

The background of the page features a series of thin, curved lines in black and red. These lines originate from the left side and sweep across the page towards the right, creating a dynamic, abstract pattern. The red lines are more prominent than the black ones.

Phoenix Controls

**Advanced Pressure Monitor II
Rough-In Installation Guide**

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Section 1 Rough-In Installation

For the Advanced Pressure Monitor II (APM2) to be installed correctly, the rough-in phase of the project must be completed properly. This section will outline the specific considerations the General Contractor must pay attention to so that the final wiring and commissioning will go smoothly.

During rough-in installation, the field wiring and plumbing can be run in the walls and routed between the triple gang electrical box, the Building Management System (BMS), door contact switch, remote sensors (if applicable) power supply, earth ground and so on.

Required Parts to be Supplied by the Installer

The following is a list of parts required and supplied by the installer for the APM2:

- Triple gang-double deep electrical box (RACO 697 or Appleton M3-350), quantity 1
- Green grounding screw, quantity 1
- Power (18 AWG recommended) and signal wiring (22 AWG recommended), as needed. Refer to See *Phoenix Recommended Cables* on page 1-12.
- 0.25" (6 mm) O.D. flame retardent polyethelyne control tubing (such as CPChem UL 1820)—to run from the room(s) to the APM2 (maximum 250 feet [76.2 meters] length)

NOTE: Less than 10% or 10 feet (1.6 meters) of total control tubing can be used in a vertical rise. Maintain tubing run on the same floor as the APM2.

- T-connectors

NOTE: Phoenix Controls recommends no more than five (5) T-connectors in a single run going to any APM2.

- EMT conduit (if required by local code)
- 24 Vac Transformer
- Door switch SPDT or SPST—normally open, as required
- Remote pressure transducers, as needed
- Remote Annunciators, as needed

The following is a list of part required and supplied by the installer for the Remote Annunciator and Pressure Pickup Port:

- Single gang electrical box, as needed
- 0.25" (6 mm) O.D. flame retardent polyethelyne control tubing (such as CPChem UL 1820)—to connect between the Pressure Pickup Port and the APM2

Parts included with Your Order

The following are parts that are included in your order:

- Advanced Pressure Monitor II (APM2), including factory calibrated differential pressure sensor, quantity 1
- APM2 Faceplate, quantity 1
- Pressure Pickup Port (quantity 0, 1 or 2 (depending on order configuration))
- 0.25" O.D. Tubes, Silicone, with integrated springs and attached brass barbed couplings, quantity 2
- Mounting screws, 6-32 x 1/2 Phillips head, quantity 5
- Mating Electrical Connectors, Phoenix contact MC plug kit, quantity 1 with 3 green and 2 black connectors

Installation Overview

- Each APM2 consists of a room pressure pick-up, a reference space pressure pickup and a room pressure monitor panel, which houses a differential pressure sensor.
- The two pressure pickup ports are installed in single gang electrical boxes, which are placed in the room walls.
- Standard 0.25" (6 mm) O.D. flame retardent polyethelyne control tubing (such as CPChem UL 1820), maximum 250 feet (76.2 meters) length, is run within the wall from the sensors to the monitor panel. In some code jurisdictions, the tubing must be in EMT conduit. Tubing and conduit is provided by others.

NOTE: Less than 10% or 10 feet (1.6 meters) of total control tubing can be used in a vertical rise. Maintain tubing run on the same floor as the APM2.

- Install in a triple gang-double deep electrical box (RACO 697, Appleton M3-350 or equivalent).
- Secure the triple gang-double deep electrical box to the stud(s) by using the mounting hole in the side of the electrical box (see figure below for mounting hole location). Drive the mounting screws from the inside of the electrical box into the wall studs to prevent sharp objects from protruding into the electrical box.
- Ensure the mounting is level and flush to the wallboard surface.

