until you see the handheld screen show “Enter 4-20mA mode” and select the parameter you want. By default, the output will be A (4mA = 0 and 20mA = full scale)
11. Hit **F5** to view the Options menu and select “Save and Run”
12. The display on the Drift/Fan unit will read “UNPLUG”
13. Unplug the RJ11 connector from the socket and let the Accutron reboot.

The Accutron Plus/FN should now run properly with the above conditions. For a more detailed explanation regarding the setup, refer to the next section “Detailed Menu Setup”



Detailed Menu Setup

Plug in the handheld programmer and wait for the display to read terminal.

Start-up screen

Accutron Plus
Serial No: xxxxxxxxx
New
Press F1 for Help

Press the **[F2]** or **[Enter]** key to continue.

Select Language
A English
B French
C Spanish

Press the letter that corresponds with your preferred language

Select Menu :
A Config, B Advanced
C Factory Settings
D Diagnostics

The Accutron main menu has 4 options. Configuration, Advanced (for advance users), Factory Settings, and Diagnostics (mainly used for troubleshooting)

Configuration menu

Enter Tag Number :

Enter the Tag Number desired. This option is mostly used if you want to identify which unit you are working with. It is simply text information.

Enter flow units :
A M/S B kcfm
C cfm D M**3/s
E fpm F usec

Press the letter that corresponds with the desired unit. M/S (meters per second) is the default.



Linear Units :
A Meters
B Feet

Choose the desired unit of measurement to determine how the Accutron Plus/FN works. "Meters" is selected by default. If "Feet" is selected, then every option will be calculated in feet.

Enter face to
face distance :
0.0
Feet

This is the distance between the faces of the 2 transducers. By default, the distance is 0.0. Entering a distance of 0.0 will cause the Accutron Plus/FN to begin the auto range mode once the settings have been saved.

Enter baseline
distance :
0.0
Feet

This is the straight line distance between the 2 transducers in the direction of the airflow. By default, this value is the same as the face-to-face. *This value cannot be greater than the face-to-face value.

Enter cross section
area :
0.0
Cubic Feet

Enter the area in which the sensors will be working in.

Enter airflow
direction sense:
A Normal sign
B Reverse sign

Selecting the Reverse sign simply multiplies the value on the display by -1. Use this option if you would like to receive positive values instead of negative values.



Enter zero flow cutoff :
0.0
kcfm

Any reading by the Airflow meter lower than the one selected here, will produce a 'zero flow' state. This will change the set analog signal to read zero flow.

Enter instrument full scale :
1000
kcfm

This is the full-scale reading of the instrument in the units selected. Flow readings greater than this will result in a "*" to appear in the right most display indicating that you have exceeded your full scale range.

Enter 4-20mA over range mode:
A Saturate / Clipping
B Emit 3mA error

Selecting **A** means that if the flow exceeds full-scale, the 4-20mA output will saturate at 20mA. Selecting **B** means that if the flow exceeds full-scale, the instrument will output 3.0mA telling the control room that full scale or max airflow has been exceeded.

Obstruction/fault timeout in minutes (100 = disabled):
100

This option delays the 4-20 output. If an obstruction is placed between the 2 transducers, you have the option of telling the Accutron if and when to output a 3.5 mA error.

Enter 4-20mA mode :
A 4mA 0% 20mA 100%
B 4mA 100% 20mA 0%
C Split mode 12mA 0%

A (Normal mode) 4mA corresponds to minimum airflow. (20mA max)
B (Reverse mode) 4mA corresponds to maximum airflow. (20mA min)
C (Split mode) 12mA corresponds to 0 airflow, 4mA to max negative, and 20mA to max.



Enter moving
average (0 - 255) :
0

This option is used to smooth out the readings in gusty conditions by taking the average of X amount of readings where X is the value entered. By default, the value is 25.

Advanced menu (only recommended for advanced users)

Enter calibration
correction:
1.0

This feature will multiply the value on the display by the number entered here.
Example: If you want the value to be twice the value on the display, enter 2.0

Enter noise filter
level:
0
value (0-4096)

This is a provision for dealing with extreme noise. Normally it is set to 0.

Enter wave detection low
threshold:
20
value (0-100)

This option is used to specify the lower wave detection threshold in order to properly detect the ultrasonic signal.

Enter wave detection high
threshold:
80
value (0-100)

This option is used to specify the upper wave detection threshold in order to properly detect the ultrasonic signal.



Enter dynamic range limiting factor:
5
value (0-1000)

Places a limit on how much weak signal noise may be expanded (digitally amplified). It prevents over amplification of noise in the absence of a valid signal.

Enter detection hysteresis length:
50
value (0-1000)

This option determines the minimum acceptable length of the waveform. Default is 50 units.

Diagnostics menu

Test quality of transducer alignment
A - Yes
B - No

Choosing to do an alignment will cause the Accutron display to show a percentage indicating how well the sensors are aligned. The scale is 0 to 100% where 0 means not aligned. The numbers provide relative indication. Best alignment is when reading is maximum.

Select diagnostic port baud rate:
A - 9600 B - 38400
C - 57600 D - 115200

Select the baud rate for diagnostic output on the COM port when using PC Diagnostics.

Select diagnostic output:
A - none B - flow
C - wave D - flowsine

This option selects the diagnostic mode. In use, a PC can be used to display the sonic-analog signals showing quality, amplitude, and noise for troubleshooting.



Test current
output?

A - Yes B - Step C - No

This option is used to test the 4-20mA outputs. "Yes" will prompt you for a desired output while "Step" will test every output from 0-20mA.

Miscellaneous

A Save and run
B Run
C Reset to defaults
D Back to menu

To reach this menu, press **F5**. **Important:** This is the only way to get the Accutron back into "Run Mode".

Settings saved
Running ...

The settings are now saved and the Accutron is ready to enter its operational mode. The message "UNPLUG" should be blinking on the instrument's LED display. You can now unplug the handheld terminal.



Section 4

FAQ (Frequently Asked Questions)

A) Why am I not seeing anything on the display?

- Check power connections. When the instrument boots, it should read "ACCUTRON" followed by the code version before entering run mode.
- Ensure that the Accutron was not damaged in any way during shipping. If this is the case, please contact your supplier.

B) The Accutron Plus/FN boots up but I am not getting any readings.

- Make sure all cables are connected.
- Make sure both transducers are aligned, and are alternately snapping (making a slight clicking sound every second).

C) Both my transducers are not snapping, what could be the problem?

Make sure each transducer is attached to the main unit via the cables and tightly connected.

D) Why is the auto range face-to-face value different from what I measured?

This is not a problem. Sometimes the unit may be off by +/- 10cm. This places the incoming waveform close to the center of the acquisition window for digital processing. Differences in this measurement (+/- 10cm or greater) have no effect on accuracy or the reading. If the unit does not function properly, then enter your measurement.

E) What should I set the full-scale setting to?

We recommend setting the full-scale to twice the maximum amount expected, but you have the option to enter whatever value you think is right.

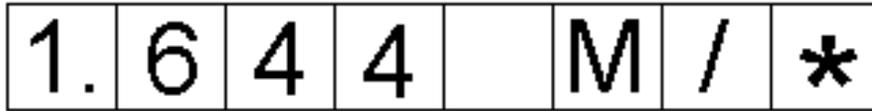
F) Why am I getting readings that differ from what they should be?

