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Product Notice

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 controlled by this equipment. Improper use can cause serious or fatal injury.

Safety Notice

Intended use: Drives incorporating the Resolver Feedback option are intended for use in stationary ground based applications in industrial power installations according to the standards EN60204 and VDE0160. They are designed for machine applications that require variable speed controlled three-phase brushless AC motors. These drives are not intended for use in applications such as:

- Home appliances
- Medical instrumentation
- Mobile vehicles
- Ships
- Airplanes.

Unless otherwise specified, the drive is intended for installation in a suitable enclosure. The enclosure must protect the drive from exposure to excessive or corrosive moisture, dust and dirt or abnormal ambient temperatures. The installation, connection and control of drives is a skilled operation, disassembly or repair must not be attempted. In the event that a drive fails to operate correctly, contact the place of purchase for return instructions.

Precautions

Do not touch any circuit board, power device or electrical connection before you first ensure that no high voltage is 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.

MEDICAL DEVICE / PACEMAKER DANGER: Magnetic and electromagnetic fields in the vicinity of current carrying conductors and industrial motors can result in a serious health hazard to persons with cardiac pacemakers, internal cardiac defibrillators, neurostimulators, metal implants, cochlear implants, hearing aids, and other medical devices. To avoid risk, stay away from the area surrounding a motor and its current carrying conductors.

Electrical components can be damaged by static electricity. Use ESD (electrostatic discharge) procedures when handling this device.

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

To ensure reliable performance of this equipment, be certain that all signals are shielded correctly.
2.1 **Incremental Encoder Feedback option features**

The Incremental Encoder Feedback option is available as a customer-fitted option for the MotiFlex e100 range of drives. The option adds to the drive:

- An incremental encoder feedback input.
- A simulated encoder output.

The option card may be inserted in either of the expansion slots, located on the top and bottom panel of the drive.

### 2.1.1 Installation

Before touching the option card, be sure to discharge static electricity from your body and clothing by touching a grounded metal surface. Alternatively, wear an earth strap while handling the card.

1. Choose carefully which of the option slots (top or bottom) to use. The choice will often depend on the best route for the wiring that will lead to the option card.

2. Pull off the drive’s top or bottom front panel cover (as appropriate). Remove the option slot cover’s retaining screw.

3. Insert a screwdriver under the edge of the option slot cover and gently lever out the cover.
4. Confirm that the correct option card is being installed. The description is printed on the leading edge of the card, furthest from the mounting bracket.

Insert the option card with the main component side facing towards the center of the drive. The edges of the option card should locate behind retaining brackets inside the drive.

5. Push down the option card until it clicks into place. The option card’s external connector plate should finish approximately level with the 8 posts along the edge of the option slot.

6. Insert the retaining screw and tighten. If the screw will not locate in the threaded socket on the option card, then check the position of the option card.

The screw must be fitted since it provides mechanical support and an electrical chassis connection for the option card.

7. Push on the drive’s top or bottom front panel cover until it clicks into place.
3.1 Introduction

All external connections to the Incremental Encoder Feedback option card are made using the two D-type connectors. The required mating connectors are supplied.

The encoder input and encoder output are described in the following sections.

3.1.1 Slot selection and feedback input / output numbering

When the option card is installed in slot 1 (at the top of the MotiFlex e100), the encoder input becomes feedback input 1. This is because the MotiFlex e100 already has two feedback inputs as standard; input 0 is the main universal encoder feedback input (connector X8), and input 3 is the step & direction input formed by digital inputs DIN1 and DIN2. See MN1943 MotiFlex e100 Installation Manual for details.

When the option card is installed in slot 2 (at the bottom of the MotiFlex e100), the encoder input is always numbered as feedback input 2. This allows two Incremental Encoder Feedback option cards to be installed with no duplication of input numbering.

Similarly, the encoder output is numbered as output 1 when the option card is installed in slot 1, and output 2 when the option card is installed in slot 2.

This numbering system is summarized in the following table:

<table>
<thead>
<tr>
<th>Slot</th>
<th>Feedback input</th>
<th>Encoder output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard drive</td>
<td>0 - Universal encoder</td>
<td>(None)</td>
</tr>
<tr>
<td></td>
<td>3 - Step &amp; Direction (DIN1 / DIN2)</td>
<td></td>
</tr>
<tr>
<td>1 Option card, top slot</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2 Option card, bottom slot</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

The same numbering system is used when referring to the feedback channels using the various Mint ENCODER... keywords. For example, the encoder input on an option card installed in slot 2 is referred to as ENCODER(2). See the Mint help file for details.
3.1.2 Connector pin assignments

Figure 3-1: D-type connector pin assignments
3.1.3 Encoder input

The incremental encoder connections (ABZ channels and Hall signals) are made using the 15-pin D-type female connector. The encoder inputs (CHA, CHB and CHZ) accept differential signals only. Twisted pairs must be used for each complementary signal pair e.g. CHA+ and CHA-. The Hall inputs may be used as differential inputs (recommended for improved noise immunity) or single ended inputs. When used as single ended inputs, leave the Hall U-, Hall V- and Hall W- pins unconnected. The overall cable shield (screen) must be connected to the metallic shell of the D-type connector. The connector includes a 'Sense' pin, which is used to detect the voltage drop on long cable runs. This allows the option card to increase the encoder supply voltage on pin 12 to maintain a 5 VDC (±7%) supply at the encoder (250 mA max). The maximum quadrature input frequency is 20 MHz (i.e. 5 MHz on both the A and B channels).

![Figure 3-2: Encoder input circuit - channel A](image1)

![Figure 3-3: Hall input circuit - channel U](image2)
Figure 3-4: Encoder input cable connections
3.1.4 Encoder output

The encoder output can be used for position feedback to a host positioner, or in master/slave situations where the axis movement can be transmitted to another controller or MotiFlex e100. It is recommended that this output only drives one output circuit load. The encoder output signals are driven by an AM26LS31 differential line driver and conform to the RS422 electrical specification. Shielded twisted pair cable is recommended.

If the option card’s encoder input is routed to its own encoder output, and the resolution of the encoder output is set to match that of the encoder input, the encoder output produces a duplicate of the encoder input signals.

If any other source is routed to the card’s encoder output, for example the MotiFlex e100’s standard encoder input or the encoder/resolver input on a second option card, a simulated encoder output is produced. This consists of bursts of A and B pulses (and a Z pulse if required) at 62.5 microsecond intervals. The frequency and length of the bursts are varied to represent the change in the input source’s position during the preceding 62.5 microsecond interval. See the keyword ENCODEROUTRESOLUTION in the Mint help file.

![Diagram of encoder output connections](https://www.baldormotion.com)

**Figure 3-5: Encoder output - typical connections to a Baldor NextMove e100**

3.1.5 Power consumption

The maximum overall power consumption of the Incremental Encoder Feedback option card is 3.9 W. See the main MotiFlex e100 installation manual (MN1943) for further details about the option slots’ power supply and derating information.
If you have any suggestions for improvements to this manual, please let us know. Write your comments in the space provided below, remove this page from the manual and mail it to:

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