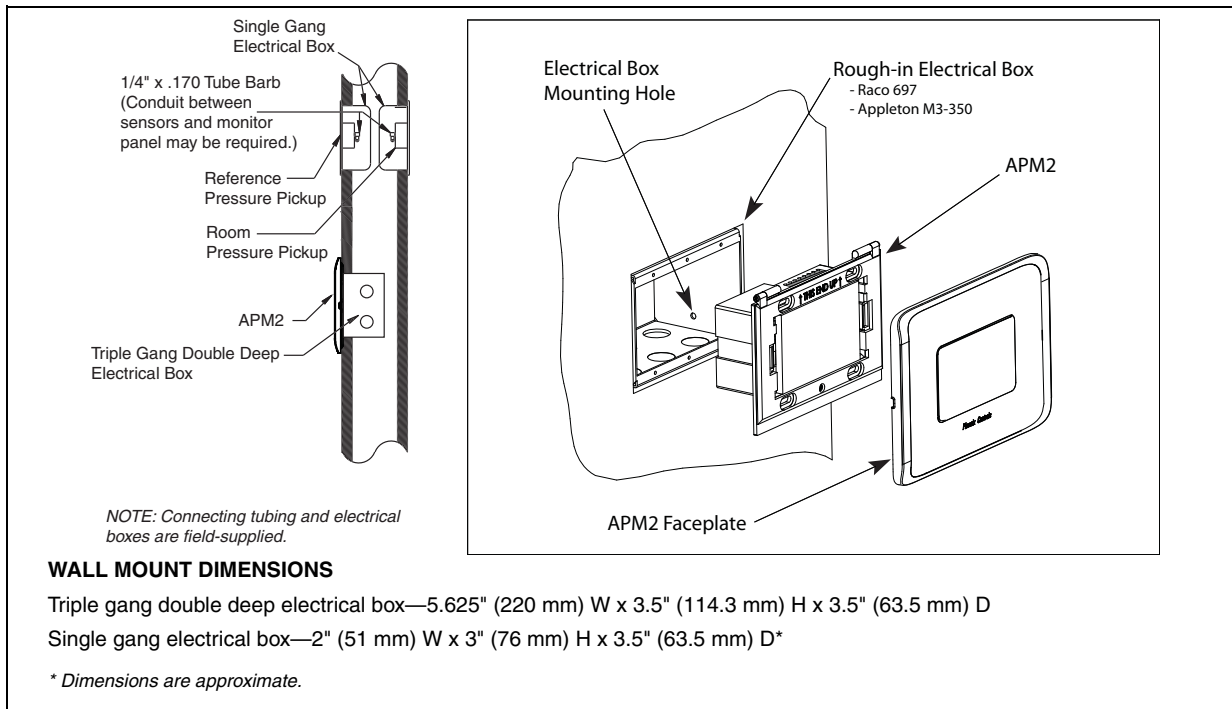


Figure 1-1. Wall Mount Installation Overview

Wiring Recommendations

- All circuits must conform to the requirements of an NEC Class 2 (dry) circuit.
- Use multiple transformers instead of larger transformers when more than 100 VA is required.
- Each pressurization zone should have either a dedicated single-phase primary circuit, or a secondary circuit disconnect
- See *Phoenix Recommended Cables* on page 1-12 for approved cable manufacturers and wire types.
- Use stranded wire for ease of installation.
- Follow good wiring practices:
 - Locate cables away from sources of electrical interference (EMI/RFI).
 - Do not run signal or communication cable in the same conduit or wire way as power cables.
 - If signal cable must cross power cables place these at a 90-degree angle.
 - Shield or drain wires, if required, should be wrapped with insulating tape to prevent contact with exposed conductors or contacts.
 - Maintain a consistent color code or polarity all the way through the wiring system.
- Power supply and signal isolation on I/O devices vary from manufacturer to manufacturer. Verify the wiring device manufacturer's recommendations for isolating power and signal common connections and maintain polarity.
- Local and national electrical codes take precedence.

- Strip 0.25" (6.4 mm) of insulation from each conductor, twist the strands, insert the conductor fully into the terminal block, and tighten the terminal.
- Test the wire connection by pulling on each conductor.

WARNING: Wiring must be performed by a licensed electrician according to local and state codes.