- Re-measure the tunnel cross-sectional area and the baseline distance and verify that it matches with the values inside the Accutron Plus/FN settings.
- Check to see if the sensors are placed on a bend or a corner. (Placing the sensors on a corner can cause inaccuracies with the readings)
- The calibration correction, in the **Advanced Menu**, may be used to make any adjustments according to a 9 point manual survey



G) What does the star (*) mean at the end of my display?

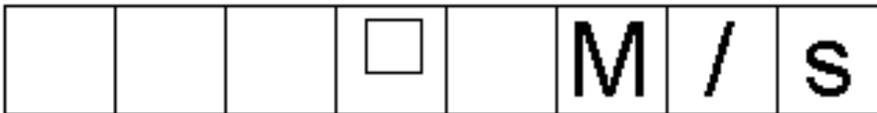
The star indicates that the reading is currently over the full-scale limit. You may want to verify if this is the case. If so, you can adjust the full-scale limit to a higher value.



H) What does the square (donut) mean in the middle of the display?

The donut means that the instrument is rejecting readings acquired because there is a problem (could be an obstruction like a vehicle parked between both sensors).

- Check to see if there is an obstruction between both sensors.
- Make sure both sensors are aligned properly.
- Make sure both transducers are attached to the main unit with cables.
- Check to see if the cables are tightly connected.



I) What is the difference between the 4-20 normal/reverse/split mode?

Normal: Airflow of 0 will output 4mA while airflow reaching instrument full-scale will output 20mA.

Reverse: Airflow of 0 will output 20mA while airflow reaching instrument full scale will output 4mA.

Split: Airflow of 0 will output 12mA (half the distance between 4mA and 20mA). Positive airflow reaching instrument full-scale will output 20mA while the negative value of instrument full-scale will output 4mA.

J) Why am I getting a 4-20mA output of 3.5mA?

A 3.5mA output indicated an obstruction between the two transducers.

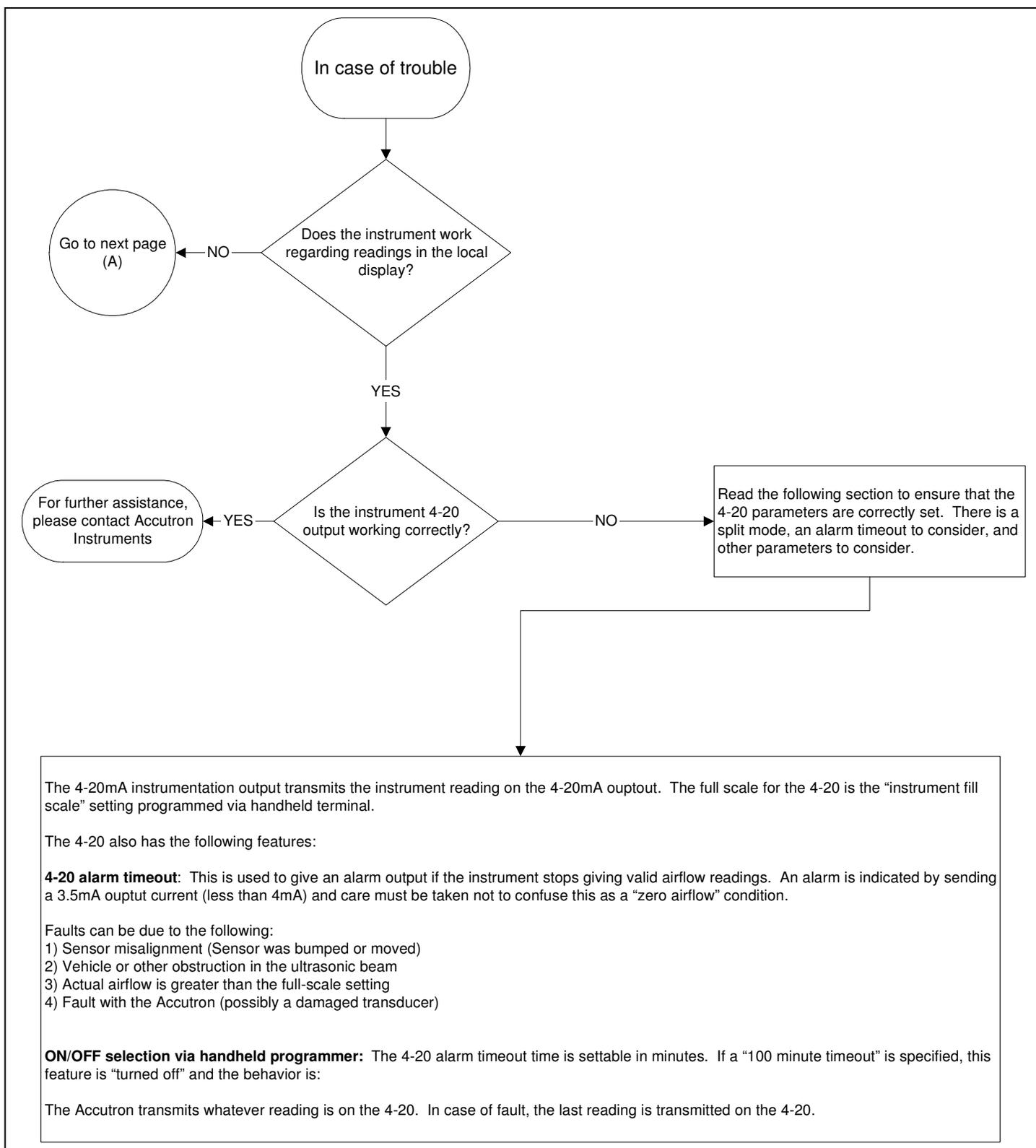
K) How do I disable the 3.5mA alarm output?

