Document Number:
XE-AMA2PM-R0A

BREATHING AIR MONITORING SYSTEM

MODEL AMA200

PRELIMINARY DOCUMENT
FOR REFERENCE/REVIEW ONLY

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Overview

The Breathing Air Monitoring System is designed for use on aerial devices. It has 11 LEDs that indicate the percentage of air in the bottle. When the air in the bottle drops below the low air setting, the LEDs flash. A 5-digit LED display shows the actual bottle pressure.

Features

Audible and Visual Alarm for Low Air Warning

Programmable for Different Size Air Bottles

Shows Pressure and Percent of Air in the Bottle

Displays Air Pressure in PSI, kPa, or Bar

Multiple Remote Displays

LED Display Brightness Automatically Adjusts for Day/Night Viewing

Specifications

Control Module

Supply Power:	9 to 30 VDC
Supply Current:	1.5 Amps Maximum
Dimensions:	3 1/4" Wide by 3 1/4" High
Unit of Measure:	PSI (Program Option for kPa, Bar)

Pressure Sensor

Model Number:	XE-AM2PT1
Pressure Range:	0 to 8000 PSI
Proof Pressure:	16000 PSI
Excitation Voltage:	5 VDC
Output Voltage:	0.5 to 4.75 VDC

GENERAL DESCRIPTION

Components

The Breathing Air system consists of the following components:

Display Module

Pressure Sensor

Audible Alarm Buzzer

Cables

Display Module

The display module is waterproof and has dimensions less than 3 1/4 inches high by 3 1/4 inches wide by 2 inches deep. All controls and indicators are located on the front of the display module. (Refer to Controls and Indicators.)

Pressure Sensor

The pressure sensor is mounted on the air tank manifold. It provides an input signal to the display module that is proportional to the tank pressure.

Audible Alarm Buzzer

A ground is provided at the 8-pin connector pin 6 to activate the buzzer (max current: 300mA).

Cables

There is one cable provided with a 8-pin connector that plugs into the rear of the display module. (Refer to Wiring Section.)

Controls and Indicators

All controls and indicators are located on the front of the display module. The intensity of the display and LEDs are automatically adjusted for day or night operation.

LED Bar Graph

The LED bar graph display indicates the remaining percentage of air in the bottle, this will be proportional to the pressure sensor input. The first two LEDs indicate 5% and 10%, the last two LEDs indicate 90% and 95%. The other LEDs are in ten percent increments. All LEDs are on at full tank and flash for low air warning.

Digital Display

During normal operation this 5-digit LED display indicates tank pressure. When the MENU button is pressed it indicates the percent of air in the bottle. When the program access mode is selected, program specific information and settings are displayed. (Refer to Programming Section for more information.)

MENU Button

Press to show percent of air in bottle. Used when accessing program features to change settings or parameters.

SILENCE Button

Suppresses audio alarm (does not cancel the visual alarm), also used when accessing program features.

Figure 1. Controls and Indicators

INSTALLATION

Install Display Module

Display modules are interchangeable. Programming may have to be set for primary/ remote operations.

1. Measure and mark mounting location for display module panel cutout and mounting screw holes. Make sure there is clearance behind the panel for the display and cables before cutting holes. Refer to Figure 2 for layout and dimensions.
2. Cut out a 2 3/4 inch diameter hole and drill four holes (clearance or tapped) for 10-32 mounting screws.
3. Place display module in position and secure with four screws.
4. Connect the cables and wires. (Refer to Wiring Section.)

