AC and DC Drive System Installation Information

Purpose

This document contains the Parker SSD Drives recommendations for installing drive systems. These instructions must be followed for safe and reliable operation.

Instructions

CODES AND REGULATIONS

Install motor and control system to comply with all applicable national and local codes including:

USA ..... National Electric Code (NEC)

SAFETY

Install all machinery and control system equipment covers and guards to protect personnel from accidental contact with 'live' or moving parts.

ENCLOSURE LOCATION

Install drive system enclosure in a location free from contamination. The ambient temperature must not exceed 105°F (40°C) and the altitude must be less than 1640 feet (500 meters) unless noted otherwise by Parker SSD Drives.

SIGNAL AND CONTROL WIRING

Wire Routing

Signal wiring (shielded cable) must be routed separately from power (high voltage) and control (120 VAC) wiring and any other non-signal wiring. Install a separate conduit or cable tray for signal wiring only. Within enclosures, harness and route signal wiring separately and as far from non-signal wiring as is possible.

The spacing between parallel runs of signal cables and motor or supply cables should be 10 inches minimum for runs up to 30 feet and increased proportionately for runs greater than 30 feet. For example, for a parallel run of 120 ft the separation should be

$$\frac{120 \text{ feet}}{30 \text{ feet}} \times 10 \text{ inches} = 40 \text{ inches}$$

Where signal wiring must cross non-signal wiring, cross these at 90 degree angle. When possible, route power wiring separately from all other wiring.

NOTE. Separation is required for AC drive power and motor cables, it can be relaxed for other cables.

Signal Wiring

Use shielded cable for signal wiring unless noted otherwise and separate it from motor cables.

Shielded cables are used to control radiated coupling. To provide effective suppression against RFI both ends of the shield must generally be connected to ground. It is important that the contact between the shield and the ground/chassis terminal is good. A bad connection will increase the impedance of the shield and reduce the suppression of radio noise.

Shielded Cable

The shield should be grounded at the drive enclosure. Analog and digital signal wiring shields must be connected to the enclosure shield terminals (SHD). The following types of shielded cable are recommended for digital signal wiring unless noted otherwise (see the Communication Cable section): two-pair ALPHA 2466, BELDEN 8723, BICC H8085, UL 2493; three-pair ALPHA 6010, BELDEN 8777, BICC H8086, UL 2493.

Using Shielded Cable

When using shielded cable, strip back the shield only as far as is necessary to terminate the conductors within. Connect one end of the shield to the appropriate enclosure terminal as shown on the system circuit diagram. Cut off and insulate other end of the shield unless noted otherwise (see the Tachometer section). If an intermediate junction of shielded cable is required, terminate or splice each shield individually to maintain each as a single, continuous conductor.

Grounding 0 VDC Signal Common

Drive systems are shipped with the 0 VDC signal common completely isolated from the earth ground. The 0 VDC signal common must be connected to the earth ground at only one point. Connect a 0 VDC signal common terminal (0) to an earth ground terminal (G) within a drive enclosure if this connection does not exist elsewhere.

POWER WIRING

Power wiring should use shielded or armored cable or should be installed in conduit.

Bonding Conduit or Shielded or Armored Cable

Conduit, armored cable or shielded cable bonding should provide a 360 degree connection. Remove paint to provide a good electrical contact and apply a protective coating, such as grease, to prevent corrosion. Any break in the conduit or shield to insert disconnects, connectors or other components must be enclosed and the conduits or shields bonded to the enclosure.

Isolation Transformer

A drive isolation transformer typically supplies the drive system. The cable between the transformer and the drive cabinet should be enclosed in conduit bonded at the transformer and at the drive system enclosures.

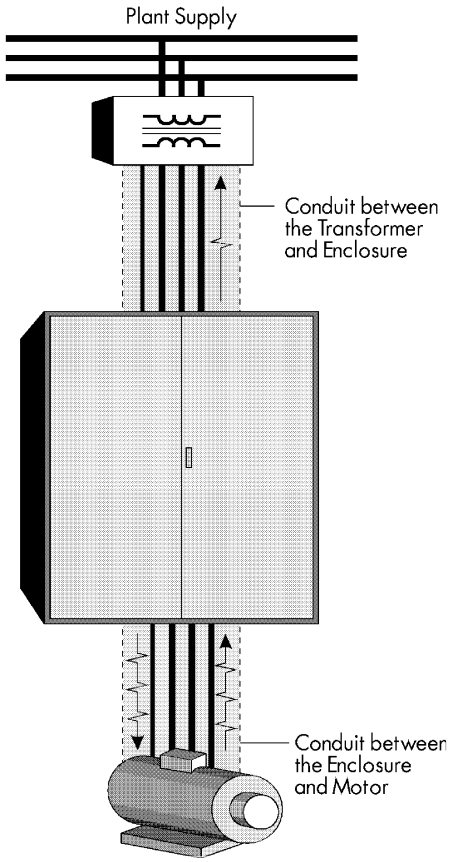


Figure 1 - Using Conduit

COMMUNICATION CABLE

Fiber Optic Cable

Use 1.0 mm O.D. acrylic fiber optic cable (part number CM056316) supplied by Parker SSD Drives.