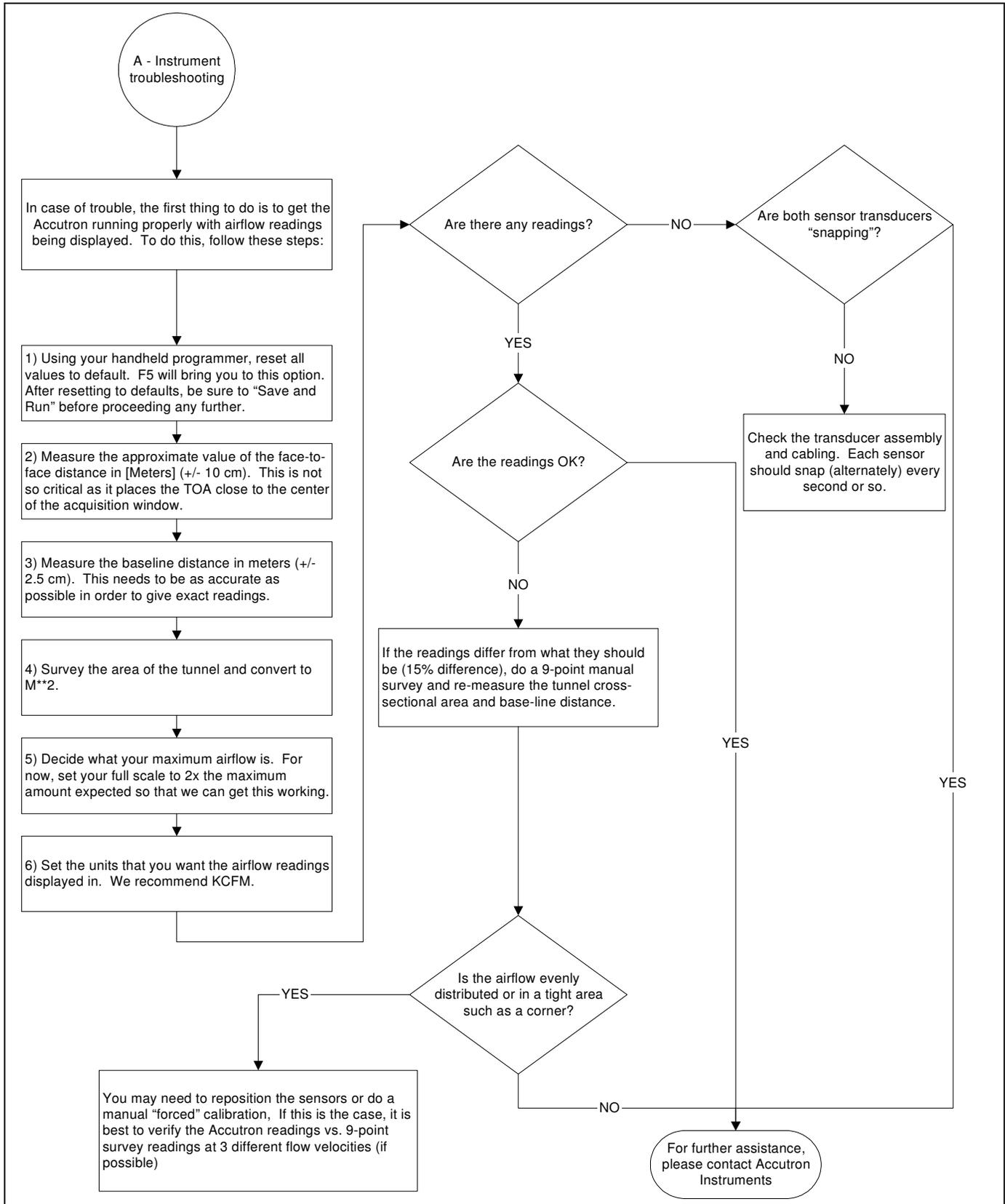
To disable this feature, go to the **Configuration** menu using your handheld and find the 4-20 alarm timeout and set this value to 100 to disable it. Setting this value to 0 will send a 3.5mA output immediately; entering a value of 10 will have the Accutron Plus/FN wait 10 minutes before sending 3.5mA.





Troubleshooting Flowchart





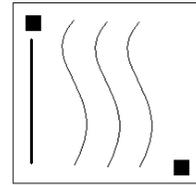


Appendix A

Glossary

Autorange: An automatic function that measures the face-to-face distance. This distance should be accurate to ± 6 inches and does not affect the accuracy of the instrument.

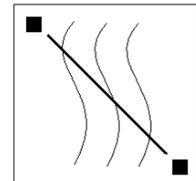
Baseline distance: The distance of the two sensors in the direction of the airflow. (Top view of two sensors)



CFM: Cubic feet per minute.

Dynamic range limiting: In normal operation, analog signals are processed mathematically to produce the "math curve". The math curve represents the envelope of the total received acoustic energy.

Face-to-face distance: The distance between the two sensors facing each other. (Top view of two sensors)



FPM: Feet per minute.

Hysteresis: The lag between making a change, such as increasing power to the transducers, and the response or effect of that change.

KCFM: Cubic feet per minute X 1000.

M/S: Meters per second.

M3/S:** Cubic meters per second.



- Snapping:** In operation, the sensor transducers are energized alternately to transmit an ultrasonic pulse. You can hear a “click” when it does this. We refer to this as “snapping”
- Transducer:** The sensor that sends and receives ultrasonic signals. Using two transducers will help determine bi-directional airflow.
- Ultrasonic:** Of or relating to acoustic frequencies above the range audible to the human ear.
- Usec:** This is one of the available flow display units, used for laboratory testing only.
- Zero flow cutoff:** A feature of the Accutron that forces the instrument to “set to zero” any flow readings that are less than this amount.



Equations

4-20mA Calculations:

Normal: $\text{mA} = 4 + ((\text{Reading of Instrument} / \text{Instrument Full Scale}) \times 16)$

Reverse: $\text{mA} = 20 - ((\text{Reading of Instrument} / \text{Instrument Full Scale}) \times 16)$

Split: $\text{mA} = 12 + ((\text{Reading of Instrument} / \text{Instrument Full Scale}) \times 8)$

Calibration correction: $\text{Correction} = \text{Reading you want} / \text{Reading you are receiving}.$

Error percentage:

In the case of perfect symmetry in the airflow distribution between the two sensors, the accuracy of the Accutron Plus/FN is dependent on how accurately the transit times can be measured.

The accuracy of the instrument is 2% of full-scale or the instrument reading $\pm 0.05\text{M/S}$; whatever is greater.

Example: If full scale is 100 KCFM, the error is $2\% \times 100 \text{ KCFM} = 2 \text{ KCFM}.$



Default Values Chart

Configuration Menu		
	Flow units	A (M/S)
	Linear Units	A (Meters)
	Face to face distance	0.0
	Baseline distance	0.0
	Cross section area	1.0
	Air flow direction	A (Normal sign)
	Zero flow cutoff	0.0
	Instrument full scale	1000.0
	4-20mA over range	A (Saturate/Clipping)
	Obstruction/fault timeout in minutes	100 (disabled)
	4-20mA mode	A (4mA 0% 20mA 100%)
	Moving average	25
Advanced Menu		
	Calibration correction	1.0
	Noise filter	0
	Wave detection low threshold	20
	Wave detection high threshold	80
	Dynamic range limiting factor	5
	Hysteresis length	50
Diagnostics menu		
	Diagnostic port baud output	D (115200)
	Diagnostic output	C (Wave)



Accutron Plus Parts List – Mine Drift Airflow Sensor

Item	QTY	Part number and Ordering information
1	1	ACCP-TXD-ASY Accutron Plus Transducer. Replacement sensor/transducer for the Accutron Plus Drift Air Flow Meter.
2	1	ACCP-CAB-STD-ASY Standard Accutron 100 foot cable assembly pre-assembled with connectors.
4	1	ACCP-CAB-XXX-ASY Custom cable assembly where XXX is the cable length in feet. Also comes pre-assembled with connectors.
5	1	ACCP-XMT-ASY Accutron Plus/Drift indicating transmitter. <ul style="list-style-type: none"> • 8 Digit LED display, NEMA 4x enclosure • 120 VAC powered • 4-20mA analog output
6	1	ACC-HHPRG-ASY Handheld programmer. Used to configure the parameters on start up of the Accutron indicating transmitter.
7	1	ACCP-WALMT-PLA-ASY <ul style="list-style-type: none"> • Plastic wall mount brackets for transducer. • Pan/tilt
8	1	ACCP-WALMT-STL-ASY <ul style="list-style-type: none"> • 6” tri-foot steel wall mount • Set screw for a tamper resistant • Wrench included • Pan/tilt



