

## P7810A-D Pressuretrol® Controller

### PRODUCT DATA



### FEATURES

- Use only with steam, air or noncombustible gases that do not corrode the pressure sensing element.
- Models available with on-off control function, on-off control and modulate, high limit and modulate, and on-off control and safety high limit functions.
- Models available in 15, 150 and 300 psi (103, 1034 and 2069 kPa) maximum setpoints.
- LED indicators show power, call for heat function and lockout status.
- Clear cover allows setpoint and differential to be read, but not adjusted, without opening cover, (Cover optional for P7810A,B models.)
- Manual reset possible without opening cover.
- Electronic maximum fixed stop limit.

### APPLICATION

The P7810 Pressuretrol® Controller is a line voltage pressure controller for pressure systems up to 300 psi (2069 kPa). Four models are available:

- P7810A—On/Off Control
- P7810B—On/Off Control with 4 to 20 mA modulation.
- P7810C—On/Off Control, High Limit and 4 to 20 mA modulation.
- P7810D—On/Off Control with High Limit.

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## SPECIFICATIONS

### Models:

- P7810A Pressuretrol® Controller with on/off control.
- P7810B Pressuretrol® Controller with on/off control and modulate.
- P7810C Pressuretrol® Controller with on/off control; modulate and safety high limit.
- P7810D Pressuretrol® Controller with on/off control and safety high limit.

### Electrical Ratings:

Power Input: 120 Vac (10%/-15%), 50/60 Hz.  
 Power Consumption: See Table 1.

**Table 1. Power Consumption.**

Rating	120 Vac	
	50 Hz	60 Hz
Watts	2.8	2.8
VA	7.0	7.0

**Switch Contact Ratings:** See Table 2.

**Table 2. Switch Contact Ratings.**

Relay	Load Type	120 Vac
Control	Amps Full Load (FLA)	9.8A
	Amps Locked Rotor (ALR)	58.8A
	Non-Inductive	10.0A
Alarm <sup>a</sup>	Pilot Duty	1.0A

<sup>a</sup> P7810C,D models only.

**Sensor Material:** 304 stainless steel.

### Pressure Connector:

P7810A,B: 1/4 in. NPT.  
 P7810C,D: 1/2 in. NPT.

**Case Material:** Plastic.

**Electrical Terminations:** Screw terminals.

**Accuracy:** ±4.0 percent full scale output operating range, over operating temperature.

### Environmental Ratings:

Operating Temperature Range: 32°F to 140°F (0°C to 60°C).  
 Storage Temperature Range: -20°F to +150°F (-29°C to +66°C).  
 Humidity: 5% to 95% relative humidity, noncondensing.  
 Vibration: 0.5G continuous maximum vibration.

**Dimensions:** See Fig. 1.

**Mounting Position:** Upright, see Fig. 2.

**Device Weight:** 2.0 lb, 8 oz (1.15 kg).

### Approvals:

Underwriters Laboratories Inc. Listed.  
 Canadian Standards Association Listed: Approved.  
 Factory Mutual Listed.  
 CSD-1 AFB (Control Safety Devices, Automatic Fired Boilers): Acceptable.  
 FCC Class B, computing devices, part 15.

### Accessories:

14026 Siphon Loop with 1/4 in. NPT threads.  
 205860 Minimum Position Potentiometer for Series 70 Motors.  
 209731A Siphon Loop with 1/2 in. NPT threads.  
 4074EWC Door Assembly with captive screw and adjusting wrench (accessory for P7810A, B).  
 4074EWD Mounting Bracket with six screws.  
 4074EDC or EED Bag Assembly to interface 4 to 20 mA with Series 90 Firing Rate Motor.

### Replacement Parts:

4074EWC Door Assembly with captive screw and adjusting wrench (replacement part for P7810C,D).  
 4074EVP Door Wrench.

**Pressure Ratings:** See Table 3.

## ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Automation and Control Products Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care  
 1885 Douglas Drive North  
 Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.

International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Table 3. Pressure Ratings (psig).

Pressure Range	Maximum Setpoint	Differential	Overpressure	Burst Pressure
0 to 15	15	2 to 10	22.5	60
0 to 150	150	5 to 20	225	600
0 to 300	300	15 to 50	450	1200

