BALDOR®
MOTORS AND DRIVES

Four Output Relays/ 3-15 PSI Pneumatic Interface Expansion Board

Catalog No. EXB004A01

Installation and Operating Manual

6/96 **MN1315**

Table of Contents

Section 1
General Information

Introduction

The Baldor controls represent the latest technology in microprocessor based motor controls. In addition to the user programmable parameters available in every control, many different expansion boards are available from Baldor to further customize the control to most any application.

Expansion boards are categorized by compatibility into two groups: Group 1 and Group 2, see Table 1-1. A board from either group may be used alone in a control. If two boards are to be used, one board must be from Group 1 and the other from Group 2.

Note: Using two Group 1 or two Group 2 boards in the same control is not allowed.

Table 1-1 Group 1 and Group 2 Board Categories

Group 1 Board Name	Catalog No.	Baldor Manual No.
Isolated Input Expansion Board	EXB003A01	MN1314
Master Pulse Reference/ Isolated Pulse Follower	EXB005A01	MN1312
DC Tachometer Interface	EXB006A01	MN1311
Isolated Encoder Expansion Board	EXB008A01	MN1317
Resolver to Digital Interface	EXB009A01	MN1313
Group 2 Board Name		
RS-232 Serial Communication	EXB001A01	MN1310
RS-422/RS-485 High Speed Serial Communication	EXB002A01	MN1310
Four Output Relays/3-15 PSI Pneumatic Expansion Board	EXB004A01	MN1315
High Resolution Analog I/O Expansion Board	EXB007A01	MN1316
2 Isolated Analog Output/ 3 Relay Output Expansion Board	EXB010A01	MN1319

Limited Warranty

For a period of two (2) years from the date of original purchase, BALDOR will repair or replace without charge controls and accessories 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.

Safety Notice

This equipment contains voltages that may be as great as 1000 volts! 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: Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. 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. Dangerous voltages are present inside the equipment. 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.

⚠ Caution: To prevent equipment damage, be certain that the electrical service is not capable of delivering more than the maximum line short circuit current amperes listed in the appropriate control manual, 230 VAC, 460 VAC or 575 VAC maximum per control rating.

Section 2
Expansion Board Description

Introduction

Four Output Relay/3-15 PSI Pneumatic Expansion Board

Catalog No. EXB004A01

Features:

- Mounting Group 2
- 2 Output Relays - N.O. and N.C.
- 2 Output Relays - N.O. or N.C.
- 3-15 PSI Pneumatic Interface

The four output relay/3-15 PSI pneumatic expansion board converts low level DC voltage opto outputs (from the H Series Motor Control board) to Dry Contact Relay Outputs. The board also provides a 3-15 PSI pneumatic to digital signal conversion for use as a process feedback or command signal by the Motor Control.

Relay Output Operation

Relay outputs 1-4 automatically perform the function of the Main Control Board opto outputs 1-4 respectively. That is, when a Main Control Board output is active, the corresponding relay output is active.

Relay outputs 1 and 2 provide both normally open and normally closed contacts. Relay outputs 3 and 4 are jumper selectable and only provide normally open or normally closed contact operation but not both.

Table 2-1 describes the Relay Output Specifications.

Table 2-1 Relay Output Specifications

Number of Relays		2-Jumper selectable for Form A (N.O.) or Form B (N.C.) **and** 2 Form C (N.O. and N.C.)
Contact Rating	AC DC	5 A_{RMS} at 230VAC Maximum 5A at 30VDC Maximum (non-destructive)
Operating Time		5 milliseconds
Release Time		4 milliseconds
Connector		Screw Terminals

Terminal tightening torque is 7 lb-in (0.8 Nm) maximum.

3-15 PSI Pneumatic Interface Operation

The expansion board contains a pressure transducer and A/D converter to convert a 3-15 PSI pneumatic input to a digital signal with 8 bit resolution. This pneumatic input can be used for one of the following:

Motor speed command	(Command Select)
Motor torque command	(except inverter)
Process control setpoint	(Setpoint Source)
Process control feedback	(Process Feedback)

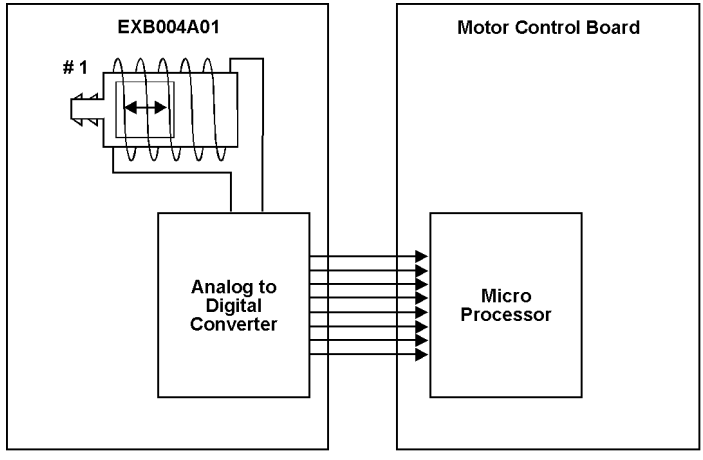
Table 2-2 describes the 3-15 PSI Pneumatic Interface Specifications.