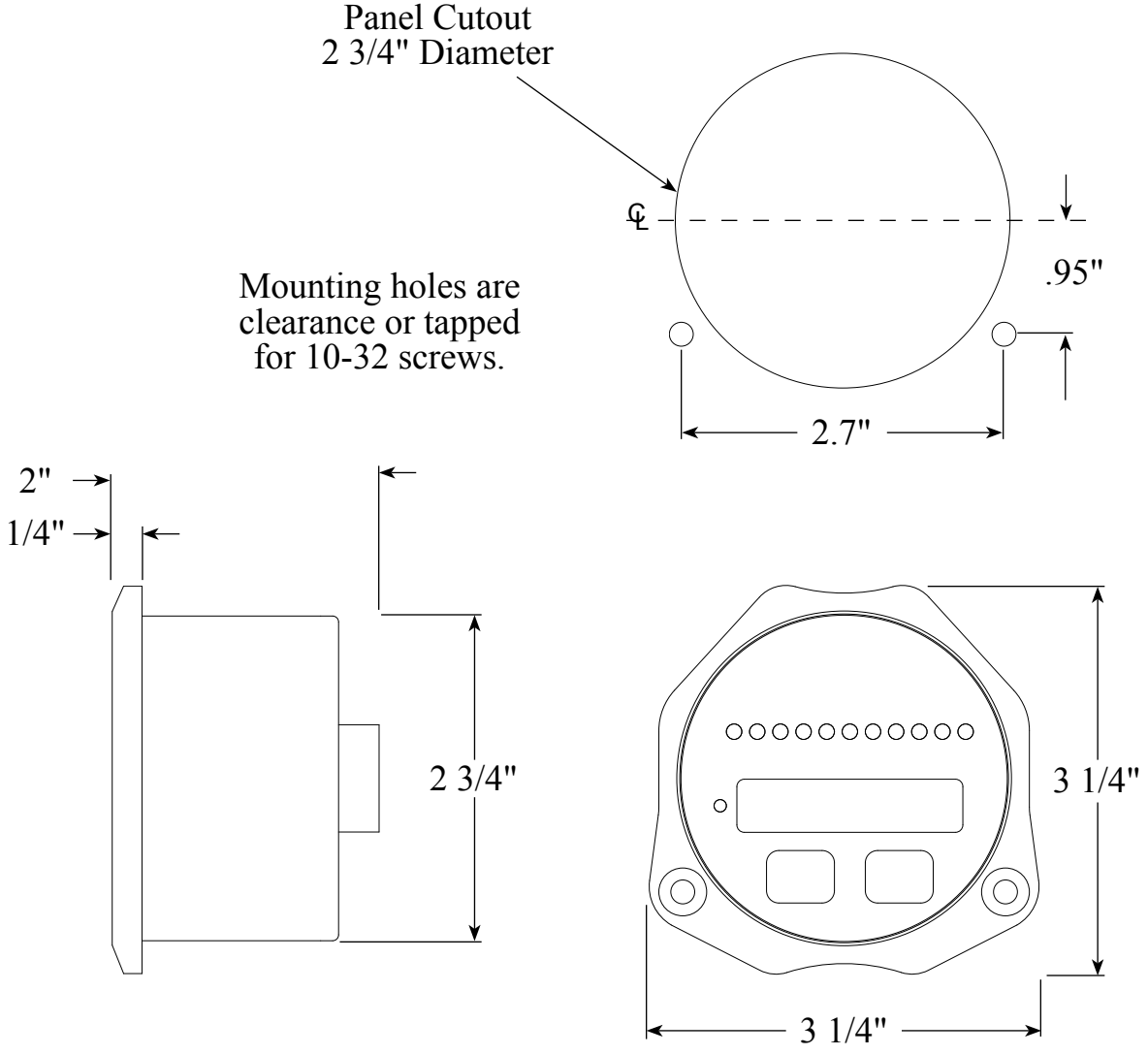


Figure 2. Display Module Mounting Dimensions

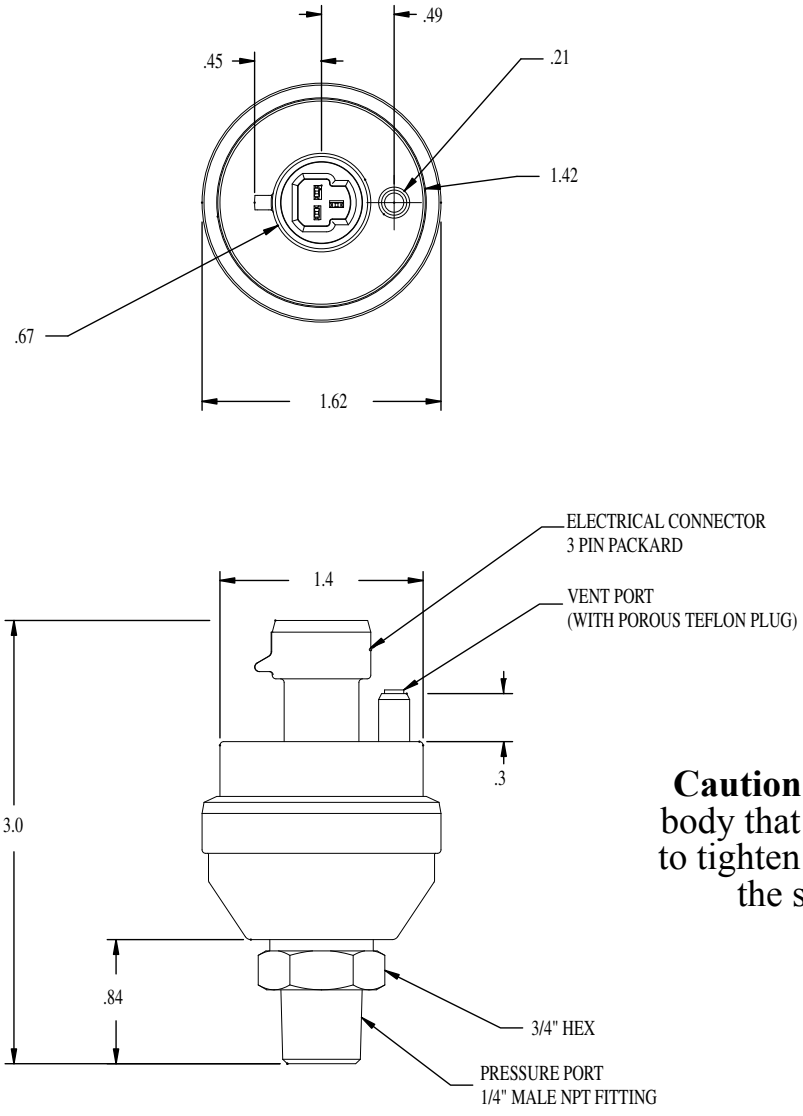
Install Pressure Sensor

The pressure sensor is mounted on the manifold of the air tank. T-fittings can be used to mount the pressure sensor.

1. Screw the sensor into a 1/4-18 NPT hole.

Caution: Do not use the main body that houses the electronics to tighten the pressure sensor. Damage to the sensor may occur.

2. Tighten the sensor with a 3/4 inch wrench on the lower hex fitting.
3. Connect the pressure sensor cable from the display module to the pressure sensor. (Refer to Wiring Section.)



Caution: Do not use the main body that houses the electronics to tighten the sensor. Damage to the sensor may occur.

Figure 3. Pressure Sensor Dimensions

Install Buzzer

Install the buzzer close to the display module so the audible warning is easily associated with the visual warning on the display.

The optional buzzer provided by FRC requires a cutout hole of 1-1/8" (1.125").

Pin 6 on the 8-pin connector at the rear of the control module is provided to connect the optional buzzer. Connect the ground side of the buzzer to pin 6. (Maximum current through pin 6 is 300 mA.) (Refer to the Wiring Section.)

On power-up the Breathing Air system is in the normal operating mode. Information from the pressure sensor or from the datalink interface is processed and displayed. Operator input is necessary only when accessing program information.

The digital display indicates bottle pressure above 500 PSI in increments of 10. (If the display module is programmed for the units of measure to be Bar, it shows one digit to the right of the decimal point.)

The bar graph display shows the percentage of air in the bottle in ten percent increments. Press the MENU button to display the actual percent of air left in the bottle.

Low Air Warning

The Low Air warning triggers when the air in the bottle drops below the low air warning setting (refer to Programming Section code 316). Both audible and visual alarms are generated. Pressing the SILENCE button suppress the audible alarm. The visual alarm includes the bar graph flashing and LoAir warning message showing in the display. To clear the visual alarm the air pressure must rise at least 30 PSI above the low air warning set point.

On power-up with the bottle pressure less than 5% full, the audio alarm is disabled. If the pressure is between 5% and the low air warning pressure setting the alarm sounds one time for ten seconds.

Program Information

Pressing the MENU button allows the operator to see the exact precent of air remaining in the bottle.

Datalink Interface

The datalink interface provides a way of connecting multiple display modules on a shared data bus. The correct ID number must be programmed for each module (see Program Code Descriptions).

Primary Display Module

Primary display modules receive input from the pressure sensor. At power up all programming information is sent to all remote displays on the datalink. An E212 error code shows if the pressure sensor input is out of range.