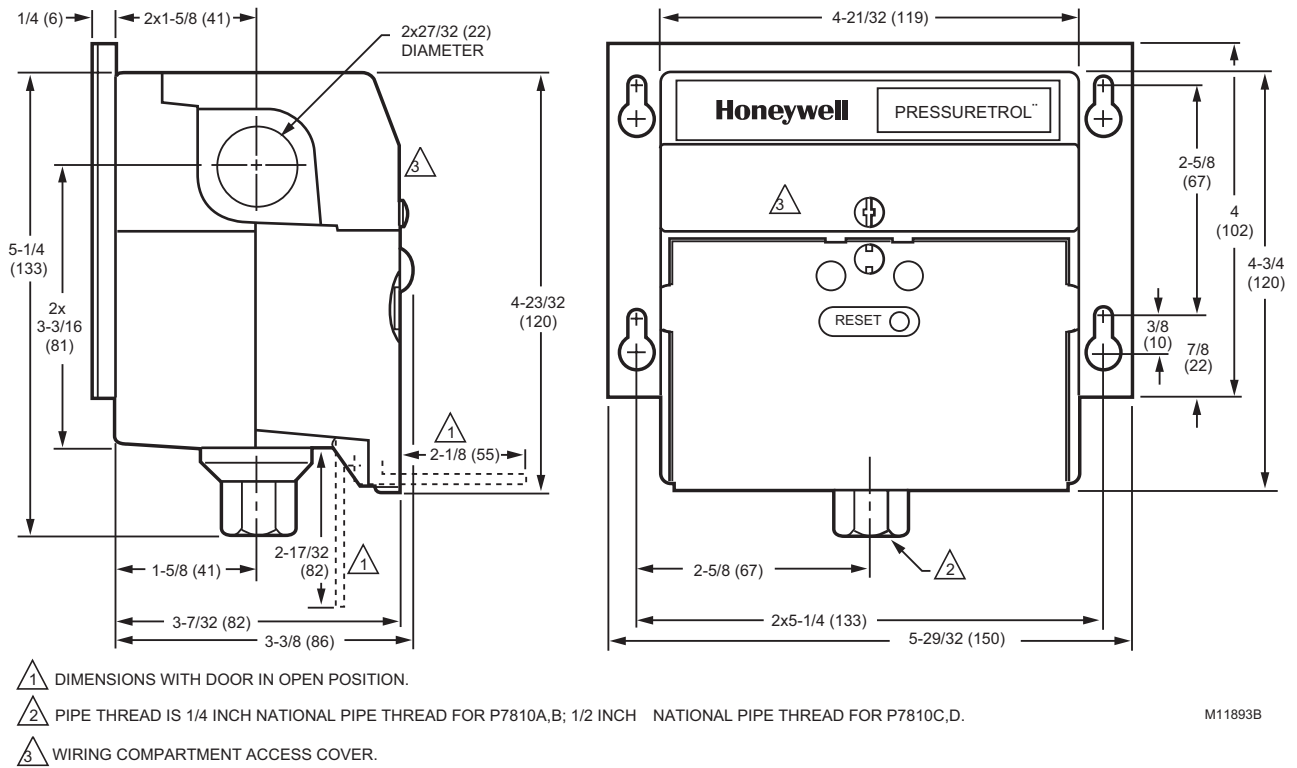


Fig. 1. Approximate dimensions of P7810 Pressuretrol® Controller in in. (mm). (P7810C,D shown; P7810A,B dimensions are identical, except for door.)

## INSTALLATION

### When Installing This Product...

1. Read instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings (pressure and voltage, for example) and description given in the specifications to make sure the product is suitable for your application.
3. Installer must be a trained, experienced flame safeguard technician.
4. After installation is complete, check out product operation as provided in these instructions.

## ⚠ WARNING

**Electrical Shock Hazard and Explosion Hazard. Can cause severe injury, death or property damage.**

1. Disconnect power before installation. More than one disconnect may be involved.
2. Allow pressure to decrease to atmosphere from the pressure vessel before removing old control.
3. Follow all installation and checkout procedures for safe installation.

### IMPORTANT

*Do not remove the overpressure inlet seal until ready to connect piping to prevent contamination of inlet.*

### Location

Install the P7810 Pressuretrol® Controller above the boiler water line when used with steam boilers. Connect the siphon loop (part number 14026—for P7810A,B; 209731A—for P7810C,D, or equivalent) between the P7810 Controller and the boiler to prevent scale and corrosive vapors from attaching the controller sensor element. Mount the P7810

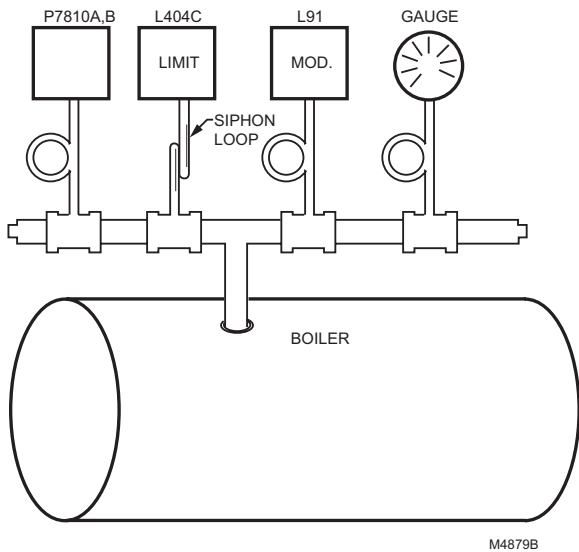
Controller next to the pressure gauge in the manufacturer-provided fitting on the boiler. See Fig. 2 and 4. Mount at a remote location to avoid excessive vibration, or mount in a special mounting on a low water cutoff.

**IMPORTANT**

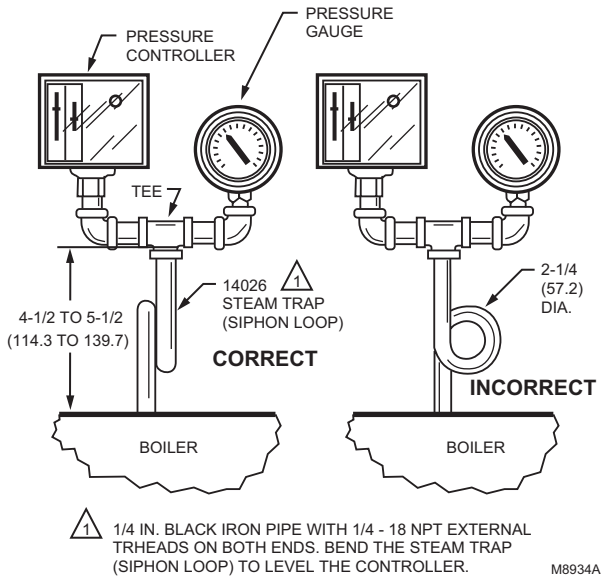
1. Locate the P7810 Pressuretrol® Controller where ambient temperature does not exceed 140°F (60°C).
2. Use pipe compound sparingly to avoid clogging the hole in the pipe or the sensor element fitting.
3. Do not hand tighten the controller connection by holding the case. Use a wrench on the flats of the sensor fitting to avoid leaks and damage to the case.
4. Level the controller for appearance.
5. Install the P7810 where the relative humidity never reaches the saturation point. The P7810 is designed to operate in a maximum 85 percent relative humidity, continuous, noncondensing moisture environment. Condensing moisture can cause a shutdown.
6. Do not install the P7810 where it could be subjected to vibration in excess of 0.5G continuous maximum vibration.
7. The P7810 is not designed to be weather tight. If installed outdoors, protect the P7810 with an approved weather-tight enclosure.