Wiring Triple Gang Electrical Box

USE ONLY THE KNOCKOUTS AT THE BACK OF THE ROUGH-IN ELECTRICAL BOX. The front knockouts will be inaccessible once the APM2 is installed. Strain relief and seal box as required.

NOTE: Install power and signal wires into separate knockouts to avoid noise.

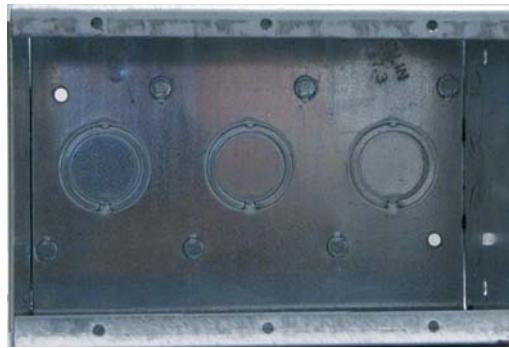


Figure 1-2. Wiring in the Triple Gang Electrical Box

Plumbing Rough-In

If the internal pressure sensor will be used, then typically a Pressure Pickup Port is installed in the monitored room and another one is installed in the reference area (typically a hallway). 0.25" nylon tubing is typically used to bring the pressure signal from this point of measurement to the pressure inputs on the back of the APM2.

Install a single gang electrical box anywhere inside the room, typically high on the wall in an inconspicuous area. This will be used for the room pressure signal (room monitor pressure port labeled **HIGH**). Run 0.25" tubing from this electrical box to the triple gang box that the pressure monitor will be mounted to in the finish stage of the installation.

CAUTION: Be careful in running the tubing in a way that the tube is protected from being damaged by being cut or penetrated by screws or nails or being crimped so that the pressure signal integrity is affected. Do not tighten strain reliefs so that they crimp the tubing. Tape the open ends of the tubes closed to prevent contamination of the inside of the tubing.

Install a second single gang box on the corridor, ante room or other reference pressure area. This will be used for the low pressure side or reference side pressure signal. This will be run to the triple gang box and connected to the APM2 pressure port labeled **LOW**.

If an external sensor will be used then run the pressure signals (room and reference) to the remote transducer.

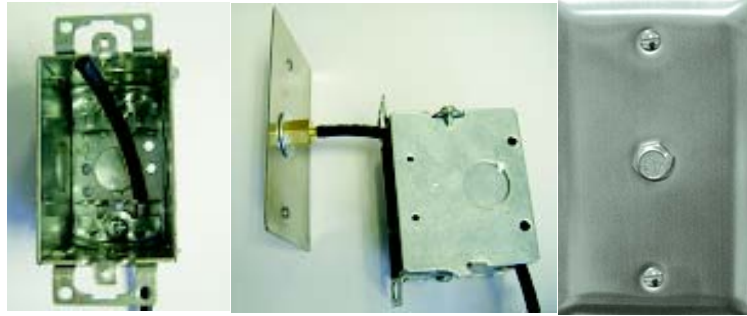


Figure 1-3. Pressure Pickup Port Installation

Use of External Transducers

The APM2 has the option to use the internal pressure sensor or external pressure transducers (ordered separately). If external pressure sensors are being used then no tubing needs to be run into the electrical box. Instead the remote pressure transducer will be separately mounted, plumbed and wired. Only the wire for the analog output of that transducer(s) will be run to the APM2. If two rooms are being monitored, you have the choice to use the internal pressure sensor and an external (remote) transducer for the second room, or two external remote transducers may be used and wired to the analog inputs in the back of the unit.

NOTE: See *Phoenix Recommended Cables* on page 1-12 for approved cable manufacturers and wire types.

Layout the system in terms of wiring:

- Power: 24 Vac, 9 VA
- Annunciator/relay: remote alarm wiring if being used
- Analog output: 0-5 or 0-10 Vdc or 4-20 mA.
- Analog Input wiring: there are two analog inputs that can be used to bring signals from remote pressure transducers
- Digital Input: the digital input can be used as a door status indication, these would be wired to a door switch mounted in the door jamb.

Once the installation has been planned, locate and mount the electrical box and bring all tubing, power, earth ground, analog input, digital input, relay/annunciator, analog output communications wiring into the triple gang box.

