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**DeviceNet™ Option**

**for FlexDrive<sup>II</sup>, Flex+Drive<sup>II</sup>**  
**and MintDrive<sup>II</sup>**

**Reference Manual**



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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. Only qualified personnel should attempt to start-up, program or troubleshoot this equipment.

## Safety Notice

Intended use: Drives incorporating the DeviceNet 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, this 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 exact operating specifications are found in the main installation manual supplied with the drive. 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.

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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 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.



**WARNING:** Be sure that you are completely familiar with the safe operation and 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 use can cause serious or fatal injury. Only qualified personnel should attempt to program, start-up or troubleshoot this equipment.



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



**WARNING:** Improper operation or programming of the drive may cause violent motion of the motor and driven equipment. Be certain that unexpected motor 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 circuit might have high voltages present whenever AC power is applied, even when the motor is not moving. Electrical shock can cause serious or fatal injury.



**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 are shielded correctly.



## 2.1 DeviceNet option

DeviceNet is available as a factory-fitted option (option D) on the FlexDrive<sup>II</sup>, Flex+Drive<sup>II</sup> and MintDrive<sup>II</sup> range of drives.

The DeviceNet option allows a PLC (or any other DeviceNet master device) to:

- Perform simple motion, controlled using polled messages.
- Read/write data using the drive's onboard Comms array.  
(On FlexDrive<sup>II</sup> only the extended comms array locations may be accessed - see the MintMT help file).

The inclusion of the DeviceNet option can be easily identified by the connector (X15) and Bus Activity LED on the front panel of the drive. It is also indicated in the drive's catalog number, which will have the letter D just before the last two digits, for example MDH1A05TB-**RD**23, or FDH1A02TB-**ED**23.

The catalog number is marked on the front of the unit, just below the Baldor logo.

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## 2.2 Units and abbreviations

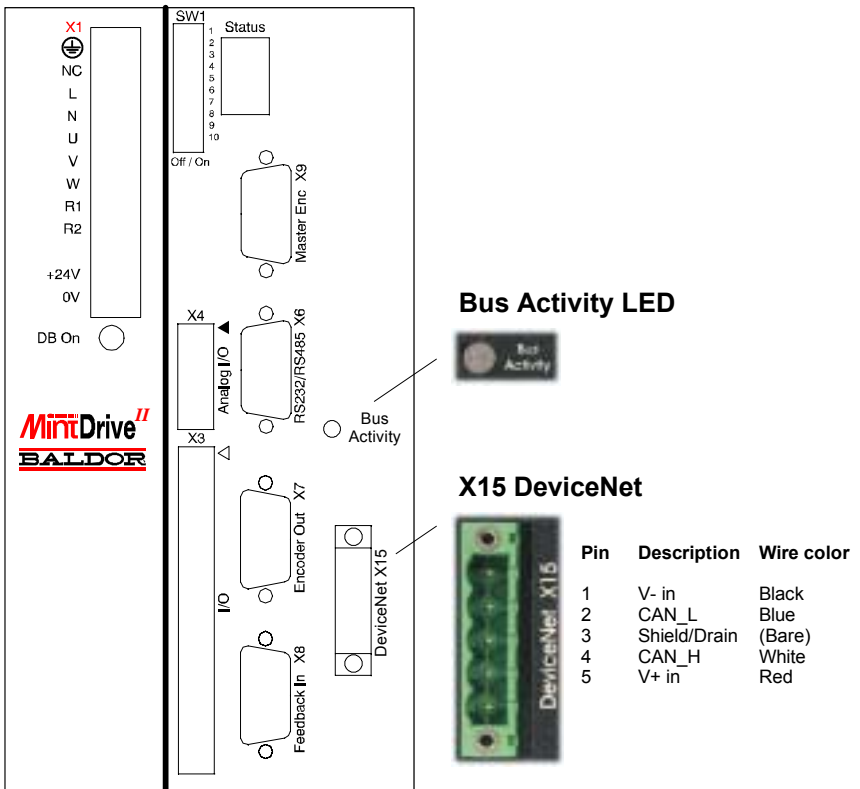
The following units and abbreviations may appear in this manual:

FPGA	Field-Programmable Gate Array
IEEE	Institute of Electrical & Electronic Engineers
LED	Light Emitting Diode
MAC ID	Medium Access Control Identifier (node address)
MintMT	The control language used by Baldor drives
ODVA	Open DeviceNet Vendor Association
PLC	Programmable Logic Controller
UCMM	Unconnected Message Manager
WorkBench v5	The Windows application software for the Baldor drives

### 3.1 Introduction

Connections to the DeviceNet option are made using the 6-pin connector X15. An additional LED is also present on the front panel, labeled Bus Activity. This LED shows various status conditions of the DeviceNet option - see section 3.2.2.