Remote Display Module

Remote display modules recieve all information from the primary display via the datalink. An E201 error code shows if the datalink input is missing.

Test Mode

The test mode is used to test all LEDs, alarm outputs, and communication links between primary and remotes. The test mode will not activate when there is a low pressure warning.

1. Press and hold the SILENCE button.

   Result: The audible alarm sounds.

   Result: The LED bar graph cycles showing empty (one LED on) and then full (all LEDs on).

   Results: The display cycles showing tESt and then 8888.

2. Release the SILENCE button.

   Result: The display module returns to normal operation.

The program access mode is selected and inputs are made using the two pushbutton switches on the front of the display module. The digital display shows stored data and operator inputs. (Refer to Figure 1.)

Note: When entering codes in the program access mode there is a time-out feature that requires an operator input every three seconds. If an input is not detected within five seconds the program returns to normal operation.

Inputs

The two pushbutton switches on the front of the display module allows the operator access to stored data and program functions.

The MENU button is used to display the precent of air remaining in the tank.

Both the MENU and SILENCE buttons are used to enter program codes.

Once a program code is entered, the MENU button selects the digit to change and the SILENCE button changes the digit or option choice.

Program Access Mode

To gain access to the program features a three-digit program code must be entered. Review the Program Code Descriptions or refer to Table 1. Program Code Quick Reference for the proper three-digit code.

Note: There is a time-out feature that returns the program to normal operation in five seconds if input is not detected.

Select Program Access Mode

Turn on power. Press the MENU button and hold it until the display shows five dashes. The program is ready for a three-digit program code to be entered.

Enter Program Code

Note: There is a time-out feature that returns the program to normal operation in five seconds if input is not detected.

1. Select the Program Access Mode (five dashes are shown in the display).
2. Press the MENU button. The number 100 shows in the display with the first digit (1) flashing. Each time the MENU button is pressed the number increments by 1. Set the first digit to the desired number.
3. Press the SILENCE button. The second digit flashes. Each time the SILENCE button is pressed the number increments by 1. Set the second digit to the desired number.
4. Press the MENU button. The third digit flashes. Each time the MENU button is pressed the number increments by 1. Set the third digit to the desired number.

When a valid three-digit program code is entered, a program value or an option shows in the display. If an invalid code is entered an error code shows in the display.

Note: When a valid code has been entered and a program value or an option shows in the display, the time-out feature is disabled.

Change Values or Options

Press the MENU button to select the digit to be changed. The digit flashes. Press the SILENCE button to change the digit or the option choice.

Exit Program Access Mode

Press both the MENU and SILENCE buttons and hold them until the display shows five dashes. Release the buttons and enter a new code or after five seconds the program times out and returns to normal operation.

Table 1. Program Code Quick Reference

CODE	FEATURE	OPTION
312	ID Number	0 to 99
313	Module Function	Pri, SLA
314	Unit of Measure/ Full Bottle Pressure	PSI, kPa, BAR 0 to 8000
316	Low Air Warning	20 to 99 (%)
330	Audible Alarm	00 to 99
340	CAN Terminator	On, Off
E201	Datalink Failure	Check Datalink and Programming
E202	Invalid Program Code Entered	Re-Enter Code
E208	Memory Failure	Contact Factory
E212	Pressure Sensor	Voltage Out of Range

Notes:

- Refer to Program Code Descriptions for detailed information.
- The time-out feature returns the program to normal operation in five seconds if input is not detected.
- When a valid code has been entered and a programed value or option is shown in the display, the time-out feature is disabled.

Program Code Descriptions

When a valid three-digit program code has been entered, a program value or option shows in the display. The MENU and SILENCE buttons are used change the data.

Press the MENU button to select the digit to be change. The digit flashes. Press the SILENCE button to change the digit or the option choice.

Code 312 ID Number

Factory programmed value: Id 0

Options: 0 to 99

This code sets the datalink identification (ID) number for the display module. The display is programmed with an ID number between 0 and 99. When a display module is programmed with Id 0 no data is output to the datalink. The ID number assigned to a remote display must match the ID number of the primary display.

Code 313 Module Function

Factory programmed value: Pri

Options: Pri, SLA

This code sets the datalink function of the display module. Two program choices are available. Pri (primary) sets the module as a primary display. The display module must be programmed as primary to interpet flow sensor information. SLA (slaved) sets the module as a remote display.