Remote Annunciator

If an remote annunciator will be used, then mount a single gang electrical box in the desired location and run wires to it.

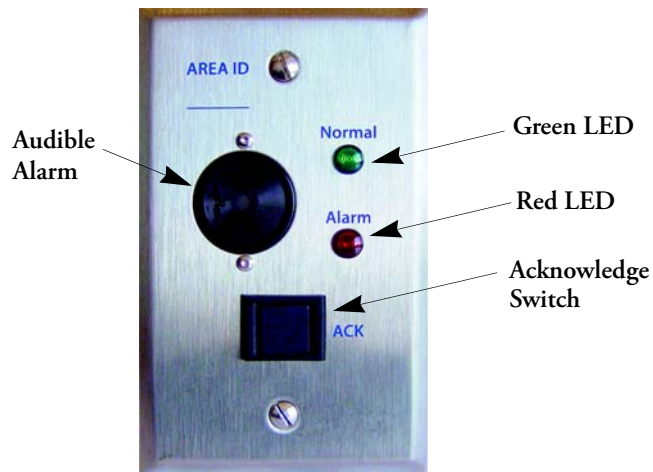
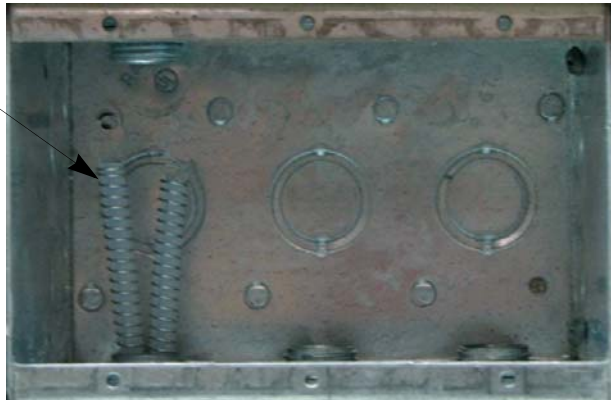


Figure 1-4. Remote Annunciator

Plumbing (Finish)

Use the following procedure for all room types positive, negative or neutral.

Soft Silicon
Tubing with
Integrated
Springs



The biggest problem that can occur during plumbing is kinking of the often stiff nylon 0.25" tubing that is used for running pressure signals from the APM2 to the monitored spaces. To prevent buckling and collapse of this stiff tubing inside the electrical box, use the supplied soft silicone tubing with integrated springs and tubing adapters to transition from the field tubing to the pressure fittings on the APM2.

Attach pressure tubing as follows:

1. Install the supplied silicone tube (with integrated spring) and attached barbed tube adaptor onto the end of the 0.25 field tubing. Thread the tubes, with installed adaptor, through the conduit opening at the bottom of the electrical box.
2. Next push the open end of the soft silicone tubing onto the APM2 pressure tube port labeled "HIGH".
3. For the most pressure stable operation, a Pressure Pickup Port installed in the reference pressure area is also recommended. In this case, install the Pressure Pickup Port in a hallway or reference space.
4. Next push the open end of the soft silicone tubing onto the APM2 pressure tube port labeled "LOW".