Figure 2-1 illustrates the function of the 3-15 PSI Pneumatic Interface.

Table 2-2 3-15 PSI Pneumatic Interface Specifications

Pressure Range	3-15 PSI
Digital Resolution	8 bits
Connector	$^1/_8$ inch Pipe Nipple
Maximum Pressure (without damage)	58 PSI

Figure 2-1 3-15 PSI Interface



Section 3
Installation

Board Installation

This section describes the Expansion Board installation procedure.

Caution: **Before you proceed, be sure to read and become familiar with the safety precautions at the beginning of this manual. Do not proceed if you are unsure of the safety precautions described. If you have any questions, contact BALDOR before you proceed.**

1. Remove the expansion board from the shipping container.
2. Remove all packing material from the board.

Caution: **Be sure all packing materials are removed from the board. Conductive foam may be present on the connectors to prevent static build up during shipping. This can prevent proper circuit operation.**

Installation differs between the 1-15 HP Size A and B controls and the 15HP Size C and larger AC controls and the SCR DC controls. If you are installing only one board, refer to the “Single Expansion Board Installation” procedure. If you are installing two expansion boards (or a second board) refer to the “Dual Expansion Board Installation” procedure.

1-15HP Size A and B Controls

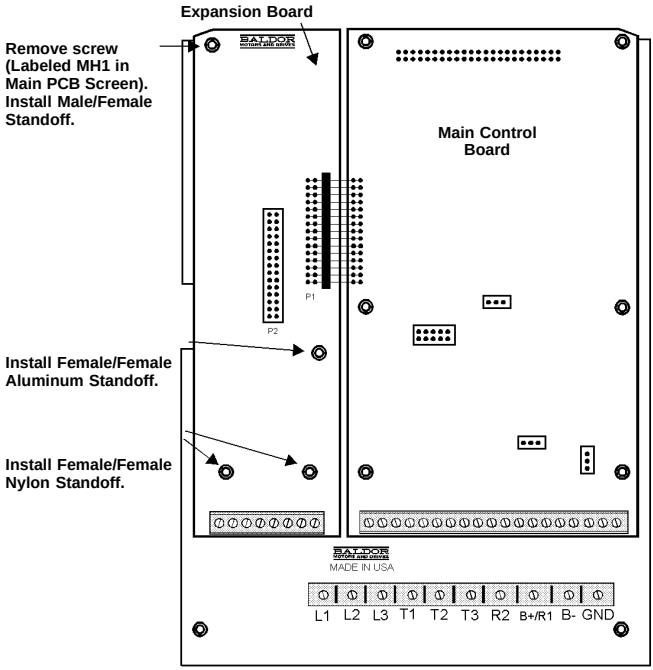
(For all 15H Inverter, 18H Vector, and 23H Servo).

Single Expansion Board Installation

Procedure:

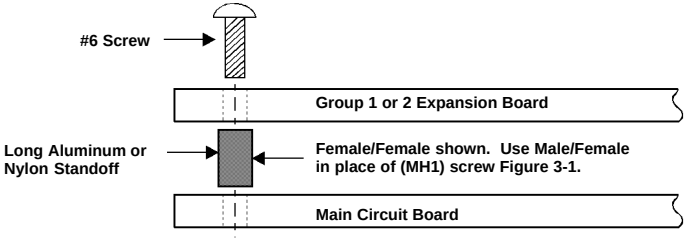
1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws that secure the control cover.
5. Remove the control cover.
6. Remove the #6 screw at position MH1 (upper left on the main circuit board. See Figure 3-1.
7. Install the long standoffs provided in the installation hardware as shown in Figure 3-1. (Be sure the Male/Female standoff is at position MH1. The other three are Female/Female.)
8. Slide the expansion board male connector into the female connector of the control board.
9. Securely mount the expansion board to the standoffs installed in step 7 using #6 screws provided in the installation hardware. See Figure 3-2.
10. The mechanical installation of the expansion board is now complete. Refer to Section 4 of this manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 11.
11. When complete, install the control cover using the four (4) Phillips head screws.
12. Restore all power sources to the control.
13. Restore drive operation.

