

P29 Series Low Pressure Control with Time Delay Relay

Application

The P29 control combines a pressure sensing mechanism with a time delay. A drop in pressure energizes the time delay relay and opens a contact after a predetermined period.

There are two principal applications for this control:

- 1. Chiller, Low Temperature**
 Pressure element is connected to the suction side of a chiller refrigeration system and the time delay relay is wired to the compressor control circuit. Prolonged low suction pressure, such as pressure caused by a low temperature condition, will cause the control to shut down the refrigeration compressor.
- 2. Industrial Equipment, Lubrication Oil Pressure**
 On any electrically driven machine with a forced oil system, the pressure element is connected to the lube oil system and the time delay relay is wired in the control circuit. The control time delay allows oil pressure to build up to normal on start-up or recover from temporary fluctuations. A sustained loss of oil pressure will cause the control to shut down the machine.

CAUTION: Risk of equipment damage. On ammonia installations the ammonia pressure control should be mounted separately from the electrical cabinet. Do not use on an ammonia system unless the control is marked for ammonia service.

IMPORTANT: The P29 Series low pressure control with time delay relay is intended to control equipment under normal operating conditions. Where failure or malfunction of a P29 control could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of or protect against failure or malfunction of the P29 control must be incorporated into and maintained as part of the control system.

Operation

When the equipment is started, the time delay heater is energized. If the pressure does not reach the "heater-off" value within the required time limit, the time delay relay trips to stop the equipment.

If the pressure rises to the "heater-off" value within the required time limit, the time delay relay will not trip and the equipment will continue to run.

Time Delay Relay

The time delay relay is a thermal expansion device. "Trip-free" manual reset models and automatic reset models are available.

The time delay relay is compensated to minimize the effect of ambient temperature variations. Timing is affected by voltage variations.

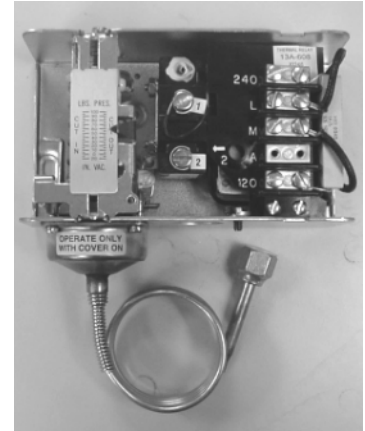


Fig. 1 -- Interior view of a P29 Control

Installation

Mounting

Mount the control in any position, directly to a wall or panel board, using the two mounting screw holes located on the back of the control case. Mount the control so that the pressure connection on the bellows is above the liquid level of the equipment on which the control is being used. While tests indicate good performance of the P29 control subjected to vibration of 2.5 G at 10 to 55 cycles per second, care should be taken to mount the control so that it is not subjected to excessive vibration which might cause malfunction or damage.

If required, Part No. 271-51 universal mounting bracket is available.

Note: Use only mounting screws supplied with the control to avoid damage to internal components.

Use P29 controls at normal room temperatures of 32 to 104°F (0 to 40°C) and in areas protected from the weather. It can be used where normal working pressures do not exceed 250 PSIG (1723 kPa) and should never be exposed to test overpressure greater than 325 PSIG (2240 kPa).

Pressure Connections

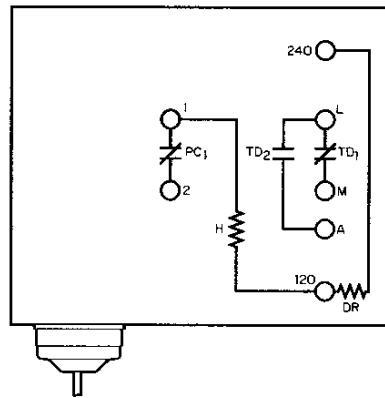
1. Avoid sharp bends or kinks in the capillary tubing.
2. Purge all tubing and lines before connecting the pressure controls.
3. Coil and secure excess capillary to avoid vibration. Allow some slack in capillary to avoid "violin string" vibration which can cause tubing to break. Do not allow tubing to rub against metal surfaces where friction can damage the capillary.

