Application

P45 controls provide dependable oil pressure cutout for pressure lubricated refrigeration compressors. The controls are factory set to compressor manufacturer’s specifications.

A built-in time delay relay, compensated for ambient temperature, allows for pressure pickup on start and avoids nuisance shutdowns on short duration pressure losses during the running cycle.

All P45 controls are designed for use only as operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add safety and limit controls or alarm and supervisory systems that warn of and protect against control failure.

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 so the pressure elements inside the control case are above the crankcase liquid level of the equipment on which the control is being used. If required, Part No. 271-51 universal mounting bracket is available.

NOTE: Use only mounting screws supplied with the control to prevent damage to internal components.

Pressure connections

1. Avoid sharp bends or kinks in capillary tubing.
2. Purge all tubing and lines before connecting pressure controls. Connect the oil pressure line to pressure connector labeled “OIL” and the crankcase line to pressure connector labeled “LOW.” (See Figure 2)
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 capillary.

CAUTION When a P45 control with a 1/4” male SAE flare is connected to 1/4” tubing, a pulsation damper must be used where there is a possibility of pulsation.

Wiring

WARNING Risk of Electrical Shock.

Disconnect the power supply before wiring connections are made to avoid possible electrical shock or damage to the equipment. On multiple circuit units, more than one circuit may have to be disconnected.

All wiring should conform to the National Electrical Code and local regulations. Use copper conductors only. For maximum electrical rating of the control, see the label inside the control cover.

See label inside control cover or in the manufacturers specifications for a typical wiring diagram. For external wiring diagrams, write for Form 3646.

Time delay relay

The time delay relay is a “trip-free”, thermal expansion device. Manual reset models and automatic reset models are available with factory set and sealed time delays of 30, 45, 60, 90 or 120 seconds.

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

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

<table>
<thead>
<tr>
<th>Timing in seconds</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12, 24, or 120</td>
<td>240*</td>
</tr>
<tr>
<td>30, 45, 60, 90 or 120</td>
<td>15 VA</td>
</tr>
<tr>
<td></td>
<td>30 VA</td>
</tr>
</tbody>
</table>

*Includes dropping resistor wattage.

When a P45 control is installed on a 440 VAC or a 550 VAC system, use an external step-down transformer to provide either 120 or 240 volts to the pilot and time delay relay circuits. The transformer must be of sufficient volt-ampere capacity to operate the motor starter and the P45’s time delay relay.

<table>
<thead>
<tr>
<th>Pressure specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time delay shutdown range (pressure difference)*</td>
</tr>
<tr>
<td>7 PSI to 60 PSI (50 kPa to 400 kPa)</td>
</tr>
</tbody>
</table>

*NOTE: The control is set to Original Equipment Manufacturers Specifications which are not field adjustable. The time delay heater de-energizes at approximately 3 PSI (21 kPa) pressure difference above setting.

EXAMPLE: If the minimum lube oil pressure required to the bearings is 9 PSI (62 kPa), oil pump pressure minus crankcase pressure. The P45 control setting should be 9 PSI (62 kPa). During initial start of the compressor, or if the oil pressure drops during the running cycle, the time delay heater is energized. If the lube oil pressure does not build up to the scale setting plus 3 PSI (21 kPa) for control differential or total of 12 PSI (83 kPa) during the timing period, the control breaks the circuit to the compressor. If this pressure of 12 PSI (83 kPa) is reached during the timing period, the time delay heater is de-energized and the compressor is permitted to continue normal operation.
Internal wiring diagrams

P45AAA, P45NAA

*V: 120, 208, 240, or 24 VAC or DC single voltage models

P45ACA, P45NCA, P45PCA

*V: 240 V dual voltage models
**V: 120 V dual voltage models

P45NCA

*V: 240 V dual voltage models with alarm circuit
**V: 120 V dual voltage models with alarm circuit

Definitions

PC: pressure actuated contacts open on increase in pressure difference between oil and low pressure connectors. Makes and breaks time delay heater circuit.

TD: heater actuated time delay contacts open after factory set time delay interval if:
1. Pressure actuated contacts close when differential pressure drops below set point, or
2. Differential pressure fails to increase to 3 psi (21 kPa) above set point after machine starts.

DR: voltage dropping resistor used in dual voltage models.

H: heater for time delay relay.

Connect L and M terminals in control circuit as single-pole switch. Connect 2 and V1 terminals so that circuit is energized only when motor starter is closed.

In P45 controls with alarm lead the TD switch is SPDT. The contacts between terminals I and m operate as the TD outlined above. When these contacts are open, the contacts between L and the alarm lead wire are closed.

Lubricating pressure to bearings is not oil pressure gage reading – it is: net oil pressure or oil pressure gage reading minus crankcase pressure.

NOTE: When P45 controls are shipped as an accessory to compressor unit, time delay and pressures are set to manufacturer’s specifications. Replacement controls should duplicate manufacturer’s specifications for time delay and pressure settings.

Checkout procedure

Before leaving the installation, at least three complete operating cycles should be observed to see that all components are functioning correctly. The time delay relay should be tested after installation and at regular intervals.

1. Pull line switch.
2. Remove control cover.
3. Insert a screwdriver or test tool (836-61 available on request) into slot and under the trip arm as shown in Fig. 3.

NOTE: A screwdriver with a thin blade not over 3/16” wide may be used.

4. Tool must fit snugly to prevent trip arm from moving down to open contacts. Keep tool in place and proceed through Step 8.
5. It is important that the control be shielded from moving air during this test. The time delay is a thermal device and air will affect timing.

6. Close line switch to start compressor running.
7. The time delay switch will stop the compressor after the time delay interval.
8. Pull line switch.
9. Remove test tool or screwdriver.
10. Replace cover and close line switch.
11. Manually reset control.
12. Test tool in checkout position.

Figure 3: 836-61 test tool in checkout position.

Repairs and replacement

Field repairs must not be made. For replacement control, contact the nearest Johnson Controls distributor.

European Single Point of Contact:
JOHNSON CONTROLS
WESTENDHOF 3
45143 ESSEN
GERMANY

NA/SA Single Point of Contact:
JOHNSON CONTROLS
507 E MICHIGAN ST
MILWAUKEE WI 53202
USA

APAC Single Point of Contact:
C/O CONTROLS PRODUCT MANAGEMENT
NO. 22 BLOCK D NEW DISTRICT
WUXI JIANGSU PROVINCE 214142
CHINA