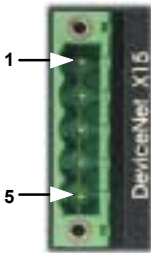
### 3.2 Connector and LED location



**Figure 1 - DeviceNet option connector and LED locations**

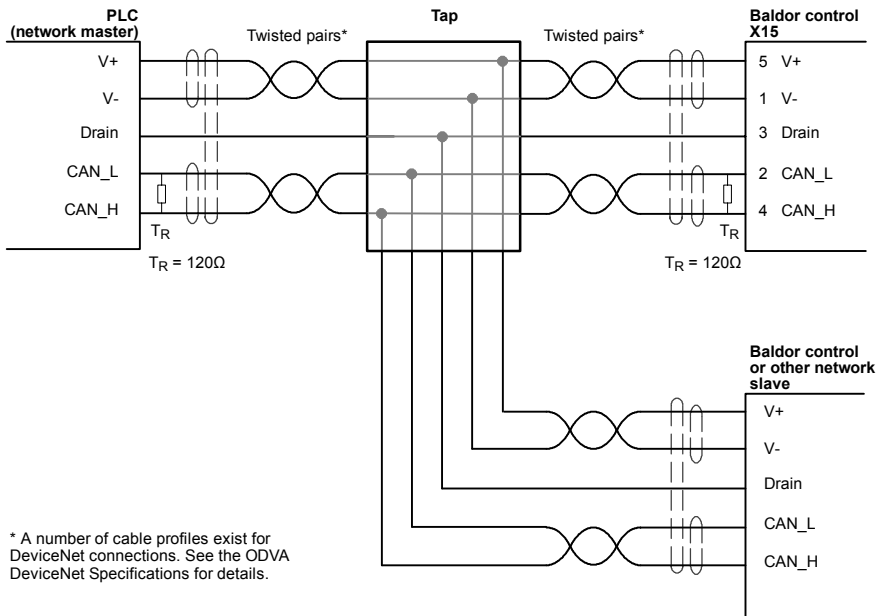
Wire colors conform to the standard cable specifications described in the ODVA DeviceNet Specifications.

### 3.2.1 DeviceNet - X15



<b>Location</b>	Connector X15 Mating connector (supplied): Phoenix COMBICON MSTB 2,5/5-STF-5,08
<b>Name</b>	DeviceNet
<b>Description</b>	Standard "Open" DeviceNet connector (as described in the ODVA DeviceNet Specification, Appendix C).

It is very important that each end of the DeviceNet trunk network is terminated with a  $120\Omega$  termination resistor to match the characteristic impedance of the cable. This resistor must be connected between the CAN\_L and CAN\_H signals. If the drive is connected to the trunk using a tap and dropline, it must not have a terminating resistor fitted. Droplines should be as short as possible, especially if high baud rates are to be used. See the ODVA DeviceNet Specifications for details of suitable dropline lengths at particular baud rates. The DeviceNet bus must provide 24VDC power to the option (pins 1 and 5).



**Figure 2 - Termination resistor locations**

The cable shield should be connected to ground/earth at only one point in the network. Ideally this should be at a power tap near the center of the network. See the *Network Grounding* section of the ODVA DeviceNet Specifications.

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## 3.2.2 Bus activity LED



After the initial power-on (or reset) sequence the LED is used to display the DeviceNet bus status:

LED status	Description
LED off	No DeviceNet master on the bus, the drive is switched off or has lost power.
LED green	The unit is being polled, is on line and operating correctly.
LED green (flashing)	One or more devices are on the DeviceNet bus, but there is no communication with this unit.
LED red	The drive has a communications fault, which could be due to an incorrect baud rate, a duplicated node ID (MAC ID) or a bus-off fault.
LED red (flashing)	Minor fault such as an I/O connection may have timed out.

## 3.2.3 DeviceNet setup

The DeviceNet option can be configured in WorkBench v5, using the Network Wizard. The Network Wizard is displayed automatically as part of the Commissioning Wizard, but it can be selected at any time from the Setup section of the Toolbox.

A number of MintMT keywords beginning with BUS... can also be used to configure and report activity of the DeviceNet option.

The DeviceNet *MAC ID* corresponds to the drive's *node ID*. The node ID of the drive can be set using the SW1 front panel DIP switches, from WorkBench v5, or by using the NODE keyword.

See the MintMT help file and the main installation manual supplied with your drive for further details.



## 4.1 Introduction

The Baldor drive containing the DeviceNet option can only act as a slave device, responding to messages received from the controlling PLC. The following sections describe the format for commands sent by the PLC and the response transmitted by the Baldor drive.

### 4.1.1 Command message format

The format of the command message sent by the controlling PLC is shown in Table 1:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Control byte							
1	Axis / Channel number							
2	Command number, low byte first							
3								
4	Data value, lowest byte first							
5								
6								
7								

**Table 1 - Command message format**

Byte 0 is used to control major drive status conditions, such as enable/disable and stop.

Byte 1 sets the axis or channel number for which the command is destined.

Bytes 2 and 3 contain the command number.

Bytes 4 to 7 contain the actual data values to be sent to the drive as part of the command. Some or all of these bytes might not be used, depending on the command.

For full details of the command message format, see the MintMT help file.

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## 4.1.2 Response message format

Each time the drive is polled by the master, it provides a response message. The frequency at which the information in the response message is updated can be altered to suit the application.

The format of the message transmitted by the Baldor drive is shown in Table 2:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Control byte							
1	Limits and move status							
2	Error code, low byte first							
3								
4	Data value, lowest byte first							
5								
6								
7								

**Table 2 - Response message format**

Byte 0 is used to return major drive status conditions, such as enable/disable and stop.

Byte 1 is used to return information about limit switches and the move status.

Bytes 2 and 3 are used to return error values relating to the last command that was processed.

Bytes 4 to 7 are used to return data, if required by the command.

For full details of the response message format, see the MintMT help file.



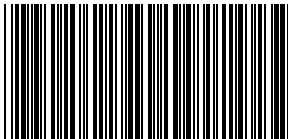
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