Figure 3-1 Single Expansion Board Installation



Terminal tightening torque is 7 lb-in (0.8 Nm) maximum.

Figure 3-2 Single Expansion Board Installation



1-15HP Size A and B Controls (Continued)

Dual Expansion Board Installation

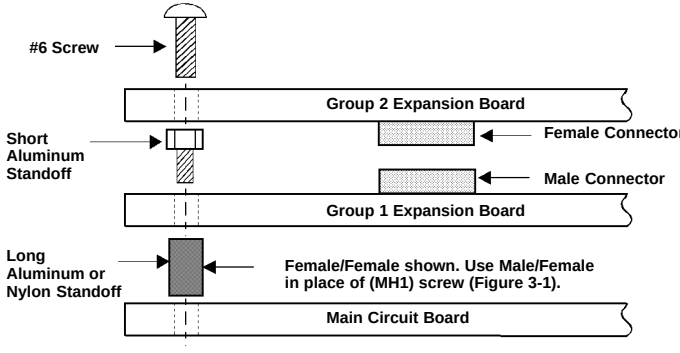
Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws that secure the control cover.
5. Remove the control cover.
6. Remove the #6 screw at position MH1 (upper left on the main circuit board. See Figure 3-1.
7. Install the long standoffs provided in the installation hardware as shown in Figure 3-1. (Be sure the Male/Female standoff is at position MH1. The other three are Female/Female.)
8. Slide the Group 1 board male connector into the female connector of the control board. See Figure 3-3.
9. Securely mount the Group 1 expansion board to the standoffs installed in step 7 using the 4 short aluminum standoffs provided in the installation hardware. See Figure 3-3.
10. The mechanical installation of the Group 1 expansion board is now complete. Refer to the manual for the Group 1 board and configure the jumpers as desired. Also complete the wiring before you proceed to step 11.
11. Install the Group 2 board on top of the previously installed Group 1 board by plugging the female connector onto the male connector of the Group 1 board as shown in Figure 3-3.
12. Secure this Group 2 board to the Group 1 board using the #6 screws provided.

Dual Expansion Board Installation (Continued)

13. The mechanical installation of the first expansion board is now complete. Refer to the manual for the Group 2 board and configure any jumpers and switches as desired. Also complete the wiring for this board before you install the cover.
14. When complete, install the control cover using the four (4) Phillips head screws.
15. Restore all power sources to the control.
16. Restore drive operation.

Figure 3-3 Dual Expansion Board Installation



15HP Size C and Larger AC Controls

(For all 15H Inverter, 21H Line Regen Inverter, 18H Vector, 22H Line Regen Vector and 23H Servo).

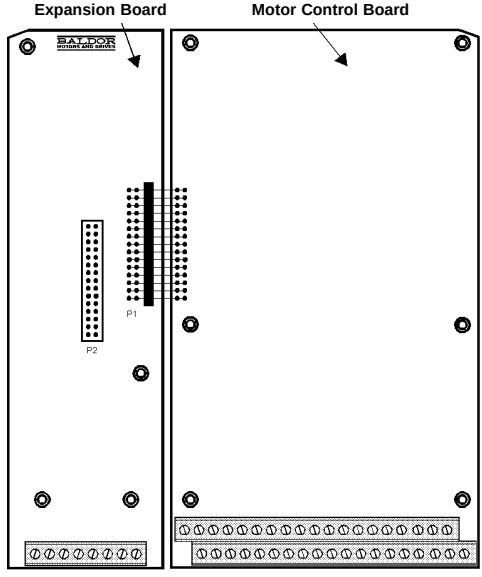
Single Expansion Board Installation

Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws ($^1/_4$ turn) that secure the control cover. (On floor mounted G size enclosures, open the enclosure door).
5. Remove the control cover.
6. Slide the expansion board male connector into the female connector of the control board. See Figure 3-4.
7. Securely mount the expansion board to the sheet metal mounting plate using the #6 screws provided in the installation hardware. See Figure 3-5.
8. The mechanical installation of the expansion board is now complete. Refer to Section 4 of this manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 9.
9. When complete, install the control cover using the four (4) Phillips head screws ($^1/_4$ turn). (On floor mounted G size enclosures, close the enclosure door).
10. Restore all power sources to the control.
11. Restore drive operation.