Accutron FN Parts List – Mine FAN Airflow Sensor

Item	QTY	Part number and Ordering information
1	1	<p>ACCF-BS-ASY</p> <p>Retractable ball/socket assembly. Used in conjunction with the Accutron Fan Unit. Consists of:</p> <ul style="list-style-type: none"> • (1) Retractable sensor/transducer • Inner core and outer core assemblies • Ring set assembly and mounting hardware
2	1	<p>ACCF-CAB-STD-ASY</p> <p>Standard Accutron 100 foot cable assembly pre-assembled with connectors.</p>
3	1	<p>ACCF-CAB-XXX-ASY</p> <p>Custom cable assembly where XXX is the cable length in feet. Also comes pre-assembled with connectors.</p>
4	1	<p>ACCF-XMT-ASY</p> <p>Accutron FN indicating transmitter (control unit).</p> <ul style="list-style-type: none"> • 8 Digit LED display, NEMA 4x enclosure • For use on intake and exhaust mine fans • 120 VAC powered • 4-20mA analog output
5	1	<p>ACC-HHPRG-ASY</p> <p>Handheld programmer. Used to configure the parameters on start up of the Accutron indicating transmitter.</p>
6	1	<p>ACCF-MP-FLAT-ASY</p> <p>Flat mounting plate assembly. Mounting plates for the retractable ball and socket sensor assemblies.</p>
7	1	<p>ACCF-MP-15ANG-0OFF-ASY</p> <p>15 degree beveled mounting plate with 0 degree offset.</p>
8	1	<p>ACCF-MP-15ANG-15OFF-ASY</p> <p>15 degree beveled mounting plate with 15 degree offset.</p>
9	1	<p>ACCF-MP-15ANG-45OFF-ASY</p> <p>15 degree beveled mounting plate with 45 degree offset.</p>
10	1	<p>ACCF-MP-15ANG-RXX-ASY</p> <p>15 degree beveled and rolled to specified radius (R**))</p>



Specifications for the Accutron Plus/Drift – Mine Drift Airflow Sensor

Connections:	Screw terminal Block Type
Transducers:	2.25" diameter X 7" (L)
Display Readout:	8-digit Alphanumeric LED display. Each digit is 0.75" (H) X 0.5" (W)
Power Supply:	Switching type with International Approvals (CUL, UL, CE)
Power Consumption:	< 10 watts
Input Power:	100 VAC to 20 VAC, 50/60 Hz 24 VDC (optional)
Display Units:	M/S, CFM, KCFM, M ³ /S, FPM
Temperature range:	-40° to +60° Celsius
Accuracy:	2% FS or ± 0.05 M/S (whichever is greater)
Output type:	4-20mA
Output modes:	Normal, Reverse, or Split (used for bi-directional measurements)
Max loop resistance:	700 ohm
Fault/Alarm Output:	3.5mA (can be disabled)
Sensor cables:	100 feet STD (sensor-to-box). Custom cables are available
Connectors:	Stainless Steel, with O-ring seals. IP68 rated.
Sensor Mounting:	Industrial CATV pan and tilt mount
Tunnel sizes:	Can accommodate a face-to-face distance of 80 feet.
Programming:	Handheld terminal used to program and configure the Accutron.
Max Airflow:	0 to 40 m/s and higher (essentially no practical upper limit) Bi-directional

Accutron Plus component checklist

- Indicating Transmitter – Qty (1)
- 100' cables w/ IP68 rated connectors – Qty (2)
- Ultrasonic Transducers – Qty (2)
- Mounting Brackets with Pan & Tilt adjustment – Qty (2)



Specifications for the Accutron FN - Mine Fan Airflow Sensor

Connections:	Screw terminal Block Type
Transducers:	2.25" diameter X 7" (L)
Display Readout:	8-digit Alphanumeric LED display. Each digit is 0.75" (H) X 0.5" (W)
Power Supply:	Switching type with International Approvals (CUL, UL, CE)
Power Consumption:	< 10 watts
Input Power:	100 VAC to 20 VAC, 50/60 Hz 24 VDC (optional)
Display Units:	M/S, CFM, KCFM, M ³ /S, FPM
Temperature range:	-40° to +60° Celsius
Accuracy:	2% FS or ± 0.05 M/S (whichever is greater)
Output type:	4-20mA
Output modes:	Normal, Reverse, or Split (used for bi-directional measurements)
Max loop resistance:	700 ohm
Fault/Alarm Output:	3.5mA (can be disabled)
Sensor cables:	100 feet STD (sensor-to-box). Custom cables are available
Connectors:	Stainless Steel, with O-ring seals. IP68 rated.
Sensor Mounting:	Industrial CATV pan and tilt mount
Mounting plates:	12" x 12" stainless steel Configured, customized, and supplied with template
Duct sizes:	Can accommodate all ducts sizes
Programming:	Handheld terminal used to program and configure the Accutron.
Max Airflow:	0 to 40 m/s and higher (essentially no practical upper limit) Bi-directional