Wiring

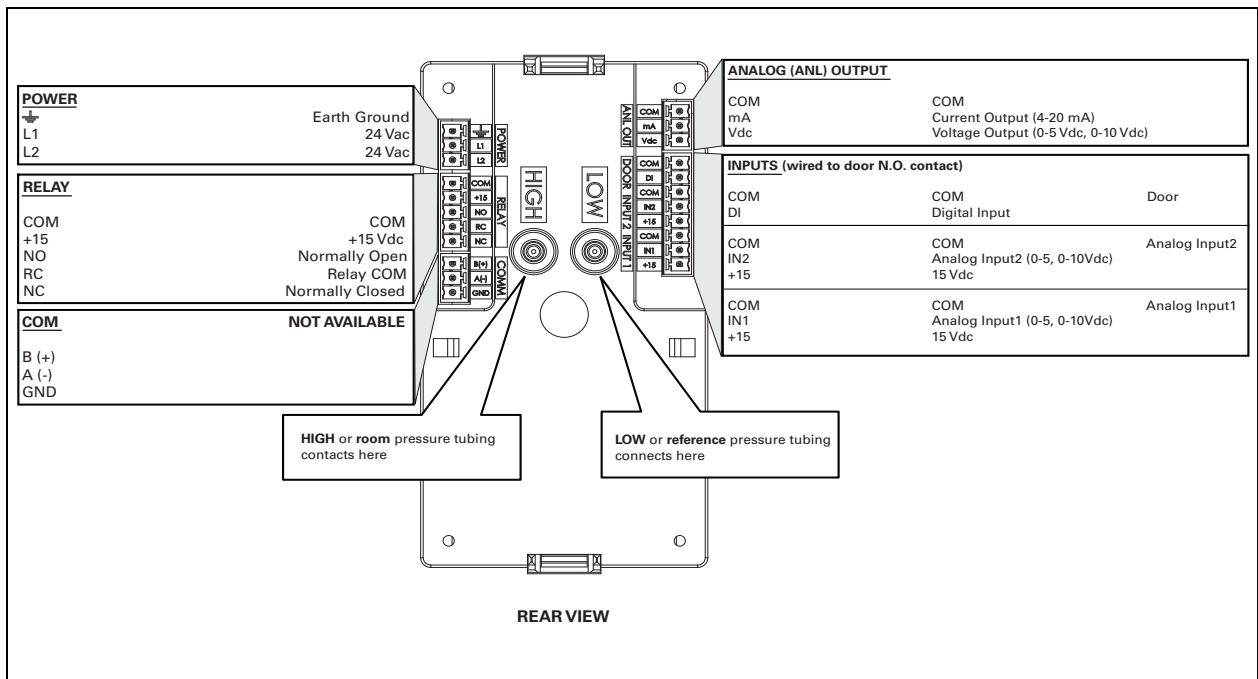


Figure 1-5. Rear View of the APM2 Showing Wiring and Plumbing Connections

The back of the APM2 has electrical connectors labeled with their function. The mating electrical connectors (supplied) are color coded and labeled with the matching function.

Power, Labeled POWER, L1, L2, Ground Symbol

Starting with the 3 pin Power connector:

1. Connect the 24 Vac lines to L1 and L2.
2. Connect a ground wire, GND, from the ground lug to the GND on the connector.
3. Install Connector.

The APM2 operates at 18-32 Vac, 50/60 Hz and consumes 2.6 W nominal, 9.6 W max.

Analog Output, Labeled ANL OUT

If using the analog output and want Voltage output, connect to the terminals labeled VDC and COM.

If using the analog out and want a 4-20 mA signal, connect to terminals labeled mA and COM. Connect this output to the BMS system or other monitoring device.

Analog Input, Labeled DOOR, INPUT2, INPUT1

There are two analog inputs available for remotely mounted transducer inputs. These are INPUT1 and INPUT2.

A 15 Vdc (14.8 to 15.2) excitation is available to power up to two transducers. They can source 90 mA max. combined. It is labeled as +15 on the connectors.

If using this to power a remote transducer, connect this to the positive excitation terminal of the transducer.

Measuring Analog Inputs

There are three potential analog inputs that can be measured, 0-5, 0-10 and 4-20 mA.

- For 0-5 or 0-10 Vdc inputs connect the positive (+) output of the transducer to terminal labeled IN1, connect the common output of the transducer to the terminal labeled COM.
- For 4-20 mA loops install a 250 ohm resistor between the terminals labeled In1 or IN2 (whichever input you're going to) and COM. The monitor will be measuring the voltage across this resistor as 1-5 Vdc corresponding to 4-20 mA.

If you will be monitoring the status of a door position, then wire the contacts labeled DOOR to the normally open contacts on a door jamb switch. The monitor will show the door "**Warning**" (when enabled) when the door is open. The door jamb switch should be closed when the door is closed and open when the door is open.