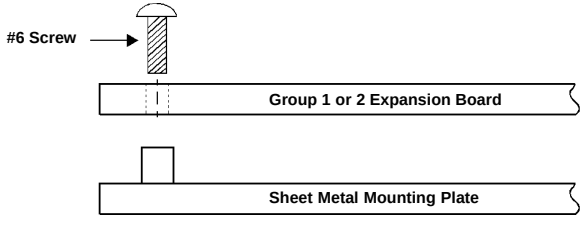
15HP Size C and Larger AC Controls
Single Expansion Board Installation (Continued)

Figure 3-4 Single Expansion Board Installation



Terminal tightening torque is 7 lb-in (0.8 Nm) maximum.

Figure 3-5 Single Expansion Board Installation



15HP Size C and Larger AC Controls (Continued)

Dual Expansion Board Installation

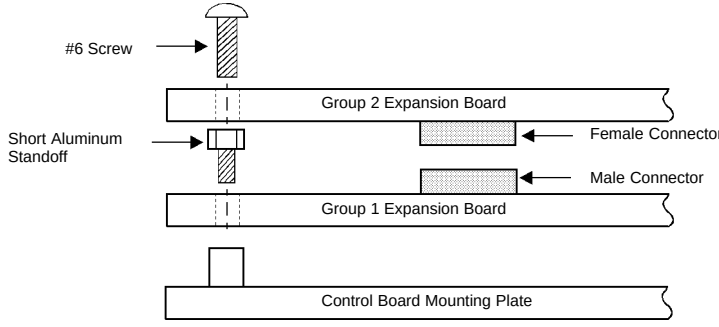
Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Remove the four (4) Phillips head screws ($^1/_4$ turn) that secure the control cover. (On floor mounted G size enclosures, open the enclosure door).
5. Remove the control cover.
6. Slide the Group 1 expansion board male connector into the female connector of the control board. See Figure 3-4.
7. Securely mount the Group 1 expansion board to the sheet metal mounting plate using the short standoffs provided in the installation hardware. See Figure 3-6.
8. The mechanical installation of the expansion board is now complete. Refer to the manual for the Group 1 board and configure the jumpers as desired. Also complete the wiring before you proceed to step 9.
9. Install the Group 2 board on top of the previously installed Group 1 board by plugging the female connector onto the male connector of the Group 1 board as shown in Figure 3-6.
10. Secure this Group 2 board to the Group 1 board using the #6 screws provided. See Figure 3-6.
11. The mechanical installation of the expansion board is now complete. Refer to the manual for the Group 2 board and configure any jumpers and switches as desired. Also complete the wiring for this board before you install the cover.

Dual Expansion Board Installation (Continued)

12. When complete, install the control cover using the four (4) Phillips head screws ($^1/_4$ turn). (On floor mounted G size enclosures, close the enclosure door).
13. Restore all power sources to the control.
14. Restore drive operation.

Figure 3-6 Dual Expansion Board Installation



SCR DC Controls

(For 19H and 20H SCR DC Controls).

Single Expansion Board Installation

Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Slide the expansion board male connector into the female connector of the control board. See Figure 3-4.
5. Securely mount the expansion board to the sheet metal mounting plate using the #6 screws provided in the installation hardware. See Figure 3-5.
6. The mechanical installation of the expansion board is now complete. Refer to the Group 1 manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 7.
7. Restore all power sources to the control.
8. Restore drive operation.

SCR DC Controls (Continued)

Dual Expansion Board Installation

Procedure:

1. Be sure drive operation is terminated and secured.
2. Remove all power sources from the control.
3. Wait at least 5 minutes for internal capacitors to discharge.
4. Slide the Group 1 board male connector into the female connector of the control board. See Figure 3-4.
5. Securely mount the Group 1 expansion board to the sheet metal mounting plate using the short standoffs provided in the installation hardware. See Figure 3-6.
6. The mechanical installation of the expansion board is now complete. Refer to the Group 1 manual and configure the jumpers as desired. Also complete the wiring before you proceed to step 7.
7. Install the Group 2 board on top of the previously installed Group 1 board by plugging the female connector onto the male connector of the Group 1 board as shown in Figure 3-6.
8. Secure this Group 2 board to the Group 1 board using the #6 screws provided. See Figure 3-6.
9. The mechanical installation of the expansion board is now complete. Refer to the manual for the Group 2 board and configure any jumpers and switches as desired. Also complete the wiring for this board before you proceed to step 10.
10. Restore all power sources to the control.
11. Restore drive operation.

