BALDOR
MOTION PRODUCTS

PROFIBUS DP Option

for FlexDrive^{II}, Flex+Drive^{II} and MintDrive^{II}

Reference Manual

10/02 **MN1911**

Contents

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 countries and U.S. 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.

Baldor UK Ltd
Mint Motion Centre
6 Bristol Distribution Park
Hawkley Drive
Bristol, BS32 0BF
Telephone: +44 (0) 1454 850000
Fax: +44 (0) 1454 850001
Email: technical.support@baldor.co.uk
Web site: www.baldor.co.uk

Baldor Electric Company
Telephone: +1 479 646 4711
Fax: +1 479 648 5792
Email: sales@baldor.com
Web site: www.baldor.com

Baldor ASR GmbH
Telephone: +49 (0) 89 90508-0
Fax: +49 (0) 89 90508-491

Baldor ASR AG
Telephone: +41 (0) 52 647 4700
Fax: +41 (0) 52 659 2394

Australian Baldor Pty Ltd
Telephone: +61 2 9674 5455
Fax: +61 2 9674 2495

Baldor Electric (F.E.) Pte Ltd
Telephone: +65 744 2572
Fax: +65 747 1708

Baldor Italia S.R.L
Telephone: +39 (0) 11 56 24 440
Fax: +39 (0) 11 56 25 660

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 PROFIBUS DP 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.

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 PROFIBUS DP option

PROFIBUS DP is available as a factory-fitted option (option P) on the FlexDrive^{II}, Flex+Drive^{II} and MintDrive^{II} range of drives.

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

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

The inclusion of the PROFIBUS DP option can be easily identified by the extra 9-pin female D-type connector (X14) 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 P in the last four characters, for example MDH1A05TB-R**P**23, or FDH1A02TB-E**P**23.

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

2.2 Units and abbreviations

The following units and abbreviations may appear in this manual:

LED . . . . . Light Emitting Diode
MintMT . . . . . The control language used by Baldor drives
PLC . . . . . Programmable Logic Controller
WorkBench v5 . . . . The Windows application software for the Baldor drives

3.1 Introduction

Connections to the PROFIBUS DP option are made using the 9-pin female D-type connector X14. An additional LED is also present on the front panel, labeled Bus Activity. This LED shows various status conditions of the PROFIBUS DP option - see section 3.2.2.

3.2 Connector and LED location

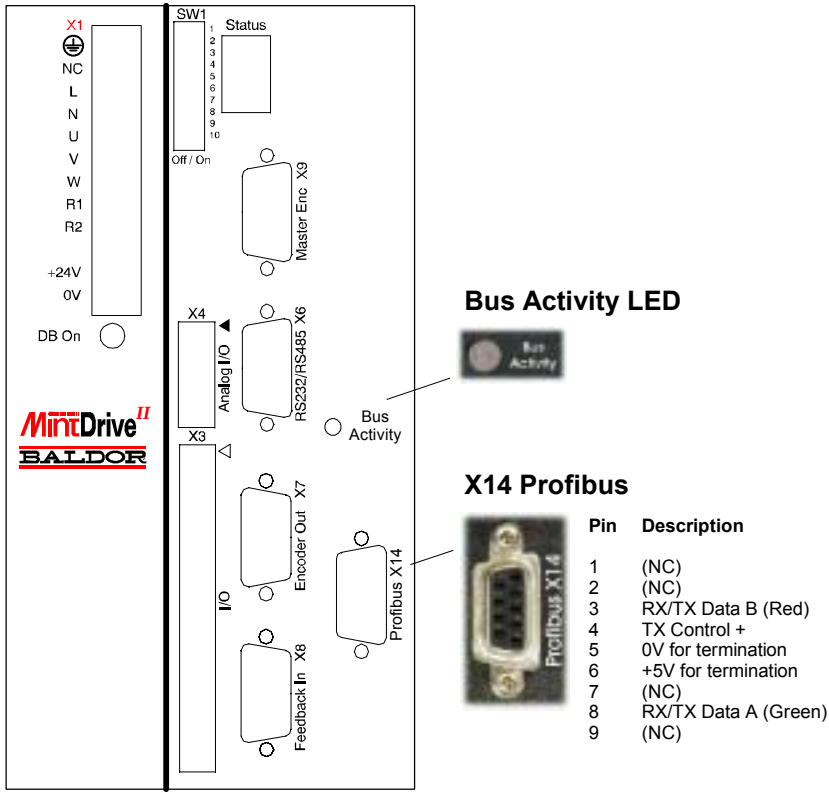
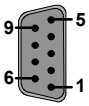


Figure 1 - PROFIBUS DP option connector and LED locations

3.2.1 Profibus - X14

Location	Connector X14 Mating connector (not supplied): 9-pin male D-type PROFIBUS DP node terminating connector
Name	Profibus
Description	Standard female 9-pin D-type connector.



Connections to X14 should always be made using specially constructed PROFIBUS DP node terminating connectors. These typically contain a resistor chain and switch to ensure correct termination is present while the device is attached or removed from the network. Line inductors are often included to maintain correct impedance at high data rates. Standard D-type connectors should not be used. Only cables specified as suitable for PROFIBUS DP should be used. These consist of shielded red/green conductors and have a characteristic impedance of 150Ω.