Code 314 Unit of Measure/Full Bottle Pressure

Factory programmed value: PSI/4600

Options: PSI, kPa, Bar/0 - 9999

This code sets the unit of measure and sets the full bottle pressure along with the LED display for 100%.

Code 316 Low Air Warning

Factory programmed value: 25%

Options: 20 to 99%

This code sets the low air warning.When the percent of air in the bottle is below the low air warning programmed value, both audible and visual alarms will be generated.

Code 330 Audible Alarm

Factory programmed value: 0

Options: 00 - 99

This code sets the time interval (1 to 99 minutes) after the silence button is pressed until the audible alarm sounds again. If set to 0, the alarm will not repeat after the silence button is pressed.

Code 340 CAN Terminator

Factory programmed value: On

Options: On, Off

This code sets the datalink terminating resistors for this module.

Error Code E201 Datalink

The remote does not detect a valid packet on the datalink from the primary.

Error Code E202 Invalid Code

An invalid program code has been entered. Re-enter program code when the digital display resets.

Error Code E208 Memory

There is a failure with the internal memory of the module. The bottle pressure shows in the display alternating with the error code. The Low Air Warning, LED bar graph, and programming does not function. Contact factory if this error code is displayed.

Error Code E212 Sensor

The primary does not detect the pressure sensor, or the output voltage from the sensor is out of range (0.3 to 4.9).

Exit Program Access Mode

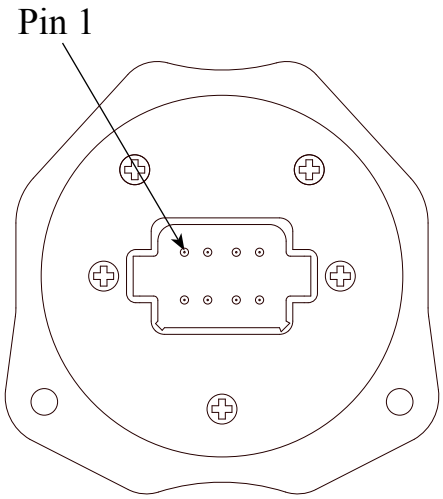
Press both the MENU and SILENCE buttons and hold them until the display shows five dashes. Release the buttons and enter a new code, or after five seconds the program times out and returns to normal operation.

WIRING

The following figures include wiring and cable information.

Display Module

A remote display module requires four (4) wires, power (pins 1 and 2) and the datalink connection (pins 7 and 8) to the primary display. A remote display must be programmed with the same ID number as the primary display.



Rear View

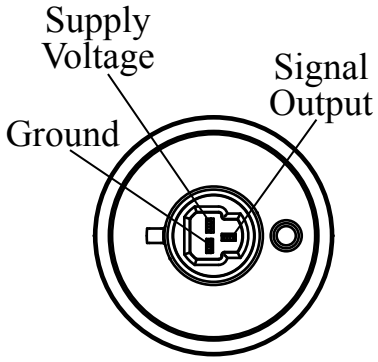
8-Pin Connector/Cable

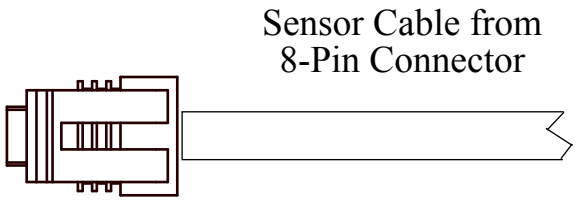
Pin	Description
1	Power
2	Ground
3	Pressure Sensor +5 VDC
4	Pressure Sensor Ground
5	Pressure Sensor Signal
6	Buzzer Ground (300ma)
7	Proprietary Datalink (–)
8	Proprietary Datalink (+)

Figure 4. Display Module Wiring

Pressure Sensor

Pressure Sensor
(Top View)





Pressure Sensor
(Side View)