Optional Remote Transducer Wiring

The figure below references the Setra remote sensors equipped with 4-20 mA output. The instruction booklets supplied with the sensors cover both the 3-wire voltage output configuration and 2-wire current configuration. The figure below clarifies the 2-wire 4-20 mA connection between the Setra 264 or 267 and APM2 inputs. The same connection applies to IN2 (AI2).

If the APM2 output is configured for 4-20 mA on the AO, the users can use either 249 or 500 Ohm resistors depending on whether they desire 1-5 or 2-10 Vdc.

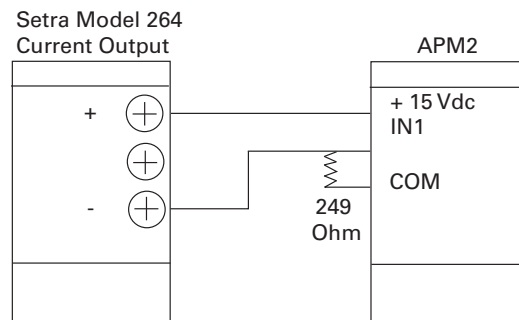


Figure 1-6. Optional Remote Transducer Wiring

Relay and Annunciator Output, Labeled RELAY

There is an SPDT dry contact available. When an alarm occurs the Normally Open (NO) and the Common (COM) internal contacts will be closed. During no alarm conditions the Normally Closed (NC) and COM are shorted.

This relay can also drive a Remote Annunciator.

Optional Remote Annunciator Wiring

In the figure below, the Remote Annunciator connector is at left, and the APM2 connector is at right.

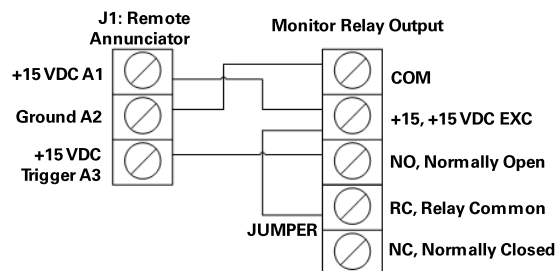


Figure 1-7. Remote Annunciator Wiring Diagram

- To connect +15 Vdc power, connect the +15 Vdc from the relay connector to +15 Vdc, A1 at the Remote Annunciator. This supplies 15 V exc. to the Remote Annunciator for powering the circuit during normal conditions.
- To connect power return, connect the COM of relay connector to Ground, A2 at the Remote Annunciator.

- On of the relay connector, connect a short jumper between the +15 and relay connector. This will connect the internal 15V supply to the common of the internal alarm relay.
- Connect the NO on the relay output to the +15 Vdc Trigger, A3 terminal on the Remote Annunciator.

When an alarm occurs and after the programmed alarm delay times out, the internal relay will supply 15 V to the Remote Annunciator circuit to actuate the audible buzzer and the red LED.

Third Party Remote Annunciator

The APM2 can drive other annunciators that are powered by a 15V supply, 50 mA max current draw, and accept a 15V trigger. If purchased separately, the Remote Annunciator can also be driven as shown below.

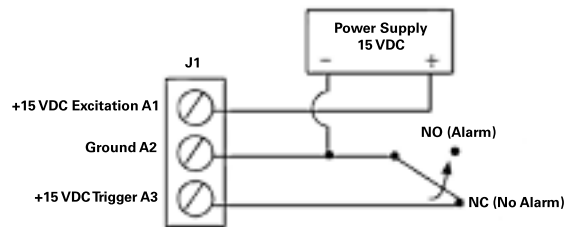


Figure 1-8. 3rd Party Remote Annunciator Wiring Diagram

Completing the Finish Wiring

1. Connect all the electrical connectors matching the wiring connector with the mates on the back of the unit. Connectors are color coded and keyed.
2. Connect the pressure signals to the **HIGH** and **LOW** ports on the back of the unit. The springs on the outside of the tubing are there to prevent buckling of the tube. As you push the unit into the electrical box push the black instrument tubing into the conduit tube or into the wall, Ideally the supplied silicone tube is the only tubing in the electrical box after the unit is slid in as far as it will go.