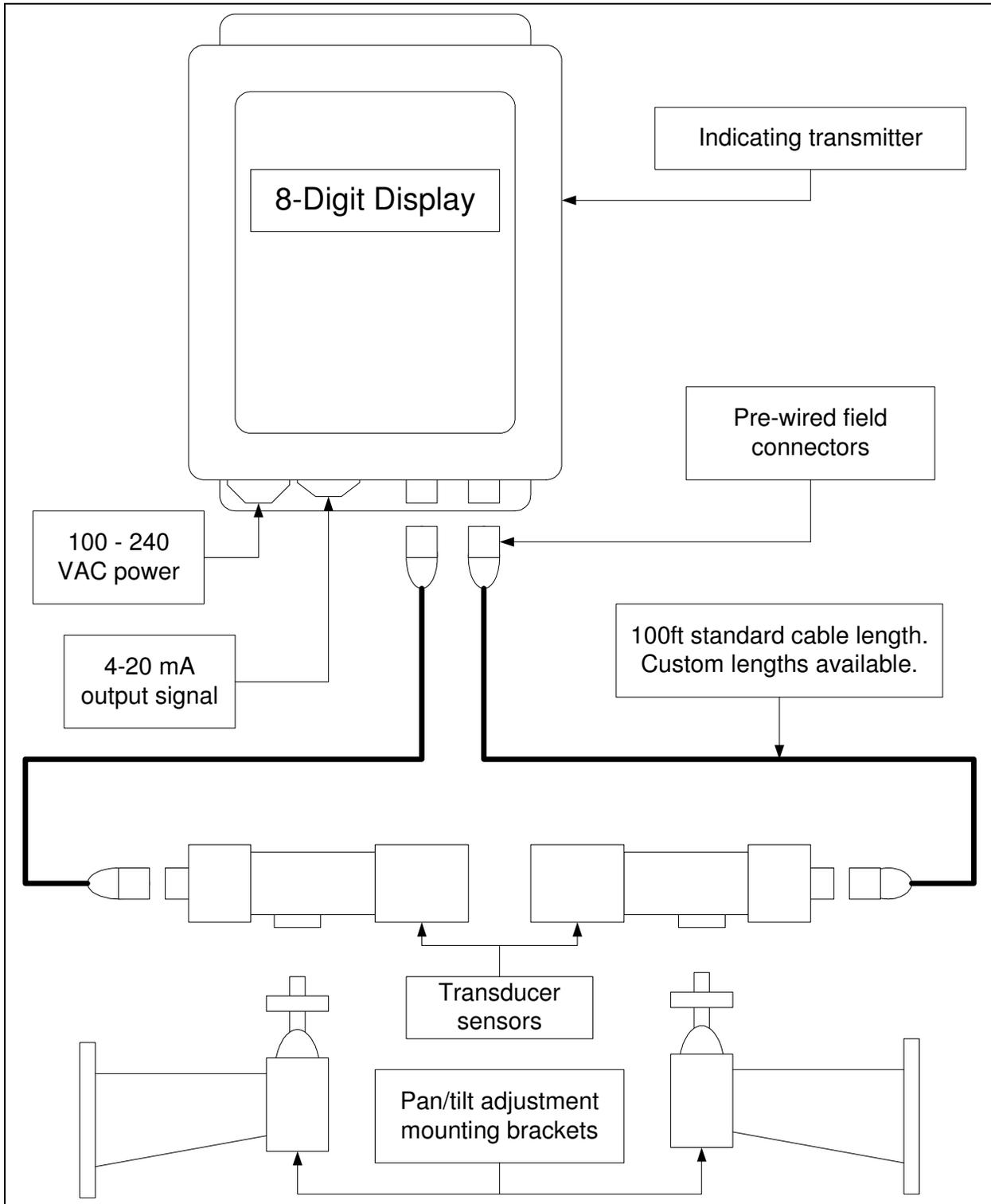
Accutron Fan component checklist

- Indicating Transmitter – Qty (1)
- 100' cables w/ IP68 rated connectors – Qty (2)
- Ultrasonic Transducers – Qty (2)
- 15° beveled stainless steel mounting plates w/ Ball & Socket – Qty (2)
- Each Ball & Socket assembly includes:
 - Ball w/ threaded inner core (2"-NPT_F) – Qty (1)
 - Threaded Retractable Sensor (2"-NPT_M) – Qty (1)
 - Inner socket ring – Qty (1)
 - Outer socket ring – Qty (1)
 - Bolts & Wing nuts – Qty (4)