**CAUTION**

**Equipment Damage Hazard.**  
**Incorrect installation of the L404 Pressure Controller can damage the equipment and may require boiler replacement.**  
 Install the L404C Pressuretrol® as shown in Fig. 2 and 3 to prevent equipment damage.



**Fig. 2. Connecting P7810A,B Pressuretrol® Controller to steam boiler.**



**Fig. 3. Right and wrong mounting of steam trap (siphon loop) for the L404 Pressuretrol® Controller, with approximate dimensions in in. (mm).**

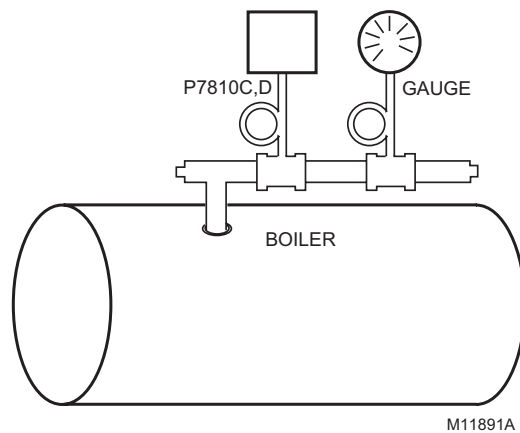
**Mounting**

Make all pipe connections in accordance with applicable local standards. Use parallel jaw wrench to tighten P7810 Controller hexagonal fitting to avoid leaks and damage to the case.

**Mounting P7810 Controller Next to Pressure Gauge**

To mount the P7810 Pressuretrol® Controller next to the pressure gauge:

1. Remove the pressure gauge.
2. Replace the gauge with a siphon loop with tee connector on top.



**Fig. 4. Connecting P7810C,D Pressuretrol® Controller to steam boiler.**

3. Mount the P7810 Controller and pressure gauge on the end of the tee.
4. If not convenient to mount the P7810 Controller next to the pressure gauge, install a siphon loop in the manufacturer provided fitting.
5. If there is no fitting, mount the siphon loop at the boiler manufacturer recommended location.
6. Attach the P7810 Controller directly to the siphon loop.
7. Level the P7810 Controller after the installation.

NOTE: The P7810C,D models require 1/2 in. (13 mm) mounting either directly or on a siphon loop.

### Remote Location Mounting

Excessive vibration at the boiler can damage the P7810 Controller electronics.

1. Mount the P7810 Controller at a remote location to eliminate vibration problems.
2. Make sure that all piping from the boiler is suitable to the application and solidly mounted.
3. Pitch the piping properly to drain the condensate back to the boiler.
4. Mount the siphon loop between the remote piping and the P7810 Controller.
5. Level the P7810 Controller after the installation.

## WIRING

### WARNING

**Electrical Shock Hazard.**  
Can cause severe injury, death or property damage.

Disconnect the power supply before wiring. More than one power supply disconnect may be involved.

All wiring must comply with applicable electrical codes, ordinances and regulations. Use NEC Class 1 line voltage wiring.

For normal installation, use moisture-resistant No. 14 wire (maximum size allowed) suitable for at least 167°F (75°C) or 194°F (90°C) for Flame Safeguard Primary Controls.

Use shielded wire for 4 to 20 mA modulating output and terminate the shield to earth ground. Do not run these wires in the same conduit as high voltage ignition wires.

All P7810 Pressuretrol® Controllers have terminal screws and 27/32 in. (22 mm) holes in both sides for conduit, cables and wiring. Remove the top cover by loosening the screw at the top of the P7810 Controller case.

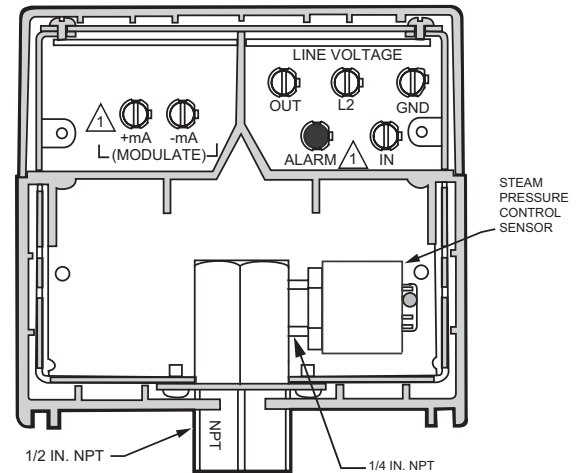
Follow the burner or boiler manufacturer wiring diagram, if provided. Make sure the loads do not exceed the contact ratings in the Specifications section. See Fig. 5 and 6 for terminal locations and Fig. 7 through 11 for typical wiring hookups.

Table 4 provides conversion wiring information for upgrading older P7810 devices to newer series.

Replace the front cover after completing the wiring.

### IMPORTANT

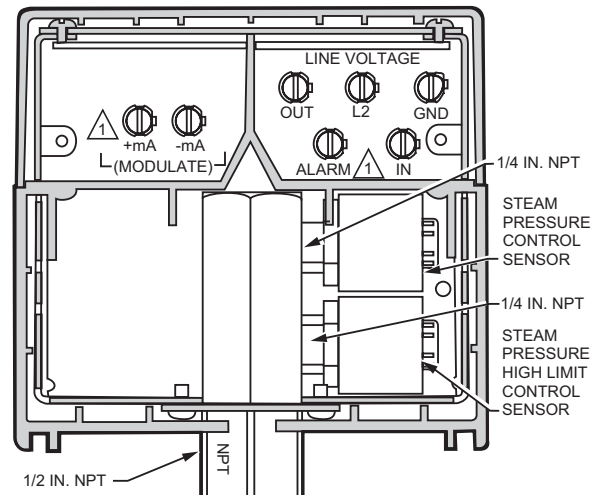
*Line voltage wiring terminals have changed between Series 2 and Series 3 models.*