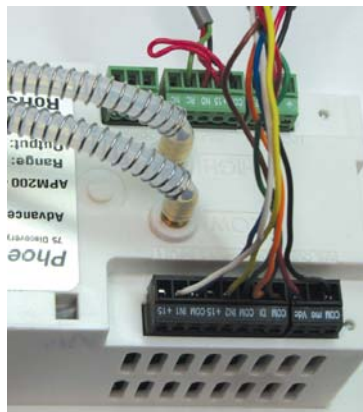


Figure 1-9. Connecting Electrical Connectors to Back of APM2

3. Mount the unit cover to the electrical box using four of the supplied mounting screws. Leaving screws slightly loose adjust the cover so that it is square. Securely tighten so that the back of the cover is tight to the finish wall surface.

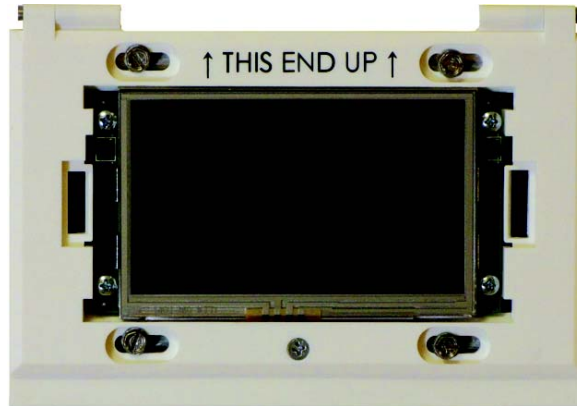


Figure 1-10. Mounting APM2 in Triple Gang Electrical Box

4. Mount the front cover assembly.



Figure 1-11. Installed APM2

PHOENIX RECOMMENDED CABLES

Cable Type	Plenum Rated	Function	Wire Gauge	Primary Vendor/Part #	Alternate Vendor/Part#	Color Code	Notes
2C Round	No	24 Vac power (110' max) @9.6 VA load	18	Belden 9409		1: Red 2: Black	Must be stranded
2C Round	Yes	24 Vac power (110' max) @9.6 VA load	18	Belden 82740	Windy City NP002 360	1: Red 2: Black	Must be stranded
TP	No	FTT-10 (4500') TP1250 (425')	22	Windy City 107500	BICC Gen C8641 Eastman Wire LEV4221	1: White/Blue stripe 2: Blue/White stripe	For more alternatives visit: echalon.com
		FTT-10 (8800')	16	Windy City 109600	BICC Gen C8661 Eastman Wire 5705		
TP	Yes	FTT-10 (4500') TP1250 (425')	22	Windy City 105500	BICC Gen. 8601 Eastman Wire LEV4221P725	1: White/Blue stripe 2: Blue/White stripe	For more alternatives visit: echelon.com
		FTT-10 (8800')	16	Windy City 109500	BICC Gen. C8621 Eastman Wire 725-5705		
TSP	No	I/O signal wiring ¹	22	Belden 9501		1: Black&Red	Twisted Shielded Pair
2 TSP	No	I/O signal wiring ²	22	Belden 9502		1: Black&Red 2: Black&White	Two Twisted Pair, Shielded
3C Round	No	I/O signal wiring	22	Belden 8443		1: Red 2: Black 3: Green	Must be stranded
4C Round	No	I/O signal wiring	22	Belden 8444	Manhattan M13304	1: White 2: Green 3: Black 4: Red	Must be stranded
5C Round	No	I/O signal wiring	22	Belden 8445	Manhattan M13305	1: White 2: Brown 3: Black 4: Red 5: Green	Must be stranded
8C Shield	No	I/O signal wiring	22	Belden 9421	Manhattan M13308	1: White 2: Orange 3: Black 4: Red 5: Green 6: Yellow 7: Blue 8: Brown	No substitutes
8C Shield	Yes	I/O signal wiring	22	Comtran 4956		1: White 2: Orange 3: Black 4: Red 5: Green 6: Yellow 7: Blue 8: Brown	No substitutes

¹ May be used for APM2 Analog out signal wiring.
² May be used for APM2 secondary transducer input.

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