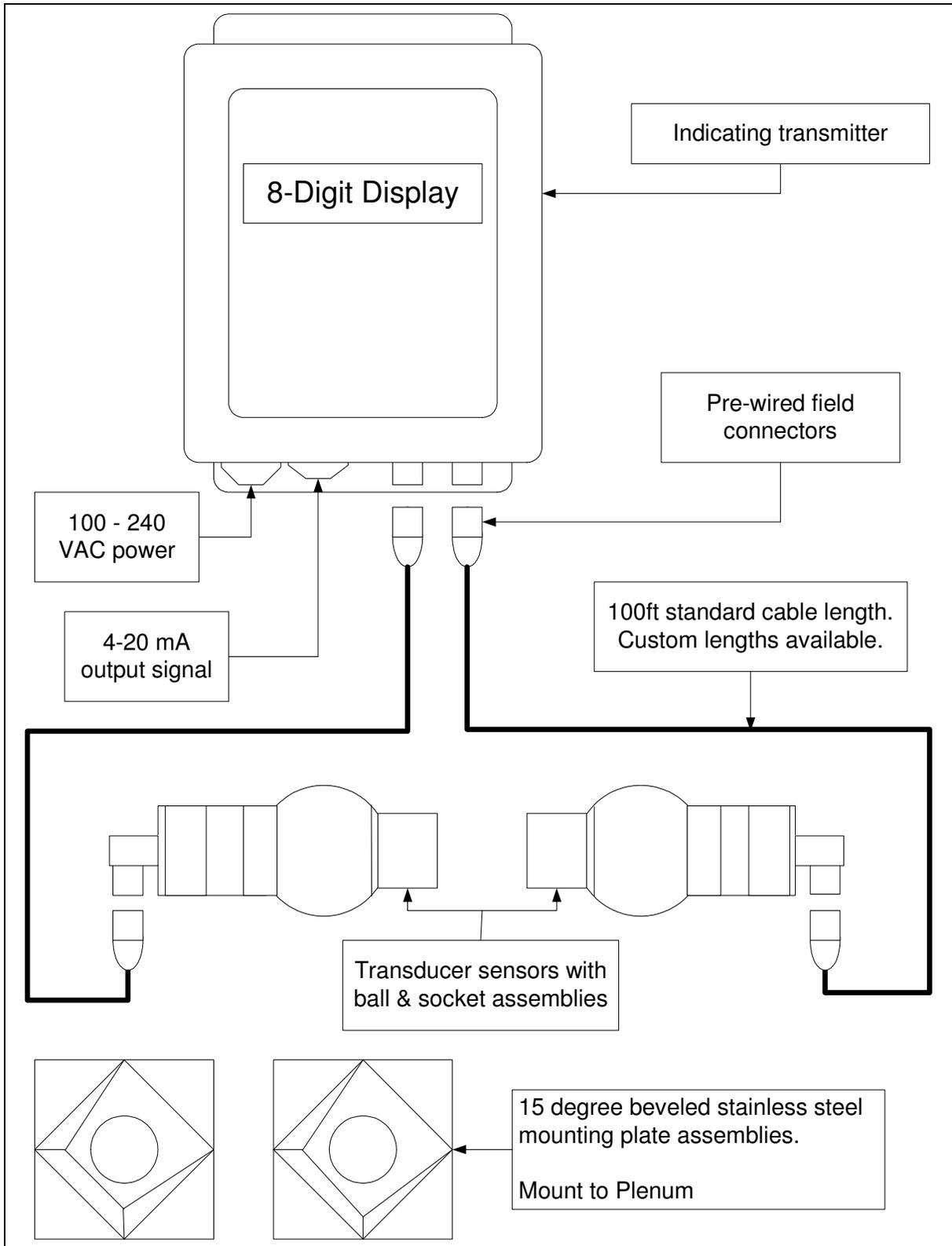
Appendix B

Accutron Plus Illustration – System Drawing



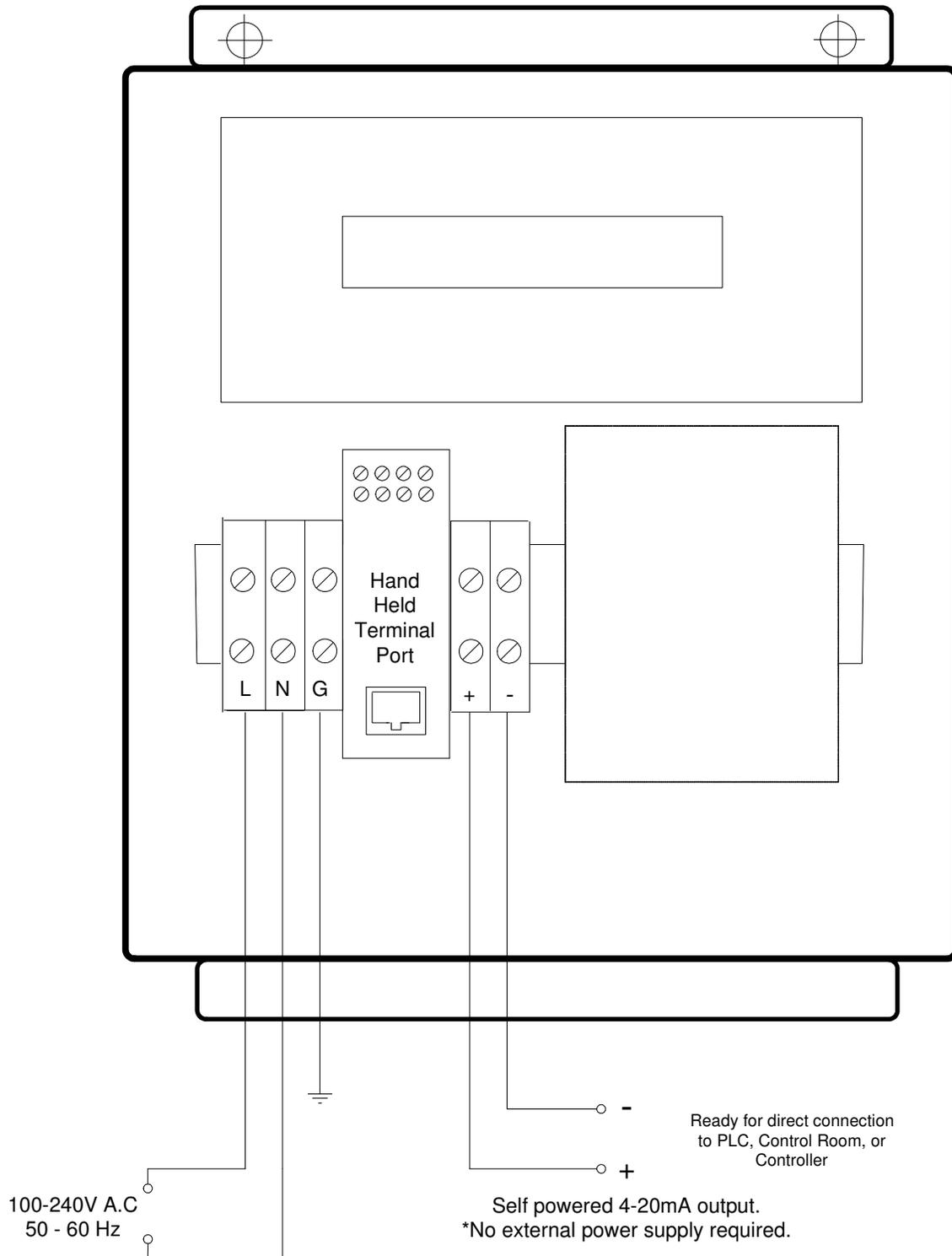


Accutron Fan Illustration – System Drawing



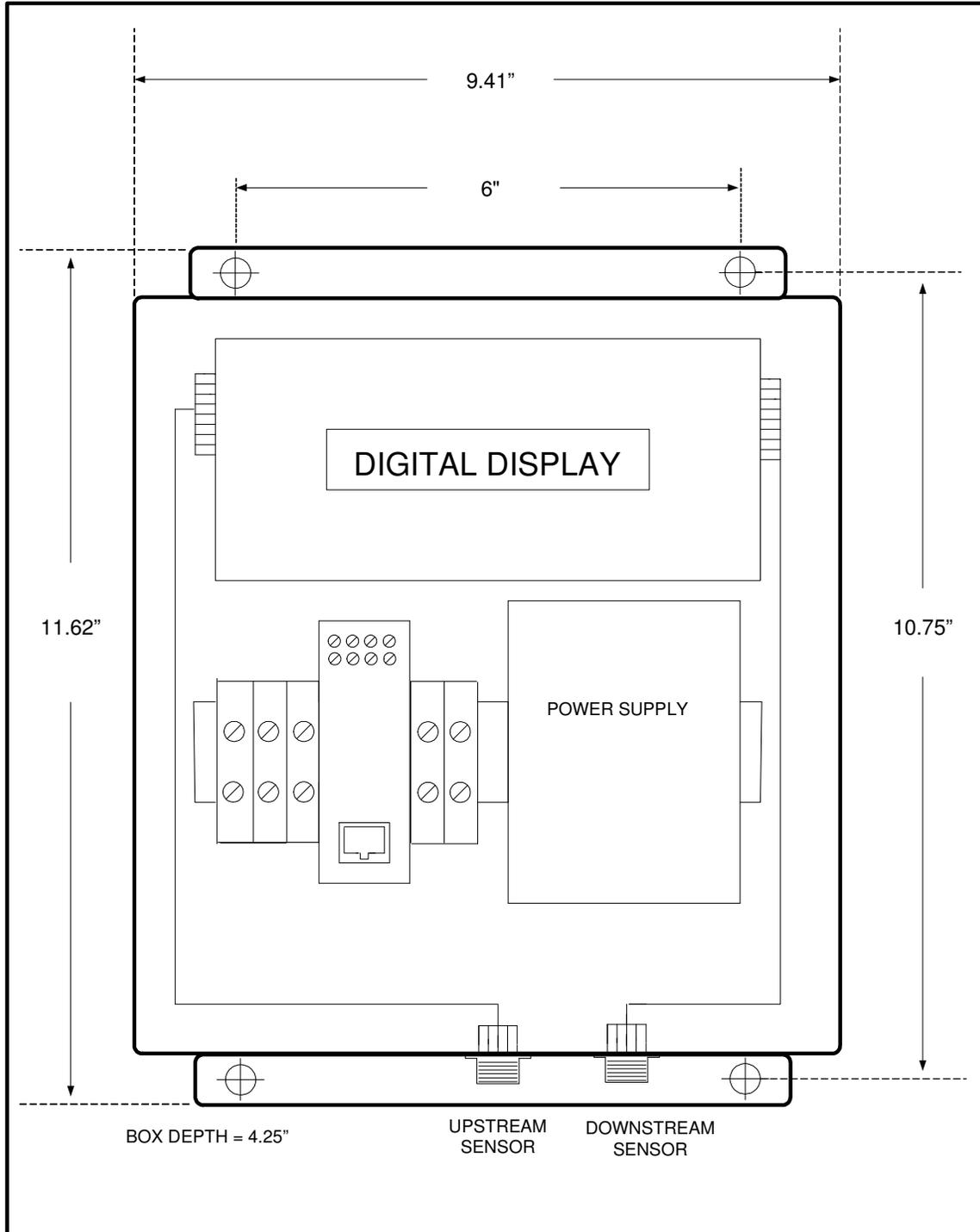