> NOTE. Parker SSD Drives recommends using composite fiber optic cable (part number CM059748) which provides additional physical protection. It will greatly reduce the risk of damaging the cable during installation.

Fiber optic signal transmission is immune to electrical noise interference and does not require special routing. However, physical damage to the cable will degrade signal transmission. Do not twist, kink, impact, or otherwise damage the cable. The minimum cable bend radius is about 1.5 inches (40 mm). Consult Parker SSD Drives for runs longer than 125 feet (38 meters).

> NOTE. It is important that the fiber optic wire be properly terminated to ensure the highest signal levels; do NOT use wire cutters or pocket knives to dress the ends of the cables. Use the fiber optic termination kit (part number LA351438) for acrylic fiber optic cable.

Serial Communication Cable

Some hardware may require a specific type of cable for serial communication. consult the manufacturer's product information unless noted otherwise by Parker SSD Drives.

FireWire 'A' Cable

FireWire signal transmissions are sensitive to noise interference and as such, should be properly terminated and shielded per IEEE1394A standard. The following cable part numbers are available from Parker SSD Drives.

- CM469189U002 = 200mm
- CM469189U003 = 280mm
- CM469189U010 = 1,000mm
- CM469189U045 = 4,500mm

Please use the following guidelines for FireWire drive system communications.

FireWire 'A' cable network guidelines

- Never exceed 63 nodes per bus.
- Never create a loop.
- Extend the cable length (more than 4.5m) by using a repeater
- The maximum number of hops between the most distant nodes on the network is 16.
- Allow a maximum of 72 meter (cumulated cable lengths) between any two nodes.

SERVICE POWER SUPPLY

When the enclosure service lights and outlets are fitted, their power supply must be 120 VAC fused at 10 amps and connected to the enclosure terminals (G), (L), and (N) as shown on the system circuit diagram. This supply should remain 'live' to provide lighting and power for maintenance when all other supply power has been disconnected. Disconnect this supply before servicing the lights or outlets.

DC MOTOR CONNECTION

High Nameplate Field Excitation - Regenerative Drive

For CW motor rotation when facing the commutator end, leads (F1) and (A2) should be of the same polarity. For CCW rotation, leads (F1) and (A1) should be of the same polarity. The series field should not be used unless noted otherwise. Insulate leads (S1) and (S2) separately and do not use.

High Nameplate Field Excitation - Non-Regenerative Drive

For CW motor rotation when facing the commutator end, leads (F1) and (A2) should be of the same polarity and leads (A1) and (S1) should be connected for a cumulative series field, if required. For CCW rotation, leads (F1) and (A1) should be of the same polarity and leads (A2) and (S1) should be connected for a cumulative series field, if required.

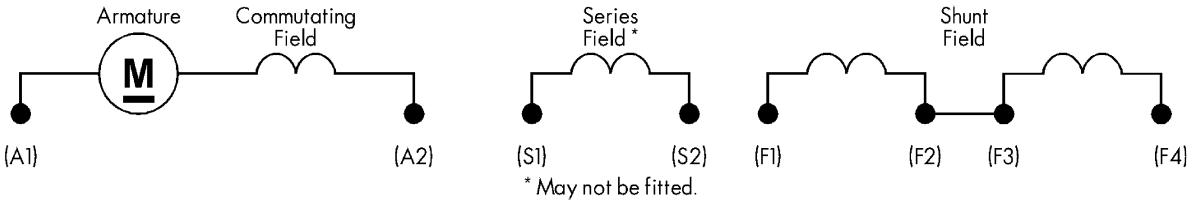


Figure 2 - High Voltage Field Excitation Configuration

Low Nameplate Field Excitation - Regenerative Drive

For CW motor rotation when facing the commutator end, leads (F1, F3) and (A2) should be of the same polarity. For CCW rotation, leads (F1, F3) and (A1) should be of the same polarity. The series field should not be used unless noted otherwise. Insulate leads (S1) and (S2) separately and do not use.

Low Nameplate Field Excitation - Non-Regenerative Drive

For CW motor rotation when facing the commutator end, leads (F1, F3) and (A2) should be of the same polarity and leads (A1) and (S1) should be connected for a cumulative series field, if required. For CCW rotation, leads (F1, F3) and (A1) should be of the same polarity and leads (A2) and (S1) should be connected for a cumulative series field, if required.

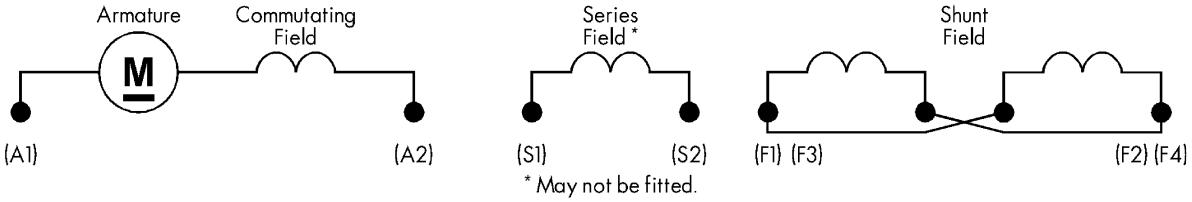


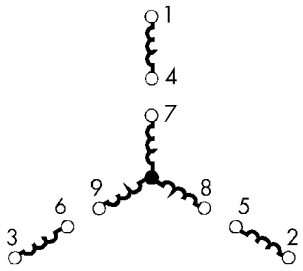
Figure 3 - Low Voltage Field Excitation Configuration

Sizing Power Wiring

Motor armature and field wiring must have a minimum current rating of 1.2 x Full Load Current (FLC) for three-phase motors and 1.5 x Full Load Current (FLC) for single-phase motors. Refer to local codes to ensure the wires are sized properly.

AC MOTOR CONNECTION

The motor leads are a major source of radiated emissions due to their length. To reduce these emissions the motor leads should be shielded and separated from sensitive equipment and conductors. The three phases and ground conductor for the motor leads should be enclosed in a dedicated conduit, physically separated from signal cables. Optionally shielded or armored cables can be used. In either case, the conduit or shield/armor should be bonded to the drive system enclosure AND to the motor.



Voltage	Line 1 (L1)	Line 2 (L2)	Line 3 (L3)	Jumper
Low	T1 & T7	T2 & T8	T3 & T9	T4 & T5 & T6
High	T1	T2	T3	T4 & T7 T5 & T8 T6 & T9

Figure 4 - Typical AC Motor Connections

Sizing Power Wiring

Motor wiring must have a minimum current rating of 1.2 x Full Load Current (FLC) for three-phase motors. Refer to local codes to ensure the wires are sized properly.

GROUNDING

Isolation Transformer

The power feeder to the drive system must have a suitably sized ground conductor IN ADDITION to bonded conduit or cable armor. This ground conductor should be connected to the ground bus in the drive enclosure and to the drive isolation transformer frame and enclosure. The drive isolation transformer secondary winding should be grounded at the neutral of the wye by connecting to the drive ground bus. See Figure 5 for an illustration of the ground connections.

Motor

Motor frames should be grounded locally in addition to the ground conductor run from the motor ground stud to the drive ground bus or terminal.

Other Enclosures

Operator stations and other enclosures, not containing power controllers, should be grounded locally or via a ground conductor or bonded conduit to the drive ground bus.

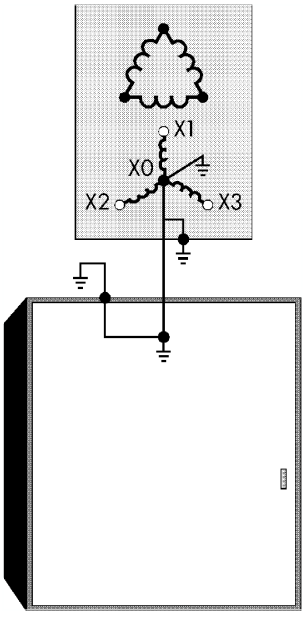


Figure 5 - Transformer Grounding

BLOWER MOTOR

A blower will only provide adequate cooling air flow when operated in the correct direction of rotation, usually indicated by an arrow on the blower housing. Incorrect rotation will generate a small forward air flow but not enough to cool the motor. Ensure correct rotation to avoid damaging the motor. When uncertain, operate the blower in both directions to determine the direction of maximum air flow. Blower motor rotation is reversed by interchanging any two of its three power leads.

MOTOR THERMAL PROTECTION

Motor thermostat must be connected to the appropriate drive enclosure terminals as shown on the system circuit diagram. Connect multiple thermostats in series.

NOTE. These wires must be run with signal, not power, wiring.

TACHOMETER

Maintain the polarity shown on the system circuit diagram when connecting a tachometer. Use shielded cable run in the signal conduit. The tachometer coupling must be a good quality, non-backlash type.

ENCODER

Incremental optical encoders must have quadrature line driver outputs. Use shielded cable run in the signal conduit for both supply and output wiring. See the cable type recommended in Note 4 above. Consult Parker SSD Drives for runs longer than 150 feet. Connect the encoder end of the shield to the shield terminal as shown on the system circuit diagram. The encoder coupling must be a good quality, non-backlash type.

INSTRUMENTATION

Use shielded cable run in the signal conduit unless noted otherwise. Analog meters and E/P and I/P transducers may be connected with unshielded wiring run with control wiring but routed separately from power wiring.