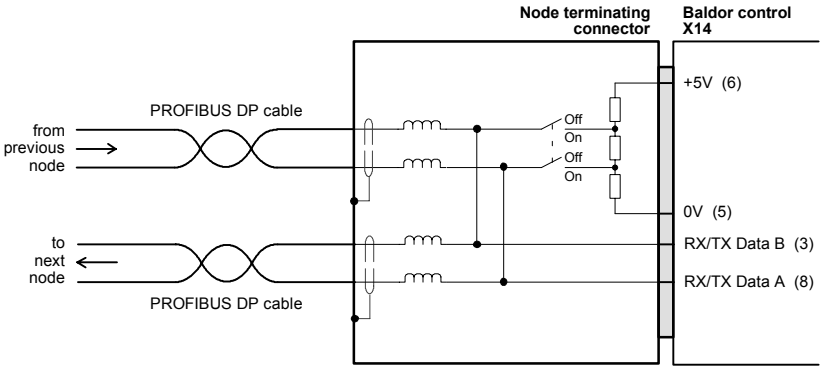


Figure 2 - Connection details

The TX Control+ signal present on pin 4 (not shown) is used when the node is connected to a repeater. The signal indicates when the node is sending data, allowing the repeater to switch mode accordingly. For most applications repeaters are not used, so it does not need to be connected.

3.2.2 Bus activity LED

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

LED status	Description
LED off	The drive is switched off or has lost power.
LED green	The master is present on the bus. The unit is being polled, is on line and is operating correctly.
LED red	The master on the bus is absent or has failed to configure the unit correctly (e.g. by using an unsupported baud rate or telegram format), or the drive is using the same node ID as another slave device on the network. Check that the master is switched on and operating correctly. Confirm that the network is terminated properly. There is often a switch on a PROFIBUS DP node terminating connector which must be switched on to include the drive on the network. Check that the telegram format being sent by the master is correct. Check that the drive's node ID is not being used by another node on the network. The drive's node ID can be determined in WorkBench v5, either by selecting the Network tool or by typing `Print NODE` in the Command window.

3.2.3 PROFIBUS DP setup

The PROFIBUS DP 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 PROFIBUS DP option.

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 PROFIBUS DP option can only act as a slave device, responding to telegrams 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 telegram format

The format of the command telegram 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 (high byte first)							
3								
4	Data value 0 (highest byte first)							
5								
6								
7								
8-11	Optional: Data value 1 (highest byte first)							
12-15	Optional: Data value 2 (highest byte first)							
16-19	Optional: Data value 3 (highest byte first)							
20-23	Optional: Data value 4 (highest byte first)							
24-27	Optional: Data value 5 (highest byte first)							

Table 1 - Command telegram format

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

One byte sets the axis or channel number for which the command is destined.

Two bytes contain the command number.

Four bytes contain the actual data value 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 information about bytes 8-27, see section 4.1.3.

4.1.2 Response telegram format

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

The format of the telegram 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 (high byte first)							
3								
4	Data value 0 (highest byte first)							
5								
6								
7								
8-11	Optional: Data value 1 (highest byte first)							
12-15	Optional: Data value 2 (highest byte first)							
16-19	Optional: Data value 3 (highest byte first)							
20-23	Optional: Data value 4 (highest byte first)							
24-27	Optional: Data value 5 (highest byte first)							

Table 2 - Response telegram format

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

One byte is used to return information about limit switches and the move status.

Two bytes are used to return error values relating to the last command that was processed.

Four bytes are used to return data, if required by the command.

For information about bytes 8-27, see section 4.1.3.

4.1.3 Bytes 8-27

Bytes 8-27 are optional, since the drive is classified as a “modular slave”. This means that the telegrams can be of variable length according to how many additional process data channels are required. Each channel requires 4-bytes, as shown in Tables 1 and 2. These extra bytes can be assigned in the PROFIBUS master (PLC) configuration application.

For full details of the command and response telegram formats, see the MintMT help file.

BALDOR®
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Baldor Electric Company
P.O. Box 2400
Ft. Smith, AR 72902-2400
U.S.A.

Visit www.supportme.net for the latest documentation and software releases.

Australia Australian Baldor PTY Ltd Tel: +61 2 9674 5455 Fax: +61 2 9674 2495	**Mexico** Baldor de Mexico Tel: +52 477 761 2030 Fax: +52 477 761 2010
Europe Baldor ASR GmbH, Germany Tel: +49 (0) 89 905 080 Fax: +49 (0) 89 905 08491	**Singapore** Baldor Electric PTE Ltd Tel: +65 744 2572 Fax: +65 747 1708
Europe (Southern) Baldor ASR AG, Switzerland Tel: +41 52 647 4700 Fax: +41 52 659 2394	**United Kingdom** Baldor UK Ltd Tel: +44 1454 850000 Fax: +44 1454 859001
Japan Baldor Japan Corporation Tel: +81 45 412 4506 Fax: +81 45 412 4507	**U.S.A. (Headquarters)** Baldor Electric Company Tel: +1 479 646 4711 Fax: +1 479 648 5792
For additional office locations visit www.baldor.com	

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