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Precautions:

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

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

⚠️ **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: The stop input to this equipment should not be used as the single means of achieving a safety critical stop. Drive disable, motor disconnect, motor brake and other means should be used as appropriate. Only qualified personnel should attempt to program, start-up or troubleshoot this equipment.

WARNING: Improper operation or programming of the 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: The motor shaft will rotate during the homing procedure. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment.

CAUTION: To prevent equipment damage, be certain that the input power has correctly sized protective devices installed.

CAUTION: To prevent equipment damage, be certain that input and output signals are powered and referenced correctly.

CAUTION: To ensure reliable performance of this equipment be certain that all signals to/from the controller are shielded correctly.
# Manual Revision History

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1. Introduction

This chapter provides an overview of the Four Channel encoder Splitter.
This manual describes the use and functionality of the four channel encoder splitter board in its standard form and cascaded forms (for 8, 12 or 16 channels).

The unit is designed to allow a single encoder to be used as a source to multiple controllers. It accepts input from one encoder, as either differential or single ended, and provides 4 buffered differential copies of the signals on male ‘D’ type connectors. A fifth buffered output is available for cascading with slave versions. Each slave increases the number of outputs by 4.

Figure 1 Board Layout

The PCB measures 100mm (3.94") x 85mm (3.75"). In the raft, the outer dimensions are 110mm (4.25") x 90mm (3.5").
2. Functionality

This section describes the functionality of the unit
2.1 Encoder connections

2.1.1 Input

The four axis encoder splitter unit encoder input is implemented using a 9 pin female ‘D’ type connector. The input can accept input from a 2 or 3 channel encoder, with either differential or single ended signaling. The inputs are received by a LM26LS32 line receiver chip with bias resistors to allow single ended and open collector encoders to be used. The input connector has a 5V power connection for standard encoders. The logic level outputs from the line receiver are fed to output circuitry.

The encoder pin-out is compatible with older Baldor products. It is not compatible with the latest Baldor drive products. Please refer to your product documentation for the encoder pin-out of your product.
2.1.2 Outputs

Each of the 4 outputs (0-3) takes the logic level intermediate signals and drives them using AM26LS31 differential line drivers. Each output is implemented on male 9 pin 'D' type connectors. Output 1 (X2) does have a 5V connection (on pin1) which supplies power from the controller. This is not recommended as this is likely to exceed the power rating of the controller’s encoder port. See section 2.4 for power connections.

Figure 4 Encoder output circuit

The encoder pin-out is compatible with older Baldor products. It is not compatible with the latest Baldor drive products. Please refer to your product documentation for the encoder pin-out of your product.

2.2 Cascaded Units

Cascaded units are built from a standard board and one or more slave boards. These are assembled in a single board carrier and are connected together using pin and socket connectors. Figure 5 shows a standard and slave boards cascaded together. The components shown in gray are not fitted.

Figure 5 Layout showing two boards cascaded
2.2.1 Slave Boards

The encoder splitter board can be built in two versions. The standard version is populated with the input encoder connector, biasing resistors and power circuitry. The slave version, has a cascade input which carries the signals and power from the master. Slave boards also have cascade outputs and up to 3 slaves can be cascaded with a master to give 16 encoder outputs from 1 input.

2.2.2 Cascade

The cascade connection carries differentially driven encoder signals and 5V power. Because of the extra buffering, each slave board adds approximately 50ns delay to the signals.

![Figure 6 Cascade interface and buffers](image)

2.3 Index

In addition to being passed to all outputs, the unbuffered index pulse is taken to a second line receiver via a set of jumpers which allow reversal of the connections. The effect of the jumpers is to invert the state of the line receiver output, allowing a positive pulse to be generated from either a positive or negative going encoder index pulses.

The output of this second line receiver drives a FET which in turn drives and indicator LED and an optically isolated darlington driver. This signal can then be used to drive other equipment which an encoder would not normally be able to drive.

![Figure 7 Index output drive](image)
2.4 Power

Power is normally provided through a 4 way screw termination connector. This has connections for 5V, 0V, chassis ground and 5V from X2. This last connection allows the unit to be powered from the controller connected to X2 by wiring this to the 5V connection.

<table>
<thead>
<tr>
<th>5V D</th>
<th>5V from X2</th>
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<td>5V in</td>
<td>5v in connection</td>
</tr>
<tr>
<td>0V</td>
<td>0v connection</td>
</tr>
<tr>
<td>Scrn</td>
<td>screen connection</td>
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5V is passed to any slave boards through the cascade interface. Slave boards do not have any power connectors.

The 5V rail has a transient voltage suppressor and 47µF of bulk decoupling. 0V and chassis can be connected with a 0.2” pitch component (capacitor, resistor, inductor or just a wire link).

The 5V rail has 10% tolerance and the unit draws up to a maximum of 360mA in addition to the power for the encoder, with an additional maximum of 360mA for each slave board.