IMPORTANT: With a 1/4 in. male SAE flare fitting and 1/4 in. tubing, a pulsation dampener must be used where there is a possibility of pulsation.

Wiring

⚠ WARNING: Risk of electrical shock.
Disconnect the power supply before mounting and wiring to prevent possible electrical shock. On multiple circuit units, more than one circuit may have to be disconnected.

⚠ CAUTION: Risk of equipment damage.
Disconnect the power supply before mounting and wiring to avoid damage to equipment. On multiple circuit units, more than one circuit may have to be disconnected.



PC₁ – PRESSURE ACTUATED CONTACTS CLOSE ON PRESSURE DROP TO ACTUATE TIME DELAY HEATER.
 TD₁ – TIME DELAY RELAY CONTACTS OPEN AFTER FACTORY SET TIME DELAY IF PRESSURE FAILS TO RISE ABOVE CUTOFF OF PRESSURE ACTUATED SWITCH.
 TD₂ – CONTACTS CLOSE SIMULTANEOUSLY AS TD₁ CONTACTS OPEN (ALARM CIRCUIT).
 DR – VOLTAGE DROPPING RESISTOR.
 H – HEATER FOR TIME DELAY RELAY.
 CONNECT L AND M TERMINALS IN CONTROL CIRCUIT AS SINGLE POLE SWITCH.
 CONNECT 2 AND 240 V OR 120 V TERMINALS SO THAT CIRCUIT IS ENERGIZED ONLY WHEN THE MOTOR STARTER CONTACTS ARE CLOSED. SEE TYPICAL WIRING DIAGRAMS FOR DETAILS.

Fig. 2 – Internal wiring for 120/240 VAC models

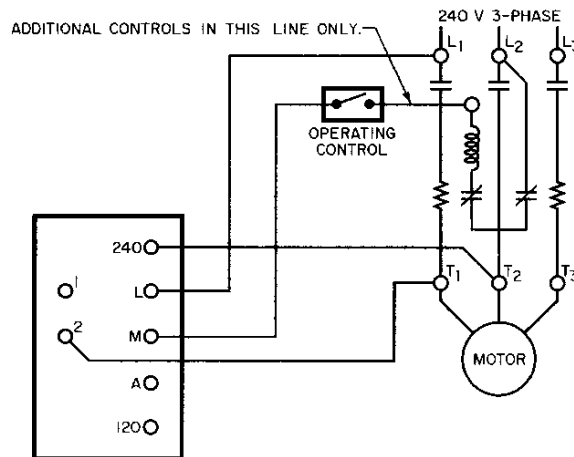


Fig. 3 – Typical wiring diagram for the P29 control when used on 240 volt system with 240 volt magnetic starter coil

Make all wiring connections using copper conductors only, and in accordance with the local, national, and regional regulations.

For maximum electrical rating of the control, see label inside control cover.

Note: Use the terminal screws furnished with the Pennswitch (8-32 x 1/4 in. binder head). Do not substitute screws of a different size.

For applications using a 208 volt control circuit, it is suggested that one leg of the 208 volt control circuit and a neutral wire be used to power the 120 volt circuit of the time delay heater.

When a P29 control is installed on a 440 or 550 VAC system, use an external step-down transformer to provide either 120 or 240 volts to the pilot and time delay relay circuits.

Electrical Power Required for Time Delay Relay

Timing in Seconds	Voltage	
	12, 24 or 120 V	240 V*
10	30 VA	60 VA
30, 45, 60, 90 or 120	15 VA	30 VA

*Includes dropping resistor wattage.

The transformer must be of sufficient volt-ampere capacity to operate the motor starter and the P29 time delay relay. For wiring, see Figs. 3 through 6 or the wiring diagrams with the manufacturer's specifications.

Adjustments

To adjust the setpoint, turn the setpoint adjustment screw clockwise to raise the pressure setting or counterclockwise to lower setting. The screw is at the top of the control case.

Adjust the control so the setpoint is at, or just above, the specified minimum pressure. The time delay is factory set and sealed and cannot be field adjusted.

Test for Shutdown

⚠ WARNING: Risk of electrical shock.
Disconnect the power supply before testing to prevent possible electrical shock. On multiple circuit units, more than one circuit may have to be disconnected.

