

P29 Series Low Pressure Control with Time Delay Relay

Application

The P29 Series 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 main applications for this control:

- Chiller: low temperature**
 You connect the pressure element to the suction side of a chiller refrigeration system and wire the time delay relay to the compressor control circuit. Prolonged low suction pressure, such as pressure caused by a low temperature condition, causes the control to shut down the refrigeration compressor.
- Industrial equipment: lubrication oil pressure**
 On any electrically driven machine with a forced oil system, you connect the pressure element to the lube oil system and wire the time delay relay in the control circuit. The time delay provides a period of time for oil pressure to build up on startup or to recover from temporary fluctuations. A sustained loss of oil pressure causes 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: Use this P29

Series low pressure control with time delay relay only as an operating control. Where failure or malfunction of the P29 control could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the P29 control.

Operation

When the equipment starts, the time delay heater energizes. 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 does not trip and the equipment continues to run.

Time delay relay

The time delay relay is a thermal expansion device with a trip-free manual reset. The time delay relay compensates to minimize the effect of ambient temperature variations. Voltage variations affect the timing.

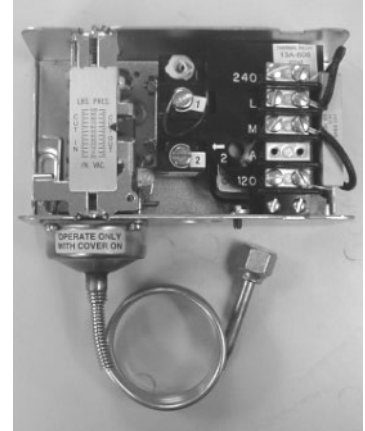


Fig. 1 Interior view of a P29 control

Installation

Mounting

Use the two mounting screw holes located on the back of the control case to mount the control, in any position, directly to a wall or panel board. Mount the control so that the pressure connection on the bellows is above the liquid level of the equipment on which you are using the control.

Do not mount the control in a location where vibration might cause malfunction or damage, even though tests indicate that the P29 control has some ability to perform at vibrations of 2.5 G at 10 to 55 cycles per second.

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

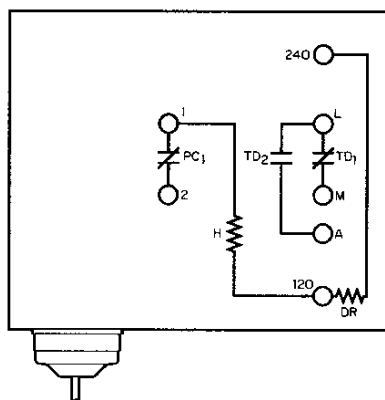
Note: Use only mounting screws supplied with the control to avoid damage to internal components.

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

Pressure connections

- Avoid sharp bends or kinks in the capillary tubing.
- Purge all tubing and lines before you connect the pressure controls.
- Coil and secure excess capillary to avoid vibration. Allow some slack in the capillary to avoid violin string vibration which can cause tubing to break. Do not allow the 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, you must use a pulsation dampener where there is a possibility of pulsation.



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

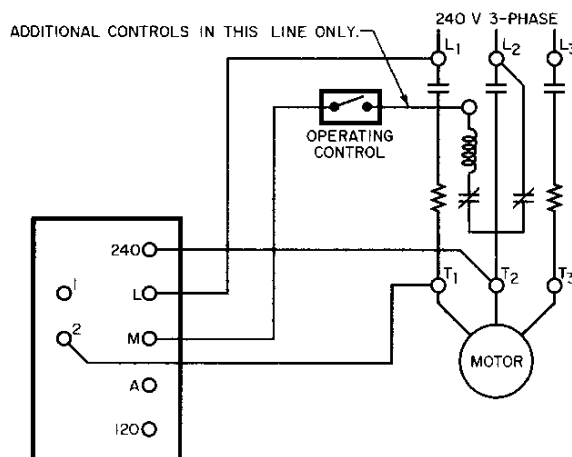


Fig. 3 Standard wiring for the P29 on a 240 V system with a 240 V magnetic starter coil

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

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

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

For applications that use a 208 V control circuit, for standard applications use one leg of the 208 V control circuit and a neutral wire to power the 120 V circuit of the time delay heater.

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

Table 1: Power required for time delay relay

Timing (s)	Voltage	
	24, 120	240
30, 60, 90, or 120	15 VA	30 VA

Note: 240 V 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 Fig. 3 to Fig. 6 or the wiring diagrams with the manufacturer's specifications.

