Application Engineering

Model 8D Compressors

BULLETIN NO: AE4-1265 R5

Contents

COPELAND

Safety

Important Safety Information

Those involved in the design, manufacture, and installation of a system, system purchasers, and service personnel may need to be aware of hazards and precautions discussed in this section and throughout this document. OEMs integrating the compressor into a system should ensure that their own employees follow this bulletin and provide any necessary safety information to those involved in manufacturing, installing, purchasing, and servicing the system.

Responsibilities, Qualifications and Training

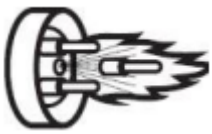
• OEMs are responsible for system design, selection of appropriate components, integration of this component into the system, and testing the system. OEMs must ensure that staff involved in these activities are competent and qualified.

• OEMs are also responsible for ensuring that all product, service, and cautionary labels remain visible or are appropriately added in a conspicuous location on the system to ensure they are clear to any personnel involved in the installation, commissioning, troubleshooting or maintenance of this equipment.

• Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission, troubleshoot and maintain this equipment. Electrical connections must be made by qualified electrical personnel.

• Observe all applicable standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment.

Terminal Venting and Other Pressurized System Hazards



If a compressor's electrical terminal pin loses its seal, pressurized oil, refrigerant, and debris may spray out. This is called "terminal venting".

The ejected debris, oil, and refrigerant can injure people or damage property. The oil and refrigerant spray can be ignited by electrical arcing at the terminal or any nearby ignition source, producing flames that may project a significant distance from the compressor. The distance depends on the pressure and the amount of refrigerant and oil mixture in the system. The flames can cause serious or fatal burns and ignite nearby materials.

Each compressor has a terminal cover or molded plug that covers electrical connections. The cover or plug helps to protect against electric shock and the risks of terminal venting. If terminal venting occurs, the cover or plug helps contain the spray of refrigerant and oil and reduces the risk of ignition. If ignition occurs, the plug or cover helps contain the flames. However, neither the terminal cover nor the molded plug can completely eliminate the risk of venting, ignition, or electric shock.

See copeland.com/terminal-venting for more details about terminal venting. Additionally, a compressor's refrigerant lines keep refrigerant and oil under pressure. When removing or recharging refrigerant from this component during service, this can pose a pressurized fluid hazard.

Flammable Refrigerant Hazards

If flammable refrigerant is released from a system, an explosive concentration can be present in the air near the system. If there is an ignition source nearby, a release of flammable refrigerant can result in a fire or explosion. While systems using flammable refrigerant are designed to mitigate the risk of ignition if the refrigerant is released, fire and explosion can still occur.

See copeland.com/flammable-refrigerants for more information on flammable refrigerant safety.

Electrical Hazards

Until a system is de-energized, and capacitors have been discharged, the system presents a risk of electric shock.

Hot Surface and Fire Hazards

While the system is energized, and for some time after it is deenergized, the compressor may be hot. Touching the compressor before it has cooled can result in severe burns. When brazing system components during service, the flames can cause severe burns and ignite nearby combustible materials.

Lifting Hazards

Certain system components may be very heavy. Improperly lifting system components or the compressor can result in serious personal injury. Use proper lifting techniques when moving.

POE Oil Hazards

This equipment contains polyol ester (POE) oils. Certain polymers (e.g., PVC/CPVC and polycarbonate) can be harmed if they come into contact with POE oils. If POE oil contacts bare skin, it may cause an allergic skin reaction.

Precautions

• Always wear personal protective equipment (gloves, eye protection, etc.).

• Keep a fire extinguisher at the jobsite at all times.

• Keep clear of the compressor when power is applied.

- IMMEDIATELY GET AWAY **if you hear unusual sounds in the compressor. They can indicate that terminal pin ejection may be imminent. This may sound like electrical arcing (sizzling, sputtering or popping). However, terminal venting may still occur even if you do not hear any unusual sounds.**

• Never reset a breaker or replace a blown fuse without performing appropriate electrical testing

- **A tripped breaker or blown fuse may indicate an electrical fault in the compressor. Energizing a compressor with an electrical fault can cause terminal venting. Perform checks to rule out an electrical fault.**

• Disconnect power and use lock-out/tag-out procedures before servicing.

- Before removing the terminal cover or molded plug, check that ALL electrical power is disconnected from the unit. Make sure that all power legs are open. (Note: The system may have more than one power supply.)

- Discharge capacitors for a minimum of two minutes

- Always use control of hazardous energy (lock-out/tag-out) procedures to ensure that power is not reconnected while the unit is being serviced.

• Allow time for the compressor to cool before servicing.

- Ensure that materials and wiring do not touch high temperature areas of the compressor.

• Keep all non-essential personnel away from the compressor during service.