Wiring Diagram



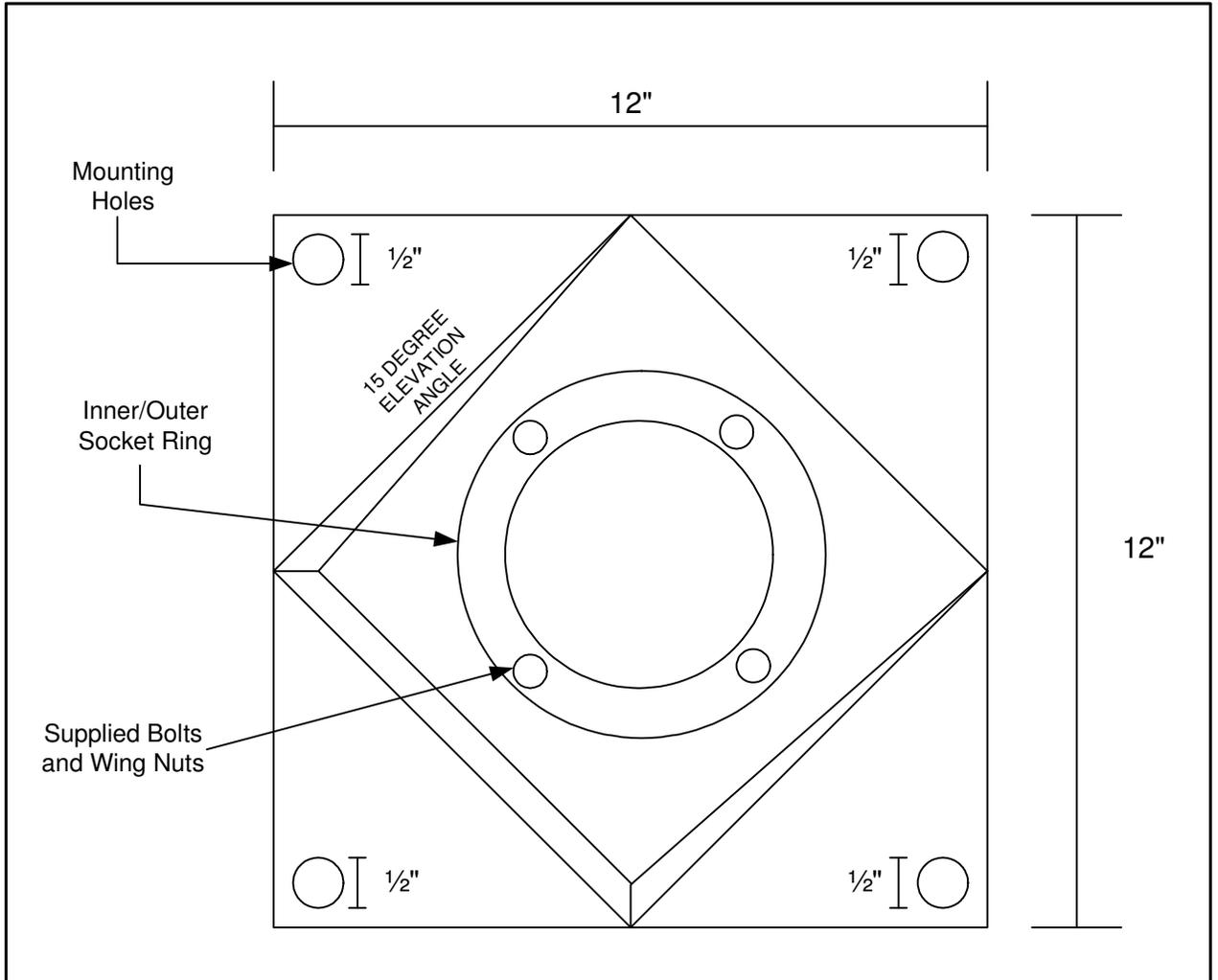


Enclosure Dimensions



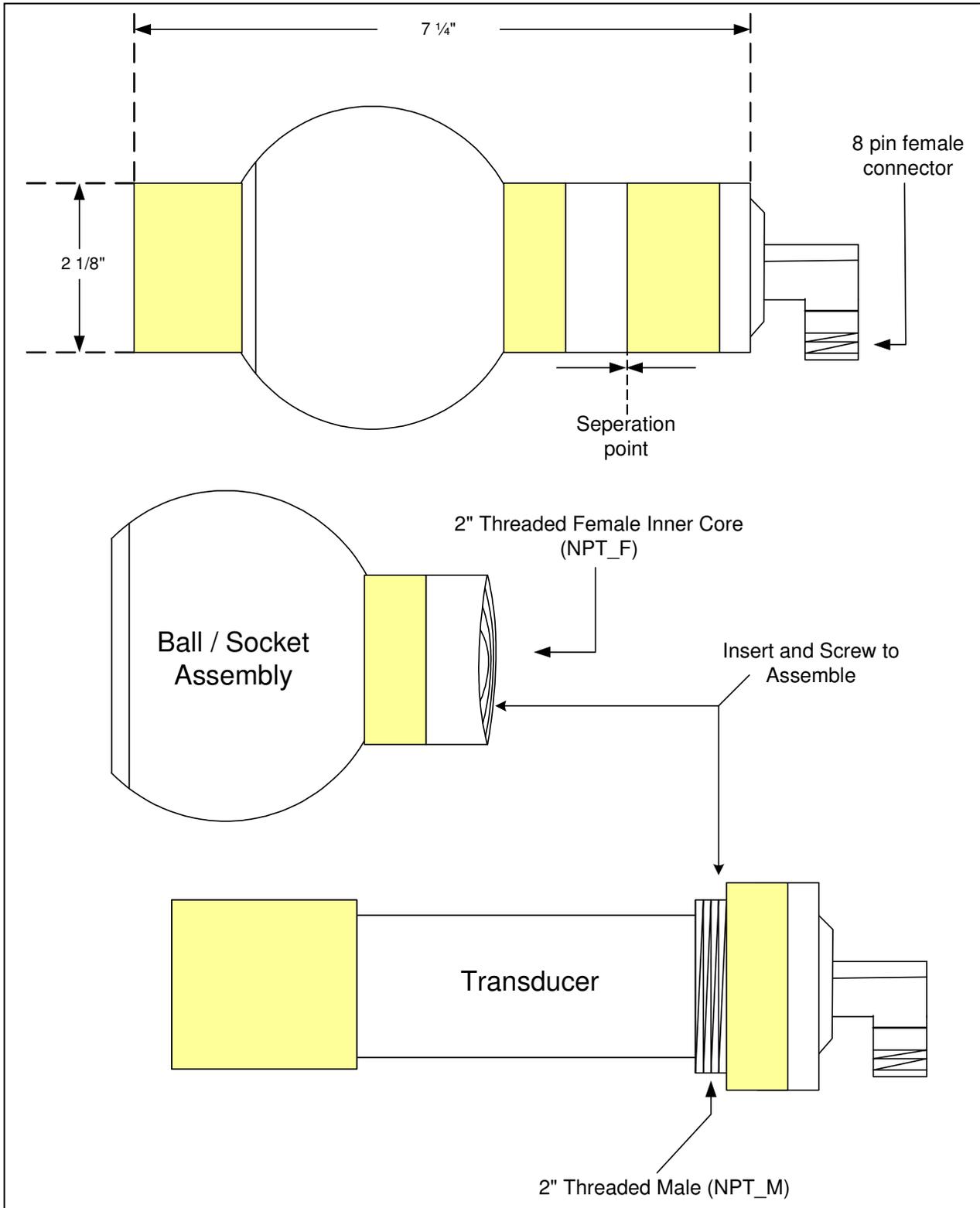


Accutron Plus FN Mounting Plate Dimensions



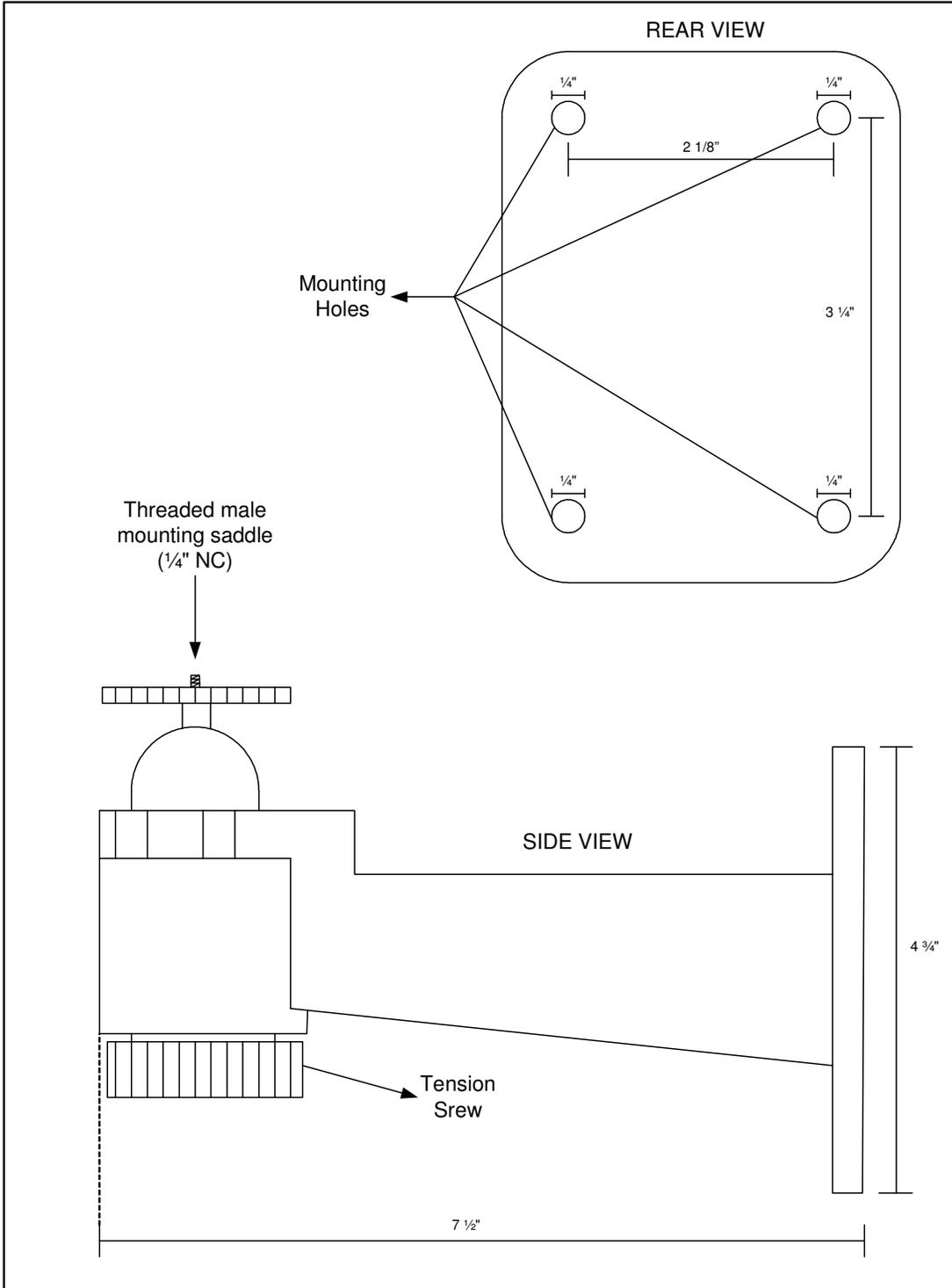