 USE COPPER CONDUCTORS ONLY

M22126A

**Fig. 5. P7810A,B (Series 3 or greater) Pressuretrol® Controller.**



 USE COPPER CONDUCTORS ONLY

M22024A

**Fig. 6. P7810C,D (Series 3 or greater) Pressuretrol® Controller.**

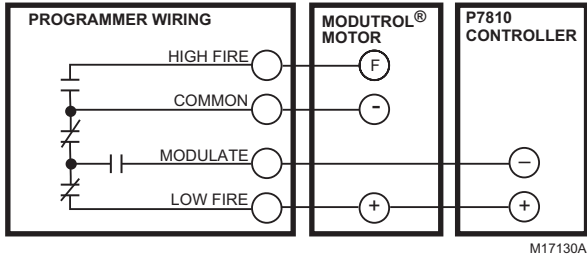
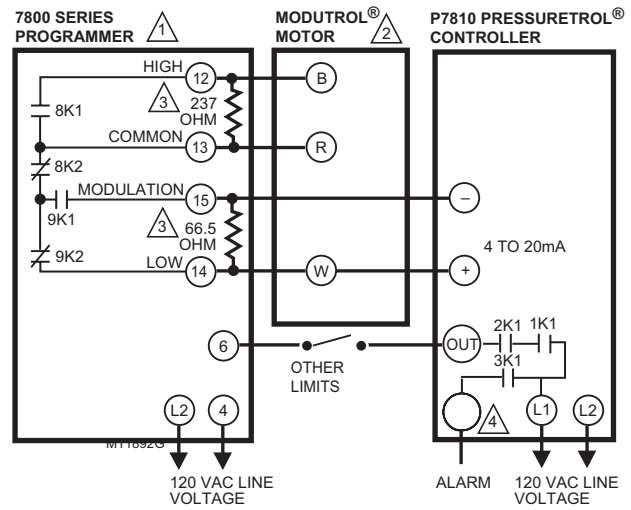


Fig. 7. Firing rate wiring diagram using 4 to 20 mA controller and Series 70 Modutrol® Motor.



- FIELD WIRING    — DEVICE WIRING
- ① 7800 SERIES SHOWN. REFER TO SPECIFICATIONS PACKED WITH THE PROGRAMMER FOR WIRING OF OTHER PRIMARY SAFETY CONTROLLERS.
- ② MODUTROL® MOTOR MUST BE MODUTROL III OR MODUTROL IV, SERIES 90, ELECTRONIC BALANCE RELAY TO OPERATE AS SHOWN.
- ③ PART OF 4074EDC OR 4074EED BAG ASSEMBLY ORDERED SEPARATELY.
- ④ LINE VOLTAGE TO PROGRAMMER AND CONTROLLER SHOULD BE IN PHASE.
- ⑤ SEE CONVERSION WIRING TABLE FOR CONVERTING OLDER SERIES DEVICES.

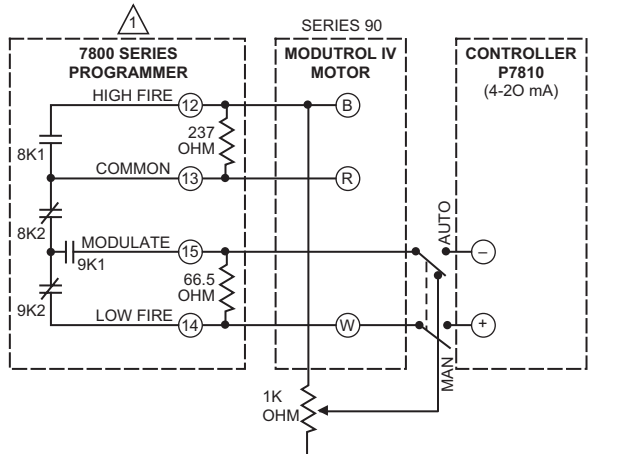
M11892G

Fig. 8. Wiring diagram for typical P7810 installation, Series 3 and greater, using Series 90 Modutrol® Motor.

Table 4. Conversion Wiring Information for Upgrading Older P7810 Devices to Newer Series.

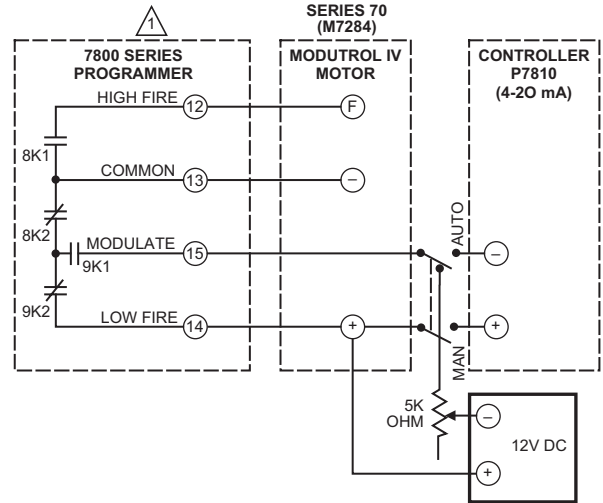
Signal/Input	Series 1 Terminals	Series 2 Terminals	Series 3 or Greater Terminals
4-20 mA signal output (-)	-	-	-
4-20 mA signal output (+)	+	+	+
Limit string output to programmer	N.O.	OUTPUT	OUT
L1 (Hot)	COM	L1 <sup>a</sup>	IN <sup>a</sup>
120 Vac Power Supply (L2)	L2	L2	L2
120 Vac Power Supply (L1)	L1	b	b
External Alarm Device	—	ALARM	ALARM

<sup>a</sup> If any additional/external limits are used, make sure they are inserted between the P7810 Pressuretrol® Controller and the Programmer in the Limit string.  
<sup>b</sup> When converting to a newer series from Series 1, L1 (120 VAC Power Supply) lead wire is not used, remove or wire-nut and tuck away.



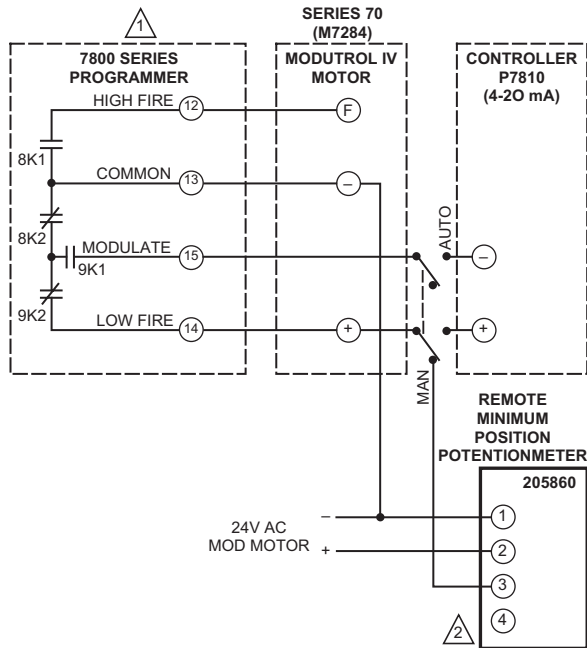
1 7800 SERIES SHOWN. REFER TO SPECIFICATIONS PACKED WITH THE PROGRAMMER FOR WIRING OF OTHER PRIMARY SAFETY CONTROLLERS.  
M20568C

**Fig. 9. Firing rate wiring diagram using P7810B,C Pressuretrol® Controller and Series 90 Modutrol® Motor with manual position potentiometer and auto-manual switch.**



1 7800 SERIES SHOWN. REFER TO SPECIFICATIONS PACKED WITH THE PROGRAMMER FOR WIRING OF OTHER PRIMARY SAFETY CONTROLLERS.  
M20570C

**Fig. 11. Series 70 Motor with auto/manual switch and 12 Vdc source.**



1 7800 SERIES SHOWN. REFER TO SPECIFICATIONS PACKED WITH THE PROGRAMMER FOR WIRING OF OTHER PRIMARY SAFETY CONTROLLERS.  
2 ONLY 50% MOTOR AUTHORITY IS AVAILABLE WHEN USING THE 205860 POTENTIOMETER WITH THE SWITCH IN THE MANUAL POSITION.  
M20569C

**Fig. 10. Series 70 Motor with auto/manual switch, using 205860 Minimum Position Potentiometer.**

## OPERATION

The P7810 uses integral electronic pressure sensors to sense pressure at the inlet through an internal manifold. The control sensor connects to the internal manifold with 1/4 inch NPT threads and provides the pressure signal to control a relay for the on/off control function. The same sensor provides the information for the 4 to 20 mA firing rate modulation output.

A separate integral electronic pressure sensor is required to provide the high limit function. This sensor also connects to the internal manifold with 1/4 in. NPT threads. P7810C,D devices contain two internal sensors and require a 1/2 inch NPT mounting to the steam pressure header. Devices with high limits lockout at setpoint and require manual reset when pressure returns below the setpoint. Devices will not reset with power interruption.

The P7810A is an on/off pressure control to start and stop a burner system through a flame safeguard control. A 1/4 inch NPT mounting is required to the steam pressure header.

The P7810B combines the on/off function of the P7810A with providing a 4 to 20 mA modulation control output. A 1/4 inch NPT mounting is required to the steam pressure header.

The P7810C has on/off function, 4 to 20 mA modulation control output, and safety high limit function in one control. A 1/2 inch NPT mounting is required to the steam pressure header.

The P7810D has on/off function and safety high limit function in one control. A 1/2 inch NPT mounting is required to the steam pressure header.

## Pressure On/Off Control Function (P7810A,B,C,D)

When pressure increases to the control setpoint, the control relay contacts open. The relay contacts close when the pressure decreases to a level at or below (differential) the control range differential setting. This cycle continues until power is removed, opening the relay. See Fig. 12.

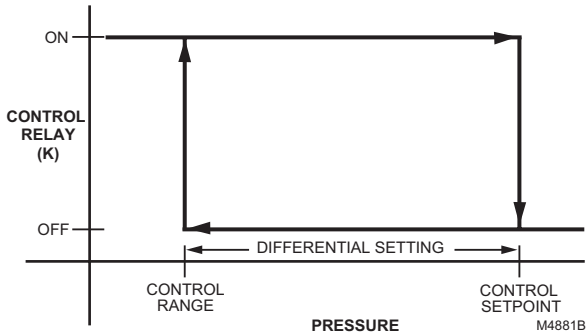


Fig. 12. P7810 on/off control function versus pressure.

## Modulate Control Function (P7810B,C Only)

When the pressure decreases to or below the modulation setpoint, the current is 20 mA. The current remains constant at all pressures below the modulation setpoint.

The modulation range is an additive value to the modulation setpoint value.

When the pressure increases above the modulation setpoint, the current decreases linearly until the modulation range point is reached. The output current is 4 mA at and above this pressure. See Fig. 13.

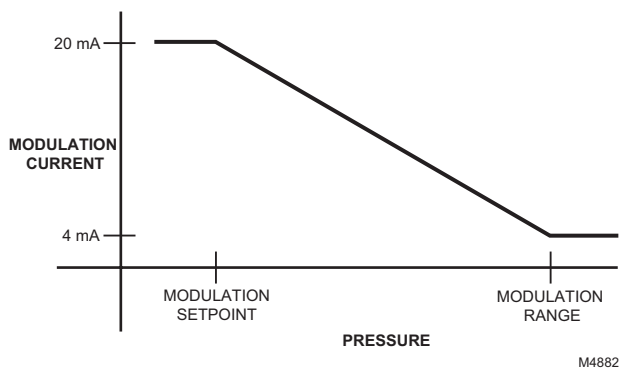


Fig. 13. P7810B,C modulation current versus pressure.

## Limit Function (P7810C,D only)

The Limit potentiometer has two functions:

- To set the **Maximum Fixed Stop Limit**. This is the maximum pressure setting that the P7810C or D control can be adjusted to and still perform its intended function (i.e., safety shutdown).



## CAUTION

**Equipment Damage Hazard.**

**Exceeding pressure vessel limits can damage equipment.**

The **Maximum Fixed Stop Limit** pressure setting **must not** exceed the maximum working pressure rating of the pressure vessel. Adjust the **Maximum Fixed Stop Limit** setting to the maximum working pressure rating that is stamped on the pressure vessel by the manufacturer.

- To set the **High Limit Setpoint**. This is the desired pressure value to which the P7810C or D control is adjusted and at which it performs its intended function (i.e., safety shutdown).

The High Limit Setpoint can be set lower than the internal stored Maximum Fixed Stop Limit Value and will provide system lockout at the knob setting. For example, the internal stored Maximum Fixed Stop Limit Value is 12 psi and the knob is set at 10 psi. System lockout is at 10 psi. The LED pattern will be green on and yellow blinking slowly.

The High Limit Setpoint can be set above the internal stored Maximum Fixed Stop Limit Value but it will have no functional effect. For example the internal stored Maximum Fixed Stop Limit Value is 12 psi and the knob is set at 14 psi. Lockout will occur at 12 psi. the LED pattern will be green on and yellow blinking fast.

When pressure increases to the high limit setpoint, the (1K1, 2K1) relay contacts open and the P7810C,D indicates a safety lockout by alternately flashing the yellow and green LEDs. The P7810C,D remains in this condition until the manual reset button (see Fig. 1) is pressed. The Alarm (3K1) relay contacts will close, providing a 120 Vac output on the Alarm terminal.

## Reset Switch Functions

The Reset Switch has the functions listed in Tables 5 and 6.



Table 5. Reset Switch Function, P7810A,B.

Reset Switch Action	P7810A,B Modes of Operation	
	Lockout	(Run) Normal Operation
Press and Continuously Hold	Blink existing fault code until the reset switch is released.	The green LED turns off and the yellow LED turns on, waiting until the reset switch is released.
Press and Release	Clear the fault code and reset the P7810.	Resets the control.

### P7810 Pressuretrol® Controller Setup

For P7810B,C and D Pressuretrol® Controllers with more than one function(control, modulate and high limit [P7810C and D]), adjust setpoints and differentials separately for each function.

#### ! CAUTION

**Equipment Damage Hazard.**  
**Improper setting of control setpoint and control range knob errors can damage the P7810.**  
 Do not set control setpoint or control range knob arrows past the scale plate endpoints.

Adjust setpoints and differentials using the knobs on the front of the P7810 Pressuretrol® Controller.

Set the knobs to the desired points by aligning the center of the knob arrow with the desired mark on the scale plate. See Fig. 14.

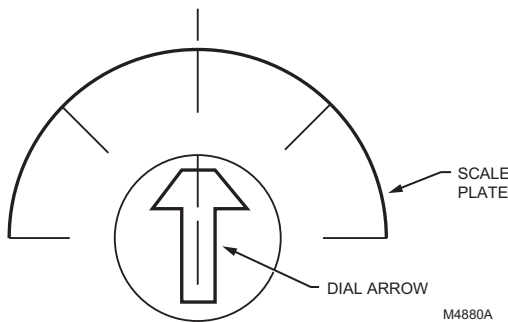


Fig. 14. Setting control setpoint and control range knobs.

#### IMPORTANT

*P7810C,D devices must set Maximum Fixed Stop Limit Value function first.*

### Setting Maximum Fixed Stop Limit Value (P7810C,D)

#### ! CAUTION

**Equipment Damage Hazard.**  
**Exceeding pressure vessel limits can damage equipment.**  
 The **Maximum Fixed Stop Limit** pressure setting **must not** exceed the maximum working pressure rating of the pressure vessel. Adjust the **Maximum Fixed Stop Limit** setting to maximum working pressure rating that is stamped on the pressure vessel by the manufacturer.

#### IMPORTANT

*The Maximum Fixed Stop Limit Value must be programmed first for the P7810C or D to operate.*

1. Initial Startup—Maximum Fixed Stop Limit Value is unprogrammed.
  - a. Green LED (Control LED)—Blinking rapidly (1/2 second on, 1/2 second off).
  - b. Yellow LED (Power LED)—On steady and bright.
2. Setting the Maximum Fixed Stop Limit Value.
  - a. Monitor the 4 to 20 mA output. Long filtering delays cause a lag between the 4 to 20 mA output and the limit setting, i.e., 20 to 25 seconds for a full scale change.
  - b. Turn the Limit Setpoint knob to the desired setting and confirm by comparing the current noted to the corresponding reading in Table 7. Ensure that the mA output is stable before using the value.
  - c. Press and hold the Reset Switch.
  - d. Release the Reset Switch when both LEDs turn on.
  - e. The Maximum Fixed Stop Limit Value is set and the device will recycle and attempt to enter Run mode.
  - f. After an accumulated run time (Call for Heat) of one hour (Series 1 and 2) or eight hours (Series 3 or greater), the Maximum Fixed Stop Limit Value setting will be permanently stored in the P7810C,D memory. Changing the Maximum Fixed Stop Limit Value setting after this time will then be ineffective.

**Table 6. Reset Switch Function, P7810C,D.**

Reset Switch Action	P7810C,D Modes of Operation				
	Lockout	Unconfigured	(Run) Normal Operation	Power-up (Configuration Time Expired)	Power-up (Configuration Time Not Expired)
Press and Continuously Hold.	Blink existing fault code until the reset switch is released.	Both LEDs turn on after three seconds, indicating the Maximum Fixed Stop Limit Value has been stored. Wait for up to 30 seconds for a release. Enter lockout after 30 seconds.	The green LED turns off and the yellow LED turns on, waiting until the reset switch is released.	Both LEDs turn on. Wait for up to 30 seconds for a release. Lockout after 30 seconds. If released within 30 seconds, enter normal operation.	Enter unconfigured mode of operation.
Press and release.	Clear the fault code and reset the P7810.	Press and release of the Reset button within three seconds is ignored. If the Reset button is pressed for more than three seconds, both LEDs turn on and the Maximum Fixed Stop Limit Value is stored into non-volatile (NV) memory. Upon release, the device will recycle and enter normal operation.	Resets the control.	Enter normal operation.	Enter unconfigured mode of operation.

**Table 7. Setting Maximum Fixed Stop Limit Value—Current Readings.**

15 psi	150 psi	300 psi	4-20 mA Output
0	0	0	4.00
1	10	20	5.07
2	20	40	6.13
3	30	60	7.20
4	40	80	8.27
5	50	100	9.33
6	60	120	10.40
7	70	140	11.47
8	80	160	12.53
9	90	180	13.60
10	100	200	14.67
11	110	220	15.73
12	120	240	16.80
13	130	260	17.87
14	140	280	18.93
15	150	300	20.00

### Changing the Maximum Fixed Stop Limit Value Setting (if Run Time is less than one hour [For Series 1 and 2] or less than eight hours [For Series 3 or greater])

1. Remove power from the P7810C,D.
2. Press and hold the Reset Switch, then apply power to the P7810C,D.
3. When the green LED blinks rapidly, release the Reset Switch.
4. Follow the steps in Setting the Maximum Fixed Stop Limit Value, above.

NOTE: If both LEDs turn on, the configuration timer (one hour) has expired. Release the Reset button and continue normal operation. Changing the Maximum Fixed Stop Limit Value Setting is no longer allowed.

### Checking the Maximum Fixed Stop Limit Value (Stored in Memory)

NOTE: The P7810C,D must be powered and in the Run mode.

1. Record the original location of the Limit setpoint knob. Make sure that the Limit setpoint knob is set (moved to) a lower value than the Maximum Fixed Stop Limit Value setpoint. The green LED will be reflective of the call for heat status and the yellow LED will blink slowly.

**IMPORTANT**

*Do not decrease the Limit Setpoint knob far enough to cause a lockout.*

2. Very slowly increase the Limit setpoint knob until the yellow LED begins to blink fast. The current position of the Limit setpoint now represents the Maximum Fixed Stop Limit Value setpoint stored in memory.
3. Return the Limit setpoint knob to the original location (step 1).

**Setting High Limit Set Point (P7810C,D)**

After the Maximum Fixed Stop Limit Value has been stored into memory, adjust the Limit Setpoint knob to the desired pressure value at which safety shutdown (lockout) will occur when the vessel pressure exceeds this setpoint value.

NOTE: The High Limit setpoint value can be less than or equal to the Maximum Fixed Stop Limit Value but cannot be set to a value higher than the Maximum Fixed Stop Limit Value.

**Pressure On/Off Control (P7810A,B,C,D)**

Adjust the setpoint and differential using the potentiometer knobs on the front of the controller. The differential is a subtractive value from the setpoint adjustment. The upper operating point is determined by the control setpoint, while the lower operating point is determined by the control range setting (control setpoint minus the differential setting).

Set the potentiometer knobs to the desired point by aligning the center of the arrow on the potentiometer knob with the desired mark on the scale plate. See Fig. 14.

Yellow light emitting diode (LED) ON constantly indicates power applied; green LED On indicates closed contact or call for heat.

**Modulate Control (P7810B,C Only)**

The P7810B,C adds 4 to 20 mA modulation output and uses two additional potentiometers. The pressure sensor output is fed to an error and gain amplifier to perform the modulation determined by the control potentiometer settings.

The potentiometer knobs mounted on the P7810B,C face adjust the current output for a given set of pressures.

The modulation range is an additive value to the modulation setpoint value.

**LED Display (Tables 8 and 9)**

The yellow LED is always lit with power applied to the P7810 Pressuretrol® Controller. The microprocessor changes the brightness of the yellow LED to indicate normal operation, turns the green LED on and off to indicate call for heat status and flashes both LEDs to indicate a fault.

NOTE: The term “flashing” means on/off/on/off for the green LED and bright/dim/bright/dim for the yellow LED.

Press and hold the Reset Switch to access internal diagnostics. The green (right) LED will flash a series of long followed by a series of short flashes. Count the long and short flashes and check the fault code table (Table 9) for information. For example: four long and three short flashes is code 43. If you miss the code the first time, keep holding the Reset Switch down and the code will repeat. Letting go of the Reset Switch clears the fault information and resets the P7810.

**Table 8. P7810 Blink Codes.**

Yellow	Green	Control State
Off	Off	Device off.
No LEDs blinking		Device on, Central Processing Unit (CPU) malfunction.
Slow Blink	Off	Run mode, output off, Limit potentiometer setpoint used.
Slow Blink	On	Run mode, output on, Limit potentiometer setpoint used.
Fast Blink	Off	Run mode, output off, Internal Maximum Fixed Stop Value setting used.
Fast Blink	On	Run mode, output on, Internal Maximum Fixed Stop Value setting used.
Alternating Fast Blinks		Lockout, output off, high limit exceeded, Alarm output engaged.
Simultaneous Fast Blinks		Lockout, output off, internal fault, Alarm output engaged.
On, Bright	Fast Blink	Output off, internal Maximum Fixed Stop Value setting not set.

**Table 9. LED Fault Codes and Recommended Troubleshooting.**

Fault Code	System Failure	Recommended Troubleshooting
11	High Limit Setpoint Exceeded.	When pressure in vessel returns to normal, P7810 can be reset.
12-32, 71-90, 92	Internal fault	Reset P7810; if same fault occurs again, replace P7810.
51, 54, 61	Internal fault—internal relays welded	Verify loads do not exceed rating of P7810 contacts, then replace P7810.
52-69, 91	Relay fault	Verify that no voltage potential exists on Output terminal. If code repeats after normal operation, look for back feed of voltage greater than 50V (ac or dc) any time during boiler sequence. Replacing P7810 will only result in same lockout on new control.