Immediately after installing and at regular intervals thereafter, the time delay relay should be tested to be sure that all circuits are operating properly. Proceed as follows:

1. Pull the disconnect switches and remove the cover from the P29 control.
2. Connect a jumper between terminal 1 and 2.
3. Close the line switch to start the compressor running. The time delay relay will stop the compressor after the time delay interval.

Note: Replace cover before testing if the control is mounted on a condensing unit where air from auxiliary equipment, such as blowers or fans, may affect the time delay heater.

4. After testing the time delay relay, pull the disconnect line switches again and remove the jumper between terminals 1 and 2.
5. Place cover on the control, close the line switch, and manually reset time delay relay.

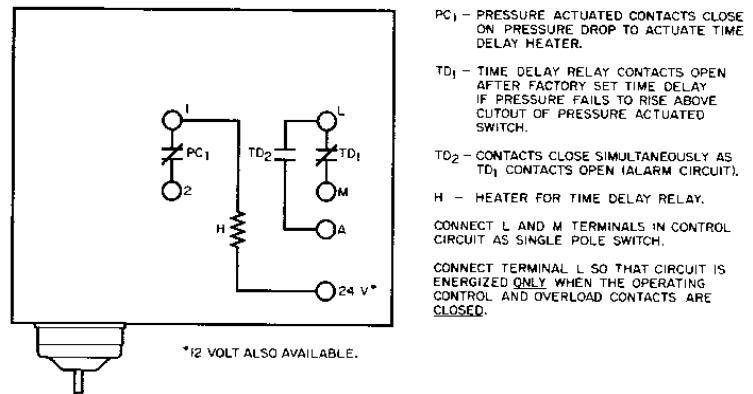


Fig. 4 - Internal wiring diagram for low voltage models

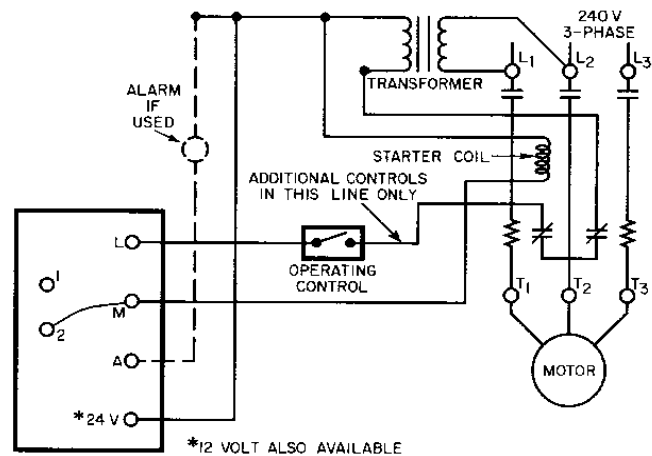


Fig. 5 - Wiring diagram where 24 volt control circuit power is obtained from a step-down transformer.

Checkout Procedure

Before leaving the installation, observe at least three complete operating cycles to ensure all components are functioning correctly.

Repairs and Replacement

Field repairs must not be made except for replacement of time delay relay assembly. The timer and terminal board may be replaced or interchanged in the field. For replacements, contact a Johnson Controls distributor.

Replacement Time Delay Relay Assemblies

Part Number	Voltage	Type of Reset	Timing in Seconds	Alarm Circuit
RLY13A-600R	120/240 VAC	Manual	60	No
RLY13A-602R	120/240 VAC	Manual	90	No
RLY13A-603R	120/240 VAC	Manual	90	Yes
RLY13A-606R	120/240 VAC	Automatic	10	No
RLY13A-608R	120/240 VAC	Automatic	90	No
RLY13A-609R	24 VAC/VDC	Manual	120	No
RLY13A-610R	120/240 VAC	Manual	30	No
RLY13A-613R	12 VAC	Manual	120	No
RLY13A-616R	120/240 VAC	Manual	120	No
RLY13A-617R	120/240 VAC	Manual	45	No
RLY13A-621R	120/240 VAC	Automatic	60	No
RLY13A-626R	12 VAC	Manual	90	No



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