• For A3 refrigerants (R290) remove refrigerant from both the high and low sides of the compressor. Use a recovery machine and cylinder designed for flammable refrigerants. Do not use standard recovery machines because they contain sources of ignition such as switches, high- and low-pressure controls and relays. Only vent the R290 refrigerant into the atmosphere if the system is in a well-ventilated area.

• Never use a torch to remove the compressor. Only tubing cutters should be used for both A2L and A3 refrigerants.

• Use an appropriate lifting device to install or remove the compressor.

• Never install a system and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system.

• Always wear appropriate safety glasses and gloves when brazing or unbrazing system components.

• Charge the system with only approved refrigerants and refrigeration oils.

• Keep POE oils away from certain polymers (e.g., PVC/CPVC and polycarbonate) and any other surface or material that might be harmed by POE oils. Proper protective equipment (gloves, eye protection, etc.) must be used when handling POE lubricant. Handle POE oil with care. Refer to the Safety Data Sheet (SDS) for further details.

• Before energizing the system:

1. Securely fasten the protective terminal cover or molded plug to the compressor, and

2. Check that the compressor is properly grounded per the applicable system and compressor requirements.

Signal Word Definitions

The signal word explained below are used throughout the document to indicate safety messages.

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Introduction

Model 8D Compressors

The model 8D compressor family reflects the growing importance of Copeland worldwide activities. The basic development engineering was done by the company's European division, in close cooperation with its Sidney, Ohio engineering group.

8D Family

The initial 8D models are the 8DP1-5000 and the 8DS1-6000. The 8DP1 is an 8-cylinder version of the 6D-35

H.P. family with common valve plates, pistons, and rods. The 8DS1 is an 8-cylinder version of the 6D-40 H.P. family with common valve plates, pistons, and rods.

Both 8D models are made with two unloaded cylinder banks, so the basic model nomenclature follows the 6D models, i.e. 8DP and 6DP, 8DS and 6DS. The 8D models

internal unloader mechanism so they may be operated fully loaded as received with the pads installed. There is no model distinction between a standard and unloaded version. If unloading is desired, then solenoid kits are available on a special bill of material and may be installed on one or both cylinder banks as desired.

In a similar fashion, all compressors are shipped with pads over the valve openings, less solid-state module, and the proper bill of material will identify the valves and solid-state module which will be shipped as accessory parts.

Electrical Characteristics

The 6D compressors are available in two electrical versions.

TSK models will have 9 lead motors and can be connected for 208/230-3-60 power part winding or across the line.

FSD models will have 6 lead motors and may be connected for 460-3-60 and 380/400-3-50 power either part winding or across the line or may be connected for 460-3-60 and 400-3-50 across the line.

The protection system is the standard T.I. solid state motor protection used on all 4D and 6D compressors.

On a two-contractor installation each contactor must be sized adequately to carry the locked rotor current. Since the contactor is an integral part of the protection system, proper contactor application is a requirement of the Copeland warranty.

Application

8D compressors are presently released for R-22 high temperature applications with unloading and for R-502 medium temperature applications fully loaded only. These compressors are not approved for low temperature applications and should not be applied outside their published operating parameters.

Because of the internal design of the motor, there is a much higher pressure drop across the motor of an operating compressor than typically seen on other Copeland® compressors. This can complicate oil equalization problems on parallel applications. A float oil equalization system is therefore recommended if parallel application is desired.