Accutron Plus FN Transducer Dimensions



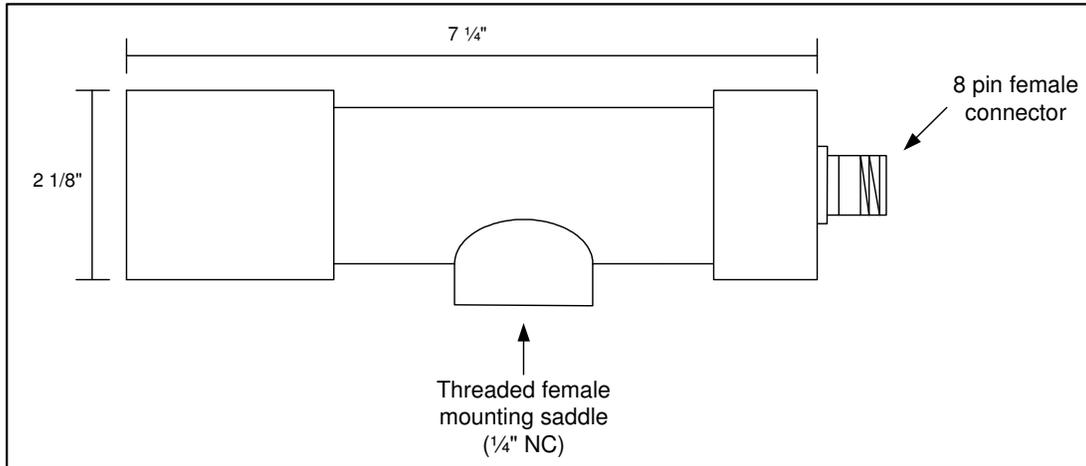


Accutron Plus Mounting Dimensions



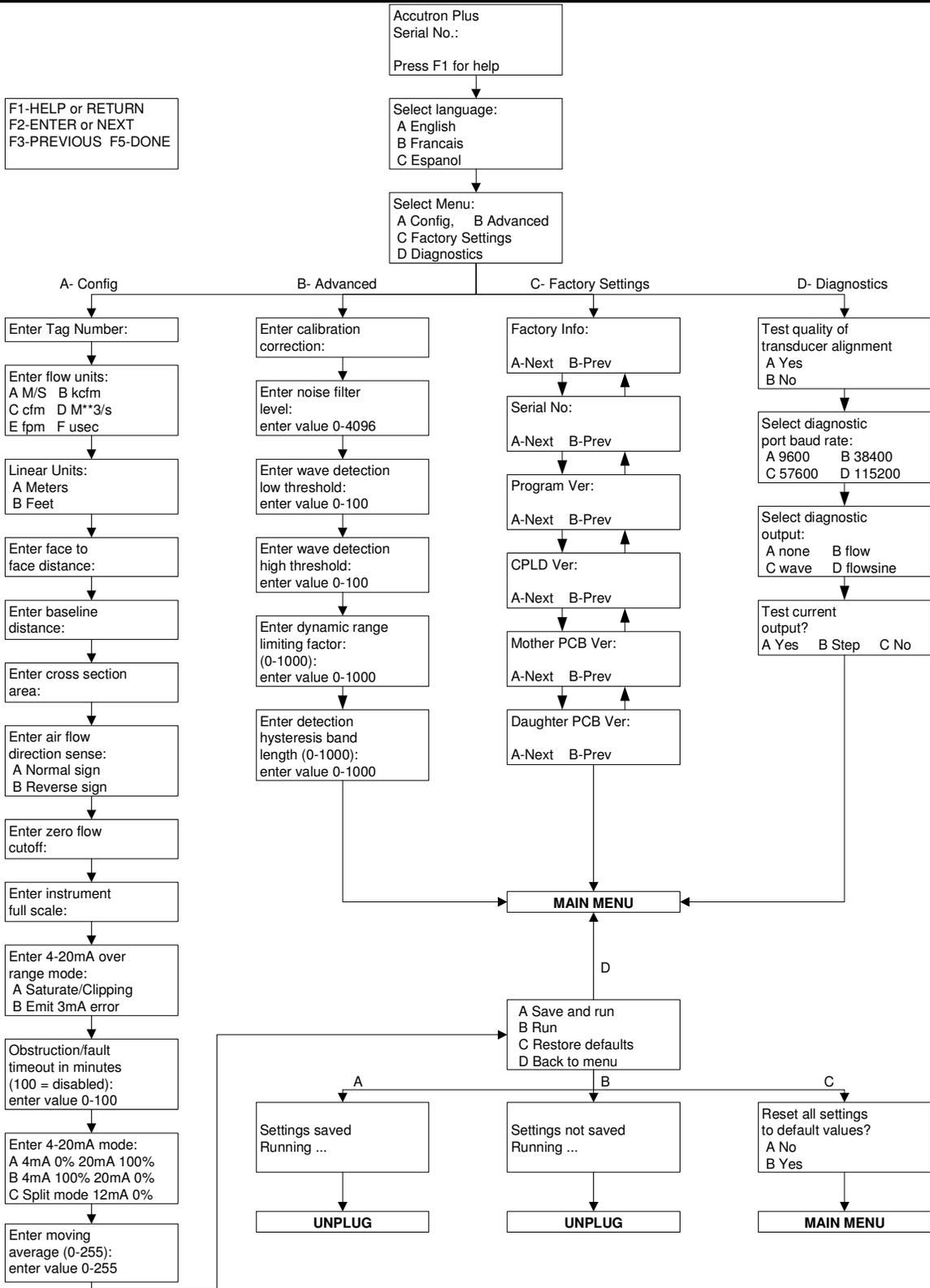


Accutron Plus Transducer Dimensions





Menu Flow Chart





NOTES: