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BALDOR
MOTORS AND DRIVES

Series 25M
Multi–Axis
Vector Control

**(Includes 3 Phase - PO and
1 Phase - TR Versions)**

Installation & Operating Manual

3/01 **MN725**

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Section 1
Quick Start Guide

Overview

If you are an experienced user of Baldor controls, you are probably already familiar with the keypad programming and keypad operation methods. If so, this quick start guide has been prepared for you. This procedure will help get your system up and running in the keypad mode quickly. This will allow motor and control operation to be verified. This procedure assumes that the Control, Motor and Dynamic Brake hardware are correctly installed (see Section 3 for procedures) and that you have an understanding of the keypad programming & operation procedures. It is not necessary to wire the terminal strip to operate in the Keypad mode (Section 3 describes terminal strip wiring procedures). The quick start procedure is as follows:

1. Read the Safety Notice and Precautions in section 2 of this manual.
2. Mount the control. Refer to Section 3 “Mechanical Installation” procedure.
3. Connect AC power, refer to Section 3 “Power Connections”.
4. Connect the external dynamic brake resistor, if required. Refer to Section 3 “Dynamic Brake Resistor”.
5. Plug in the keypad, refer to Section 3 “Remote Keypad Installation”.
6. Connect the motor, refer to Section 3 “Motor Connections”.
7. Connect the encoder, refer to Section 3 “Encoder Installation”.

Note: It is not necessary to wire the terminal strip to operate in the Keypad mode.

Quick Start Checklist

1. Verify AC line voltage at the source matches the control rating.
2. Inspect all power connections for accuracy, workmanship and torques as well as compliance to codes.
3. Verify control and motor are grounded to each other and the control is connected to earth ground.
4. Check all signal wiring for accuracy.
5. Be certain all brake coils, contactors and relay coils have noise suppression. This should be an R-C filter for AC coils and reverse polarity diodes for DC coils. MOV type transient suppression is not adequate.

Check of Motors and Couplings

1. Verify freedom of motion for all motor shafts.
2. Verify that all motor couplings are tight without backlash.
3. Verify the holding brakes if any, are properly adjusted to fully release and set to the desired torque value.

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Quick Start Procedure

Initial Conditions

Become familiar with the keypad programming and keypad operation of the control as described in Section 4 of this manual.

1. Verify that any enable inputs to J1B-8 are open.
2. Connect the Keypad to J4 on the 25M panel.
3. Turn power on. Be sure there are no faults.
4. **(PSM–PR only)** Verify PSM "Ready" is ON and the "DB ON" and "Monitor" indicators are OFF. Verify the control "Ready" is ON.
5. **(25M–TR only)** Verify that "Ready" is ON and the "DB" is OFF.
6. Set the Level 1 Input block, Operating Mode to "KEYPAD".
7. Be sure the Level 2 Protection block, Local Enable INP parameter is OFF and the Level 2 Protection block, External Trip parameter is OFF.
8. Enter the following motor data in the Level 2 Motor Data block parameters:
   Motor Voltage (input)
   Motor Rated Amps (FLA)
   Motor Rated Speed (base speed)
   Motor Rated Frequency
   Motor Mag Amps (no load current)
   Encoder Counts
9. At the Level 2 Motor Data block, go to CALC Presets and select YES (using the ▲ key). Press ENTER and let the control calculate the preset values for the parameters that are necessary for control operation.
10. Disconnect the motor from the load (including coupling or inertia wheels). If the load cannot be disconnected, refer to Section 6 and manually tune the control. After manual tuning, perform steps 15 through 19.

⚠ **WARNING: The motor shaft will rotate during the autotune procedure. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment.**

11. Go to Level 2 Autotune block, and do the following tests:
    CMD OFFSET TRIM
    CUR LOOP COMP
    STATOR R1
    FLUX CUR SETTING
    FEEDBACK TESTS
    SLIP FREQ TEST
12. Remove all power from the control.
13. Couple the motor to its load.
14. Turn power on. Be sure no errors are displayed.
15. Set the Level 2 Output Limits block, "MIN OUTPUT SPEED" parameter.
16. Set the Level 2 Output Limits block, "MAX OUTPUT SPEED" parameter.
17. Go to Level 2 Autotune block, and perform the SPD CNTRLR CALC test.
18. Run the drive from the keypad using one of the following: the arrow keys for direct speed control, keypad entered speed or the JOG mode.
19. Select and program additional parameters to suit your application.

The control is now ready for use in the Keypad mode. If a different operating mode is desired, refer to Section 3 Control Connections and Section 4 Programming and Operation.

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Section 2
General Information

Introduction

The Baldor 25M control uses flux vector technology in a closed loop control scheme to adjust the frequency and phase of voltage and current applied to a three phase induction motor. The vector control internally separates the motor current into its flux (stator current) and torque producing (rotor current) components. Each current is independently controlled and vectorially added to maintain a 90° phase relationship between them. This produces maximum torque from zero speed to motor base speed. Above motor base speed, the flux component is reduced for constant horsepower operation.

In addition to controlling the current, the frequency must also be controlled. The PWM frequency of the motor signal is calculated based on the slip frequency and the mechanical speed of the rotor. This allows instantaneous adjustment of the voltage and current phasing in response to speed and position feedback from an encoder mounted on the motor shaft.

A keypad interface is used to program the Series 25M parameters to optimize the control for your application. The keypad is used to program the control parameters, set the operating mode, monitor operation status, perform diagnostics, and examine the fault log.

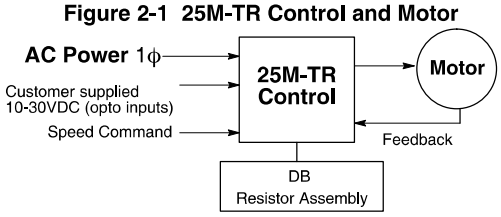
Sensorless Control

The vector control can also be used as a sensorless control. Simply set the Level 2, Motor Data block, Encoder Counts parameter to a value of zero for sensorless operation.

25M–TR Only

Figure 2-1 shows the 25M-TR control and motor configuration. The 25M-TR control is self contained except for external power supplies required for the opto input circuits.

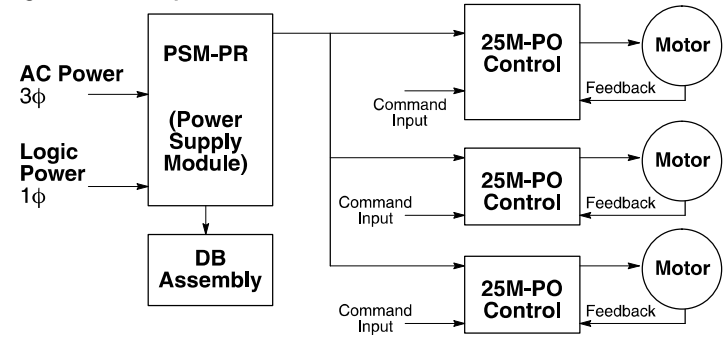
Figure 2-1 25M-TR Control and Motor



25M–PO Only

The 25M AC Flux Vector Control is one member of a family of multi-axis controls. One or more 24M Encoderless Vector, 25M Flux Vector or 26M AC Servo control may be powered from one Power Supply Module (PSM). See Figure 2-2. The PSM converts the AC line power to DC Bus and logic power. The DC Bus power is converted by the 25M control to a three phase signal for proper motor operation. The 25M control should be sized to the motor based on the rated current found on the motor nameplate.

Figure 2-2 Multiple Controls Powered from One PSM



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Limited Warranty

For a period of two (2) years from the date of original purchase, BALDOR will repair or replace without charge controls which our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. This warranty is in lieu of any other warranty or guarantee expressed or implied. BALDOR shall not be held responsible for any expense (including installation and removal), inconvenience, or consequential damage, including injury to any person or property caused by items of our manufacture or sale. (Some states do not allow exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply.) In any event, BALDOR's total liability, under all circumstances, shall not exceed the full purchase price of the control. Claims for purchase price refunds, repairs, or replacements must be referred to BALDOR with all pertinent data as to the defect, the date purchased, the task performed by the control, and the problem encountered. No liability is assumed for expendable items such as fuses.

Goods may be returned only with written notification including a BALDOR Return Authorization Number and any return shipments must be prepaid.

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Safety Notice:

This equipment contains high voltages. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start–up procedure or troubleshoot this equipment.

This equipment may be connected to other machines that have rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the start–up procedure or troubleshoot this equipment.

PRECAUTIONS:

⚠ **WARNING: Do not touch any circuit board, power device or electrical connection before you first ensure that power has been disconnected and there is no high voltage present from this equipment or other equipment to which it is connected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start–up procedure or troubleshoot this equipment.**

⚠ **WARNING: Be sure that you are completely familiar with the safe operation of this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the start–up procedure or troubleshoot this equipment.**

⚠ **WARNING: This unit has an automatic restart feature that will start the motor whenever input power is applied and a RUN (FWD or REV) command is issued. If an automatic restart of the motor could cause injury to personnel, the automatic restart feature should be disabled by changing the Level 2 Miscellaneous block, Restart Auto/Man parameter to Manual.**

⚠ **WARNING: Be sure all wiring complies with the National Electrical Code and all regional and local codes. Improper wiring may result in unsafe conditions.**

⚠ **WARNING: Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that grounds are connected. Electrical shock can cause serious or fatal injury.**

⚠ **WARNING: Do not remove cover for at least five (5) minutes after AC power is disconnected to allow capacitors to discharge. Electrical shock can cause serious or fatal injury.**

⚠ **WARNING: Improper operation of control may cause violent motion of the motor shaft and driven equipment. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment. Peak torque of several times the rated motor torque can occur during control failure.**

⚠ **WARNING: Motor circuit may have high voltage present whenever AC power is applied, even when motor is not rotating. Electrical shock can cause serious or fatal injury.**

Continued on next page

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⚠ **WARNING:** **A DB Resistor may generate enough heat to ignite combustible materials. To avoid fire hazard, keep all combustible materials and flammable vapors away from brake resistors.**

⚠ **WARNING:** **The motor shaft will rotate during the autotune procedure. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment.**

⚠ **Caution:** **Suitable for use on a circuit capable of delivering not more than the RMS symmetrical short circuit amperes listed here at rated voltage.**

Horsepower	rms Symmetrical Amperes
1–50	5,000
51–200	10,000
201–400	18,000
401–600	30,000
601–900	42,000

⚠ **Caution:** **To prevent equipment damage, be certain that the input power has correctly sized protective devices installed as well as a power disconnect.**

⚠ **Caution:** **Do not connect AC power to the Motor terminals U, V and W. Connecting AC power to these terminals may result in damage to the control.**

⚠ **Caution:** **Baldor recommends not using "Grounded Leg Delta" transformer power leads that may create ground loops and degrade system performance. Instead, we recommend using a four wire Wye.**

⚠ **Caution:** **Disconnect motor leads (T1, T2 and T3) from control before you perform a "Megger" test on the motor. Failure to disconnect motor from the control will result in extensive damage to the control. The control is tested at the factory for high voltage / leakage resistance as part of Underwriter Laboratory requirements.**

⚠ **Caution:** **Avoid locating control immediately above or beside heat generating equipment, or directly below water or steam pipes.**

⚠ **Caution:** **Avoid locating control in the vicinity of corrosive substances or vapors, metal particles and dust.**

⚠ **Caution:** **Do not connect any shields to the encoder case or motor frame. The encoder +5VDC supply at J2-4 is referenced to circuit board common. Do not connect any shields to ground or another power supply or damage to the control may result.**

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Section 3
Installation

Receiving & Inspection

Baldor Controls are thoroughly tested at the factory and carefully packaged for shipment. When you receive your control, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your control.
2. Remove the control from the shipping container and remove all packing materials. The container and packing materials may be retained for future shipment.
3. Verify that the part number of the control you received is the same as the part number listed on your purchase order.
4. Inspect the control for external physical damage that may have been sustained during shipment and report any damage immediately to the commercial carrier that delivered your control.
5. If the control is to be stored for several weeks before use, be sure that it is stored in a location that conforms to published storage humidity and temperature specifications. (Refer to Section 7 of this manual).

Location Considerations

The location of the control and Power Supply Module (PSM) is important. Installation should be in an area that is protected from direct sunlight, corrosives, harmful gases or liquids, dust, metallic particles, and vibration. Exposure to these can reduce the operating life and degrade performance of the control.

Several other factors should be carefully evaluated when selecting a location for installation:

1. For effective cooling and maintenance, the control and PSM should be mounted on a smooth, non-flammable vertical surface. The amount of heat generated within the control can be calculated based on Table 3-1.
2. At least two inches top and bottom clearance must be provided for air flow.
3. **Altitude derating**. Up to 3300 feet (1000 meters) no derating required. Derate the continuous and peak output current by 2% for each 1000 feet (300 meters) above 3300 feet.
4. **Temperature derating**. From 0°C to 40°C ambient no derating required. Above 40°C, derate the continuous and peak output current by 2% per °C above 40°C. Maximum ambient is 60°C.

Table 3-1 Control Watts Loss Ratings

25M-TR		25M-PO		PSM-PR	
115 VAC	**230 VAC**	**230 VAC**	**460 VAC**	**230 VAC**	**460 VAC**
3.5 Watts/ Amp	10 Watts/ Amp	10 Watts/ Amp	17 Watts/ Amp	10 Watts/ Amp	17 Watts/ Amp

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Mechanical Installation **(25M-TR Only)**
Mount the control to the mounting surface. The control must be securely fastened to the mounting surface. Use the four (4) mounting holes to fasten the control to the mounting surface or enclosure. The location of the mounting holes are shown in Section 7 of this manual.

Mechanical Installation **(25M-PO Only)** Mount the PSM (Power Supply Module) and the control to the mounting surface.

PSM Procedure The PSM must be securely fastened to the mounting surface. Use the four (4) mounting holes to fasten the PSM to the mounting surface or enclosure. The location of the mounting holes are shown in Section 7 of this manual.

Control Procedure The control must be securely fastened to the mounting surface. Use the four (4) mounting holes to fasten the control to the mounting surface or enclosure. The location of the mounting holes are shown in Section 7 of this manual.

Through Wall Mounting The PSM and control module are designed for panel or through wall installation.

Procedure:

1. Refer to Section 7 of this manual for drawings and dimensions for through the wall mounting. Use the information contained in these drawings to layout the appropriate size hole on your enclosure and wall.
2. Cut the holes in your enclosure and wall.
3. Locate and drill holes for mounting hardware as shown in the drawings.
4. Secure the four (4) brackets to the exterior of the customers panel with the hardware provided.
5. Secure the control to the customers panel using the hardware provided.

Keypad Installation **(PO and TR systems)**

Procedure:

1. Refer to the Remote Keypad Installation procedure and mount the keypad.
2. Connect the cable for the keypad assembly to J4 of the control.

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Remote Keypad Installation The keypad may be remotely mounted using the optional Baldor keypad extension cable. The keypad assembly (grey - DC00005A-02) comes complete with the screws and gasket required to mount it to an enclosure. When the keypad is properly mounted to a NEMA Type 4 indoor enclosure, it retains the Type 4 indoor rating.

Tools Required:

- Center punch, tap handle, screwdrivers (Phillips and straight) and crescent wrench.
- 8-32 tap and #29 drill bit (for tapped mounting holes) or #19 drill (for clearance mounting holes).
- 1-1/4″ standard knockout punch (1-11/16″ nominal diameter).
- RTV sealant.
- (4) 8-32 nuts and lock washers.
- Extended 8-32 screws (socket fillister) are required if the mounting surface is thicker than 12 gauge and is not tapped (clearance mounting holes).
- Remote keypad mounting template. A tear out copy is provided at the end of this manual for your convenience.

Mounting Instructions: **For tapped mounting holes**

1. Locate a flat 4″ wide x 5.5″ minimum high mounting surface. Material should be sufficient thickness (14 gauge minimum).
2. Place the template on the mounting surface or mark the holes as shown.
3. Accurately center punch the 4 mounting holes (marked A) and the large knockout (marked B).
4. Drill four #29 mounting holes (A). Thread each hole using an 8-32 tap.
5. Locate the 1-1/4″ knockout center (B) and punch using the manufacturers instructions.
6. Debur knockout and mounting holes making sure the panel stays clean and flat.
7. Apply RTV to the 4 holes marked (A).
8. Assemble the keypad to the panel. Use 8–32 screws, nuts and lock washers.
9. From the inside of the panel, apply RTV over each of the four mounting screws and nuts. Cover a 3/4″ area around each screw while making sure to completely encapsulate the nut and washer.

Mounting Instructions: **For clearance mounting holes**

1. Locate a flat 4″ wide x 5.5″ minimum high mounting surface. Material should be sufficient thickness (14 gauge minimum).
2. Place the template on the mounting surface or mark the holes as shown on the template.
3. Accurately center punch the 4 mounting holes (marked A) and the large knockout (marked B).
4. Drill four #19 clearance holes (A).
5. Locate the 1-1/4″ knockout center (B) and punch using the manufacturers instructions.
6. Debur knockout and mounting holes making sure the panel stays clean and flat.
7. Apply RTV to the 4 holes marked (A).
8. Assemble the keypad to the panel. Use 8–32 screws, nuts and lock washers.
9. From the inside of the panel, apply RTV over each of the four mounting screws and nuts. Cover a 3/4″ area around each screw while making sure to completely encapsulate the nut and washer.

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Electrical Installation

All interconnection wires between the control, AC power source, motor, host control and any operator interface stations should be in metal conduits. Use listed closed loop connectors that are of appropriate size for wire gauge being used. Connectors are to be installed using crimp tool specified by the manufacturer of the connector. Only Class 1 wiring should be used.

System Grounding

Baldor Controls are designed to be powered from standard three phase lines that are electrically symmetrical with respect to ground. System grounding is an important step in the overall installation to prevent problems. The recommended grounding method is shown in Figure 3-1 and 3-2.

Figure 3-1 Recommended System Grounding (PSM-PR)

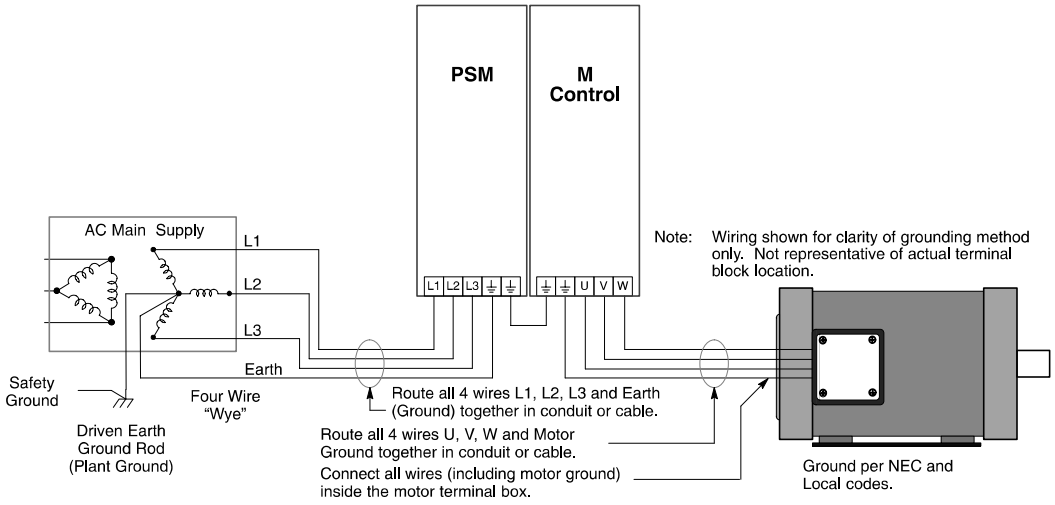
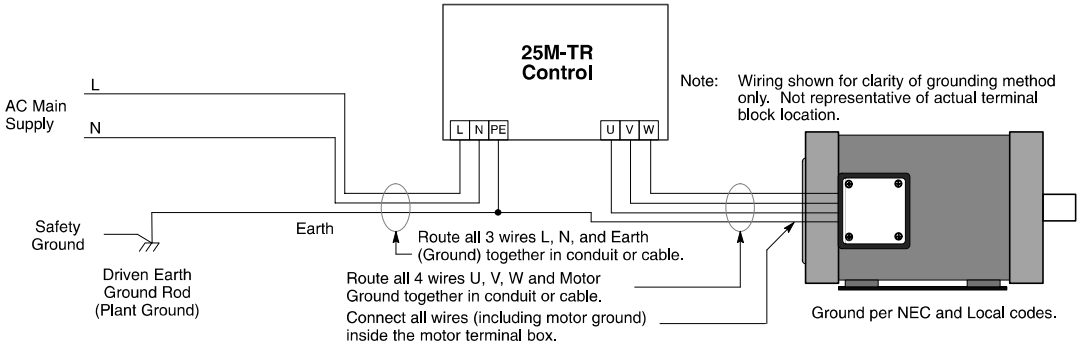


Figure 3-2 Recommended System Grounding (25M-TR)



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System Grounding Continued

Ungrounded Distribution System

With an ungrounded power distribution system it is possible to have a continuous current path to ground through the MOV devices. To avoid equipment damage, an isolation transformer with a grounded secondary is recommended. This provides three phase AC power that is symmetrical with respect to ground.

Input Power Conditioning

Baldor controls are designed for direct connection to standard three phase lines that are electrically symmetrical with respect to ground. Certain power line conditions must be avoided. An AC line reactor or an isolation transformer may be required for some power conditions.

- If the feeder or branch circuit that provides power to the control has permanently connected power factor correction capacitors, an input AC line reactor or an isolation transformer must be connected between the power factor correction capacitors and the control.
- If the feeder or branch circuit that provides power to the control has power factor correction capacitors that are switched on line and off line, the capacitors must not be switched while the control is connected to the AC power line. If the capacitors are switched on line while the control is still connected to the AC power line, additional protection is required. TVSS (Transient Voltage Surge Suppressor) of the proper rating must be installed between the AC line reactor or an isolation transformer and the AC input to the control.

Line Impedance

The Baldor control requires a minimum 3% line impedance. If the impedance of the incoming power does not meet the requirement for the control, a 3 phase line reactor can be used to provide the needed impedance in most cases. Line reactors are optional and are available from Baldor.

The input impedance of the power lines can be determined as follows:

Measure the line to line voltage at no load and at full rated load.
Use these measured values to calculate impedance as follows:

$$\%\text{Impedance} = \frac{(\text{Volts}_{\text{No Load Speed}} - \text{Volts}_{\text{Full Load Speed}})}{(\text{Volts}_{\text{No Load Speed}})} \times 100$$

Line Reactors

Three phase line reactors are available from Baldor. The line reactor to order is based on the full load current of the motor (FLA). If providing your own line reactor, use the following formula to calculate the minimum inductance required.

$$L = \frac{(V_{L-L} \times 0.03)}{(I \times \sqrt{3} \times 377)}$$

Where:	L	Minimum inductance in Henries.
	V_{L-L}	Input volts measured line to line.
	0.03	Desired percentage of input impedance.
	I	Input current rating of control.
	377	Constant used with 60Hz power. Use 314 if input power is 50Hz.

Load Reactors

Line reactors may be used at the control output to the motor. When used this way, they are called Load Reactors. Load reactors serve several functions that include:

- Protect the control from a short circuit at the motor.
- Limit the rate of rise of motor surge currents.
- Slowing the rate of change of power the control delivers to the motor.

Load reactors should be installed as close to the control as possible. Selection should be based on the motor nameplate FLA value.

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Power Disconnect

A power disconnect should be installed between the input power service and the PSM-PR (Power Supply Module) or 25M-TR control for a fail safe method to disconnect power. The control will remain in a powered-up condition until all input power is removed from the control and the internal bus voltage is depleted. The PSM-PR should also have a power disconnect means installed in the 1 phase logic power supply.

Protection Devices

The PSM-PR or 25M-TR control must have a suitable input power protection device installed. Input and output wire size is based on the use of copper conductor wire rated at 75 °C. Use the recommended circuit breaker or fuse types as follows:

Circuit Breaker: 1 phase, thermal magnetic.
Equal to GE type THQ or TEB for 115 or 230 VAC

3 phase, thermal magnetic.
Equal to GE type THQ or TEB for 230 VAC or
GE type TED for 460 VAC.

Fast Action Fuses: Buss KTN on 230 VAC or
Buss KTS on 460 VAC, Buss FRS or equivalent.

Time Delay Fuses: Buss FRN on 230 VAC or
Buss FRS on 460 VAC or equivalent.

Table 3-2 describes the wire size to be used for power connections and the ratings of the protection devices.

Recommended fuse sizes are based on the following:
115% of maximum continuous current for time delay fuses.
150% of maximum continuous current for fast or very fast acting fuses.

Table 3-2 Wire Size and Protection Devices

Catalog Number	L1, L2, L3 Incoming Power						X3 Logic Power		
	Maximum Continuous Amps	Input Breaker	Input Fuse		Wire Gauge		Input Fuse	Wire Gauge	
			Fast Acting	Time Delay	AWG	mm²		AWG	mm²
ZD25M1A02-TR	2.5A	5A	4A	4A	14	2.08			
ZD25M1A05-TR	5A	7.5A	7.4A	6.7A	14	2.08			
ZD25M2A02-TR	2.5A	5A	4A	4A	14	2.08			
ZD25M2A05-TR	5A	7.5A	7.4A	6.7A	14	2.08			
PSM2A060-PR1	60A	90A	90A	70A	6	13.3	Internal	16	1.0
PSM2A060-PR2	60A	90A	90A	70A	6	13.3	Internal	16	1.0
PSM2A100-PR1	100A	150A	150A	115A	3	26.7	Internal	16	1.0
PSM2A100-PR2	100A	150A	150A	115A	3	26.7	Internal	16	1.0
PSM4A030-PR1	30A	50A	50A	40A	8	8.37	Internal	16	1.0
PSM4A030-PR2	30A	50A	50A	40A	8	8.37	Internal	16	1.0
PSM4A050-PR1	50A	70A	80A	60A	6	13.3	Internal	16	1.0
PSM4A050-PR2	50A	70A	80A	60A	6	13.3	Internal	16	1.0
PSM4A100-PR1	100A	125A	150A	110A	1	42.4	Internal	16	1.0
PSM4A100-PR2	100A	125A	150A	110A	1	42.4	Internal	16	1.0

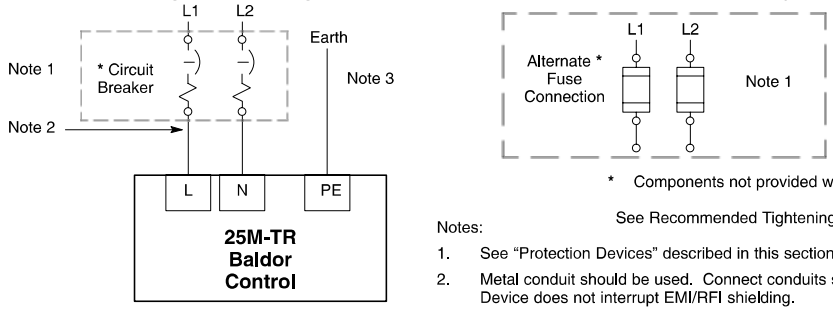
Note: All wire sizes are based on 75°C copper wire, 3% line impedance. Higher temperature smaller gauge wire may be used per NEC and local codes. Recommended fuses/breakers are based on 25°C ambient, maximum continuous control output current and no harmonic current.

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Power Connections

Power connections are shown in Figure 3-3 or Figure 3-4.

Figure 3-3 Single Phase AC Power and Motor Connections (25M-TR Only)



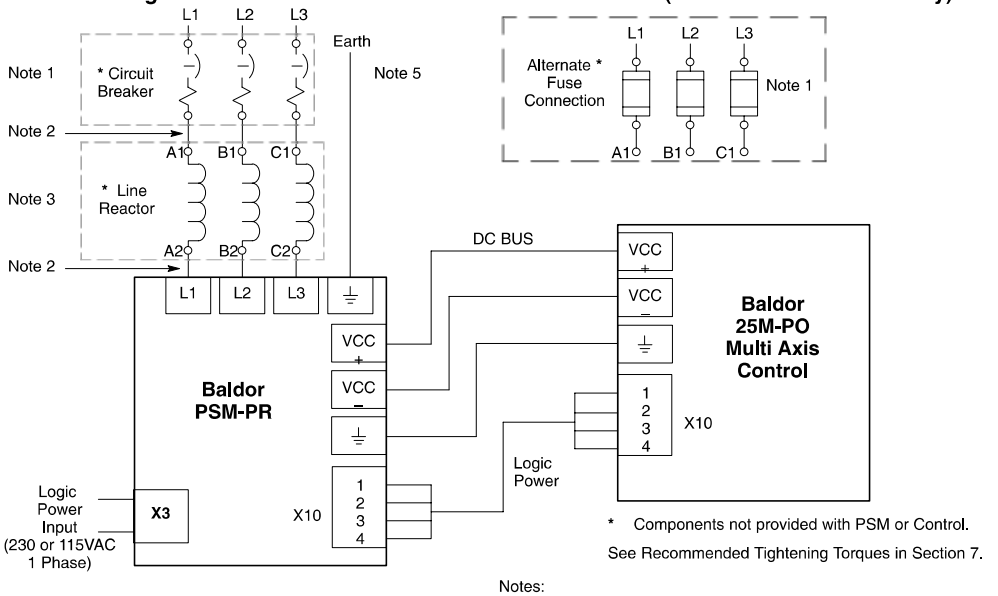
* Components not provided with PSM or Control.

See Recommended Tightening Torques in Section 7.

Notes:

1. See "Protection Devices" described in this section.
2. Metal conduit should be used. Connect conduits so the use of a Reactor or RC Device does not interrupt EMI/RFI shielding.
3. Use same gauge wire for Earth ground as is used for L and N.

Figure 3-4 3 Phase Power and Motor Connections (PSM-PR and 25M-PO Only)



* Components not provided with PSM or Control.

See Recommended Tightening Torques in Section 7.

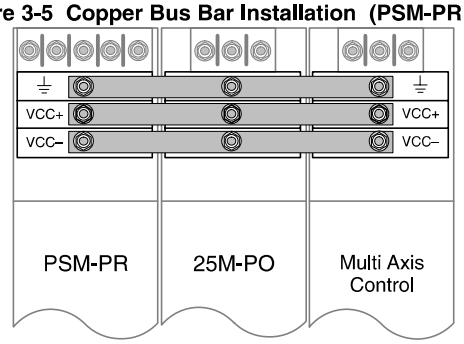
Notes:

1. See Protection Device description in this section.
2. Metal conduit should be used. Connect conduits so the use of a Reactor or RC Device does not interrupt EMI/RFI shielding.
3. See Line Impedance in this section.
4. Refer to Motor Connections in this section.
5. Use the same gauge wire for Earth as used for L1, L2, L3 connections.

Important:
Be sure to connect the proper voltage for X3 Logic Power input. Look at the last digit of the identification number to determine voltage:
PSMXAXXX-PR1 = 115VAC
PSMXAXXX-PR2 = 230VAC

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Figure 3-5 Copper Bus Bar Installation (PSM-PR and 25M-PO Only)



Refer to Section 7 for information on Bus Bars and installation spacing information.

See Terminal Tightening Torques in Section 7 of this manual.

Figure 3-6 25M-TR Connector Locations

X1 - Power Connector

⏚	Earth	
NC	No Connection	Input Power
L	AC Line	
N	Neutral	
U	Motor lead "U"	
V	Motor lead "V"	Motor
W	Motor lead "W"	
R1	Dynamic Brake	Dynamic Brake or
R2	Dynamic Brake	Regen Resistor

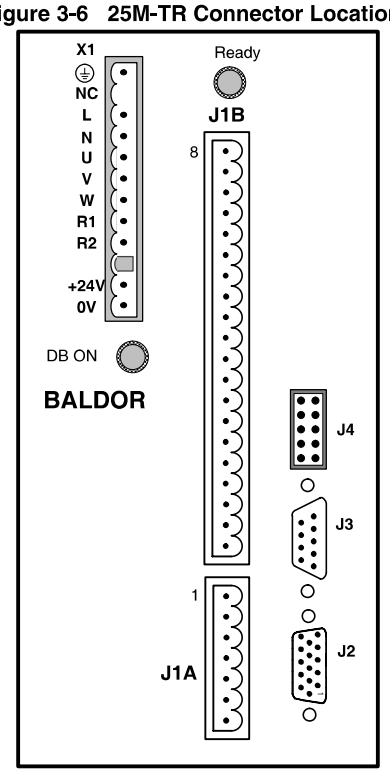
+24V	External	+24VDC Input
0V	Supply	24V Common

J1B - Digital I/O

8	Enable	18	+24VDC
9	FWD CMD	19	CREF (OPTO IN)
10	REV CMD	20	OUT1-
11	IN1	21	OUT1+
12	IN2	22	OUT2-
13	IN3	23	OUT2+
14	IN4	24	OUT3-
15	IN5	25	OUT3+
16	External Trip	26	OUT4-
17	24V Return	27	OUT4+

J1A - Analog I/O

1	AGND	5	ANA IN 2-
2	ANA IN 1	6	ANA OUT1
3	Reference	7	ANA OUT2
4	ANA IN 2+		



J4 - Keypad

1	Shield	6	RCV-
2	N.C.	7	N.C.
3	XMIT+	8	N.C.
4	XMIT-	9	+8VDC
5	RCV+	10	DGND

J3 - Buffered Encoder Output

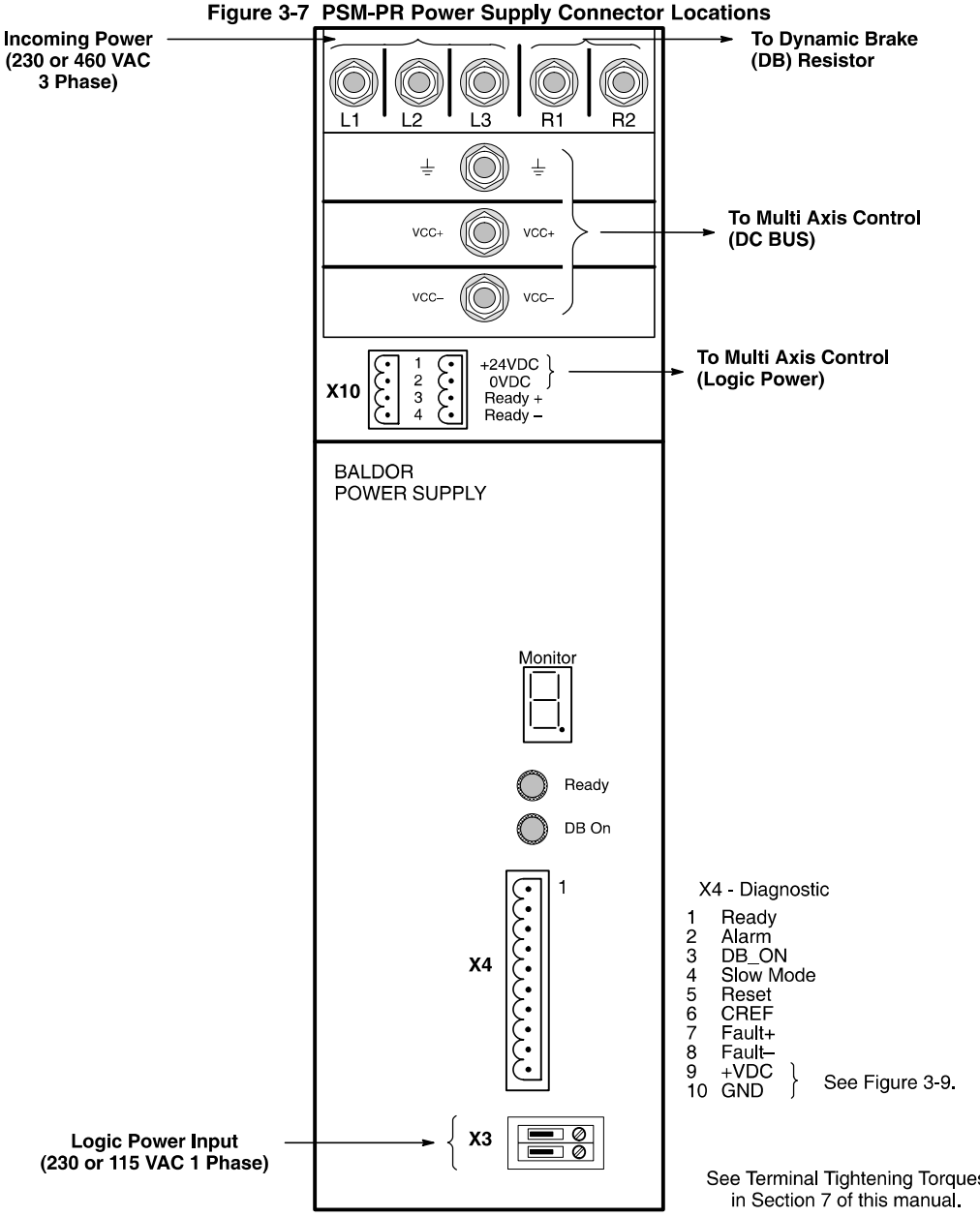
1	CHA+	6	CHA-
2	CHB+	7	CHB-
3	CHC+	8	CHC-
4	N.C.	9	N.C.
5	DGND		

J2 - Encoder Input - 15 pin

1	CHA+	6	CHA–	11	+5VDC
2	CHB+	7	CHB–	12	NC
3	CHC+	8	CHC–	13	DGND
4	U+	9	W+	14	W–
5	U–	10	V+	15	V–

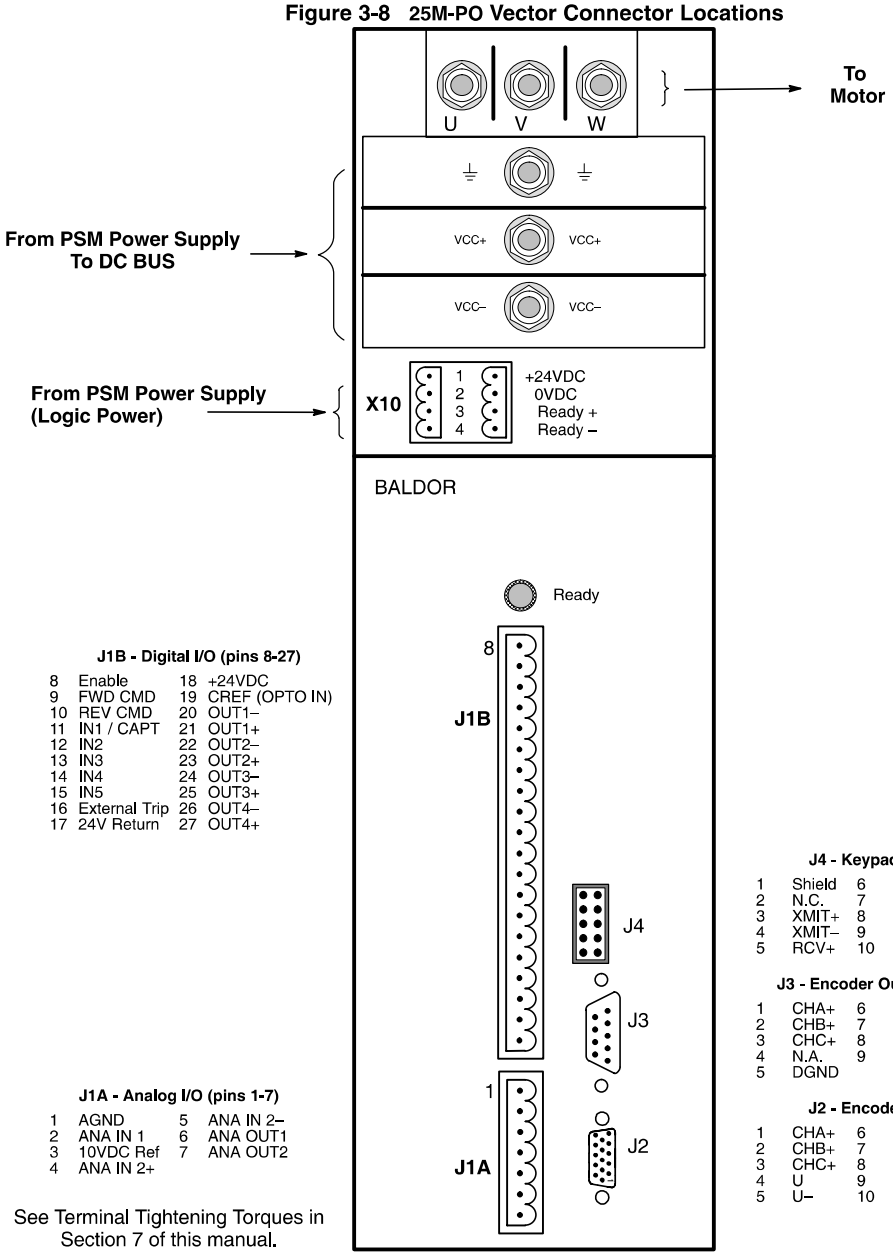
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Figure 3-7 PSM-PR Power Supply Connector Locations



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Figure 3-8 25M-PO Vector Connector Locations



J1B - Digital I/O (pins 8-27)

8	Enable	18	+24VDC
9	FWD CMD	19	CREF (OPTO IN)
10	REV CMD	20	OUT1–
11	IN1 / CAPT	21	OUT1+
12	IN2	22	OUT2–
13	IN3	23	OUT2+
14	IN4	24	OUT3–
15	IN5	25	OUT3+
16	External Trip	26	OUT4–
17	24V Return	27	OUT4+

J1A - Analog I/O (pins 1-7)

1	AGND	5	ANA IN 2–
2	ANA IN 1	6	ANA OUT1
3	10VDC Ref	7	ANA OUT2
4	ANA IN 2+		

See Terminal Tightening Torques in Section 7 of this manual.

J4 - Keypad

1	Shield	6	RCV–
2	N.C.	7	N.C.
3	XMIT+	8	N.C.
4	XMIT–	9	+8VDC
5	RCV+	10	DGND

J3 - Encoder Output

1	CHA+	6	CHA–
2	CHB+	7	CHB–
3	CHC+	8	CHC–
4	N.A.	9	N.A.
5	DGND		

J2 - Encoder Input - 15 pin

1	CHA+	6	CHA–	11	+5VDC
2	CHB+	7	CHB–	12	NC
3	CHC+	8	CHC–	13	DGND
4	U	9	W	14	W–
5	U–	10	V	15	V–

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Optional PSM-PR I/O Connections – (PSM-PR Only)

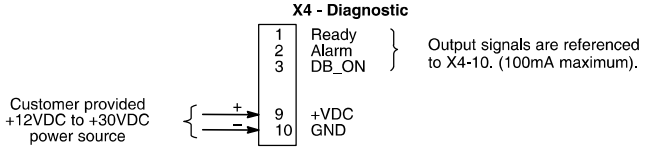
Connector X4 contains the interface input and output connections for the PSM (Power Supply Module). Connection to the X4 I/O terminal strip is optional. No connections are required for normal operation. However, to monitor PSM status or to "Reset" the PSM you may make some or all of these optional connections.

Status monitor output connections (Opto Isolated Outputs)
Status monitor output connections are shown in Figure 3-9. The output signals (X4-1, 2 and 3) can then be connected to an external device (referenced to X4-10). These internal contacts close when active and apply the voltage +24VDC at the output.

The Alarm Output (X4–2) activates immediately when one of the following faults occur: Loss of AC Power, Phase Loss (AC input), Loss of Logic Power, Bus Undervoltage, Overtemperature or Dynamic Brake fault. The other Status Monitor outputs (X4–1 and 3) have a 100ms delay before activation.

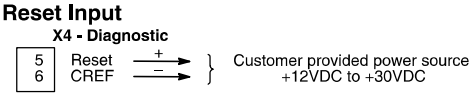
Note: The maximum current draw when all three outputs are active must not exceed 100mA.

Figure 3-9 Status Monitor Output Connections



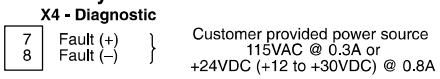
Reset connection
Connection of the Reset input is shown in Figure 3-10. This is useful to reset the control after a fault condition. The reset input voltage is +24VDC (12 to 30VDC @ 10mA) and must be applied for at least 60 μs.

Figure 3-10 Reset Input



Fault Relay connection
Fault Relay connection is shown in Figure 3-11. The fault relay output can be connected to an external relay or other device. This internal normally closed contact opens when a fault condition occurs. The fault list is the same as for the Alarm Output.

Figure 3-11 Fault Relay

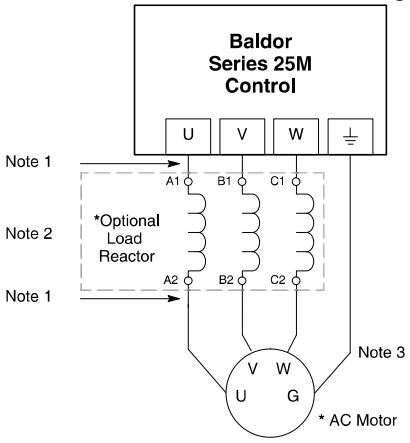


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Motor Connections

Motor connections are shown in Figure 3-12.

Figure 3-12 Motor Connections



Notes:

1. Metal conduit should be used. Connect conduits so the use of Load Reactor or RC Device does not interrupt EMI/RFI shielding.
2. See Line/Load Reactors described previously in this section.
3. Use same gauge wire for Earth ground as for L and N or L1, L2 and L3.

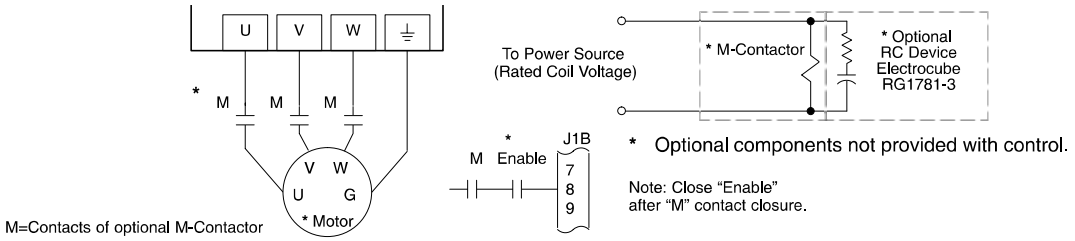
* Optional components not provided with control.

See Recommended Tightening Torques in Section 7.

M-Contactor

If required by local codes or for safety reasons, an M-Contactor (motor circuit contactor) may be installed. However, incorrect installation or failure of the M-contactor or wiring may damage the control. If an M-Contactor is installed, the control must be disabled for at least 20msec before the M-Contactor is opened or the control may be damaged. M-Contactor connections are shown in Figure 3-13.

Figure 3-13 Optional M-Contactor Connections



Dynamic Brake Resistor

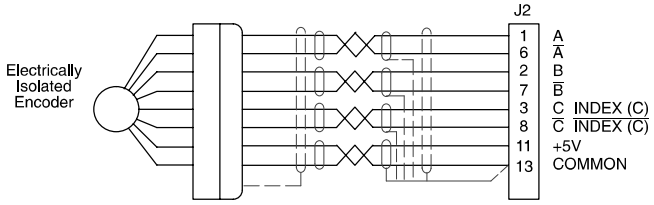
An external DB (Dynamic Brake) resistor must be installed to dissipate excess power from the DC bus during motor deceleration operations. For selection of the DB resistor, refer to the specifications located in Section 7 of this manual. DB hardware is connected at DB+ and DB– (25M-TR) or at R1 and R2 terminals (PSM-PR Power Supply).

Encoder Installation

Electrical isolation of the encoder shaft and housing from the motor is required. Electrical isolation prevents capacitive coupling of motor noise that will corrupt the encoder signals. Baldor provides shielded wire for encoder connection. Figure 3-14 shows the electrical connections between the encoder and the encoder connector.

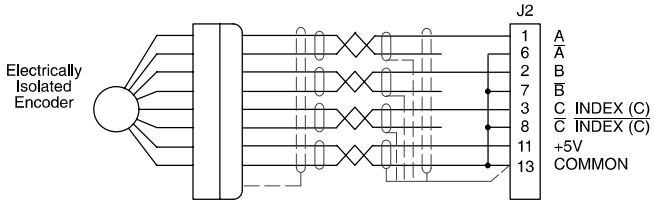
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Figure 3-14 Differential Encoder Connections



Single Ended Connections
Differential inputs are recommended for best noise immunity. If only single ended encoder signals are available, connect them to A, B, and INDEX (C) (J2-1, J2-2-2 and J2-3 respectively). $\overline{A}$, $\overline{B}$, and $\overline{INDEX (C)}$ are then connected to common at J2-13 as shown in Figure 3-15.

Figure 3-15 Single Ended Encoder Connections



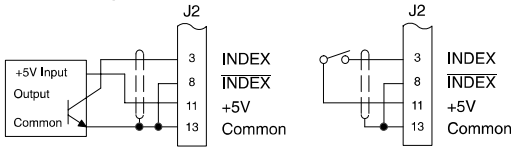
Home (Orient) Switch Input The Home or Orient function causes the motor shaft to rotate to a predefined home position. The homing function allows shaft rotation in the drive forward direction only. The home position is located when a machine mounted switch or the encoder "Index" pulse is activated (closed). Home is defined by a rising signal edge at terminal J2-3. The shaft will continue to rotate only in a "Drive Forward" direction for a user defined offset value. The offset is programmed in the Level 2 Miscellaneous Homing Offset parameter. The speed at which the motor will "Home" or orient is set with the Level 2 Miscellaneous Homing Speed parameter.

A machine mounted switch may be used to define the Home position in place of the encoder index channel. A differential line driver output from a solid state switch is preferred for best noise immunity. Connect this differential output to terminals J2-3 and J2-8.

A single ended solid-state switch or limit switch should be wired as shown in Figure 3-16. Regardless of the type of switch used, clean rising and falling edges at J2-3 are required for accurate positioning.

Note: A control may require dynamic brake hardware for Orient (Homing) function to work. The control may trip without dynamic brake hardware installed.

Figure 3-16 Typical Home or Orient Switch Connections



5VDC Proximity Switch Limit Switch (Closed at HOME).

Buffered Encoder Output The control provides a buffered encoder output on connector J3. This output may be used by external hardware to monitor the encoder signals. It is recommended that this output only drive one circuit load (a 26LS31 type device drives this output).

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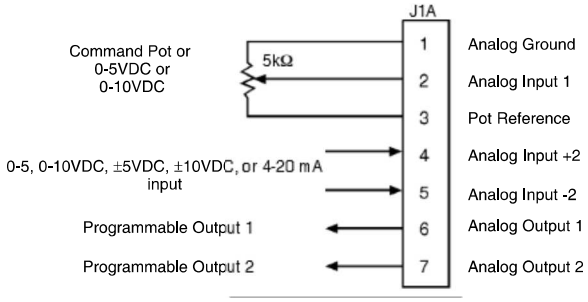
Analog Inputs and Outputs

Analog Inputs

Two analog inputs are available: Analog Input #1 (J1A-1 and J1A-2) and Analog Input #2 (J1A-4 and J1A-5) as shown in Figure 3-17. Either analog input #1 or #2 may be grounded provided the common mode range is not exceeded. Either analog input may be selected in the Level 1 INPUT block, Command Select parameter value. Analog input #1 is selected if parameter value "Potentiometer" is selected. Analog input #2 is selected if parameter value "+/–10Volts, +/–5 Volts or 4-20mA" is selected.

Note: Bipolar input signals (±5VDC and ±10VDC) are used in Bipolar and Process Control modes only. Other modes use 0-5VDC and 0-10VDC input signals.

Figure 3-17 Analog Inputs and Outputs



Analog Input #1 (Single Ended)

The single ended analog input #1 is used when the controller is set to Standard Run 3 Wire, 3 SPD ANA 2Wire, 3 SPD ANA 3Wire, Serial, Process Control, EPOT-2 Wire or EPOT-3 Wire (not Keypad or 15 Speed).

Note: A potentiometer value of 5kΩ to 10kΩ, 0.5 watt may be used.

The single ended analog input #1 can be used in one of three ways. Speed command (Level 1 Input block, Command Select=Potentiometer). Process Feedback (Level 2 Process Control block, Process Feedback=Potentiometer). Setpoint Source (Level 2 Process Control block, Setpoint Source=Potentiometer).

When using Analog Input #1, the respective parameter must be set to "POTENTIOMETER".

Analog Input #2 (Differential)

Analog input #2 accepts a 0-5VDC, 0-10VDC or 4-20 mA command in all modes and ±5VDC, ±10VDC, 0-5VDC, 0-10VDC or 4-20 mA in Bipolar and Process Control modes. The operating mode is defined in the Level 1 Input block OPERATING MODE parameter.

Note: Analog Input #2 is used with Standard Run 3-Wire, Fan Pump 2 Wire, Fan Pump 3 Wire, Process Control, 3 SPD ANA 2Wire, 3 SPD ANA 3Wire, EPOT-2 Wire or EPOT-3 Wire (not Keypad, 15 Speed or Serial modes).

Note: Analog Input #2 can be connected for single ended operation by grounding either of the inputs, if the common mode voltage range is not exceeded. The common mode voltage can be measured with a voltmeter. Apply the maximum command voltage to analog input 2 (J1A-4, 5). Measure the AC and DC voltage across J1A-1 to J1A-4. Add the AC and DC readings together. Measure the AC and DC voltage from J1A-1 to J1A-5. Add the AC and DC readings together.

If either of these measurement totals exceeds a total of ±15 volts, then the common mode voltage range has been exceeded. If the common mode voltage range has been exceeded, the solution is either to change the command voltage source or isolate the command voltage with a commercially available signal isolator.

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Figure 3-18 Analog Inputs Equivalent Circuits

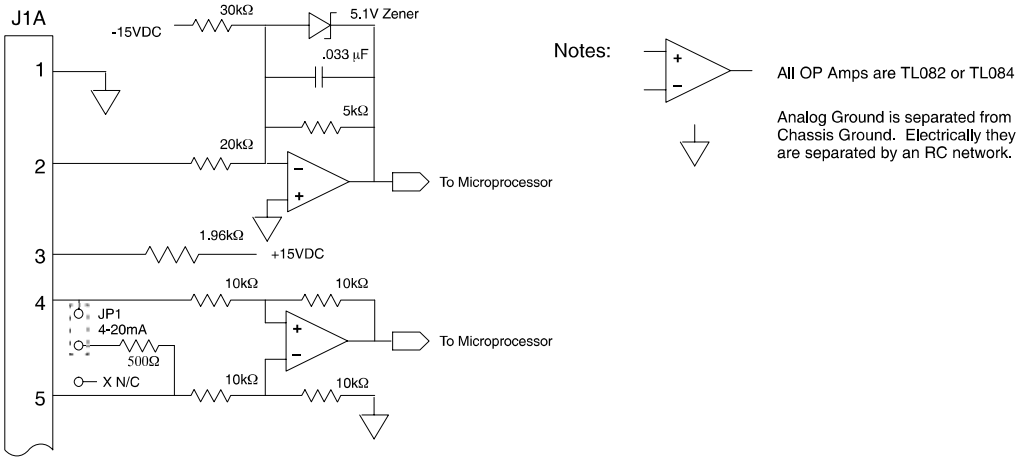
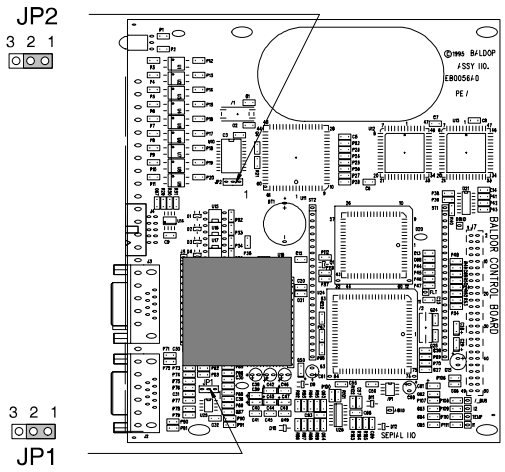


Figure 3-19 Jumper Locations



Refer to Table 3-3 for jumper position information.

Table 3-3 Jumper Positions

Jumper	Jumper Position	Description of Jumper Position Setting
JP1	1–2	Voltage Command Signal. (Factory Setting)
	2–3	4–20mA Command Signal.
JP2	1–2	Do Not Move (Factory Setting)
	2–3	Not used.

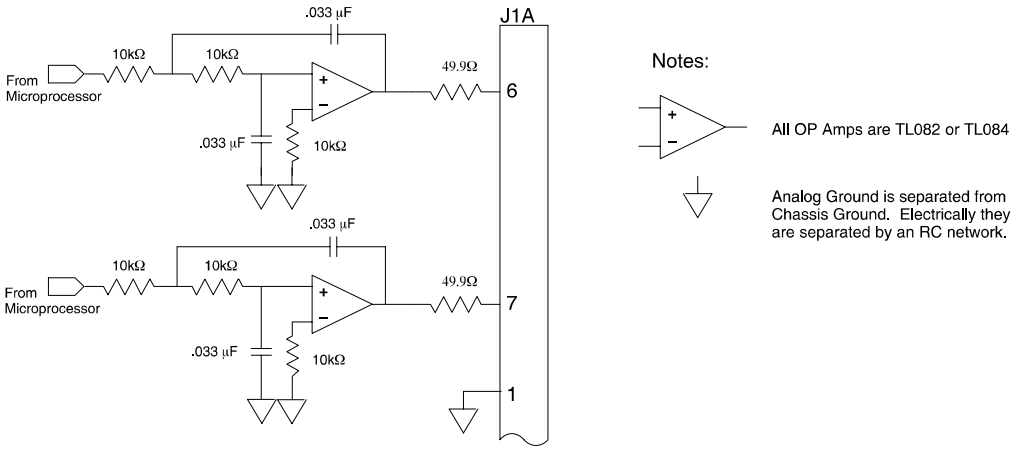
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Analog Outputs

Two programmable analog outputs are provided on J1A-6 and J1A-7. The output conditions are defined in Section 4 of this manual. The actual output voltage for each analog output condition can be 0-10VDC or ±10VDC depending upon the output condition selected (1mA maximum output current) and can provide real-time status of various control conditions. The output conditions are defined in Section 4 of this manual.

The return for these outputs is J1A-1 analog ground. Each output is programmed in the Level 1 Output block.

Figure 3-20 Analog Outputs Equivalent Circuits



External Trip Input

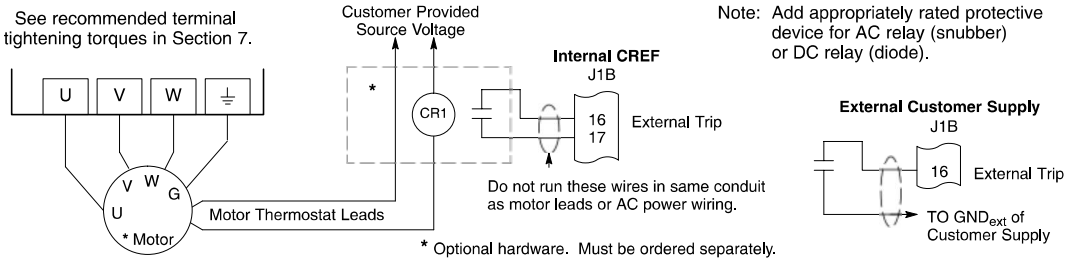
Terminal J1B-16 is available for connection to a normally closed thermostat or overload relay contact in all operating modes as shown in Figure 3-21. The thermostat or overload relay should be a dry contact type with no power available from the contact. If the motor thermostat or overload relay activates, the control will automatically shut down and give an External Trip fault. The optional relay (CR1) shown provides the isolation required and the N.O. contact is closed when power is applied to the relay and the motor is cold.

The optional relay (CR1) shown provides the isolation required. The N.O. contact shown is closed when power is applied to the relay and the motor is cold.

Connect the External Trip Input wires to J1B-16 and J1B-17 (or GND_{ext}). Do not place these wires in the same conduit as the motor power leads.

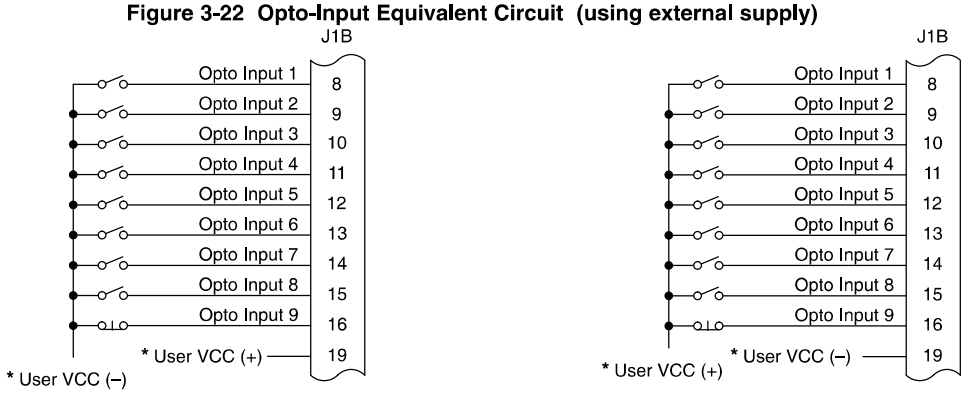
To activate the External Trip input, the External Trip parameter in the programming Protection Block must be set to “ON”.

Figure 3-21 Motor Temperature Relay



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Figure 3-22 Opto-Input Equivalent Circuit (using external supply)



Opto Inputs Closing to Ground

* User VCC = 10 - 30VDC
External Power Source

Opto Inputs Closing to +VCC

Opto-Isolated Outputs

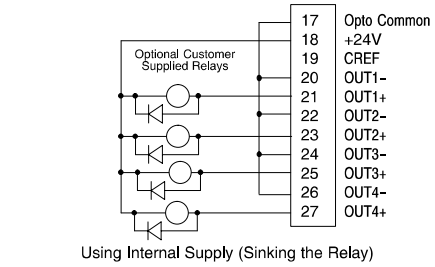
Four programmable Opto-isolated outputs are available at terminals J1B-20 through J1B-27. See Figure 3-23.

The Opto-isolated outputs may be configured for sinking or sourcing 50 mA each. However, all must be configured the same. The maximum voltage from opto output to common when active is 1.0 VDC (TTL compatible). The Opto-isolated outputs may be connected in different ways as shown in Figure 3-23.

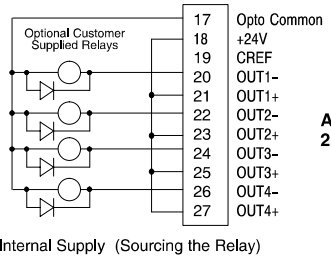
If the opto outputs are used to directly drive a relay, a flyback diode rated at 1A, 100 V (1N4002) minimum should be connected across the relay coil. See Electrical Noise Considerations in Section 5 of this manual.

Each Opto Output is programmed in the Level 1 Output programming block.

Figure 3-23 Opto-isolated Output Configurations

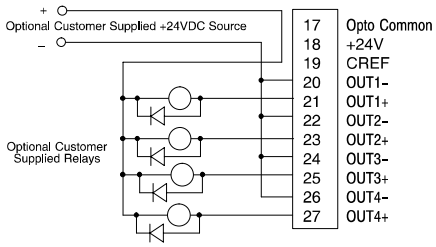


Using Internal Supply (Sinking the Relay)

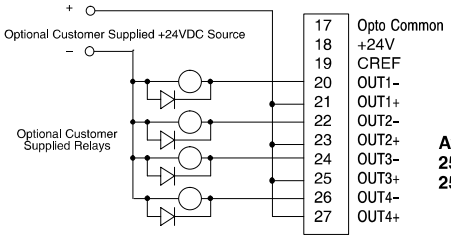


Using Internal Supply (Sourcing the Relay)

Available with 25M-PO Only.



Using External Supply (Sinking the Relay)



Using External Supply (Sourcing the Relay)

Available with 25M-PO and 25M-TR

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Control Circuit Connections The operating modes define the basic motor control setup and the operation of the input and output terminals. After the circuit connections are completed, the operating mode is selected by programming the operating mode parameter in the Level 1 Input programming block. Operating modes are:

- Keypad Mode
- Standard Run 3 Wire Mode (e.g. Potentiometer)
- 15 Speed 2 Wire Mode (e.g. Preset Speeds)
- 3 Speed Analog 2 Wire Mode
- 3 Speed Analog 3 Wire Mode
- Serial
- Bipolar Speed or Torque Mode (e.g. ±10VDC, ±5VDC or 4-20mA)
- Process Control
- Electronic Pot 2 Wire Mode
- Electronic Pot 3 Wire Mode

Opto Isolated Inputs Logic input connections are made at terminal strip J1B pins 8, 9, 10, 11, 12, 13, 14, 15, and 16. Input connections at J1B can be wired as active High or active Low as shown in Figure 3-24. J1B pin 19 is the Control Reference point (CREF) for the Opto Isolated Input signals.

Active High (Sourcing) - If pin 19 is grounded, an input is active when it is at +24VDC (+10VDC to +30VDC).

Active Low (Sinking) - If pin 19 is at +24VDC (+10VDC to +30VDC), an input is active when it is grounded.

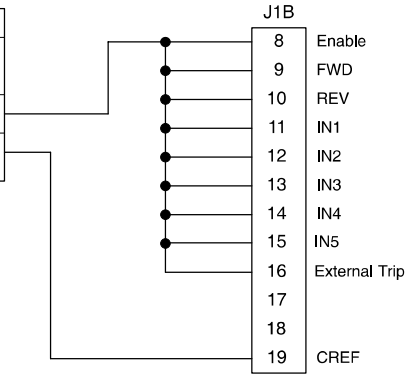
Note: **(25M-PO Only)** The internal 24VDC power supply can be used to power the the Opto Input circuits by connecting a jumper between CREF J1B pin 19 to J1B pin 17 or 18. This provides GND or 24VDC at CREF for Active Low or High input conditions.

As an alternative, an external power supply can be used and connected as shown in Figure 3-24.

Note: **(25M-TR Only)** An internal 24VDC power supply is not available to power the the Opto Input circuits. An external power source must be used as shown in Figure 3-24.

Figure 3-24 Active HIGH (Sourcing)/LOW (Sinking) Relationship

Active High	Active Low
GND_{ext} (Sink)	V_{ext} (Source)
+24VDC	GND
GND	+24VDC



Note: These pins are shown wired together. Although this can be done, each input is usually connected to a switch for individual control of each input condition.

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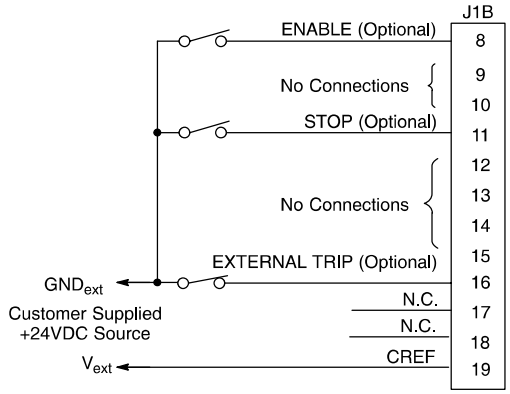
25M Operating Mode Configurations

Opto Input Switch Power Connections

The main difference in the connection of a 25M-TR and a 25M-PO is that the 25M-TR requires an external power supply. The 25M–PO can use the internal or an external power supply. Refer to the examples shown in Figure 3-25.

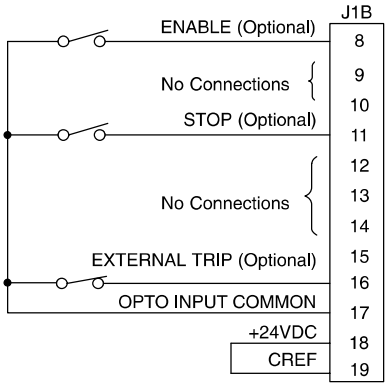
Figure 3-25 Connection Diagram Examples

25M-TR or 25M-PO Keypad Mode



J1B-19 CREF connection. Connect to +VCC for active Low or to GND for active High.

25M-PO Keypad Mode



J1B-18 & 19 CREF connection. Connect J1B-19 to J1B-18 for active Low or to J1B-17 for active High.

Serial Operating Mode The Serial operating mode requires the optional Serial Interface expansion board. Refer to MN1306 for more information about expansion boards for Series M controls.

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25M Operating Mode Configurations Continued

Keypad Operating Mode (see Figure 3-26)

The Keypad operating mode allows the control to be operated from the keypad. In this mode no control connection wiring is required. However, the Enable and External Trip inputs may optionally be used. All other opto inputs remain inactive. However, the analog outputs and opto-outputs remain active at all times. To use an opto input, the associated parameter value must set.

For operation in Keypad mode, set the Level 1 Input block, Operating mode parameter to Keypad. At the keypad press the LOCAL key to change between the LOCAL and REMOTE modes. The word "LOCAL" or "Remote" should appear on the keypad display.

The STOP key can operate in two ways:

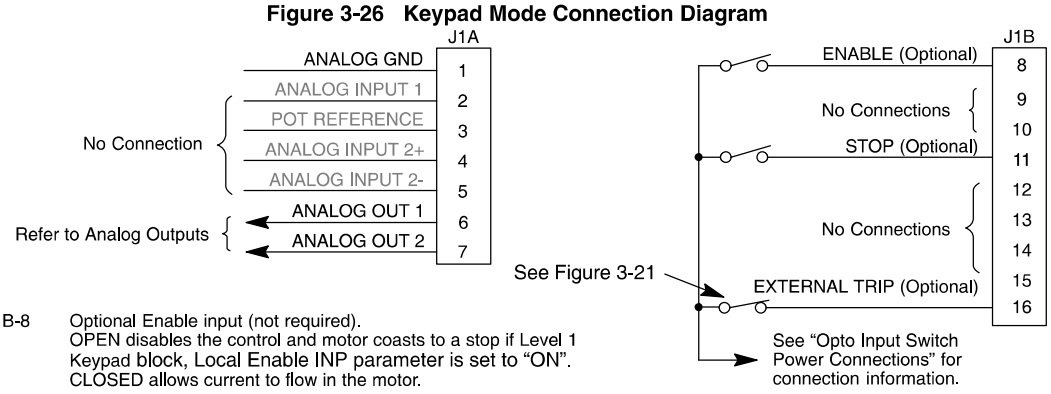
- Press STOP key one time to brake or coast to stop.
- Press STOP key two times to disable control.

The Enable input is optional.
To use the Enable input, J1B-8 must be connected and the Local Enable INP parameter in the Level 2 Protection block must be set to ON. The Enable line is normally closed. When opened, the motor will COAST to a stop. When the enable line is again closed, the motor will not start until a new direction command is received from the keypad (▲ or ▼ key).

The Stop input is optional.
To use the Stop input, J1B-11 must be connected to the opto input common and the Loc. Hot Start parameter in the Level 1 Keypad Setup block must be set to ON. The Stop line is normally connected to the opto input common for normal operation. When this line is opened, the motor will coast or brake to a stop and the control is disabled. The motor will restart when J1B-11 is closed (to opto input common) after open.

The External Trip input is optional.
The External Trip input is used to cause a fault condition during a motor over temperature condition. The External Trip input (J1B-16) must be connected and the External Trip parameter in the Level 2 Protection block must be set to "ON". When J1B-16 is opened, the motor will coast to a stop and an External Trip fault is displayed on the keypad.

Figure 3-26 Keypad Mode Connection Diagram



J1B-8 Optional Enable input (not required).
OPEN disables the control and motor coasts to a stop if Level 1 Keypad block, Local Enable INP parameter is set to "ON".
CLOSED allows current to flow in the motor.

J1B-11 Optional STOP input (not required).
OPEN motor coasts or brakes to a stop if Level 1 Keypad block, Local Hot Start parameter is set to "ON". Motor will restart when switch closes after open.
CLOSED allows current to flow in the motor.

J1B-16 Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON".
OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

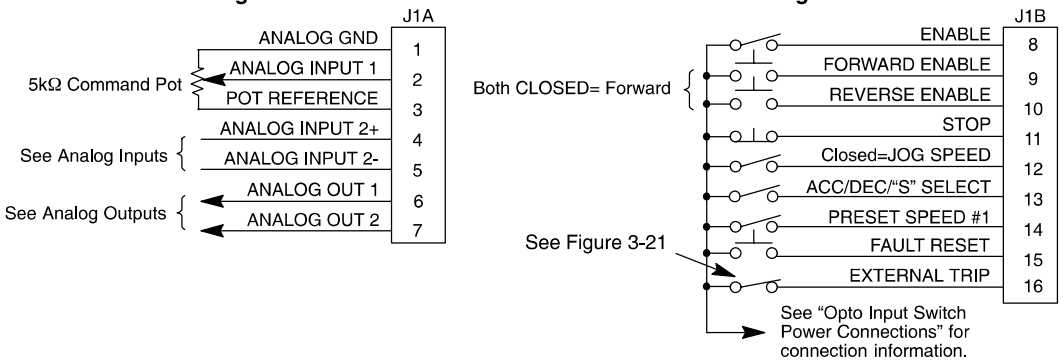
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25M Operating Mode Configurations Continued

Standard Run 3 Wire Mode The motor speed command may be Preset Speed (J1B-14), Analog Input #1 (5kΩ pot) or Analog Input #2.

In standard run mode, the control is operated by the Opto Isolated inputs at J1B-8 through J1B-16 and the analog command input (5kΩ pot). The Opto inputs can be switches as shown in Figure 3-27 or logic signals from another device. The External Trip Opto Input at J1B-16 is active if connected as shown and the Level 2 PROTECTION block, EXTERNAL TRIP parameter is set to ON. Refer to Figure 3-27.

Figure 3-27 Standard Run 3-Wire Mode Connection Diagram



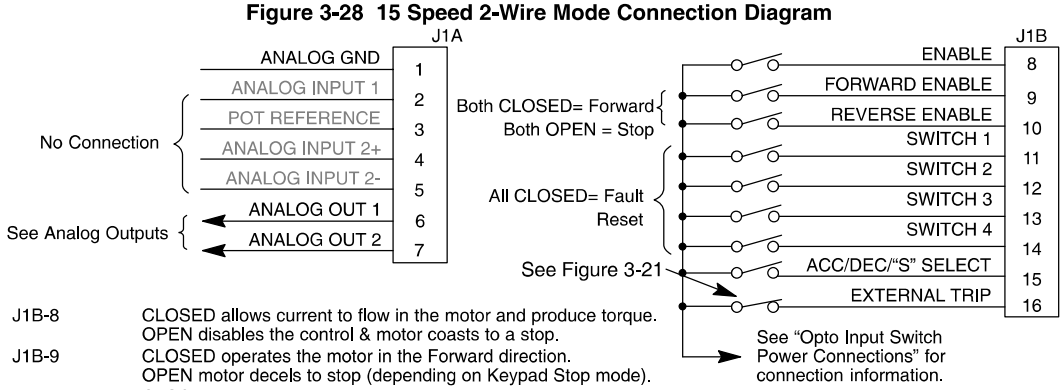
J1B-8	CLOSED allows current to flow in the motor and produce torque. OPEN disables the control and motor coasts to a stop.
J1B-9	Momentary CLOSED starts motor operation in the Forward direction. In JOG mode (J1B-12 CLOSED), continuous CLOSED jogs motor in the Forward direction.
J1B-10	Momentary CLOSED starts motor operation in the Reverse direction. In JOG mode (J1B-12 CLOSED), CONTINUOUS closed JOGS motor in the Reverse direction.
J1B-11	When OPEN motor decels to stop (depending on Keypad Stop mode).
J1B-12	CLOSED places control in JOG mode, Forward and Reverse run are used to jog the motor.
J1B-13	CLOSED selects ACC / DEC / S-CURVE group 2. OPEN selects group 1.
J1B-14	CLOSED selects preset speed #1. OPEN selects Level 1 Input block, Command Select parameter.
J1B-15	CLOSED to reset fault condition. OPEN to run.
J1B-16	Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON". OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

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15 Speed 2-Wire Mode In this mode, 15 preset motor speeds are stored during setup and selected during operation. Switch Truth Table is defined in Table 3-4.

Operation in the 15 Speed 2-Wire mode is controlled by the Opto Isolated inputs at J1B-11 through J1B-15. The Opto inputs can be switches as shown in Figure 3-28 or logic signals from another device. The External Trip Opto Input at J1B-16 is active if connected as shown and the Level 2 PROTECTION block, EXTERNAL TRIP parameter is set to ON.
Switched inputs at J1B-11 through J1B-14 allow selection of 15 preset speeds and provide Fault Reset as defined in Table 3-4.

Figure 3-28 15 Speed 2-Wire Mode Connection Diagram



J1B-8	CLOSED allows current to flow in the motor and produce torque. OPEN disables the control & motor coasts to a stop.
J1B-9	CLOSED operates the motor in the Forward direction. OPEN motor decels to stop (depending on Keypad Stop mode).
J1B-10	CLOSED operates motor in the Reverse direction. OPEN motor decels to stop (depending on Keypad Stop mode).
J1B-11 to 14	Selects programmed preset speeds as defined in Table 3-4.
J1B-15	CLOSED selects ACC / DEC / S-CURVE group 2. OPEN selects group 1.
J1B-16	Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON". OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

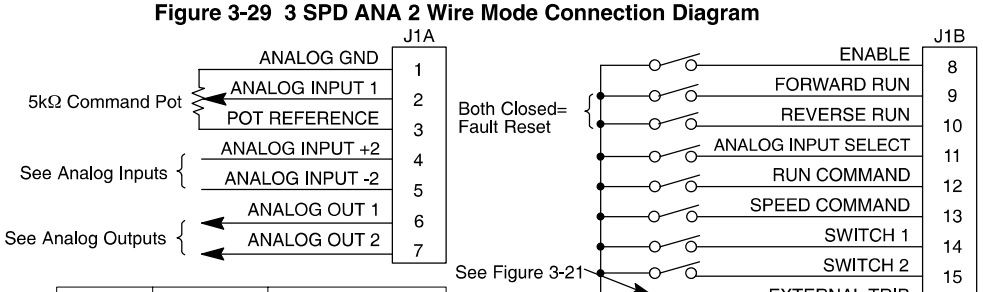
Table 3-4 Switch Truth Table for 15 Speed, 2 Wire Control Mode

Function	J1B-11	J1B-12	J1B-13	J1B-14
Preset 1	Open	Open	Open	Open
Preset 2	Closed	Open	Open	Open
Preset 3	Open	Closed	Open	Open
Preset 4	Closed	Closed	Open	Open
Preset 5	Open	Open	Closed	Open
Preset 6	Closed	Open	Closed	Open
Preset 7	Open	Closed	Closed	Open
Preset 8	Closed	Closed	Closed	Open
Preset 9	Open	Open	Open	Closed
Preset 10	Closed	Open	Open	Closed
Preset 11	Open	Closed	Open	Closed
Preset 12	Closed	Closed	Open	Closed
Preset 13	Open	Open	Closed	Closed
Preset 14	Closed	Open	Closed	Closed
Preset 15	Open	Closed	Closed	Closed
Fault Reset	Closed	Closed	Closed	Closed

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3 SPD ANA 2 Wire Control Mode

Figure 3-29 3 SPD ANA 2 Wire Mode Connection Diagram



J1B-14	J1B-15	Command
OPEN	OPEN	Analog Input (Command Select)
CLOSED	OPEN	Preset #1
OPEN	CLOSED	Preset #2
CLOSED	CLOSED	Preset #3

J1B-8 CLOSED allows current to flow in the motor and produce torque.
OPEN disables the control & motor coasts to a stop.

J1B-9 CLOSED to start motor operation in the Forward direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

J1B-10 CLOSED to start motor operation in the Reverse direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

Note: Close both J1B-9 and J1B-10 to reset after a fault condition.

J1B-11 CLOSED selects Analog Input #1.
OPEN selects the value of the Level 1 Input block, Command Select parameter.

Note: If Level 1 Input block, Command Select parameter is set to "Potentiometer", then Analog Input #1 is always selected.

J1B-12 CLOSED selects Start/Stop and Reset commands from the terminal strip.
OPEN selects Start/Stop and Reset commands from keypad.

J1B-13 CLOSED selects the value of the Level 1 Input block, Command Select parameter.
OPEN selects speed command from Keypad.

Note: When changing from terminal strip to keypad (J1B-12 or 13) the motor speed and direction will remain the same after the change.

J1B-14 Selects programmed preset speeds as defined in table shown in Figure 3-29.

J1B-15 Selects programmed preset speeds as defined in table shown in Figure 3-29.

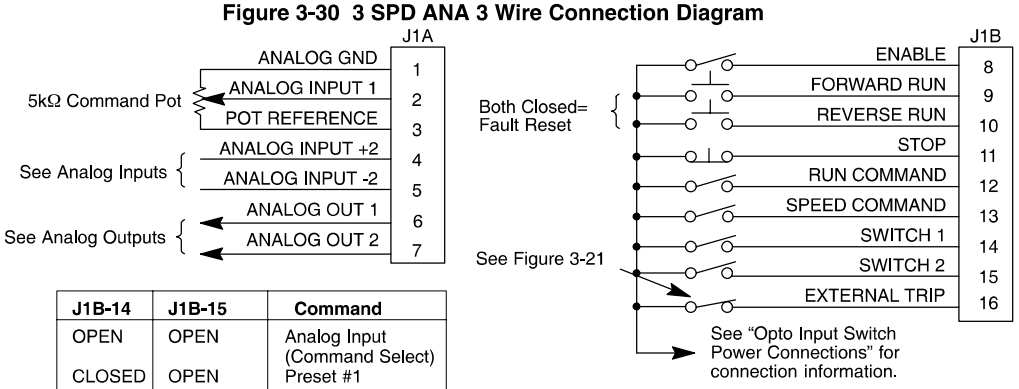
Note: If J1B-14 and 15 are both open, the speed command input is selected (Analog Input #1 or 2).

J1B-16 Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON".
OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

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3 SPD ANA 3 Wire Control Mode

Figure 3-30 3 SPD ANA 3 Wire Connection Diagram



J1B-14	J1B-15	Command
OPEN	OPEN	Analog Input (Command Select)
CLOSED	OPEN	Preset #1
OPEN	CLOSED	Preset #2
CLOSED	CLOSED	Preset #3

J1B-8 CLOSED allows current to flow in the motor and produce torque.
OPEN disables the control & motor coasts to a stop.

J1B-9 Momentary CLOSED to start motor operation in the Forward direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

J1B-10 Momentary CLOSED to start motor operation in the Reverse direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

Note: Close both J1B-9 and J1B-10 to reset after a fault condition.

J1B-11 OPEN motor decels to stop (depending on Keypad Stop mode).

J1B-12 CLOSED selects Start/Stop and Reset commands from the terminal strip.
OPEN selects Start/Stop and Reset commands from keypad.

J1B-13 CLOSED selects the value of the Level 1 Input block, Command Select parameter.
OPEN selects speed command from Keypad.

Note: When changing from terminal strip to keypad (J1B-12 or 13) the motor speed and direction will remain the same after the change.

J1B-14 Selects programmed preset speeds as defined in table shown in Figure 3-30.

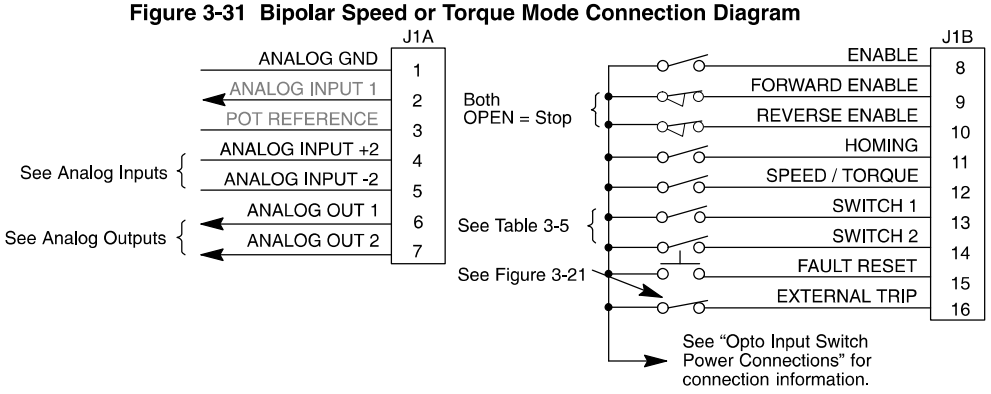
J1B-15 Selects programmed preset speeds as defined in table shown in Figure 3-30.

J1B-16 Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON".
OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

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Bipolar Speed or Torque Control Mode with Multiple Parameter Sets

Figure 3-31 Bipolar Speed or Torque Mode Connection Diagram



J1B-8 CLOSED allows current to flow in the motor and produce torque.
OPEN disables the control & motor coasts to a stop.

J1B-9 CLOSED to enable operation in the Forward direction.
OPEN motor decels to stop (depending on Keypad Stop mode). Drive will brake to a stop if Forward command still present).

J1B-10 CLOSED to enable operation in the Reverse direction.
OPEN motor decels to stop (depending on Keypad Stop mode). Drive will brake to a stop if Reverse command still present).

Note: When J1B-9 and J1B-10 are both closed, Analog Input 2 is selected and the polarity of the input determines the direction of motor rotation.

J1B-11 Causes the motor shaft to orient (Homing) to a marker or external switch.

J1B-12 CLOSED puts the control in torque command mode. OPEN puts the control in speed command mode.

J1B-13 & 14 Select from four parameter tables as defined in Table 3-5.

J1B-15 Momentary CLOSED to reset fault condition.
OPEN to run.

J1B-16 Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON".
OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

Table 3-5 Bipolar Mode Table Select Truth Table

Function	J1B-13	J1B-14
Parameter Table #0	Open	Open
Parameter Table #1	Closed	Open
Parameter Table #2	Open	Closed
Parameter Table #3	Closed	Closed

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25M Operating Mode Configurations Continued

Multiple Parameter Sets

The following procedure allows you to program up to four complete sets of parameter values and to use these multiple parameter sets. When programming each parameter set, use the ENTER key to accept and automatically save parameter values.

Note: The control can be programmed in the REMOTE mode with the drive enabled. The control must be disabled to change the operating mode parameter and the operating mode can not be stored in a parameter table.

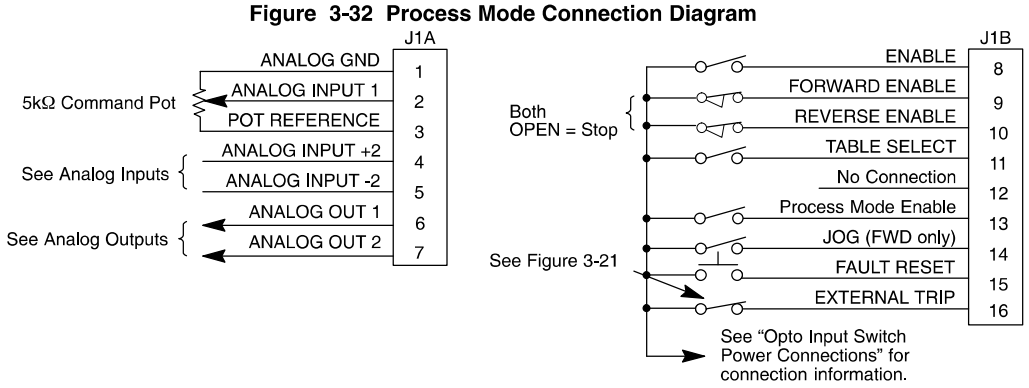
Note: Preset speed does not apply to table select.

1. If this is a new installation, do this procedure after the Pre-Operation Checklist and Power-Up Procedures at the end of this section.
2. Set the Level 1 INPUT block, Operating Mode parameter value to BIPOLAR in each of the parameter sets.
3. Set switches J1B-13 and J1B-14 to Parameter Table #0 (both switches open). Be sure switches J1B-9 and J1B-10 are OPEN, J1B-8 is CLOSED. Enter all parameter values, and autotune as instructed in Section 3 of this manual. This creates and saves the first parameter set which is numbered Table#0.
4. Set switches J1B-13 and J1B-14 to Parameter Table #1. Be sure switches J1B-9 and J1B-10 are OPEN, J1B-8 is CLOSED. Enter all parameter values, and autotune as instructed in Section 3 of this manual. This creates and saves the second parameter set which is numbered Table#1.
5. Set switches J1B-13 and J1B-14 to Parameter Table #2. Be sure switches J1B-9 and J1B-10 are OPEN, J1B-8 is CLOSED. Enter all parameter values, and autotune as instructed in Section 3 of this manual. This creates and saves the third parameter set which is numbered Table#2.
6. Set switches J1B-13 and J1B-14 to Parameter Table #3. Be sure switches J1B-9 and J1B-10 are OPEN, J1B-8 is CLOSED. Enter all parameter values, and autotune as instructed in Section 3 of this manual. This creates and saves the final parameter set which is numbered Table#3.
7. Remember that to change the value of a parameter in one of the parameter tables, you must first select the table using the switches. You cannot change a value in a table until you have first selected that table.

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Process Mode Connections

Figure 3-32 Process Mode Connection Diagram



J1B-8 CLOSED allows current to flow in the motor and produce torque.
OPEN disables the control & motor coasts to a stop.

J1B-9 CLOSED to enable operation in the Forward direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

J1B-10 CLOSED to enable operation in the Reverse direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

J1B-11 OPEN=Table 0, CLOSED=Table 1.

J1B-13 CLOSED to enable the PID closed loop operation.

J1B-14 CLOSED puts the control in JOG Mode. Control will only JOG in the forward direction.
OPEN allows PID & Feedforward Speed or Torque control.

J1B-15 Momentary CLOSED to reset fault condition.
OPEN to run.

J1B-16 Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON".
OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

Table 3-6 Process Mode Input Signal Compatibility

Setpoint or Feedforward	Feedback					
	J1A-1 & 2	**J1A-4 & 5**	**5V EXB [1]**	**10V EXB [1]**	**4-20mA EXB [1]**	**EXB Pulse FOL [3]**
J1A-1 & 2	■					
J1A-4 & 5		■				
5V EXB [1]			■	■	■	
10V EXB [1]			■	■	■	
4-20mA EXB [1]			■	■	■	
EXB Pulse FOL [3]						■
Serial [1] [2] [3]						

[1] Requires expansion board EXB103M01 (Serial + High Resolution Analog I/O for M Series controls).

[2] Requires expansion board EXB102M01 (Serial + Pulse Follower for M Series controls).

[3] Requires expansion board EXB101M01 (Serial Communications for M Series controls).

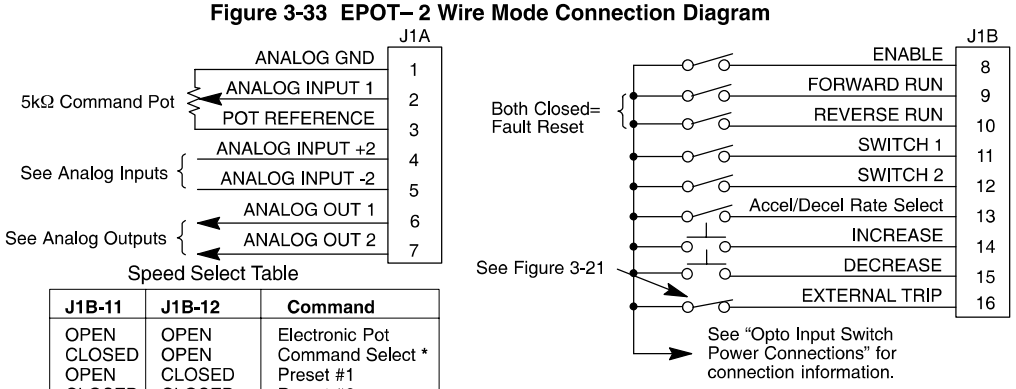
■ Conflicting inputs. Do not use same input signal multiple times.

Note: Only one expansion board may be installed.

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EPOT– 2 Wire Control Mode

Figure 3-33 EPOT– 2 Wire Mode Connection Diagram



Speed Select Table

J1B-11	J1B-12	Command
OPEN	OPEN	Electronic Pot
CLOSED	OPEN	Command Select *
OPEN	CLOSED	Preset #1
CLOSED	CLOSED	Preset #2

* Command Select refers to the Level 1 Command Select parameter value.

J1B-8 CLOSED allows current to flow in the motor and produce torque.
OPEN disables the control & motor coasts to a stop.

J1B-9 CLOSED operates the motor in the Forward direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

J1B-10 CLOSED operates motor in the Reverse direction.
OPEN motor decels to stop (depending on Keypad Stop mode).

Note: Close both J1B-9 and J1B-10 to reset after a fault condition.

J1B-11 & 12 Selects programmed preset speeds as defined in Table of Figure 3-33.

J1B-13 CLOSED selects ACC / DEC / S-CURVE group 2.
OPEN selects group 1.

J1B-14 Momentary CLOSED increases motor speed while contact is closed.

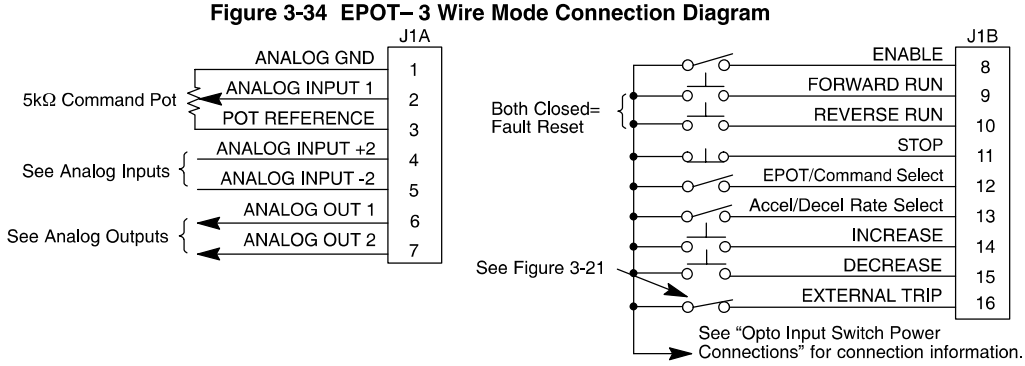
J1B-15 Momentary CLOSED decreases motor speed while contact is closed.

J1B-16 Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to "ON".
OPEN causes an External Trip to be received by the control (when programmed to "ON"). When this occurs, the drive disables, drive "Ready" LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

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EPOT– 3 Wire Control Mode

Figure 3-34 EPOT– 3 Wire Mode Connection Diagram



J1B-8 CLOSED allows current to flow in the motor and produce torque.
OPEN disables the control & motor coasts to a stop.

J1B-9 Momentary CLOSED operates the motor in the Forward direction.

J1B-10 Momentary CLOSED operates motor in the Reverse direction.

Note: Close both J1B-9 and J1B-10 to reset after a fault condition.

J1B-11 Momentary OPEN motor decels to stop (depending on Keypad Stop mode).

J1B-12 OPEN selects EPOT.
CLOSED selects Level 1 Command Select parameter value.

J1B-13 CLOSED selects ACC / DEC / S-CURVE group 2.
OPEN selects group 1.

J1B-14 Momentary CLOSED increases motor speed while contact is closed.

J1B-15 Momentary CLOSED decreases motor speed while contact is closed.

J1B-16 Optional External Trip input (not required). If used, you must set Level 2 Protection block, External Trip to “ON”. OPEN causes an External Trip to be received by the control (when programmed to “ON”). When this occurs, the drive disables, drive “Ready” LED goes out and an external trip fault is displayed on the keypad display (also logged into the fault log).

Pre-Operation Checklist

This procedure will help get your drive up and running in the Keypad mode quickly. This will allow you to prove motor and control operation. You should understand the keypad programming & operation procedures described in Section 4 of this manual.

Note: The control terminal strip does not require any connections to operate in the Keypad mode (if Level 2 Protection block, External Trip parameter is set to OFF and Level 2 Protection block, Local INP Enable is set to “OFF”).

1. Measure the AC line voltage and verify it matches the nameplate rating.
2. Inspect all power connections for accuracy, workmanship and tightness and compliance to codes.
3. Verify control and motor are grounded to each other and the control is connected to earth ground.
4. Check all signal wiring for accuracy.
5. Be certain all brake coils, contactors and relay coils have noise suppression. This should be an R-C filter for AC coils and reverse biased diodes for DC coils. MOV type transient suppression is not adequate.

Check of Motors and Couplings

1. Verify motor shaft rotates freely.
2. Verify motor coupling is tight without backlash.
3. Verify holding brakes if any, are properly adjusted to fully release and set to the desired torque value.

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Power-Up Procedure

You should have an understanding of the keypad programming & operation procedures described in Section 4 of this manual.

Initial Conditions
Be sure the PSM, DB resistor, Control, and Motor are wired according to the procedures described in this section.

1. Verify that any enable inputs to J1B-8 are open.
2. Connect the Keypad to J4 on the 25M panel.
2. Turn power on. Be sure there are no faults.
3. **(PSM–PR only)** Verify PSM "Ready" is ON and the "DB ON" and "Monitor" indicators are OFF. Verify the control "Ready" is ON.
4. **(25M–TR only)** Verify that "Ready" is ON and the "DB" is OFF.
5. Set the Level 1 Input block, Operating Mode to "KEYPAD".
6. Be sure the Level 2 Protection block, Local Enable INP parameter is OFF and the Level 2 Protection block, External Trip parameter is OFF.
7. Enter the following motor data in the Level 2 Motor Data block parameters:
   Motor Voltage (input)
   Motor Rated Amps (FLA)
   Motor Rated Speed (base speed)
   Motor Rated Frequency
   Motor Mag Amps (no load current)
   Encoder Counts
8. At the Level 2 Motor Data block, go to CALC Presets and select YES (using the ▲ key). Press ENTER and let the control calculate the preset values for the parameters that are necessary for control operation.
9. Disconnect the motor from the load (including coupling or inertia wheels). If the load cannot be disconnected, refer to Section 6 and manually tune the control. After manual tuning, perform steps 15 through 19.

⚠ **WARNING: The motor shaft will rotate during the autotune procedure. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment.**

10. Go to Level 2 Autotune block, and do the following tests:
    CMD OFFSET TRIM
    CUR LOOP COMP
    STATOR R1
    FLUX CUR SETTING
    FEEDBACK TESTS
    SLIP FREQ TEST
11. Remove all power from the control.
12. Couple the motor to its load.
13. Turn power on. Be sure no errors are displayed.
14. Set the Level 2 Output Limits block, "MIN OUTPUT SPEED" parameter.
15. Set the Level 2 Output Limits block, "MAX OUTPUT SPEED" parameter.
16. Go to Level 2 Autotune block, and perform the SPD CNTRLR CALC test.
17. Run the drive from the keypad using one of the following: the arrow keys for direct speed control, keypad entered speed or the JOG mode.
18. Select and program additional parameters to suit your application.

The control is now ready for use in the Keypad mode. If a different operating mode is desired, refer to Section 3 Control Connections and Section 4 Programming and Operation.

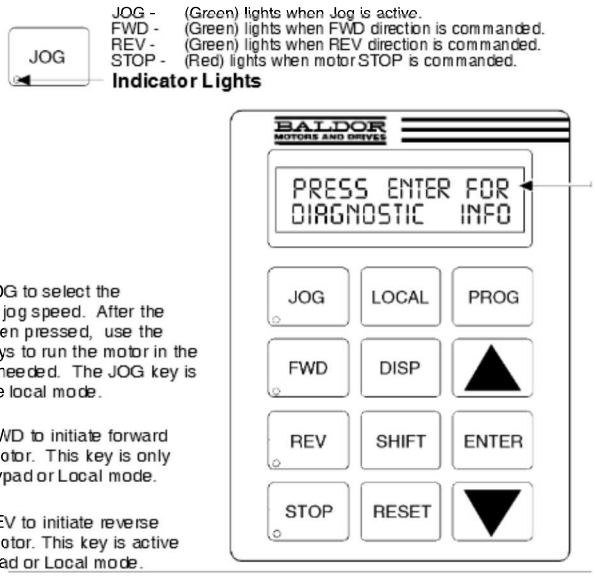
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Section 4
Programming and Operation

Overview

The keypad is used to program the control parameters; to operate the motor when programmed for the Keypad operating mode; and to monitor the status and outputs of the control by accessing the display options, the diagnostic menus and the fault log.

Figure 4-1 Keypad



Keypad Display - Displays status information during Local or Remote operation. It also displays information during parameter setup and fault or Diagnostic Information.

JOG - Press JOG to select the preprogrammed jog speed. After the JOG key has been pressed, use the FWD or REV keys to run the motor in the direction that is needed. The JOG key is only active in the local mode.

FWD - Press FWD to initiate forward rotation of the motor. This key is only active in the Keypad or Local mode.

REV - Press REV to initiate reverse rotation of the motor. This key is active only in the Keypad or Local mode.

STOP - Press STOP to initiate a stop sequence. Depending on the setup of the control, the motor will either ramp or coast to a stop. This key is operational in all modes of operation unless it has been disabled by the Keypad Stop parameter in the Keypad (programming) Setup Block.

Note: If the control is operating in remote mode and the stop key is pressed the control will change to the local mode when the stop command is initiated. To resume operation in the remote mode, press the LOCAL key.

LOCAL - Press LOCAL to change between the Local (keypad) and Remote operation. When the control is in the Local mode all other external commands to the J1B terminal strip will be ignored with the exception of the external trip input.

DISP - Press DISP to return to Display mode from Programming mode. Provides operational status and advances to the next display menu item.

SHIFT - Press SHIFT in the program mode to control cursor movement. Pressing the SHIFT key once moves the blinking cursor one character position to the right. While in Program mode, a parameter value may be reset to the factory preset value by pressing the SHIFT key until the arrow symbols at the far left of the keypad display are flashing, then press an arrow key. In the Display mode the SHIFT key is used to adjust the keypad contrast.

RESET - Press RESET to clear all fault messages (in local mode). Can also be used to return to the top of the block programming menu without saving any parameter value changes.

PROG - Press PROG to enter the program mode. While in the Program mode the PROG key is used to edit a parameter setting.

▲ - (UP Arrow)
Press ▲ to change the value of the parameter being displayed. Pressing ▲ increments the value to the next greater value. Also, when the fault log or parameter list is displayed, the ▲ key will scroll upward through the list. In the local mode pressing the ▲ key will increase motor speed to the next greater value.

ENTER - Press ENTER to save parameter value changes and move back to the previous level in the programming menu. In the Display mode the ENTER key is used to directly set the local speed reference. It is also used to select other operations when prompted by the keypad display.

▼ - (Down Arrow)
Press ▼ to change the value of the parameter being displayed. Pressing ▼ decrements the value to the next lesser value. Also, when the fault log or parameter list is displayed, the ▼ key will scroll downward through the list. In the local mode pressing the ▼ key will decrease motor speed to the next lower value.

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Display Mode

During normal operation, the control is in the DISPLAY MODE. In this mode, the Keypad Display shows the status of the control as in the following example.



The DISPLAY MODE is used to view operating conditions, DIAGNOSTIC INFO and the FAULT LOG and to adjust the Display Contrast. The description of how to do these tasks are described on the following pages.

Adjusting Display Contrast When AC power is applied to the control the keypad should display the status of the control. At power up, the display may be blank if the contrast is improperly set. Use the following procedure to adjust the display contrast.

(Contrast may be adjusted in display mode when motor is stopped or running)

Action	Description	Display	Comments
Apply Power	No visible display		
Press DISP Key	Places control in display mode		Display mode with nothing visible (blank) or too dim to be read.
Press SHIFT SHIFT	Allows display contrast adjustment		
Press ▲ or ▼ Key	Adjusts display intensity	ADJUST CONTRAST ▲ [ENTER] TO SAVE	
Press ENTER	Saves level of contrast and exits to display mode	STOP MOTOR SPEED LOCAL 0 RPM	Typical display

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Display Mode Continued

Display Screens & Diagnostic Information Access

Action	Description	Display	Comments
Apply Power		BALDOR MOTORS & DRIVES	Logo display for 5 seconds.
	Display mode showing motor speed.	STOP MOTOR SPEED LOCAL 0 RPM	No faults present. Local keypad mode. If in remote/serial mode, press local for this display.
Press DISP key	Display showing motor frequency.	STOP FREQUENCY LOCAL 0.00 HZ	
Press DISP key	Scroll to diagnostic info block.	PRESS ENTER FOR DIAGNOSTIC INFO	
Press ENTER key	Access diagnostic information.	STOP SPEED REF LOCAL 0 RPM	Displays commanded speed, direction of rotation, Local/ Remote.
Press DISP key	Display mode showing control temperature.	STOP CONTROL TEMP LOCAL 0.0°C	Displays operating temperature in degrees C.
Press DISP key	Display mode showing bus voltage.	STOP BUS VOLTAGE LOCAL 321V	
Press DISP key	Display mode showing % overload current remaining.	STOP OVRLD LEFT LOCAL 100.00%	
Press DISP key	Display mode showing real time opto inputs & outputs states. 0=Open, 1=Closed.	DIGITAL I/O 000000000 0000	Opto Inputs states (Left); opto outputs states (Right).
Press DISP key	Display mode showing time the drive has been powered up.	TIME FROM PWR UP 0000000.01.43	HR.MIN.SEC format.
Press DISP key	Display mode showing continuous amps; PK amps rating; amps/volt scale of feedback, power base ID.	X.XA X.X APK X.XX A/V ID:XXX	
Press DISP key	Display mode showing which Group1 or 2 expansion boards are installed and recognized.	G1 NOT INSTALLED G2 NOT INSTALLED	In this case, no expansion boards are installed.
Press DISP key	Display mode showing motor shaft revolutions from the REV home set point.	POSITION COUNTER + 000.00000 REV	
Press DISP key	Display mode showing parameter table selected.	STOP TABLE LOCAL 0	
Press DISP key	Display mode showing software version and revision installed in the control.	SOFTWARE VERSION XXX-X.XX	
Press DISP key	Displays exit choice.	PRESS ENTER FOR DIAGNOSTIC EXIT	Press ENTER to exit diagnostic information.

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Display Mode Continued

Fault Log Access

When a fault condition occurs, motor operation stops and a fault code is displayed on the Keypad display. The control keeps a log of up to the last 31 faults. If more than 31 faults have occurred, the oldest fault will be deleted from the fault log to make room for the newest fault. To access the fault log perform the following procedure:

Action	Description	Display	Comments
Apply Power		BALDOR MOTORS & DRIVES	Logo display for 5 seconds.
	Display mode showing motor speed.	STOP MOTOR SPEED LOCAL 0 RPM	Display mode.
Press DISP key	Press DISP to scroll to the Fault Log entry point.	PRESS ENTER FOR FAULT LOG	
Press ENTER key	Display first fault type and time fault occurred.	EXTERNAL TRIP 1: 0:00:30	1 = Most recent fault. 2 = Next most recent fault. ETC.
Press ▲ key	Scroll through fault messages.	PRESS ENTER FOR FAULT LOG EXIT	If no messages, the fault log exit choice is displayed.
Press ENTER key	Return to display mode.	STOP MOTOR SPEED LOCAL 0 RPM	Display mode stop key LED is on.

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Program Mode

The Program Mode is used to enter or change parameter values, enter or change motor data, and autotune the drive.

From the Display Mode press the PROG key to access the Program Mode.

Note: When a parameter is selected, alternately pressing the Disp and Prog keys will change between the Display Mode and the selected parameter. When a parameter is selected for programming, the keypad display provides the following information:



Parameter Status. All programmable parameters are displayed with a "P:" in the lower left corner of the keypad display. If a parameter is displayed with a "V:", the parameter value may be viewed but not changed while control is enabled. If the parameter is displayed with an "L:", the value is locked and the security access code must be entered before its' value can be changed.

Parameter Blocks Access for Programming

Use the following procedure to access parameter blocks to program the control.

Action	Description	Display	Comments
Apply Power	Keypad Display shows this opening message.	BALDOR MOTORS & DRIVES	Logo display for 5 seconds.
	If no faults and programmed for LOCAL operation.	STOP MOTOR SPEED LOCAL 0 RPM	Display mode.
	If no faults and programmed for REMOTE operation.	STOP MOTOR SPEED REMOTE 0 RPM	Display mode.
	If fault is displayed, refer to the Troubleshooting section of this manual.		
Press PROG key		PRESS ENTER FOR PRESET SPEEDS	Press ENTER to access Preset Speed parameters.
Press ▲ or ▼ key	Scroll to the ACCEL/DECEL block.	PRESS ENTER FOR ACCEL/DECEL RATE	Press ENTER to access Accel and Decel rate parameters.
Press ▲ or ▼ key	Scroll to the Level 2 Block.	PRESS ENTER FOR LEVEL 2 BLOCKS	Press ENTER to access Level 2 Blocks.
Press ENTER key	First Level 2 block display.	PRESS ENTER FOR OUTPUT LIMITS	
Press ▲ or ▼ key	Scroll to Programming Exit menu.	PRESS ENTER FOR PROGRAMMING EXIT	Press ENTER to return to Display mode.
Press ENTER key	Return to display mode.	STOP MOTOR SPEED LOCAL 0 RPM	

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Program Mode Continued

Changing Parameter Values when Security Code Not Used

Use the following procedure to program or change a parameter already programmed into the control when a security code is not being used.

The example shown changes the operating mode from Keypad to Bipolar.

Action	Description	Display	Comments
Apply Power	Keypad Display shows this opening message.	BALDOR MOTORS & DRIVES	Logo display for 5 seconds.
	If no faults and programmed for LOCAL operation.	STOP MOTOR SPEED LOCAL 0 RPM	Display mode. Stop LED on.
Press PROG key	Access programming mode.	PRESS ENTER FOR PRESET SPEEDS	
Press ▲ or ▼ key	Scroll to Level 1 Input Block. Then press ENTER to access Input Block.	PRESS ENTER FOR INPUT	Press ENTER to access INPUT block parameter.
Press PROG key	Access Operating Mode.	OPERATING MODE P: KEYPAD	Keypad mode shown is the factory setting.
Press ▲ key	Scroll to make your selection.	OPERATING MODE P: BIPOLAR	Typical selection.
Press ENTER or PROG	Save selection to memory.	OPERATING MODE P: BIPOLAR	
Press ▲ key	Scroll to menu exit.	PRESS ENTER FOR MENU EXIT	
Press ENTER key	Return to Input Block.	PRESS ENTER FOR INPUT	
Press DISP key	Return to Display Mode.	STOP MOTOR SPEED LOCAL 0 RPM	Typical display mode.

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Program Mode Continued

Reset Parameters to Factory Settings

Sometimes it is necessary to restore the parameter values to the factory settings. Follow this procedure to do so.

Note: All parameter values already programmed will be changed when resetting the control to factory settings.

Note: After factory settings are restored, motor data must be programmed and the drive must be autotuned.

Action	Description	Display	Comments
Apply Power	Keypad Display shows this opening message.	BALDOR MOTORS & DRIVES	Logo display for 5 seconds.
	If no faults and programmed for LOCAL operation.	STOP MOTOR SPEED LOCAL 0 RPM	Display mode. Stop LED on.
Press PROG key	Enter program mode.	PRESS ENTER FOR PRESET SPEEDS	
Press ▲ or ▼ key	Scroll to Level 2 Blocks.	PRESS ENTER FOR LEVEL 2 BLOCKS	
Press ENTER key	Select Level 2 Blocks.	PRESS ENTER FOR OUTPUT LIMITS	
Press ▲ or ▼ key	Scroll to the Miscellaneous block.	PRESS ENTER FOR MISCELLANEOUS	
Press ENTER key	Select Miscellaneous block.	RESTART AUTO/MAN P: MANUAL	
Press ▲ key	Scroll to Factory Settings parameter.	FACTORY SETTINGS P: NO	
Press ENTER key	Access Factory Settings parameter.	FACTORY SETTINGS ▲ □ NO	□ represents blinking cursor.
Press ▲ key	Scroll to YES, to choose original factory settings.	FACTORY SETTINGS ▲ □ YES	
Press ENTER key	Restores factory settings.	FACTORY SETTINGS P:LOADING PRESETS	"Loading Presets" is first message "Operation Done" is next "No" is displayed last.
Press ▲ key	Scroll to menu exit.	PRESS ENTER FOR MENU EXIT	
Press ENTER key	Return to display mode.	STOP MOTOR SPEED LOCAL 0 RPM	Display mode. Stop LED on.

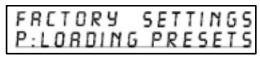
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Program Mode Continued

Initialize New Software When new software is installed, the control must be initialized to the new software version and memory locations. Use the following procedure to initialize the software.

Note: All parameter values already programmed will be changed when resetting the control to factory settings.

Note: After factory settings are restored, motor data must be programmed and the drive must be autotuned.

Action	Description	Display	Comments
Apply Power	Keypad Display shows this opening message.		Logo display for 5 seconds.
	If no faults and programmed for LOCAL operation.		Display mode. Stop LED on.
Press PROG key	Enter program mode.		
Press ▲ or ▼ key	Scroll to Level 2 Blocks.		
Press ENTER key	Select Level 2 Blocks.		
Press ▲ or ▼ key	Scroll to the Miscellaneous block.		
Press ENTER key	Select Miscellaneous block.		
Press ▲ key	Scroll to Factory Settings parameter.		
Press ENTER key	Access Factory Settings parameter.		☐ represents blinking cursor.
Press ▲ key	Scroll to YES, to choose original factory settings.		
Press ENTER key	Restores factory settings.		"Loading Presets" is first message "Operation Done" is next "No" is displayed last.
Press ▲ key	Scroll to menu exit.		
Press ENTER key	Return to display mode.		Display mode. Stop LED on.
Press ▲ key	Scroll to diagnostic info block.		
Press ENTER key	Access diagnostic information.		Displays commanded speed, direction of rotation, Local/ Remote and motor speed.
Press DISP key	Display mode showing software version and revision installed in the control.		Verify new software version.
Press DISP key	Displays exit choice.		Press ENTER to exit diagnostic information.

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Operation Examples

Operating the Control from the Keypad

If the control is configured for remote or serial control, the LOCAL Mode must be activated before the control may be operated from the keypad. To activate the LOCAL Mode, first the motor must be stopped using the keypad STOP key (if enabled), remote commands or serial commands.

Note: Pressing the keypad STOP key (if enabled) will automatically issue a motor stop command and change to LOCAL mode.

When the motor has stopped, the LOCAL Mode is activated by pressing the "LOCAL" key. Selection of the LOCAL Mode overrides any remote or serial control inputs except for the External Trip input, Local Enable Input or STOP input.

The control can operate the motor in three (3) different ways from the keypad.

1. JOG Command.
2. Speed adjustment with Keypad entered values.
3. Speed adjustment using the Keypad arrow keys.

Note: If the control has been configured for Keypad in the operating mode parameter (level 1, input block), then no other means of operation is permitted other than from the keypad.

Accessing the Keypad JOG Command

Action	Description	Display	Comments
Apply Power	Keypad Display shows this opening message.	BALDOR MOTORS & DRIVES	Logo display for 5 seconds.
	If no faults and programmed for LOCAL operation.	STOP MOTOR SPEED LOCAL 0 RPM	Display mode. Stop LED on.
Press JOG key	Access programmed JOG speed.	STOP MOTOR SPEED LOCAL 0 RPM	JOG key LED on.
Press and hold FWD or REV key	Move control forward or reverse at JOG speed.	FWD MOTOR SPEED LOCAL 200 RPM	Control runs while FWD or REV key is pressed. JOG & FWD (or REV) LED's on.
Press JOG key	Disables JOG mode.	STOP MOTOR SPEED LOCAL 0 RPM	JOG LED off. Stop key LED on.

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Speed Adjustment using the Keypad

Action	Description	Display	Comments
Apply Power	Keypad Display shows this opening message.		Logo display for 5 seconds.
	If no faults and programmed for LOCAL operation.		Display mode. Stop LED on.
Press ENTER key	Select the local speed reference.		
Press SHIFT key	Move blinking cursor right one digit.		☐ represents blinking cursor.
Press ▲ key	Increase thousands value by one digit.		
Press ENTER key	Save new value and return to display mode.		
Press FWD or REV key	Motor runs FWD or REV at commanded speed.		FWD (REV) LED on.
Press STOP key	Motor stop command issued.		Display mode. Stop LED on.

Speed Adjustment Using Arrow Keys

Action	Description	Display	Comments
Apply Power	Keypad Display shows this opening message.		Logo display for 5 seconds.
	If no faults and programmed for LOCAL operation.		Display mode. Stop LED on.
Press FWD or REV key	Motor runs FWD or REV at selected speed.		FWD key LED on.
Press ▲ key	Increase motor speed.		Display mode.
Press ▼ key	Decrease motor speed.		Display mode.
Press STOP key	Motor stop command issued.		Display mode. Stop LED on.
Press FWD or REV key	Motor runs FWD or REV at commanded speed.		Motor runs at previously set speed.
Press STOP key	Motor stop command issued.		Display mode. Stop LED on.

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