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.

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

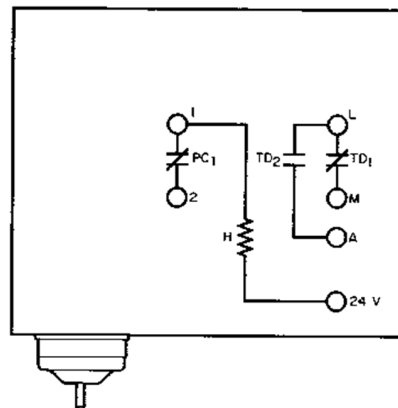
⚠ WARNING: Risk of electrical shock.
Disconnect the power supply before testing to prevent possible electrical shock. On multiple circuit units, more than one circuit may have to be disconnected.

Immediately after installation and at regular intervals thereafter, you must test the time delay relay to be sure that all circuits operate correctly. 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 stops the compressor after the time delay interval.

Note: Replace the cover before testing if the control is mounted on a condensing unit and 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 the cover on the control, close the line switch, and manually reset the time delay relay.



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).

H - HEATER FOR TIME DELAY RELAY.

CONNECT L AND M TERMINALS IN CONTROL CIRCUIT AS SINGLE POLE SWITCH.

CONNECT TERMINAL L SO THAT CIRCUIT IS ENERGIZED ONLY WHEN THE OPERATING CONTROL AND OVERLOAD CONTACTS ARE CLOSED.

Fig. 4 Internal wiring diagram for low voltage models

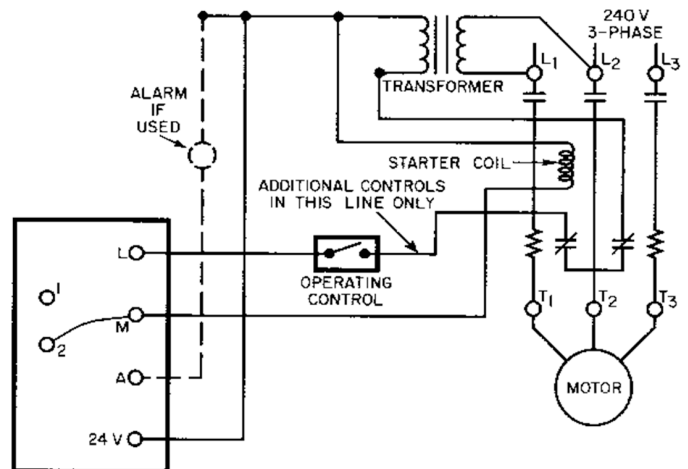


Fig. 5 Wiring with 24 V control circuit power from a step-down transformer

Checkout procedure

Before you leave the installation, observe at least three complete operating cycles to ensure all components function correctly.

Repairs and replacement

Do not make field repairs except for replacement of the time delay relay assembly. You can replace or interchange the timer and terminal board in the field. For replacements, contact a Johnson Controls® distributor.

Table 2: Replacement time delay relay assemblies

Part number	Voltage	Type of reset	Timing	Alarm circuit
RLY13A-600R	120/240 VAC	Manual	60 s	No
RLY13A-609R	24 VAC/VDC	Manual	120 s	No
RLY13A-610R	120/240 VAC	Manual	30 s	No
RLY13A-613R	12 VAC	Manual	120 s	No
RLY13A-616R	120/240 VAC	Manual	120 s	No

Table 3: Conformity declaration information

Information	Description
Purpose of control	Pressure operating controls
Method of mounting control	Flat surface or with a universal mounting bracket (Part No. 271-51)
Method of earthing of control	Wiring binding screw terminal
Type 1 or Type 2 action	Type 1.C (micro-interruption)
External pollution situation	Pollution degree 3
Rated impulse voltage	4,000 VAC

Single point of contact

APAC:

JOHNSON CONTROLS
C/O CONTROLS PRODUCT MANAGEMENT
NO. 32 CHANGJIANG RD NEW DISTRICT
WUXI JIANGSU PROVINCE 214028
CHINA

Europe:

JOHNSON CONTROLS
VOLTAWEG 20
6101 XK ECHT
THE NETHERLANDS

NA/SA:

JOHNSON CONTROLS
5757 N GREEN BAY AVE.
GLENDALE, WI 53209
USA

UK:

JOHNSON CONTROLS
TYCO PARK
GRIMSHAW LANE
MANCHESTER M40 2WL
UNITED KINGDOM



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