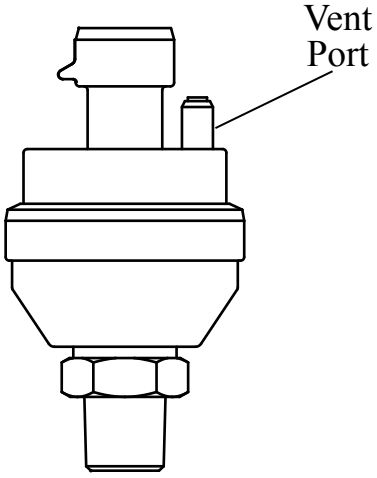


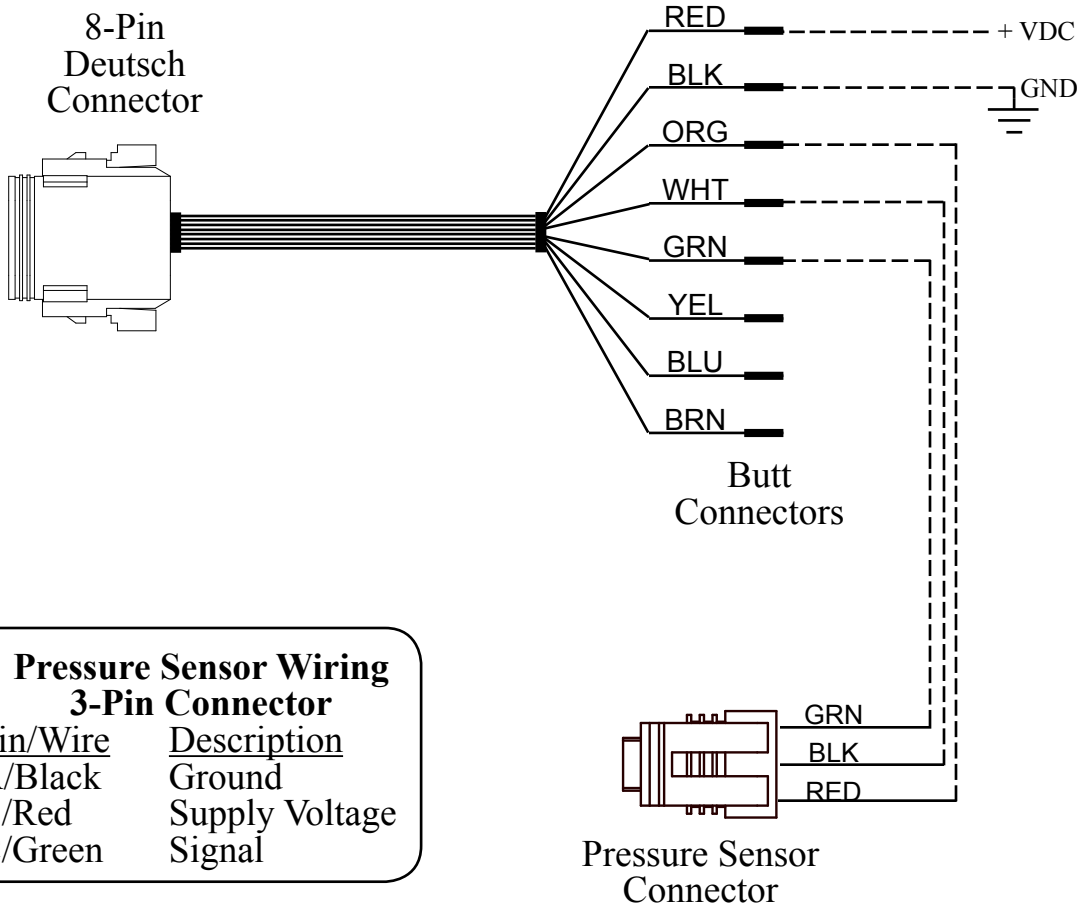
Figure 5. Pressure Sensor Wiring

AMA210

The AMA210 kit includes a 8-pin connector with butt crimps. When the pressure sensor kit is ordered seperate it has a connector with three wires that needs to be connected to the display module.

8-Pin Connector Wiring

Pin	Wire Color	Description
1	Red	Power
2	Black	Ground
3	Orange	Pressure Sensor +5 VDC
4	White	Pressure Sensor Ground
5	Green	Pressure Sensor Signal
6	Yellow	Buzzer Ground (300ma)
7	Blue	Proprietary Datalink (–)
8	Brown	Proprietary Datalink (+)



Pressure Sensor Wiring
3-Pin Connector

Pin/Wire	Description
A/Black	Ground
B/Red	Supply Voltage
C/Green	Signal

Figure 6. AMA210 Wiring