Figures and Tables

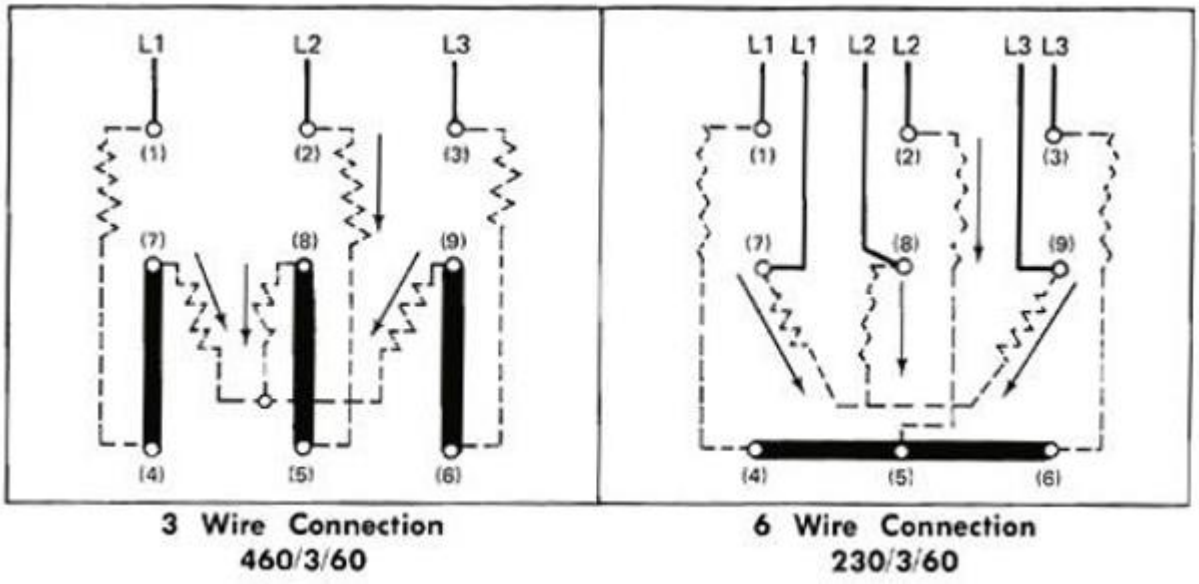


Figure 1 TSK Wiring Connections

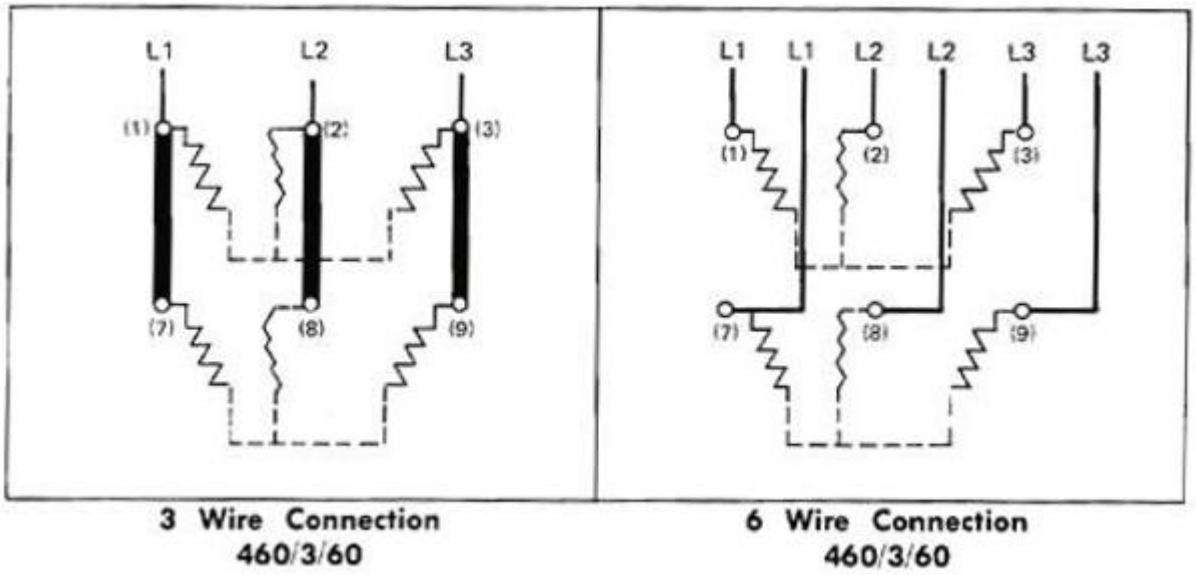


Figure 2 FSD Wiring Connections

Table 1 - Model 8D Compressor Line

MODEL	8DP1-5000-TSK	8DP1-5000-FSD	8DS1-6000-TSK	8DS1-6000-FSD
60 HZ. Displacement R-22 Capacity, ARI	6428 CFH 566,000 BTU/HR	6428 CFH 566,000 BTU/HR	7608 CFH 650,000 BTU/HR	7608 CFH 650,000 BTU/HR
Voltage Rating	208/230-3-60 ACL 208/230-3-60 PWS 460/3/60 ACL 400/3/50 ACL	460-3-60 ACL 460-3-60 PWS 380/400-3-50 ACL 380/400-3-50 PWS	208/230-3-60 ACL 208/230-3-60 PWS 460-3-60 ACL 400-3-50 ACL	460-3-60 ACL 460-3-60 PWS 380/400-3-50 ACL 380/400-3-50 PWS
230 Volt LRA, ACL LRA, Part Wdg. MCC RLA	 1070 Amps 654 Amps 252 Amps 180 Amps	 — — — —	 1070 Amps 654 Amps 314 Amps 224 Amps	 — — — —
460 Volt LRA, ACL LRA, Part Wdg. MCC RLA	 535 Amps — 126 Amps 90 Amps	 510 Amps 330 Amps 127 Amps 91 Amps	 535 Amps — 157 Amps 112 Amps	 510 Amps 330 Amps 135 Amps 96.5 Amps
Contactor Sizing 208/230 V. 2 Contactor 460 V. 1 Contactor 460 V. 2 Contactor	 2 - 120 Amp* 120 Amps —	 — 120 Amps 2 - 90 Amp*	 2 - 120 Amp* 120 Amps —	 — 120 Amps 2 - 90 Amps*

*Must be U.L. approved for part winding applications at 100% of ACL LRA rating.

Revision Tracking R5

The document format has been updated to the new Copeland format

All occurrences of "Emerson" have been removed

A note regarding A3 and R290 venting has been updated