## CHECKOUT

### WARNING

**Electrical Shock Hazard and Explosion Hazard. Can cause severe injury, death or property damage.**

1. Live voltage is present at the P7810 and all controller circuits. Use extreme care during checkout.
2. This checkout procedure disables the Safety High Limit function.

#### IMPORTANT

1. Do not put the system into service until all applicable tests described in the Checkout section of the instructions for the primary safety control and any additional tests required by the burner or boiler manufacturer are satisfactorily completed.
2. Close all manual fuel shutoff valves when trouble occurs.

After installation and wiring, check out the P7810 Pressuretrol® Controller with the system in operation.

### Checkout

1. Allow the system to stabilize.
2. Observe the operation of the P7810 while raising and lowering the setpoint. Pressure increases when the setpoint is increased and decreases when the setpoint is decreased.
3. Check the make and break points of the P7810. If they do not agree with a separate, accurately calibrated pressure gauge, make a slight adjustment according to the scale. Use accurate pressure testing equipment when checking out the P7810. Do not rely on inexpensive gauges. The P7810 is carefully calibrated at the factory.

Test the P7810 Pressuretrol® Controller as follows:

NOTE: Make sure the P7810 is operating properly by checking the LED indicators. If the P7810 LEDs indicate a lockout condition, press the manual reset button.

NOTE: This procedure simulates pressure changes using knob setpoint adjustments. Make knob adjustments very slowly because of filtering delays within the P7810 (20 to 25 seconds for full scale change).

Inaccuracy can result if knob adjustments are not made very slowly. To observe actual P7810 control accuracy, set the knobs to normal operating values. Compare the knob settings to the boiler pressure readings where P7810 actions occur.

To check the control setpoint of the P7810A,B,C,D:

1. Note the boiler pressure by checking the boiler pressure gauge. To properly perform these tests, the boiler pressure should be near the middle of the P7810 pressure range.
2. Turn the P7810 limit setpoint knob fully clockwise to make sure this limit does not interfere during steps 4 and 5. This setting must return to the proper operating position when returning the system to normal operation.
3. Check the control setpoint and control differential.
4. Set the control differential knob to the center of its range.
5. Turn the control setpoint knob fully counterclockwise and make sure the P7810 control circuit is open and the green LED is off (no call for heat).
6. Read the boiler pressure gauge and add this number to the control differential setting.
7. Turn the control setpoint knob slowly clockwise and make sure the control circuit closes and the P7810 indicates a call for heat (green LED on) when the P7810 control setpoint passes through the value determined in step 6.
8. Turn the control setpoint knob slowly counterclockwise and make sure the control circuit opens and the P7810 no longer indicates a call for heat (green LED off) when the control setpoint passes through the boiler pressure gauge value.

Check the modulation setpoint and modulation range of the P7810B,C as follows:

1. Set the P7810 modulation range knob to the center of the range.
2. Turn the modulation setpoint knob fully clockwise and make sure the firing rate motor travels to the fully open position (boiler is firing).
3. Turn the modulation setpoint knob slowly counterclockwise and make sure the firing rate motor starts moving toward the closed position when the modulation setpoint passes through the boiler pressure gauge value. (Alternately, make sure the current starts decreasing toward 4 mA.)

4. Determine the pressure point at which minimum modulation output will occur by checking the boiler pressure gauge and subtracting the modulation range knob setting (at midpoint).
5. Turn the modulation setpoint knob slowly counterclockwise and make sure the firing rate motor continues to move to the closed position. Make sure the firing rate motor reaches the lowfire position when the modulation setpoint reaches the pressure point identified in step 4 above. (Alternately, make sure the measured current decreases gradually toward 4 mA.)

Check the limit setpoint as follows (boiler pressure required):

1. Turn the control setpoint knob clockwise until the control circuit closes. Make sure the yellow LED is flashing and the green LED is on, indicating normal operation with a call for heat.
2. Turn the limit setpoint knob slowly counterclockwise and make sure that the P7810 opens the circuit and indicates a safety lockout by alternately flashing the yellow and green LED (see LED Display section) when the limit setpoint passes through the boiler pressure gauge value.
3. Make sure that the Alarm output is energized.

Check for normal system operation as follows:

1. Set all knobs to the required operating position.
2. Press the reset button to clear the safety lockout condition.
3. Start the system and observe the operation through at least one complete cycle to make sure the P7810 functions properly as described in the Operation section.

## TROUBLESHOOTING

### WARNING

**Electrical Shock Hazard.**  
**Can cause severe injury, death or property damage.**

Line voltage is present at the P7810 and in all controller circuits. Use extreme care when troubleshooting.

To determine control malfunctions, use checkout procedures as listed in the Checkout section.



### CAUTION

**Equipment Damage Hazard.**  
**Can cause equipment damage or improper operation.**

Do not put the system into service until you have satisfactorily completed all applicable tests described in this checkout section, and also all tests in the Checkout section of the applicable instructions for the primary safety control and any other tests the burner and boiler manufacturer require.

## SERVICE INFORMATION



### WARNING

**Electrical Shock Hazard.**  
**Can cause severe injury, death or property damage.**

1. Only qualified Flame Safeguard technicians should attempt to service Flame Safeguard controls and burners.
2. Line voltage is present in the electrical circuits to the P7810 Pressuretrol® Controller. Open the master electrical switch before replacing the device. More than one power supply disconnect may be involved.

## Scheduled Inspection and Maintenance

### Calibration

The P7810 Pressuretrol® Controller was carefully calibrated during manufacturing and does not require field calibration.

### Maintenance

Keep the cover of the P7810 Pressuretrol® Controller in place at all times to protect the internal components from dust, dirt and physical damage. Routine maintenance consists of occasional inspection and removal of accumulated dirt and dust. Make sure the P7810 Pressuretrol® Controller is functioning properly by performing an operation check of the entire system during routine maintenance checks.





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