Section 4
Hardware Setup

Introduction

Four Output Relay/3-15 PSI Pneumatic Expansion Board
Catalog No. EXB004A01

Features:

- Mounting Group 2
- 2 Output Relays - N.O. and N.C.
- 2 Output Relays - N.O. or N.C.
- 3-15 PSI Pneumatic Interface

The Four Output Relay/3-15 PSI Pneumatic expansion board converts low level DC voltage opto outputs (from the H Series Motor Control board) to Dry Contact Relay Outputs. The board also provides a 3-15 PSI pneumatic to digital signal conversion for use as a process feedback or command signal by the Motor Control.

3-15 PSI Pneumatic Interface Operation

The expansion board contains a pressure transducer and A/D converter to convert a 3-15 PSI pneumatic input to a digital signal with 8 bit resolution. This pneumatic input can be used for one of the following:

Motor speed command	(Command Select)
Motor torque command	(except inverter)
Process control setpoint	(Setpoint Source)
Process control feedback	(Process Feedback)

No jumpers are required for Pneumatic interface configuration. The 3-15 PSI #1 is available for connection. 3-15 PSI #2 is not available as shown in Table 4-1.

Table 4-1 3-15 PSI Pneumatic Interface Connection

$^{1}/_{8}$ inch Pipe Nipple	Function
#1	3-15 PSI Pressure Input
#2	No Connection

Relay Output Operation

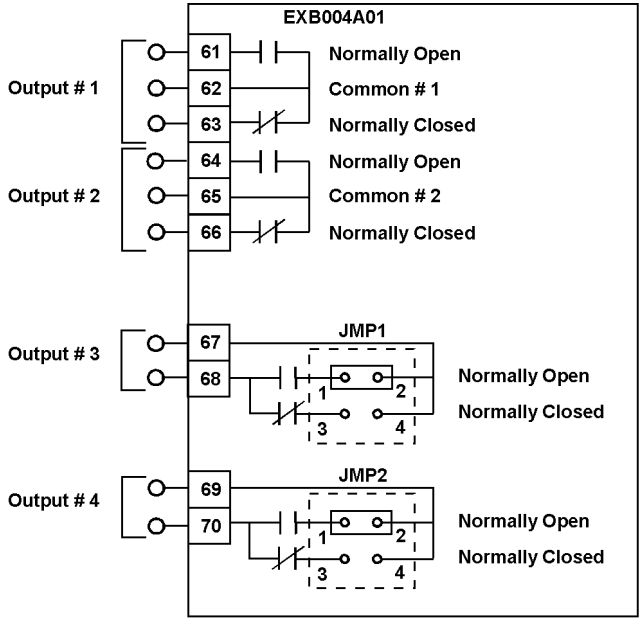
Relay outputs 1-4 automatically perform the function of the Main Control Board opto outputs 1-4 respectively. That is, when a Main Control Board output is active, the corresponding relay output is active.

Relay outputs 1 and 2 provide both normally open and normally closed contacts. Relay outputs 3 and 4 are jumper selectable and only provide normally open or normally closed contact operation but not both. See Figure 4-1 for relay output jumper configuration and Table 4-2 for jumper selection. The jumper and wiring terminal locations are shown in Figure 4-2.

Table 4-2 3-15 PSI Pneumatic Interface Connection

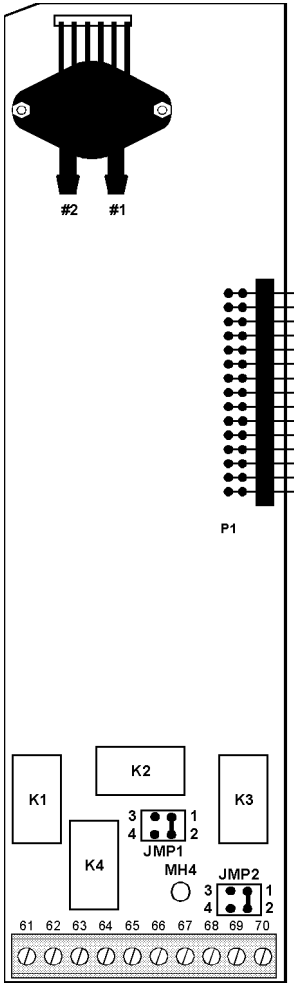
Jumper	Jumper Position	Function
JMP1	1 & 2	Output #3 Normally Open
	3 & 4	Output #3 Normally Closed
JMP2	1 & 2	Output #4 Normally Open
	3 & 4	Output #4 Normally Closed

Figure 4-1 Relay Output Jumper Configuration



Terminal tightening torque is 7 lb-in (0.8 Nm) maximum.

Figure 4-2 Jumper and Terminal Locations (Top View)



Terminal tightening torque is 7 lb-in (0.8 Nm) maximum.

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